THE *DAUBERT* COUNTERREVOLUTION

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INTRODUCTION

Until approximately thirty years ago, expert witnesses could testify almost without limit regarding any relevant issue within 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. [2] Much of this evolution took place in toxic tort cases, in the context of broader controversy over the efficiency and justice of toxic tort litigation.[3] Particular controversy surrounded mass tort litigation involving the morning sickness drug Bendectin, silicone breast implants, and the herbicide Agent Orange, among other products and substances.[4]

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[1] *See infra* notes __ to __ and accompanying text.

[2] *See infra* notes __ to __ and accompanying text.

[3] In addition to dozens of law review articles, see, e.g., CARL F. CRANOR, REGULATING TOXIC SUBSTANCES: A PHILOSOPHY OF SCIENCE AND THE LAW 147 (1993); CARL F. CRANOR, TOXIC TORTS: SCIENCE, LAW, AND THE POSSIBILITY OF JUSTICE (2006); KENNETH FOSTER & PETER HUBER, JUDGING SCIENCE: SCIENTIFIC KNOWLEDGE AND THE FEDERAL COURTS (1998); PETER HUBER, GALILEO'S REVENGE: JUNK SCIENCE IN THE COURTROOM (1991); KENNETH FOSTER ET AL., EDS., PHANTOM RISK: SCIENTIFIC INFERENCE AND THE LAW (1993); JONATHAN HARR, A CIVIL ACTION (1996); SHEILA JASANOFF, SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA (1997).

[4] For books discussing some of these mass torts and the evidentiary issues they presented, see MARCIA ANGEL, BREAST IMPLANTS ON TRIAL (1996); MICHAEL D. GREEN, BENDECTIN AND BIRTH DEFECTS: THE CHALLENGES OF MASS TOXIC SUBSTANCES LITIGATION (1996); JOSEPH SANDERS, BENDECTIN ON TRIAL: A STUDY OF MASS TORT LITIGATION (1998); PETER H. SCHUCK, AGENT ORANGE ON TRIAL (1986).

Courts ultimately determined that much of this litigation relied on dubious causation theories, which in turn led to precedents restricting expert testimony. This 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*, [6] *General Electric Co. v. Joiner*,[7] and *Kumho Tire 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 allowed experts to testify only when their opinions meet a stringent reliability test. [10]

These profound changes to the traditional laissez-faire law of expert testimony provoked resistance from some federal judges who favored more liberal rules of admissibility. Judges rejected the early precedents favoring stricter review of expert testimony 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,

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[5] *See infra* notes __ to __ 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 __ to __ and accompanying text.

[10] Fed. R. Evid. 702. *See infra* notes __ to __ and accompanying text.

[11] *See infra* notes __ to __ and accompanying text.

[12] *See infra* notes __ to __ and accompanying text.

[13] *See infra* notes __ to __ and accompanying text.

were within the bounds of a reasonable interpretation of the extant law. In particular, *Joiner* could be read as granting district courts broad discretion to determine whether and to what extent *Daubert's* reliability test should be applied to an expert's application of his methodology to the facts at hand. Resistance should have withered away, however, after Federal Rule of Evidence 702 was amended. The language of the rule makes it clear that applying the reliability test to an expert's analysis is mandatory. 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 this rule encapsulated, Rule 702 is stricter than the rules for expert testimony admissibility applied by any federal circuit or state supreme court just ten years before it went into effect. Most federal courts, recognizing their place in the scheme of things,[15] acquiesced to the new regime. There has, however, been an extraordinary undercurrent of rebellion by a minority of federal judges who implicitly object to the radical changes[16] 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 with the text of amended Rule 702

[14] Fed. R. Evid. 702.

[15] *Cf.* Daubert v. Merrell Dow Pharm., 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.").

[16] *See* David L. Faigman, *The* Daubert *Revolution and the Birth of Modernity: Managing Scientific Evidence in the Age of Science*, 46 UC DAVIS L. REV. (forthcoming 2013) (describing these changes as "revolutionary").

but also some or all of the *Daubert* trilogy.[17]

The most prominent example of such judicial obstinance, coming over a decade after Rule 702 was amended, 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. In the process of doing so, the appellate court ignored Rule 702, directly contradicted 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 rather credulously held that relying on the "weight of the evidence" constitutes a reliable scientific methodology. [19]

Not surprisingly, plaintiffs' lawyers have greeted *Milward* ecstatically, 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.[20] Defense lawyers, meanwhile, have

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[17] *See infra* notes __ to __ and accompanying text.

[18] 639 F.3d 11 (1st Cir. 2011). *Milward* has provoked an extraordinary amount of commentary, both favorable and unfavorable. *E.g.*, 3 DAVID FAIGMAN ET AL., *Benzene, Legal Issues—Injury Similarity*, in MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 29:6 (2011–2012 ed.); DAVID KAYE ET AL., THE NEW WIGMORE: EXPERT EVIDENCE § 10.5.1 (sup. 2012); Michael Green, *Introduction: The Third Restatement of Torts in a Crystal Ball*, 37 WM. MITCHELL L. REV. 993, 1010 n.53 (2011) ("One of the most significant toxic tort causation cases in recent memory."); Steven Gold, *The Reshapement 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"); 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, no time stamp), http://www.progressivereform.org/CPRBlog.cfm?idBlog=616EE094D602ED6885FD84E7EB0A212E; William A. Ruskin, Daubert *on the Defense*, TOXIC TORT LITIGATION BLOG (July 26, 2012, no time stamp), http://www.toxictortlitigationblog.com/tags/milward-v-acuity-specialty-pro/. *See infra* notes __ and __ for citations to additional commentary.

[19] *See infra* notes __ to __ and accompanying text.

[20] 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.

been aghast.[21] The Supreme Court refused to review *Milward*,[22] so it remains good law in the First Circuit, not just allowing but 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.[23]

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 counter-revolutionary judges to stop or roll back the changes, even when the changes were codified into Rule 702. 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. However, 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

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[21] *E.g.*, Julie A. Brennan, Milward v. Acuity Specialty Products: *The "Weight of the Evidence" Necessitates Supreme Court Review of First Circuit's Decision*, March 8, 2012, http://dritoday.org/feature.aspx?id=295; Eric Lasker, *Manning the* Daubert *Gate: A Defense Primer in Response to* Milward v. Acuity Specialty Products, 79 DEF. COUNSEL J. 128 (2012); Nathan A. Schachtman, Milward—*Unhinging the Courthouse Door to Dubious Scientific Evidence*, SCHACHTMAN LAW, (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*, Sept. 11, 2012, http://dritoday.org/feature.aspx?id=420; Apryl Underwood, *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.

[22] Milward v. Acuity Specialty Products Group, Inc., 639 F.3d 11 (1st Cir.2011), *cert. denied*, 132 S.Ct. 1002 (2012).

[23] Indeed, it already has. *See* Kuhn v. Wyeth, Inc., 686 F.3d 618, 625 (8th Cir. 2012) (quoting *Milward* for the proposition that "trial courts are not empowered to determine which of several competing scientific theories has the best provenance"); *In re* Chantix (Varenicline) Prods. Liab. Litig., 2012 WL 3871562 at *22 (N.D. Ala. Aug. 21, 2012) (relying on *Milward* in asserting that any testimony on which reasonable scientists can disagree is admissible).

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 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 allows. They do so by ignoring the language of Rule 702, and instead 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 theme tying the history of, 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 that favor more liberal rules for admissibility believe that the rules are meant to address only the problem "junk science"—scientific testimony that not only falls outside the scientific mainstream, but does so in the face of well-accepted contrary evidence.[24]

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. In short, parties to litigation have a natural inclination to choose experts

[24] *See* General Electric Co. v. Joiner, 522 U.S. 136, 161 (1997) (Stevens, J., dissenting) (arguing that expert testimony was admissible because it wasn't "junk science").

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. [25]

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 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.[26] The only significant limitation was that the expert's testimony had to be "beyond the ken of the jury."[27]

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[25] General Electric Co. v. Joiner, 522 U.S. 136, 143 (1997).

[26] *See* DAVID H. KAYE, ET AL., THE NEW WIGMORE: EXPERT EVIDENCE § 2.1 (2d ed. 2010) (describing the traditional rules for the admissibility of expert testimony). The main exception was that "many jurisdictions applied the general acceptance test of *Frye v. United States* to limited categories of expert testimony, mostly in criminal cases." *Id.*; *see also* David E. Bernstein, *Frye, Frye Again: The Past, Present, and Future of the General Acceptance Test*, 41 JURIMETRICS J. 385, 394-395 (2001) (noting that the civil cases applying *Frye* were limited largely to paternity tests and techniques more often used in criminal investigations).

[27] KAYE, ET AL., *supra* note __, § 2.21.

Even this restriction on expert testimony gradually withered. Many courts ruled that any potentially helpful expert testimony was admissible.[28] Any flaws in an expert's testimony were issues of weight, not admissibility. To the extent there were problems with the expert's methodology or reasoning, the only recourse for opposing counsel was to try to alert the trier of fact to these problems at trial.[29]

These very liberal admissibility rules coexisted with deep suspicion of expert testimony. [30] Critics charged that the incentive structure facing litigants and the experts themselves made the prevalence of biased, one-sided expert testimony inevitable.[31] The essential problem critics identified is that attorneys seeking expert witnesses are not interested in pursuing expertise wherever it leads, but instead search for an expert willing to support the litigants' position.[32] Expert testimony in the United States is therefore subject to massive adversarial bias—bias that arises because experts are hired

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[28] *Id*. §2.2.2.

[29] *Id*.

[30] *Id*. § 2.1.

[31] *See, e.g.*, Samuel R. Gross, *Expert Evidence*, 1991 WISC. L.J. 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.").

[32] KAYE, ET AL., *supra* note at __ ("Perhaps the most frequent criticism of experts was that they too often became partisans, the hired mouthpiece for a party's point of view instead of the objective spokesman for scientific truth."). For examples, see Lucillus A. Emery, *Medical Expert Evidence*, 39 AM. L. REV. 481, 489 (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 money."). As Susan Haack puts it, attorneys are not interested in inquiry, but in advocacy. Susan Haack, *What's Wrong with Litigation-Driven Science? An Essay in Legal Epistemology*, 38 SETON HALL L. REV. 1053, 1070 (2008).

to advance the cause of one party to an adversarial proceeding.[33]

Critics identified three distinct types of adversarial bias: conscious bias, which occurs an expert deliberately tailors evidence to support a client; unconscious bias, which occurs when the expert does not intentionally mislead the court, but is influenced by psychological attachment to his "side"; and selection bias, which results from litigants choosing as their expert witnesses persons whose views are known to support the litigants' position.[34] So in some cases attorneys would deploy "hired guns";[35] in others, especially in the forensic context, they would find "team players;"[36] and, perhaps most frequently, they would simply choose from the supply of available and honest experts those who had sincere views on the issue at hand that happened to coincide with a client's position.

Many reformers, most famously including Learned Hand, argued that the appropriate remedy to adversarial bias (combined with inexpert juries) was increased reliance on

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[33] *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).

[34] *Id*.; These forms of bias have been recognized since at least Abinger v. Ashton, 17 Eq. 358, 373-375 (Ch. 1873), 1873 WL 14842.

[35] L. Timothy Perrin, *Expert Witness Testimony: Back to the Future*, 29 U. RICH. L. REV. 1389 (1995); *see also* Olympia Equip. Leasing Co. v. Western Union Telegraph Co., 797 F.2d 370, 382 (7th Cir. 1986) (reiterating that all too often, "experts" are "'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.'"'); E.I. du Pont de Nemours and Co., Inc. 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 GOODE, ET AL., GUIDE TO THE TEXAS RULES OF EVIDENCE: CIVIL AND CRIMINAL § 802.2, at 17 (Texas Practice, 2d ed. 1993)); Dan L. Burk, *When Scientists Act Like Lawyers: The Problem of Adversary Science*, 33 JURIMETRICS J. 363, 368-370 (1993) (discussing the causes of "adversary science" in the courts).

[36] *E.g*., DAVID H. KAYE, THE DOUBLE HELIX AND THE LAW OF EVIDENCE 68 (2010); Gross, *supra* note _, 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 EUROPEAN J. L. & ECON. 255 (2005); Peter J. Neufield, *The (Near) Irrelevance of* Daubert *to Criminal Justice and Some Suggestions for Reform*, 95 AM. J. PUB. HEALTH 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 (2002).

court-appointed, nonpartisan experts.[37] Hand wrote, "[H]ow can the jury judge between two statements each 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."[38] But despite recurring suggestions[39] that the American legal system limit or even end the partisan control of parties to litigation,[40] court-appointed experts were and remain rare.[41]

For decades, the American legal system soldiered on with adversarial experts and liberal admissibility rules. The system was shaken out of its complacency by the

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[37] Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40 (1901); *see also* Clemens Herschel, *Services of Experts in the Conduct of Judicial Inquiries*, 21 AM. L. REV. 571, 572 (1887); G.A. Endlich, *Proposed Changes in the Law of Expert Testimony*, 32 AM. L. REV. 851, 853-54 (1898); Emory Washburn, *Testimony of Experts*, 1 AM. L. REV. 45, 61-62 (1866); Lucilius A. Emery, *Medical Expert Evidence*, 39 AM. L. REV. 481, 492-93 (1905).

[38] Hand, supra note __, at 54-55. 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) ("if 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?").

[39] For numerous examples, see Edward K. Cheng, *Same Old, Same Old: Scientific Evidence Past and Present*, 104 MICH. L. REV. 1387 (2006). *See generally* KAYE ET AL., *supra* note __, § 11.1, at 475 ("From 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.); Gross, *supra* note __, at 1188-1189 (describing the use of non-partisan experts as "the most frequently suggested reform")

[40] Recent sources favoring court-appointed experts, at least in some contexts, include Sofia Adrogue & Alan Ratliff, *The Independent Expert Evolution: From the "Path of Least Resistance" to the "Road Less Traveled?"* 34 TEX. TECH. L. REV. 843 (2003); David E. Bernstein, *The Breast Implant Fiasco*, 87 CALIF. L. REV. 457 (1999); John Shepard Wiley, Jr., *Taming Patent: Six Steps for Surviving Scary Patent Cases*, 50 UCLA L. REV. 1413 (2003); 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 (2005); 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 PSYCH. PUB. POL. AND L. 154 (2002).

[41] KAYE ET AL., *supra* note __, §11.1, at 478 ("by all accounts judges exercise these powers infrequently"); Michael Saks, *Court-Appointed Experts: Defining the Role of Experts Appointed Under Federal Rule of Evidence 706*, 35 JURIMETRICS J. 233, 234 (1995) (explaining that 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").

increased use of scientific evidence in criminal cases starting in the early 1970s.[42] 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.[43] Some federal courts, either thinking themselves constrained by the Federal Rules of Evidence to eschew *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.[44]

Even more momentous, in the late 1970s plaintiffs began bringing "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,[45] claiming that the morning sickness drug Bendectin caused birth defects,[46] and arguing that cancer and other harms were caused by the defoliant Agent Orange when it was used during

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[42] *See* David L. Faigman, *The* Daubert *Revolution and the Birth of Modernity: Managing Scientific Evidence in the Age of Science*, 46 UC DAVIS L. REV. (forthcoming 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).

[43] *Id*.

[44] *E.g.*, United States v. Downing, 753 F.2d 1224 (3d Cir. 1985); United States v. Williams, 583 F.2d 1194 (2d Cir. 1978).

[45] *E.g.*, *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).

[46] For overviews, see GREEN, *supra note* __; SANDERS, *supra note* __. 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 (2006).

the Vietnam War.[47] 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.

Some 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*, was the 1984 D.C. Circuit case of *Ferebee v. Chevron*.[48] *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

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[47] *See* SCHUCK, *supra* note __; 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).

[48] 736 F.2d 1529 (D.C. Cir. 1984); *accord C*ity of Greenville v. W.R. Grace & Co., 827 F.2d 975 (4th Cir. 1987); Wells v. Ortho Pharmaceutical Corp., 788 F.2d 741 (11th Cir. 1986); Bandura v. Orkin Exterminating Co., 664 F. Supp. 1218, 1219 (N.D. Ill. 1987), *aff'd*, 865 F.2d 816 (7th Cir. 1988). *See generally* Burke v. Dow Chemical Co., 797 F. Supp. 1128, 1138 (E.D.N.Y. 1992) (describing *Ferebee* as "a leading case"); Alaini 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, e.g.*, Nonnon v. City of New York, 819 N.Y.S.2d 705, 715 (N.Y. App. Div. 2006) (refusing to apply *Frye* 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).

"tissue samples, standard tests, and patient examination" to support his causation testimony.[49]

The *Ferebee* court held that this testimony was admissible, because the "basic methodology" used by the expert was "sound."[50] 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's underlying motive for adopting a forgiving test was revealed elsewhere in the opinion. The court wrote, "products 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. . . . the fact that . . . science would require more evidence before conclusively considering the causation question resolved is irrelevant."[51] The court added that the fact that this "case may have been the first of its exact type, or that his 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."[52] "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

[49] *Ferebee*, 736 F.2d at 1536.

[50] *Id.*

[51] *Id*.

[52] *Id*. at 1534.

such a link exists, it is for the jury to decide whether to credit such testimony."[53]

The problem 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, selection bias—this assumption is wrong. [54] A toxic tort plaintiff with even marginally suggestive evidence of general causation is going to have no trouble finding qualified experts from among tens of thousands of least minimally qualified American physicians, toxicologists, etc., who are willing to testify that specific causation should be extrapolated from such evidence.

The admission of the underlying testimony at issue *Ferebee* may not have been especially problematic given the underlying facts of the case; the plaintiff may very well have had reliable expert testimony, even though the D.C. Circuit didn't explain why that was so and seemed to suggest he didn't need it.[55] Regardless, *Ferebee's* forgiving rhetoric became a rallying cry for courts inclined to admit extremely dubious expert testimony in a variety of toxic tort contexts.[56] 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.[57]

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[53] *Id*.

[54] *See* Bernstein, *supra* note __; 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.").

[55] Nathan Schachtman, *Ferebee Revisited*, SCHACHTMAN LAW (Nov. 8th, 2012, 2:27 pm), http://schachtmanlaw.com/ferebee-revisited/.

[56] *See* Alaini 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).

[57] *See*. FOSTER ET AL., *supra* note__ (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);

For example, there were several multi-million verdicts against defendants based on the thoroughly discredited theories of a group of medical charlatans who called themselves "clinical ecologists."[58] 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.[59] 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.[60]

Such verdicts led to withering criticism from within and without the legal community.[61] Editorialists in science journals and newspapers like the *New York Times* called for stricter controls on expert testimony.[62] 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.[63] Put another

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PETER W. HUBER, GALILEO'S REVENGE: JUNK SCIENCE IN THE COURTROOM (1991) (providing accounts of many of these cases); HANS ZEISEL & DAVID KAYE, PROVE IT WITH FIGURES: EMPIRICAL METHODS IN LAW AND LITIGATION 45-68 (1997) (discussing some of these cases).

[58] *E.g.*, Elam v. Alcolac, 765 S.W.2d 42 (Mo. Ct. App. 1988) (compensatory and punitive damages totaling $49 million). For harsh criticism of *Elam*, see Richard S. Cornfield & Stuart F. Schlossman, *Immunologic Laboratory Tests: A Critique of the* Alcolac *Decision*, in FOSTER ET AL., *supra* note __, at 401.

[59] Wells v. Ortho Pharmaceutical Corp., 788 F.2d 741 (11th Cir. 1986).

[60] Oxendine v. Merrell Dow Pharmaceuticals, 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.").

[61] For an example of criticism from the medical profession, see Board of Trustees of the American Medical Association, Report A-88, *Impact of Product Liability on the Development of New Medical Technologies (Resolution 6, A-87)* (1988).

[62] James L. Mills & Duane Alexander, *Occasional Notes: Teratogens and "Litogens"*, 325 NEW ENG. J. MED. 1234 (1986); *Federal Judges vs. Science*, N.Y. TIMES, Dec. 27, 1986, § 1, at 22.

[63] *See* Ealy v. Richardson-Merrell, Inc., 897 F.2d 1159 (D.C. Cir. 1990); Brock v. Merrell Dow

way, courts held that a party may present unreliable scientific evidence to the jury if the issue was on the "frontier of current medical and epidemiological inquiry," and the expert was relying on a methodology used in the mainstream scientific community.[64]

This still meant that in many toxic tort cases plaintiffs could rely on causation evidence that was at best highly speculative. The D.C. Circuit, for example, held that animal studies and chemical structure analyses 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.[65]

Meanwhile, verdicts for plaintiffs based on questionable causation theories continued to pile up, leading to an increasing volume of criticism through the early 1990s.[66] The

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Pharmaceuticals, Inc., 874 F.2d 307, 311, modified, 884 F.2d 166 (5th Cir. 1989); Richardson v. Richardson-Merrell, Inc., 857 F.2d 823, 831 (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 David E. Bernstein, *Learning the Wrong Lessons from "An American Tragedy": A Critique of the Berger-Twerski Informed Choice* Proposal, 104 U. MICH. L. REV. 1961 (2006) (reviewing the Bendectin litigation), and eventually in the breast implant litigation, see David E. Bernstein, *The Breast Implant Fiasco*, 87 CAL. L. REV. 457 (1999).

[64] Richardson v. Richardson-Merrell, Inc., 857 F.2d 823 (D.C. Cir. 1988) (reaffirming *Ferebee*, but limiting it to expert testimony regarding issues on the frontier of scientific inquiry); Christophersen v. Allied-Signal Corp., 902 F.2d 362 (5th Cir. 1990); *In re* Benedectin Prod. Liab. Litig., 732 F. Supp. 744 (E.D. Mich. 1990); Bandura v. Orkin Exterminating Co., 664 F. Supp. 1218, 1219 (N.D. Ill. 1987), aff'd, 865 F.2d 816 (7th Cir. 1988); Rubanick v. Witco Chem. Corp., 576 A.2d 4 (N.J. App. Div. 1990).

[65] Ambrosini v. Labarraque, 966 F.2d 1464, 1469 (D.C. Cir. 1992).

[66] A key, but hardly the only, factor, was the attention the issue received due to publication of *Peter Huber, Galileo's Revenge: Junk Science in the Courtroom* (1990); *see also* BOARD OF TRUSTEES OF THE AMERICAN MEDICAL ASSOCIATION, REPORT A-88, IMPACT OF PRODUCT LIABILITY ON THE DEVELOPMENT OF NEW MEDICAL TECHNOLOGIES (Resolution 6, A-87) 9 (1988); Bert Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 SCI. 1508 (1988); Blake Fleetwood, *From the People Who Brought You the Twinkie Defense*, WASH. MONTHLY, June 1987, at 33; Eliot Marshall, *Immune System Theories on Trial*, 234 SCI. 1490 (1986); Eliot Marshall, *Science in Court*, 243 SCI. 1658 (1989); Walter Olson, *The Case Against Expert Witnesses*, FORTUNE, Sept. 25, 1989, at 134. For criticism in the legal academic literature, see, e.g., Bert Black, *A Unified Theory of Scientific Evidence*, 56 FORDHAM L. REV. 595 (1988); Ronald 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);

problem, according to critics, was not simply experts testifying 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.[67] Due to selection bias, there was (and is) no shortage of sincere, well-qualified expert witn3sses "who … confuse hypothesis with confirmed fact, and testify ... to the actual existence of causal relations or substantially enhanced risks on weak or no evidence."[68]

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 adopted the reliability test pioneered in the toxic tort context by the *Agent Orange* opinion.[69] 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 factfinder."[70]

Proposals for a Model Rule on the Admissibility of Scientific Evidence, 115 F.R.D. 79, 84-145 (1987); Paul Rothstein, *When Should the Judge Keep Expert Testimony from the Jury?*, 1 INSIDE LITIG., Apr. 1987, at 19; 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* Frye*ing Pan and into the Fire: The Expert Witness Problem in Toxic Tort Litigation*, 10 REV. LITIG. 117, 138 (1990).

[67] *See, e.g.*, FOSTER ET AL., *supra* note __, at 433 (contending that courts must assess "the relevance of data to health and the reliability of scientific inferences").

[68] D. Michael Risinger, *Preliminary Thoughts on a Functional Taxonomy of Expertise for the Post-Kumho World*, in MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY sec 2:15, 144 (David L. Faigman et al. eds., 2d ed. 2005).

[69] *E.g.*, Lynch v. Merrell-National Laboratories, 830 F.2d 1190 (1st Cir. 1987); Viterbo v. Dow Chem. Co., 826 F.2d 420 (5th Cir. 1987).

[70] COMM. ON RULES OF PRACTICE AND PROCEDURE OF THE JUDICIAL CONFERENCE OF THE UNITED STATES, PRELIMINARY DRAFT OF PROPOSED AMENDMENTS TO THE FEDERAL RULES OF CIVIL PROCEDURE AND FEDERAL RULES OF EVIDENCE 83 (1991). The Judicial Conference Advisory

Early incarnations of the reliability test, however, did not prove a consistent barrier to junk science.[71] A few courts instead applied the *Frye* general acceptance test, which had previously been largely limited to forensic science evidence in criminal cases,[72] to toxic tort evidence. Specifically, the Fifth, Sixth, and Ninth Circuits all used the general acceptance test to exclude controversial evidence in torts cases involving exposure to chemicals and pharmaceutical products.[73]

There things stood in the early 1990s, while all sides of the controversy waited for the Supreme Court to weigh in.[74] While the let-it-all in approach[75] was clearly dying out, significant controversy remained as to both the underlying problem and the

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Committee eventually took no action, and instead referred the issue to the new Advisory Committee on the Federal Rules of Evidence. SUMMARY OF THE REPORT OF THE COMMITTEE ON RULES OF PRACTICE AND PROCEDURE 11-12 (1992).

[71] *E.g.*, DeLuca v. Merrell Dow Pharmaceuticals, 911 F.2d 941 (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); s*ee* Susan Poulter, *Science and Toxic Torts: Is There a Rational Solution to the Problem of Causation?*, 7 HIGH TECH. L.J. 189, 204 (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").

[72] 1 DAVID W. LOUISELL & CHRISTOPHER B. MUELLER, FEDERAL EVIDENCE § 105, 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.").

[73] Christophersen v. Allied-Signal Corp., 939 F.2d 1106 (5th Cir. 1991); Daubert v. Merrell Dow Pharmaceuticals, Inc., 951 F.2d 1128 (9th Cir. 1991), *vacated*, 509 U.S. 579 (1993); Sterling v. Velsicol, 855 F.2d 1188, 1208 (6th Cir. 1988). *Sterling* didn't cite *Frye*, but did apply the general acceptance test.

[74] The Court had repeatedly declined to address the issue. *E.g.*, Ealy v. Richardson-Merrell, Inc., 897 F.2d 1159 (D.C. Cir.), *cert. denied*, 498 U.S. 950 (1990); Richardson v. Richardson-Merrell, Inc., 857 F.2d 823 (D.C. Cir. 1988), *cert. denied*, 493 U.S. 883 (1989); Ferebee v. Chevron Chem. Co., 736 F.2d 1529 (D.C. Cir.), *cert. denied*, 469 U.S. 1062 (1984); Christophersen v. Allied-Signal Corp., 902 F.2d 362 (5th Cir. 1990), *rev'd*, 939 F.2d 1106 (5th Cir. 1991) (en banc), *cert. denied*, 503 U.S. 912 (1992); Brock v. Merrell Dow Pharms., Inc., 874 F.2d 307, *modified*, 884 F.2d 166 (5th Cir. 1989), *cert. denied*, 494 U.S. 1046 (1990).

[75] *See 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).

underlying solution. On one side were courts and commentators that believed that the essential problem was obvious quackery—situations in which experts were either relying on discredited methodologies like clinical ecology or, as in the context of Bendectin litigation, where they were presenting causation theories that conflicted with a great deal of sound contrary evidence published in reputable scientific journals. For such courts, more vigorous scrutiny of expert testimony would involve only moderate tinkering with the previous regime. 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. Moreover, while such courts were willing to give somewhat closer scrutiny to expert evidence in toxic tort cases, they assumed that rules for the admissibility of expert testimony in other contexts where controversy had been much more muted would basically stay constant.

For other courts and commentators, the problem was far broader. The essential problem was not "junk science" 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 objective evidence such as peer-reviewed, published studies.[76] 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.[77] Moreover, these courts

[76] *E.g.*, HUBER, *supra* note __, 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.").

[77] *See, e.g.*, FOSTER ET AL., *supra* note __, at 433; Bert Black, *A Unified Theory of Scientific Evidence*, 56 FORDHAM L. REV. 595, 599 (1988) (contending that courts should consider "the validity of the reasoning leading to a conclusion").

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.[78]

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*[79] 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 thought a more stringent approach that broadly tackled the problem of adversarial bias was needed.

Supporters of more lenient rules for admissibility pointed to language in *Daubert* noting the "the liberal thrust of the Federal Rules [of Evidence] and their general approach of relaxing the traditional barriers to opinion testimony,"[80] and emphasizing

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[78] *Galileo's Revenge*, for example, dealt not only with toxic tort cases, but with medical evidence and engineering quackspertise. HUBER, *supra* note __; *see also* 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.").

[79] 509 U.S. 579 (1993).

[80] *Id*. at 588.

the "flexible" nature of the inquiry trial courts must engage in. [81] The Court expressed optimism about the capabilities of the adversarial process and of the jury, and spoke of "shaky but admissible" evidence. [82] Finally, the Court emphasized that the admissibility inquiry must be focused "solely on principles and methodology, not on the conclusions that they generate." [83] 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") could be considered reliable, regardless of how carefully or competently the expert utilized that methodology in the case at hand.[84]

On the other hand, *Daubert* insisted that trial court judges play "a gatekeeping role"[85] to "ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." [86] 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.[87] 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

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[81] *Id*. at 593.

[82] *Id*. at 596.

[83] *Id*. at 595.

[84] *See* Kenneth J. Chesebro, *Taking* Daubert's *"Focus" Seriously: The Methodology/Conclusion Distinction*, 15 CARDOZO L. REV. 1745, 1748-49 (1994), and Michael H. Gottesman, *Admissibility of Expert Testimony after* Daubert: *The "Prestige" Factor*, 43 EMORY L.J. 867, 869-72 (1994) (both arguing that under Daubert, courts may only assess experts' general methodology).

[85] *Daubert*, 509 U.S. at 597.

[86] *Id*. at 589.

[87] *Id*. at 593-94.

and whether that reasoning or methodology properly can be applied to the facts in issue."[88] "Rule 702's 'helpfulness' standard," the Court added, "requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility."[89]

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.[90]

News reports of the decision reflected differing perspective of just what the Court had done.[91] Commentators were similarly divided. The Author of this Article believed that *Daubert* required what on average would amount to significantly increased judicial scrutiny of expert testimony to ensure reliability.[92] The Court's more forgiving

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[88] *Id*. at 592-93.

[89] *Id*. at 592.

[90] *Id.* at 590 n.8. For commentary on this omission, see Edward 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).

[91] The *New York Times* reported that "the 7-2 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. Paul M. Barrett, *Justices Rule against Business in Evidence Case*, Wall St. J., June 29, 1993, at 3A; s*ee also* Margaret A. Berger, *Supreme Court Deals Blow to Venerable* 'Frye' *Standard*, N.Y.L.J., July 19, 1993 ("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 (quoting the attorneys' reactions).

[92] David E. Bernstein, *The Admissibility of Scientific Evidence After Daubert v. Merrell Dow*

remarks seemed aimed primarily at mythical version of *Frye*, understood as an "austere" rule that made it extremely difficult to present expert testimony. [93] In fact, courts rarely if ever applied *Frye* in a harsh, unforgiving way.[94] Moreover, they usually applied *Frye* only to very narrow categories of evidence. The Court's criticisms of *Frye* were therefore not especially apposite.[95] What was important, however, was the Court's focus on the reliability of expert testimony, its suggestion of several pertinent and reasonably strict criteria for determining reliability, and, in contrast to the traditional very narrow scope of *Frye*, the Court's insistence that the new standard applied to all scientific evidence.[96]

Nevertheless, as noted, not everyone agreed, and *Daubert* became something of a Rohrsach 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

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Pharmaceuticals, 15 CARDOZO L. REV. 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.").

[93] *Daubert*, 509 U.S. at 589.

[94] KAYE ET AL., *supra* note __, § 9.2.1, at 408 ("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.").

[95] As Michael Green notes, "[t]o 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).

[96] *Daubert*, 509 U.S. 579, 592 n.11 (1993) ("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.").

applied *Ferebee* three years after *Daubert*. The court held that highly speculative expert testimony that Depo Provera caused the plaintiff's birth defects was admissible because there "there is no 'overwhelming body of contradictory epidemiological evidence' to [the expert's] conclusion."[97]

Consider as well the post-Daubert Ninth Circuit case of *Hopkins v. Dow Corning*.[98] *Hopkins* involved a claim that silicone breast implants cause a woman's immune system disease, a causation case that had no reliable scientific evidence behind it, and eventually became discredited as contrary evidence accumulated.[99] *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.[100] 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

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[97] Ambrosini v. Labarraque, 101 F.3d 129, 138-39 (D.C. Cir. 1996) (citing and applying *Ferebee*); *see also* Michael D. Green, *Relief at the Frying of* Frye: *Reflections on* Daubert v. Merrell Dow Pharmaceuticals, 1 SHEPARD'S EXPERT & SCI. EVIDENCE Q. 43, 47-48 (1993) (suggesting that *Daubert* adopted *Ferebee*-like standards in cases on the frontier of medical science). *See generally* McCullock v. H.B. Fuller Co., 61 F.3d 1038, 1043 (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").

[98] 33 F.3d 1116 (9th Cir.1994)

[99] Bernstein, Breast Implant Fiasco, *supra* note __.

[100] *Id.*

scientifically valid.'"[101]

In general, however, because of the attention that *Daubert's* "gatekeeper" requirement received, and because the Court suggested several relatively stringent criteria for scrutinizing expert testimony, the trend was toward stricter scrutiny of expert testimony. [102] Many courts adopted an exacting interpretation of *Daubert*, sometimes specifically referencing the problems attendant to adversarial bias.[103] Despite *Hopkins*, two Ninth Circuit opinions rejected the "methodologies/conclusions" distinction,[104] and on remand from *Daubert* itself the court issued an opinion widely seen as adopting a strict interpretation of the Supreme Court's ruling.[105]

For several years, the Supreme Court was content to allow the debate over the proper interpretation of *Daubert* to simmer in the lower courts. The court was moved to intervene, however, because two circuits engaged in open revolt against the idea that courts should 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

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[101] *Hopkins*, 33 F.3d at 1121. 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*.

[102] MOLLY TREADWAY JOHNSON ET AL., FED. JUDICIAL CTR., EXPERT TESTIMONY IN FEDERAL CIVIL TRIALS: A PRELIMINARY ANALYSIS 1 (2000) (finding that *Daubert* significantly increased judges' willingness to serve as "gatekeepers").

[103] *E.g.*, Braun v. Lorillard Inc., 84 F.3d 230, 235 (7th Cir. 1996).

[104] Lust v. Merrell Dow Pharmaceuticals, 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 Northern R.R. Co., 29 F.3d 499, 500 (9th Cir. 1994) (emphasizing that a district court is "both authorized and obligated to scrutinize carefully the reasoning and methodology" underlying the expert's proffered testimony).

[105] Daubert v. Merrell Dow Pharmaceuticals, 43 F.3d 1311 (9th Cir. 1995).

admissibility of expert testimony in toxic tort cases,[106] announced that henceforth it would provide a "hard look," i.e., "more stringent review" of district court rulings excluding plaintiffs' causation evidence.[107] 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."[108]

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 whether the ruling excluded plaintiffs' evidence or defendants'. Moreover, the court never applied any sort of reliability test to the evidence at hand.

One circuit is an outlier, but two constituted a trend that provoked Supreme Court intervention. 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."[109] *Joiner* involved an electrician, Robert Joiner, who

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[106] *See, e.g.*, *In re* Paoli R.R. Yard PCB Litig., 916 F.2d 829 (3d Cir. 1990); DeLuca v. Merrell Dow Pharmaceuticals, 911 F.2d 941 (3d Cir. 1990); Linkstrom v. Golden T. Farms, 883 F.2d 269 (3d Cir. 1989). *See generally* Bernstein, Fryeing Pan, *supra* note __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).

[107] *In re* Paoli R.R. Yard PCB Litig., 35 F.3d 717, 763-64 (3d Cir. 1994).

[108] *Id*. at 764.

[109] 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).

developed small cell lung cancer after being exposed to PCBs at his workplace. He sued several manufacturers of PCBs, relying on expert testimony regarding causation that was based on extrapolating from animal studies epidemiological studies. The district court found that the studies on which the plaintiffs' experts relied did not 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."[110]

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 district court exclusion of plaintiffs' evidence in toxic tort cases.[111] 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.[112]

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 experts' 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

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[110] *Id*. at 533.

[111] General Electric Co. v. Joiner, 522 U.S. 136, 143 (1997).

[112] *Id.*

nothing in "*Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the ipse dixit of the expert."[113] Instead, courts were free to conclude that "there is simply too great an analytical gap between the data and the opinion proffered."[114] The Court then carefully reviewed the plaintiff's causation testimony, found it wanting, and upheld the district court's exclusion of the evidence. [115]

The Court's ruling in *Joiner* sent a powerful signal to lower federal courts that the era of speculative expert testimony on causation was over.[116] The Supreme Court had bluntly rejected the let-it-all in approach in *Daubert*. Now, in *Joiner*, it also rejected

[113] *Id.* at 146.

[114] *Id*.

[115] 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 PCBs was far less than the exposure in the animal studies. The PCBs 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 and 500 parts per million. The cancer that these mice developed was alveologenic adenomas; Joiner had developed small cell carcinomas. No study demonstrated that adult mice developed cancer after being exposed to PCBs. One of the experts admitted that no study had demonstrated that PCBs lead to cancer in any other species. *Id.* at 144.

[116] *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 scrutiny" lower court opinion in *Joiner*, issued a much stricter ruling in Allison v. McGhan Med. 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.*, Glastetter v. Novartis Pharms. Corp., 107 F. Supp. 2d 1015 (E.D. Mo. 2000); Hollander v. Sandoz Pharms. Corp., 95 F. Supp. 2d 1230, 1235-38 (W.D. Okla. 2000); Brumbaugh v. Sandoz Pharm. Corp., 77 F. Supp. 2d 1153, 1157 (D. Mont. 1999); *In re* Breast Implant Litig., 11 F. Supp. 2d 1217, 1228 (D. Colo. 1998) ("To the extent 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. General Elec. Co., 120 F.3d 991, 996-97 (9th Cir. 1997); Brumbaugh v. Sandoz Pharm. Corp., 77 F. Supp. 2d 1153, 1157 (D. Mont.1999). *See generally* 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 v. Sandoz Pharmaceuticals Corp., 95 F. Supp. 2d 1230, 1234 n. 9 (W.D. Okla. 2000); Glastetter v. Novartis Pharmaceuticals Corp., 107 F. Supp. 2d 1015, 1036 (E.D. Mo. 2000).

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.[117] 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*.[118] The court upheld the district court's admission of expert causation evidence that at best amounted to educated guesses.[119] 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.[120]

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.[121] In the absence of such an explicit

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[117] *E.g.*, Michael H. Gottesman, *From Barefoot to* Daubert *to* Joiner: *Triple Play or Double Error?*, 40 ARIZ. L. REV. 753, 755 (1998). Professor Gottesman represented the plaintiffs in *Joiner* and *Daubert* before the Supreme Court.

[118] 140 F.3d 381 (2d Cir. 1998).

[119] *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).

[120] *Zuchowicz*,140 F.3d at 384-86.

[121] Gen. Elec. Co. v. Joiner, 522 U.S. 118, 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* conclude that there is simply too great an analytical gap between the data and the opinion proffered.") (emphasis added).

requirement, the Second Circuit could plausibly conclude that the district court did not abuse its discretion.[122]

By contrast to *Zuchowicz*, in *Moore v. Ashland Chemical Inc.*,[123] 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."[124]

Moore reflected the trend in federal courts far more than *Zuchowicz.*[125] 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

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[122] *See also* Westberry v. Ginslaved Gummi AB, 178 F.3d 257 (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 Industries, Inc., 167 F.3d 146, 154 (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, 1230 (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).

[123] 151 F.3d 269 (5th Cir.1998).

[124] *Id.* at 276.

[125] This led one plaintiffs' lawyer, not shy about hyperbole, to concludes in 1999 that "Daubert is death and disaster to Plaintiffs' attorneys!" Ralph Metzger, *Dealing with* Daubert *in California: The Perspective of a Plaintiff's Attorney*, http://www.toxictorts.com/index.php/about-us/articles/40-dealing-with-daubert-in-california-the-perspective-of-a-plaintiffs-attorney

Daubert trilogy, *Kumho Tire Co. v. Carmichael*. [126] 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.[127]

In *Kumho Tire*, however, the Court extended *Daubert's* gatekeeping function beyond scientific evidence to encompass all expert testimony. It is difficult to overestimate the significance of this ruling. As noted previously,[128] before *Daubert*, the *Frye* general acceptance test 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." [129]

One additional development reinforced, indeed codified, the Supreme Court's insistence that all adversarial expert testimony be subject to a reliability test. In 1997,

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[126] 526 U.S. 137 (1999).

[127] *E.g.*, Iacobelli Construction, Inc. v. County of Monroe, 32 F.3d 19 (2d Cir. 1994); *In Re*: Orthopedic Bone Screw Products Liability Litigation, 1997 WL 39583 (E.D. Pa.); Thornton v. Caterpillar, Inc., 951 F. Supp. 575 (D.S.C. 1997); *see also* Imwinkelried, *supra* note _, at 2290-2293; Linda S. Simard & William G. Young, Daubert's *Gatekeeper: The Role of the District Judge in Admitting Expert Testimony*, 68 TULANE L. REV. 1457 (1994). This continues to be an issue in state courts that follow the *Frye* rule. The Kansas Supreme Court, for example, held that a physician's testimony claiming that ingestion of the drug Parlodel caused a woman's deathwas exempt from *Frye* because it was not based on scientific evidence but was instead his "pure opinion." Kuhn v. Sandoz Pharms. Corp., 14 P.3d 1170 (Kan. 2000).

[128] *See supra* notes __ to __ and accompanying text.

[129] Weisgram v. Marley, 528 U.S. 440, 456 (2000) (emphasis supplied).

legislation codifying *Daubert* was pending in the federal House of Representatives and Senate. The legislation was introduced by representatives and senators 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." The Advisory Committee therefore decided to try to amend Rule 702 through the rule-making process. [130]

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."[131]

Amended Rule 702, which went into effect in December 2000, therefore cleared up a significant ambiguity in the *Joiner*.[132] *Zuchowicz* held that district courts did not abuse their discretion if they refused to insist that an expert's causation conclusion be based on reliable reasoning. But Rule 702 now explicitly required just that.[133] Experts relying on informed speculation and educated guesses as in *Zuchowicz* cannot show that they have applied "the principles and methods reliably to the facts of the case."[134]

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[130] http://www.uscourts.gov/uscourts/RulesAndPolicies/rules/Reports/EV12-1997.pdf

[131] http://www.uscourts.gov/uscourts/RulesAndPolicies/rules/Reports/EV5-1998.pdf

[132] *Cf.* PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, SCIENTIFIC EVIDENCE 66 (4th ed. 2007) ("The amendment goes beyond merely codifying *Daubert* and *Kumho*. It requires the proper application of the technique in the particular case."). William G. Childs, *The Overlapping Magisteria of Law and Science: When Litigation and Science Collide*, 85 Neb. L. Rev. 643, 680 n.23 (2007) (concluding that amended Rule 702 superseded *Daubert*).

[133] FED. R. EVID. 702.

[134] *Cf.* McClain v. Metabolife Intern., Inc., 401 F.3d 1233 (11th Cir. 2005) (overturning a trial

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.[135] Simultaneous with the amendment to Rule 702, Rule 701 was amended to clarify that it applied only to testimony "not based on scientific, technical, or other specialized knowledge within the scope of Rule 702."[136]

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. Not all federal judges, however, were prepared to accept 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

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court admissibility ruling and jury verdict on this basis).

[135] *E.g.*, Asplundh Mfg. Div. v. Benton Harbor Eng'g, 57 F.3d 1190, 1194 (3d Cir. 1995).

[136] FED. R. EVID. 701.

by the *Daubert* trilogy as codified by amended Rule 702.[137] Some judges, however, have continued to apply more liberal rules. Such judges often rely on cases preceding the 2000 changes to Rule 702, going back at times to pre-*Joiner*, or even pre-*Daubert* caselaw inconsistent with later developments in the law of expert testimony. Meanwhile, they ignore the language of Rule 702.[138]

Some federal judges appear unaware that Rule 702 was amended in 2000.[139] Other

[137] For example, several courts excluded causation evidence in cases alleging harm from the drug Parlodel. Soldo v. Sandoz Pharms. Corp., 244 F. Supp. 2d 434 (W.D. Pa. 2003); Dunn v. Sandoz Pharms. Corp., 275 F. Supp. 2d 672, 676-84 (M.D.N.C. 2003); Caraker v. Sandoz Pharms. Corp., 172 F. Supp. 2d 1046, 1048-53 (S.D. Ill. 2001); Shiharath v. Sandoz Pharms. Corp., 131 F. Supp. 2d 1347, 1351-74 (N.D. Ga. 2001), *aff'd sub nom.*, Rider v. Sandoz Pharms. Corp., 295 F.3d 1194 (11th Cir. 2002); Glastetter v. Novartis Pharms. Corp., 107 F. Supp. 2d 1015, 1017-46 (E.D. Mo. 2000), *aff'd*, 252 F.3d 986 (8th Cir. 2001); Hollander v. Sandoz Pharms. Corp., 95 F. Supp. 2d 1230, 1233-39 (W.D. Okla. 2000), *aff'd*, 289 F.3d 1193 (11th Cir. 2002). *But see* Brasher v. Sandoz Pharms. 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 Pharms. Corp., No. IP 98-1429-C-Y/S, 2001 U.S. Dist. LEXIS 4531, at *55-88 (S.D. Ind. March 7, 2001) (same); Globetti v. Sandoz Pharms. Corp., 111 F. Supp. 2d 1174, 1180 (N.D. Ala. 2000) (same). Such evidence would have been easily admissible in an earlier era.

[138] For discussions of this issue, David Bernstein, *Courts Refusing to Apply Federal Rule of Evidence 702*, VOLOKH CONSPIRACY (May 6, 2006, 09:29), http://www.volokh.com/posts/chain_1147021015.shtml; David Bernstein, *More on* Daubert *and Rule 702*, VOLOKH CONSPIRACY (June 6, 2006, 15:38), http://www.volokh.com/posts/1152214719.shtml. Perhaps the most egregious example of federal appellate court ignoring the language of Rule 702 arose in the 2006 Federal Circuit opinion in Liquid Dynamics Corp. v. Vaughan Co., Inc., 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. To justify its ruling, the court cited a 1986(!) Eighth Circuit opinion for the proposition that if inadequacies in expert testimony are a matter of weight, not admissibility. 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. 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) (quoting Daubert v. Merrell Dow Pharm., 509 U.S. 579, 588 (1993)) ("The Federal Rules of Evidence favor the admissibility of expert testimony and are applied with a 'liberal thrust.'").

[139] 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, those three cases were interpreting the old Rule 702, and neither judge addressed the text of the current rule. *In re* Chantix Prods. Liab. Litig., (N. D. Ala. August 21, 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 Marketing, Sales Practices and Product Liability Litigation, 2011 WL 13576 (E.D. Pa. 2011). While the judge did quote the language of the current rule, she added that in a 1999 case, *In re* TMI Litig., 193 F.3d 613, 664 (3d Cir. 1999), the Third

judges have ignored both *Joiner's* statement that district court's may reject testimony when there is an "analytical gap" between the expert's methodology and conclusions, and amended Rule702's insistence that courts ensure than a witness has applied the principles and methods reliably to the facts of the case.[140] Yet others have been far more lenient about admitting expert testimony than any reasonable interpretation of Rule 702 would allow.[141] 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.[142]

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?" The Third Circuit obviously could not have distilled a rule from statutory language that did not yet exist.

[140] 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. United States v. Frazier, 387 F.3d 1244, 1260 (11th Cir. 2004), quoting 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) (Tojflat, 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 Fed. Appx. 691, 695, 696 (3d Cir. 2002); *see also* Riley v. Target Corp., 2006 WL 1028773, slip op. (E.D. Ark. Apr. 13, 2006) (holding that any flaws in a "differential diagnosis" go to weight, not admissibility).

[141] Kudabeck v. Kroger Co., 338 F.2d 856, 860-63 (8th Cir. 2003) (holding that chiropractor's testimony that a fall caused plaintiff's degenerative disc disease satisfied *Daubert*); Perkins v. Origin Medsystems, Inc., 299 F. Supp. 2d 45 (D. Conn. 2004) (concluding that a clinician's speculation based on her experience was admissible); *In re* Phenylpropanolamine (PPA) Products Liability Litig., 289 F. Supp. 2d 1230, 1248 (W.D. Wash. 2003) ("case and adverse drug reports, textbooks and treatises, and the clinical experience of several experts . . . satisfies the mandate of *Daubert*").

[142] 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, 929 (8th Cir. 2001), quoting Turner v. Iowa Fire Equip. Co., 229 F.3d 1202, 1208–09 (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 the Rules of Evidence designed not for the exhaustive search for cosmic

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.*,[143] 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).[144] The plaintiffs' scientific expert was Martyn Smith, a well-credentialed toxicologist with much experience researching the health effects of benzene.[145]

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,

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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." *Bonner*, 259 F.3d at 929, quoting Hose v. Chicago Northwestern Transp. Co., 70 F.3d 968, 974 (8th Cir. 1996). This was not a correct statement of the law even in 1996, much less after Rule 702 was amended in 2000.

[143] 639 F.3d 11 (1st Cir. 2011).

[144] Milward v. Acuity Specialty Products Group, Inc., 664 F. Supp. 2d 137 (D. Mass. 2009).

[145] *Id*. at 142.

in particular the inhibition on topoisom erase II enzyme.[146]

Smith argued that considering this evidence as a whole, the "weight of the evidence" demonstrated that benzene could cause APL.[147] 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.

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 can cause APL just because it can cause AML.[148] One of the defendants' experts, epidemiologist David Garabrandt, 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.[149]

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. 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.[150] 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

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[146] *Id*. at 142-43.
[147] *Id*. at 142.
[148] *Id.* at 144.
[149] *Id.* at 149.
[150] *Id.*

benzene causes APL. O'Toole then granted summary judgment to the defendants.[151]

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;[152] and (c) the appellate court acknowledges that the doubts raised by the district court were "sensible" ones?[153]

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.[154] 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.

A. Ignoring Rule 702

As the Supreme Court pointedly emphasized in *Daubert*, the Federal Rules of Evidence are interpreted like any other statute.[155] The first step in interpreting any

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[151] *Id*. at 145-48.

[152] A supporter of the *Milward* appellate opinion notes: "It isn't 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." Gold, [waiting for citeable version]

[153] *Milward*, 639 F.3d at 23.

[154] *Id*. at 26.

[155] Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 587 (1993).

statute is to start with the statutory language.

Milward quoted the text of amended Rule 702,[156] but then proceeded to ignore it in analyzing the admissibility of plaintiffs' expert testimony. [157] Instead, the court contended that "the alleged flaws identified by the court go to the weight of Dr. Smith's opinion, not its admissibility."[158] 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."[159] 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."[160] Given that the First Circuit acknowledged that the doubts raised by the district court judge about Smith's testimony were "sensible,"[161] 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

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[156] 639 F.3d at 15, quoting Fed R. Evid 702.

[157] Nathan Schachtman, *WOE-fully Inadequate Methodology – An Ipse Dixit By Another Name*, SCHACHTMAN LAW (May 1st, 2012 at 05:03), http://schachtmanlaw.com/woe-ful-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").

[158] *Id*. at 22.

[159] *Id.* at 22, quoting United States v. Vargas, 471 F.3d 255, 264, quoting Int'l Adhesive Coating Co. v. Bolton Emerson Int'l, 851 F.2d 540, 545 (1st Cir. 1988).

[160] Fed. R. Evid. 702. *Cf.* Moreno, *supra* note __ (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).

[161] *Milward*, 639 F.3d at 23.

Circuit opinion, *United States v. Vargas*, for the proposition that "weak" expert testimony is for the jury alone to sort out.[162] 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 the text of amended Rule 702, as well as *Daubert*, *Joiner*, or *Kumho Tire*. Instead, *Vargas* quoted a case from 1988, a time when federal courts applied admissibility standards for more forgiving than Rule 702's.[163]

Milward also suggested on two occasions that Smith's testimony was admissible because, as required by *Kumho Tire*, he used the "same intellectual rigor" in preparing his testimony as he and others do outside of legal proceedings. [164] *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." As well, the opinion 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." [165]*Kumho Tire* therefore cannot support 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 decided, does not adopt 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

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[162] 471 F.3d 255, 264 (1st Cir. 2006), quoting Int'l Adhesive Coating Co. v. Bolton Emerson Int'l, 851 F.2d 540, 545 (1st Cir.1988).

[163] *Id*.

[164] *Milward*, 639 F.3d at 15, 26.

[165] Kumho Tire Co. v. Carmichael, 526 U.S. 137, 147-148 (1999).

to the facts of the case. So if an expert scientist, using all the intellectual rigor he can muster, ultimately is forced to rely on unreliable speculation and hypothesis his testimony is not admissible under Rule 702.[166]

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. Smith also 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 do in such circumstances: utilize advanced statistical techniques to try to tease a statistically significant result out of the aggregated data. Most remarkably, 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.[167] In such circumstances, it seems unwarranted, to say the least, for the First Circuit to conclude 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

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[166] *See* Chapman v. Maytag Corp., 297 F.3d 682, 687 (7th Cir. 2002); Goebel v. Denver and Rio Grande Western R.R. Co., 215 F.3d 108, 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.

[167] Reply Brief of Plaintiffs-Appellants Brian K. Milward and Linda J. Milward 24-26, Milward v. Acuity Systems Products Group, Inc., 639 F.3d 11 (1st Cir. 2011).

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 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.[168]

The broader theoretical problems with deferring to causation experts purporting to rely on the weight of the evidence will be discussed later. [169] For now, however, it's 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 the Supreme Court's holding in *General Electric Co. v. Joiner*.[170]

Justice Stevens's dissenting opinion in *Joiner* is completely consistent with *Milward*. Stevens wrote:

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[168] *Milward*, 639 F.2d at 23.

[169] *See infra* notes __ to __ and accompanying text.

[170] 522 U.S. 136 (1997).

> 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 PCBs 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.[171]

Stevens concluded that the Eleventh Circuit had been correct in finding that the district court had abused its discretion in excluding this evidence.

But Stevens spoke only for himself. The rest of the Justices disagreed that the district court was obligated to admit weight of the evidence testimony. Not only that, but the Court examined *Joiner's* experts' evidence in exactly the way the *Milward* court said was forbidden, that is, by "atomistically" looking at each study relied on by the experts to see if it could support causation testimony.[172] *Milward* utterly fails to explain how

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[171] *Id*. at 151 (Stevens, J., dissenting).

[172] *Accord* 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*).

its holding is consistent with *Joiner*.[173] Indeed, even the late Professor Margaret Berger's Introduction to the Third Edition of the *Federal Judicial Center's Reference Manual on Scientific Evidence*, which strongly favors liberal admissibility standards in toxic torts cases,[174] acknowledges given *Joiner* a "trial judge ... is free to choose an atomistic approach that evaluates the available studies one by one."[175] Milward's own expert on scientific methodology, Carl Cranor, wrote after the case that *Milward* corrected the Supreme Court's "atomistic" error in *Joiner*.[176] 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,[177] 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 briefing on whether and why reviewing plaintiffs' expert evidence

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[173] 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.

[174] Berger, *supra* note __.

[175] *Id*. at 23.

[176] Cranor, CPR Blog, *supra* note __.

[177] *See, e.g.*, INSTITUTE OF MED. & NAT'L RESEARCH COUNCIL, THE NAT'L ACADS., DIETARY SUPPLEMENTS: A FRAMEWORK FOR EVALUATING SAFETY 255-60 (2004); Susan Haack, *An Epistemologist in the Bramble-Bush: At the Supreme Court with Mr. Joine*r, 26 J. HEALTH POL. POL'Y & L. 217 (1999). *But see* Merck & Co. v. Garza, Merck & Co. v. Garza, 347 S.W.3d 256, 261 (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 expert only works if the expert is reasonably relying on the facts and data in the studies in question, an issue address 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.

holistically should change the judgment that the testimony was not reliable. [178]

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."[179] This is a blunt return to the pre-*Daubert Ferebee* standard, in which plaintiffs' evidence is looked on more favorably when on issue is on the frontier of scientific knowledge.[180] This 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."[181] 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,[182] Rule 702 and *Joiner* utterly rejected *Ferebee*-like standards.

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." Such a hypothesis, the court explained is not

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[178] "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 __, § 10.5.1 (supp. 2012).

[179] *Milward*, 639 F.2d at 24 (citing Norris v. Baxter Healthcare Corp., 397 F.3d 878, 882 (10th Cir. 2005), and Allen v. Pa. Eng'g Corp., 102 F.3d 194, 197 (5th Cir. 1996).

[180] *See supra* notes __ to __ and accompanying text.

[181] 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) (Rule 702 does not establish a "best efforts test").

[182] *See supra* notes __ to __ and accompanying text.

"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."[183]

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. Relying on the testimony of Professor Cranor, the 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.[184]

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.[185]

In part, the distinction between the standards for regulatory determinations and the standards for causation determinations in toxic tort cases rests on the differing

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[183] Tamraz v. Lincoln Electric Company, 620 F.3d 665 (6th Cir. 2010).

[184] "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, 401 (D. Kan. 1984).

[185] Many courts have acknowledged as much. *See, e.g.*, Rider v. Sandoz Pharms. Corp., 295 F.3d 1194, 1201 (11th Cir. 2002) ("[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 an objective review of evidence to determine whether it has sufficient ... basis to be considered reliable.").

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. Scientists working for regulatory agencies can be presumed to represent mainstream opinion in their fields, and to be trying to reach the best possible result from a public welfare perspective. 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.[186]

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[186] In the process of writing this article, the author came across a draft paper 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.
>
> This is far from the measured assessments that might occur among scientists at an 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 litigation, the process of consensus advisory committees and the process of direct and cross examination of expert witnesses in a courtroom is equally disparate.

Michael D. Green, *Pessimism about* Milward, 3 WAKE FOREST J. L. AND POL'Y __ (forthcoming); *see also* Underwood, *supra* note __ (noting that in the toxic tort context, "the soil is tilted for bias"); *see also* Sanders, *supra* note __, 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, forthcoming. Adversarial bias creates special problems for expert testimony that it doesn't 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

Federal evidence rules evolved to ultimately demand an *objective* basis for opinion testimony to deal with the problems attendant to adversarial bias.[187] 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.[188] 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 conclusion's 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." [189] 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

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unbiased participant in the proceedings.

Bernstein, *supra* note __, at 455.

[187] *See* Fed. R. Evid. 702 advisory committee's note (2000) ("The trial court's gatekeeping function requires more than simply 'taking the expert's word for it.'"); *Daubert*, 43 F.3d at 1319 ("We've been presented with only the experts' qualifications, their conclusions and their assurances of reliability. Under *Daubert*, that's not enough.").

[188] *E.g.*, Siharath v. Sandoz Pharms. Corp., 131 F. Supp. 2d 1347, 1358 (N.D. Ga. 2001) ("The 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."); Merck & Co. v. Garza, 347 S.W.3d 256, 261 (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 SCIENCE 164 (1995) (noting that epidemiology is subject to systematic errors, biases, and confounders).

[189] *Milward*, 639 F.3d at 22.

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 plaintiffs' expert purported to rely on a "weight of the evidence methodology." The court used this phrase as if 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."[190] To allow an expert to testify simply because he purports to be simply 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 without reference to reliable scientific evidence could claim he is utilizing a "weight of the evidence methodology."[191]

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

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[190] *See* 3 DAVID FAIGMAN ET AL., *Benzene, Legal Issues—Injury Similarity*, in MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 29:6 (2011–2012 ed.) (criticizing *Milward* for confusing inference with a scientific methodology). The same could be said for those state courts utilizing the *Frye* rule who admit testimony because an expert purports to be using the "extrapolation method." *E.g*. Donaldson v. Central Illinois Public Service Co., 767 N.E.2d 314 (Ill. 2002). At least in *Donaldson*, unlike in *Milward*, the court was not obligated under governing law to consider the expert's reasoning process.

[191] *See* Oxendine v. Merrell Dow Pharmaceuticals, 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); *see* Green, Wake Forest, *supra* note __ (recounting the origins of the mosaic metaphor). *See generally* KAYE ET AL., *supra* note __ ("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* were also were using a weight-of-evidence, best-inference 'method.'").

only scientifically valid when the expert provides transparent and detailed explanation of exactly what how the expert weighed the evidence.[192] As Kaye, et al., 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."[193] Otherwise, weight of the evidence is nothing more than a metaphor, not an actual scientific methodology.[194]

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 fourteen different things.[195] 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."[196]

Milward correctly cautions that relying on the weight of the evidence is not

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[192] Douglas L. Weed, 25 RISK ANALYSIS 1545, 1546-51 (Supp. 1 2005); *see also* V. H. Dale, et al., *Enhancing the Ecological Risk Assessment Process*, 4 INTEGRATED ENVT'L ASSESS. MANAGEMENT 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 SCIENCE OF THE TOTAL ENVIRONMENT 1406, 1406 (2011) (noting that "weight of the evidence" evaluations are prone to arbitrariness and subjectivity).

[193] KAYE ET AL., *supra* note __, at § 10.5.1; Magistrini v. One Hour Martinizing Dry Cleaning, 180 F. Supp. 2d 584, 602–07 (D.N.J. 2002), *aff'd*, 68 Fed. Appx. 356 (3d Cir. 2003) (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 how the weight he gave to the different pieces of evidence); 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 gave to each study).

[194] Weed, *supra* note __.

[195] *Id.*

[196] *Id.* at 1546.

"inherently unreliable."[197] The question presented to the First Circuit, 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."[198] 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."[199] Such evidence will normally come from epidemiological studies. [200]

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

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[197] *Milward*, 639 F.3d at 19.

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

[199] Hill, *supra* note __, at 296; *see* Dunn v. Sandoz Pharmaceuticals Corporation, 275 F. Supp. 2d 672, 680-81 (M.D.N.C. 2003) (elaborating on this point).

[200] FEDERAL JUDICIAL CENTER, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE, 599 n.141 (3d ed. 2011) ("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.").

methodology to differential diagnosis.[201] 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."[202] What Smith did instead analogous instead to differential etiology, i.e., trying to determine which of several known causes of a disease caused the subject's disease.[203] 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."[204] Translated into legal jargon, differential etiologies are only probative of specific causation, not general causation.[205] Just like courts typically exclude differential etiologies when the expert has not provided sufficient independent evidence that the substance at issue can cause the disease at issue,[206] 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.[207] Why the court thought

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[201] *Milward*, 639 F.3d at 18.

[202] Granfield v. CSX Transp., Inc., 597 F.3d 474, 486 (1st Cir. 2010).

[203] Hill, *supra* note __, at 296.

[204] David E. Bernstein, *Getting to Causation in Toxic Tort Cases*, 74 BROOK. L. REV. 51, 68 (2008).

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

[206] *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, 233 (2007).

[207] *Cf.* Nathan Schachtman, *WOE-fully Inadequate Methodology – An Ipse Dixit By Another Name* SCHACHTMAN LAW (May 1st, 2012 at 05:03), http://schachtmanlaw.com/woe-ful-inadequate-methodology-an-ipse-dixit-by-another-name/:

Cranor's testimony—which the district court studiously ignored in its opinion—so valuable is not obvious. Cranor is not a scientist, and in his published work he exhibited confusion regarding basic scientific concepts and their relationship to legal burdens of proof.[208] 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 rule for plaintiffs' evidence in toxic tort litigation, and an opponent of the stricter rules that have come into place since *Daubert*.[209] Even 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

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> The Panel 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. Id at 18. 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." Id. at 20 (upholding this approach as "methodologically reliable").

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.

[208] *See* Michael D. Green, *Science is to Law as the Burden of Proof is to Significance Testing*, 37 JURIMETRICS 205, 222 (1997) (noting Cranor's "confusion of statistical significance and legal burdens of proof, a fundamental error").

[209] *See, e.g.*, CARL F. CRANOR, REGULATING TOXIC SUBSTANCES: A PHILOSOPHY OF SCIENCE AND THE LAW 147 (1993); CARL F. CRANOR, TOXIC TORTS: SCIENCE, LAW, AND THE POSSIBILITY OF JUSTICE (2006); Carl F. Cranor et al., *Judicial Boundary Drawing and the Need for Content-Sensitive Science in Toxic Torts After* Daubert v. Merrell Dow Pharmaceuticals, Inc., 16 VA. ENVT'L. L.J. 1, 6 (1996).

what the word 'reliability' is" and "I don't like the word 'reliable,' because I don't understand what it means."[210]

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, 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.[211] It would hardly be surprising if the district court, which found even the general causation testimony unreliable, were to turn around and 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.[212]

CONCLUSION

By academic convention, the author is expected at this point to propose a grand theory; in this case, perhaps, a theory of why and when judges are inclined to defy statutes and Supreme Court precedent. And yet, no grand theory is needed to explain the reaction of judges to *Daubert* and it progeny. The factors leading to judicial

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[210] Deposition of Carl F. Cranor, Ph.D., Milward v. Acuity Special Products Group, Inc., Jan. 26, 2009, at 129 (on file with author).

[211] *See generally* Bernstein, Brooklyn, *supra* note __ (explaining the difference between general and specific causation).

[212] A notable 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 some courts were willing to apply. *See* Faigman, *supra* note __.

noncompliance are straightforward.

First, the modern reliability test represents a radical change in the law of expert testimony, and judges, a conservative lot, tend to be hostile to radical legal change. Rule 702 not only codifies revolutionary changes in the substantive law, but also place 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.[213] Judicial conservatism is enabled in part by the conservatism of defense attorneys, who often themselves ignore the text of Rule 702 in their briefs in favor of reliance on old circuit precedents, which invites judges to do the same.[214]

Moreover, judges and lawyers have been subject to a vast amount of literature on *"Daubert,"* which, as noted,[215] 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.[216]

Because of these disparities, some judges seem not to realize that Rule 702 was

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[213] *See* Faigman, *supra* note_ (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 (2000) (discussing judges' case management responsibilities under *Daubert*).

[214] 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.

[215] *See supra* notes __ to __ and accompanying text.

[216] 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.

amended in 2000.[217] Even among the majority that recognize this, many judges seem to believe that Rule 702 simply codified prior caselaw, 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 *Daubert* itself; and (b) that the trilogy and the language of Rule 702 implicitly overruled a great deal of prior caselaw, 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 involved funding the Project on Scientific Knowledge and Public Policy (SKAPP)), which in turn sponsored conferences,[218] policy papers,[219] and law review articles.[220] The funding, ironically, came from money paid by defendants into the Common Benefit Trust, part of the breast implant litigation settlement, which was itself the product of highly speculative, unreliable expert testimony enabled by lenient judges.[221] More recently, the Robert L.

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[217] *See supra* note __ and accompanying text.

[218] *See* David Michaels, *Conventions in Science and Law*, 72 LAW & CONTEMP. PROBS. i, i (2008) ("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.").

[219] *E.g.*, SCIENTIFIC KNOWLEDGE AND PUB. POLICY, DAUBERT: THE MOST INFLUENTIAL SUPREME COURT RULING YOU'VE NEVER HEARD OF (2003); DAVID M. FLORES, JAMES T. RICHARDSON & MARA L. MERLINO, EFFECTS OF DAUBERT ON EXPERT EVIDENCE PRACTICES IN FEDERAL DISTRICT COURT OF SOUTH CAROLINA 2 (2008).

[220] *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)' Symposium, *Sequestered Science: the Consequences of Undisclosed Knowledge*, 69 LAW & CONTEMP. PROBS. 1 (2006).

[221] *See supra* notes __ to __ and accompanying text; Bernstein, *supra* note __.

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*.[222]

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.[223] Her 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.[224]

Finally, although the Supreme Court's opinions on expert testimony have been notably bipartisan, [225] support for stricter rules for experts in toxic tort cases has generally been associated with the political right, and opposition with the left. Resistance in the federal judiciary to stricter rules for the admissibility of expert testimony has come primarily from Democratic appointees. [226] This remains true even

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[222] http://lawpolicyjournal.law.wfu.edu/symposium/spring-symposium/.

[223] Margaret A. Berger & Aaron D. Twerski, *Uncertainty and Informed Choice: Unmasking* Daubert, 104 MICH. L. REV. 257, 282-87 (2005); Margaret Berger, *Decade of* Daubert, 95 AMERICAN J. OF PUBLIC HEALTH S59 (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 (2001).

[224] Margaret A. Berger, *The Admissibility of Expert Testimony*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 11, 18 (3d ed. 2011). As we have seen, *Daubert* itself is highly ambiguous on the matter, *see supra* notes __ to __ and accompanying text, but after *Joiner* this claim is clearly false.

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

[226] For example, the author of *Milward* was Judge Sandra Lynch, a Clinton appointee. The author

though the post-*Daubert* upheaval in expert evidence law has helped prompt a broad reconsideration of dubious forensic testimony used by prosecutors at the expense of criminal defendants.[227]

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. 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 necessarily 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 exactly the situation where judges 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 side claiming that their scientific judgment either does or does 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.[228] But this

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of *Tamraz v. Lincoln Electric Company*, 620 F.3d 665 (6th Cir. 2010), a strict Sixth Circuit opinion often contrasted with *Milward*, was Jeffrey Sutton, a Bush II appointee.

[227] *See, e.g.*, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (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, 527-29 (2010); Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification*, 309 SCIENCE 892 (2005).

[228] *See* Bernstein, *supra* note __.

reform has been proposed for well over one hundred years and has yet to make meaningful headway. [229] The best alternative is to exclude expert 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's precisely what Rule 702 accomplishes.

[229] *See* Sanders, *supra* note __, at 77 (noting that proposals for greater use of nonpartisan expert are resisted by the legal establishment because adversarial processes 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.").