

Daubert* and the Exclusionary Ethos: The Convergence of *Corporate* and *Judicial* Attitudes towards the Admissibility of Expert Evidence in Tort Litigation

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The article traces the way admissibility jurisprudence following Daubert has come to emphasize the importance of strict judicial gatekeeping; making it more difficult for plaintiffs to succeed in tort and product liability litigation. This exclusionary ethos appears to have been shaped by a range of values and interests which appear closely aligned to the perspectives promoted by corporate-sponsored proponents of tort and evidence reform. The effects of the exclusionary ethos are explored through an example of judicial gatekeeping in recent mobile telephone litigation and a review of judicial surveys of post-Daubert attitudes toward expert evidence. The role of corporate-sponsored amicus briefs in the influential Supreme Court Kumho Tire Co. Ltd. v Carmichael appeal, extra-legal mobilization by conservative think tanks in litigation around electric and magnetic fields (EMF), and a qualitative citation analysis of federal court judgments, are then used in a preliminary attempt to trace the influence of corporate lobbying and social problem rhetorics on judicial attitudes and practice.

I. INTRODUCTION

During the 1990s the U.S. Supreme Court became acutely attentive to cases dealing with expert evidence. The 1993 Supreme Court decision *Daubert v Merrell Dow Pharmaceuticals, Inc.* is conventionally interpreted as the beginning of this interest as well as the progenitor of an admissibility revolution. This article traces the way *Daubert* jurisprudence, itself symbolic of more widespread trends in adjectival jurisprudence and law reform, has made it more difficult for plaintiffs to succeed in toxic tort and consumer litigation (Finley 1999). It is our contention that recent federal jurisprudence, including Supreme Court jurisprudence, seems to have been shaped, and simultaneously reinforced, by a range of values which appear closely

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aligned to the perspectives and concerns promoted by politically conservative corporate-sponsored proponents of tort and evidence reform.

The following discussion is divided into two parts with several subsections and case studies. Initially we offer a textually based overview of the *Daubert* judgment, explaining how its meaning and authority evolved in subsequent appeals. This will highlight how potentially liberalizing features of the decision have been “read down,” and exclusionary possibilities “read up” and applied (Feeley & Rubin 1998). A succinct case study illustrates how *Daubert's* stringent gatekeeping ethos has recently been applied to emerging toxic tort litigation involving claims that mobile telephone use causes brain cancer. We then broaden our focus; providing a brief overview of recent empirical research into federal court judgments and judicial attitudes towards expert evidence in the wake of *Daubert*. In the second part we attempt to sketch some of the roles played by corporate-sponsored think tanks in encouraging the convergence of judicial and corporate attitudes towards admissibility, civil liability, and tort reform. This provides the opportunity to make some provisional assessment of factors informing judicial understanding of, and responses to, expertise. Drawing upon different types of evidence, we provide three brief case studies to support our analysis. The first examines the Supreme Court jurisprudence in the *Kumho Tire Co. Ltd. v Carmichael* appeal and its convergence with views articulated in industry and think tank-sponsored amicus curiae briefs. The second explores some of the extra-legal mobilization in litigation around electric and magnetic fields (EMF). The third provides a qualitative citation analysis of federal court judgments. This analysis suggests that corporate-sponsored polemicists have been more influential, as sources of authority, about the nature of science and expertise, than specialist philosophers and social scientists.

II. DAUBERT: AN ADMISSIBILITY REVOLUTION?

The *Daubert* appeal was part of the Bendectin litigation. An anti-nausea drug, Bendectin was commonly prescribed for women with morning sickness before it was removed from the market in 1983. From the late 1970s concern arose that Bendectin might be associated with birth defects. By the early 1980s numerous plaintiffs had filed civil actions in state and federal courts. The influential Supreme Court *Daubert* (1993) decision was an appeal over the admissibility standard for scientific expert evidence in one of these Bendectin cases (Green 1996; Sanders 1998). At that stage, the Supreme Court was intervening in mass tort litigation which had virtually concluded in the federal circuits (Edmond & Mercer 2000; Edmond 2002b).

Difficulties with tort litigation, particularly procedures and evidence in mass torts, have been recognized and discussed for decades (Molot 1998; Schuck 1986; T. M. Schwartz 1991; G. T. Schwartz 1992; Swift 2000; Yeazell 1994). However, the emergence of large-scale litigation, including a

series of highly publicized (and often politicized) case congregations, and a range of (inconsistent) judicial responses to admissibility decision-making throughout the 1980s, appear to have stimulated the Supreme Court's willingness to hear the *Daubert* appeal (Gottesman 1998; Graham 2000). The Court's interest was primarily focused on expert evidence adduced by plaintiffs.

For the purposes of our analysis, the following features of the *Daubert* decision are of recurring interest.

A. THE LIBERAL THRUST OF THE FEDERAL RULES OF EVIDENCE (1975)

The rules governing the admissibility of evidence in federal courts were enacted as part of the *Federal Rules of Evidence* (FRE) in 1975. Rule 702 guides the admissibility of expert opinion evidence:

Rule 702. Testimony by Experts. If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.¹

Prior to *Daubert*, judges had interpreted Rule 702 in a variety of ways. It was not until the appeal, however, that these differences, or the issue of expert opinion evidence itself, were conceived as sufficiently significant to warrant intervention by the U.S. Supreme Court.

Before the *Daubert* appeal, a version of *general acceptance* (or the *Frye* test) – that is, whether a theory or technique was “generally accepted” in the relevant field (*Frye v United States* 1923) – was the most common standard used to determine the admissibility of expert evidence, even though it was originally associated with criminal prosecutions and novel proffers of expertise. Several federal circuits had supplemented “general acceptance” with additional criteria or departed from a strict interpretation of the *generality* of acceptance. In consequence, general acceptance was subject to a range of competing readings. Some judges and commentators described the *Frye* standard as too onerous. Others considered it too liberal *in practice* (Giannelli 1980, 1993, 1994).

In *Daubert*, the Supreme Court sought to standardize admissibility decision-making across the federal circuits. Characterizing the *Frye* test as “austere,” Justice Blackmun explained that:

The drafting history [of the FRE] makes no mention of *Frye*, and a rigid “general acceptance” requirement would be at odds with the “liberal thrust” of the Federal Rules and their “general approach” of relaxing the traditional barriers to “opinion” testimony. (*Daubert v Merrell Dow Pharmaceuticals, Inc.* 1993 at 588)

All of the judges agreed that nothing in the text of Rule 702 established “general acceptance” as an absolute prerequisite to admissibility (*Daubert*

1993 at 588–89). They found, given the “Rules’ permissive backdrop,” the assertion that they somehow “assimilated *Frye* . . . unconvincing” (ibid. at 589). Consequently, the majority sought to articulate an alternative, and ostensibly more liberal, standard in accordance with the FRE.

B. DEFINING SCIENCE FOR LAW

Abandoning *Frye* required the provision of some new basis for admissibility decision-making. The majority of the Court emphasized the importance of securing *relevant* and *reliable* evidence. This account is mostly concerned with constructions of reliability. The concept of relevance, while important, is considerably more case dependent.

Because, according to the majority, Rule 702 clearly implies some degree of regulation, they imposed conditions: “The subject of an expert’s testimony must be ‘scientific . . . knowledge,’” that is, “an inference or assertion must be derived by the scientific method” (*Daubert* 1993 at 589–90). In order to determine whether proffered evidence is “scientific knowledge” that “will assist the trier of fact [usually the jury] to understand or determine a fact in issue” the majority provided a list of four factors (hereafter the *Daubert* criteria) to assist the trial judge’s assessment:

[1] Ordinarily, a key question to be answered in determining whether a theory of technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested. . . . K. Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* 37 (5th ed. 1989) (“[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability”).

[2] Another pertinent consideration is whether the theory or technique has been subjected to peer review and publication. Publication (which is but one element of peer review) is not a *sine qua non* of admissibility; it does not necessarily correlate with reliability, see S. Jasanoff, *The fifth Branch: Science Advisors as Policymakers* 61–76 (1990) . . .

[3] Additionally, in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error . . .

[4] Finally, “general acceptance” can yet have a bearing on the inquiry. (*Daubert* 1993 at 593–4)

Notwithstanding the provision of specific criteria, the majority explained that any inquiry should be “flexible” (*Daubert* 1993 at 594). In consequence, these factors were characterized as indicative rather than “a definitive checklist or test” (ibid. at 593). The Court, including the dissentients Rehnquist CJ and Stevens J, recognized that even a liberal admissibility standard would inevitably exclude some probative evidence: “in practice, a *gatekeeping* role for the judge, no matter how flexible, inevitably on occasion will prevent the jury learning of authentic insights and innovations” (ibid. at 597, 600).

None of the judges in *Daubert* equated legal approaches to scientific evidence with “cosmic understanding” (ibid. at 600). For the majority, expert evidence was admitted into legal contexts for more pragmatic purposes: the expeditious and just resolution of disputes. The dissenters were concerned that the criteria articulated by the majority, particularly the doctrine of falsification [1], were overly abstract, effectively forcing judges to become “amateur scientists” (ibid. at 597, 601).

C. CONFIDENCE IN THE JURY AND THE ADVERSARIAL SYSTEM

In response to corporate concerns that modifying the standards of admissibility might “result in a ‘free-for-all’ in which befuddled juries were confounded by absurd and irrational pseudoscientific assertions” the majority explained:

In this regard respondent [Merrell Dow] seems to us to be overly pessimistic about the capabilities of the jury and of the adversary system generally. Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence . . . the court remains free to direct a judgment . . . and likewise to grant summary judgment. (*Daubert* 1993 at 596)

D. JURISPRUDENCE AFTER *DAUBERT*

Despite the references to a more liberal approach to admissibility – recognized in the FRE, the flexible criteria, the need for judicial pragmatism as well as confidence in the lay jury and adversarialism – *Daubert* has become the basis for the elaboration of a more onerous admissibility regime. This regime is characterized by rigorous screening of expert evidence, the strict application of an ideal checklist (the criteria) emphasizing “testing” to determine reliable expertise, judicial appraisals of scientific *truth*, and a pervasive pessimism about the roles played by experts, plaintiffs, and jurors.

To help us understand how these more restrictive readings were developed we need to examine two issues: (i) the manner in which *Daubert* has helped to legitimize the development of onerous criteria for “reliable science” by drawing on philosophical authorities, like Popper, without considering limitations or implications to their work; and (ii) how *Daubert’s* call for judges to become *gatekeepers* has, in subsequent appeals to the Supreme Court, been transformed from an ostensibly pragmatic approach, sensitive to justice and the need to resolve disputes, into a more idealistic orientation with greater emphasis on the determination of scientific *truth*.

1. *Popper and “Testing”*: From Formal to Folk Epistemologies of Science

In *Daubert*, testing (equated with Popper’s doctrine of falsification) was characterized as a key feature of scientific practice. In federal court jurisprudence, “testing” has since assumed an important role in admissibility

decision-making. The emergence of testing, especially in product liability litigation, is significant for several reasons: (a) Popperian philosophy of science, while historically important, has few modern proponents among professional philosophers, sociologists, or historians of science (Chalmers 1976; Fuller 2003; Haack 1993, 2001; Oldroyd 1986); (b) there has been very limited discussion of the political ideologies associated with or the admissibility implications of this model of science. By equating falsification with “how science is done” the Supreme Court was purporting to incorporate *proper* scientific practice into its jurisprudence (Edmond & Mercer 2002). Except to those familiar with debates among philosophers and sociologists, to criticize Popper (and Hempel) and testing might seem equivalent to attacking the method, or essence, of science (Mulkey & Gilbert 1981). Now that the legal standard is firmly established, courts provide limited scope for epistemological challenges. Any ideological or admissibility implications associated with the work of Popper, or the application of a *folk* version of testing, remain largely unacknowledged. The new legal doctrine of testing purports to provide a philosophically, but more importantly a scientifically, based means of guaranteeing reliability and simplifying decision making. A bowdlerized version of falsification, invoked without reference to extensive criticism, has been incorporated into evidence jurisprudence in a manner that would seem to be inconsistent with both its progenitor’s aspirations and modern empirically predicated approaches to the sciences (Edmond & Mercer 1998; Kassirer & Cecil, 2002). (c) In the *Daubert* judgment, testing is combined with other criteria in a manner inconsistent with some of Popper’s aspirations for falsification. In many places Popper emphasized that his method of falsification transcended the need to consider other philosophical or more sociologically oriented criteria for demarcating science from pseudoscience. The combination of falsification with other criteria such as error rates, peer review, publication, and general acceptance, even in the simplistic form adopted by the majority of judges, produces a standard even more onerous than testing standing alone.

2. *Joiner* and *Kumho*: Gatekeeping and Scientific “Truth”

Daubert and its implications have been actively and creatively contested in the federal courts. Two appeals, *General Electric Co. v Joiner* (1997) and *Kumho Tire Co. v Carmichael* (1999) which took expert evidence jurisprudence (around Rule 702) back to the Supreme Court, provide further insight into judicial sensitivities and help us to expound a more comprehensive and diachronically sensitive reading of *Daubert*.

Like *Daubert*, *Joiner* and *Kumho* were concerned with the admissibility of plaintiffs’ expert evidence. *Joiner* was an appeal to determine the appropriate standard for appellate review of trial judge admissibility decision-making. *Kumho* arose because plaintiffs were endeavoring to circumvent the *rigor* of the strict application of the *Daubert* criteria by claiming that their

expert evidence – specialist engineering testimony – was non-scientific. Both judgments emphatically reinforced the centrality of the *Daubert* decision to federal evidence jurisprudence. Both judgments excluded the plaintiffs' expert evidence.

One of the most conspicuous developments between *Daubert* (1993) and *Kumho* (1999) is the frequency in recourse to the trial judge's *gatekeeping* role. There are effectively only two references to gatekeeping in *Daubert*. The majority's reference, reproduced above, suggests that a gatekeeping role may occasionally prevent juries from learning of authentic insights. The other reference emerges in the dissent of Rehnquist CJ and Stevens J: "Rule 702 confides to the judge some gatekeeping responsibility in deciding questions of the admissibility of proffered expert testimony" (*Daubert* 1993 at 600). In the text of *Daubert*, gatekeeping was literally linked to a recognition that the drafters of Rule 702 had envisaged a screening role.

The centrality, urgency and stringency of gatekeeping were rapidly expanded in subsequent trials and appeals. In *Joiner*, the gatekeeping role was forcefully affirmed. Gatekeeping featured as a central component of admissibility decision-making:

Of course, neither the difficulty of the task nor any comparative lack of expertise can excuse the judge from exercising the gatekeeper duties that the Federal Rules of Evidence impose (*Joiner* 1997 at 520)

Gatekeeping duties were explicitly linked to the FRE. Not even complexity and inexperience could excuse dereliction. In addition, gatekeeping was accorded an important socioeconomic rationale, linking it to a fairly conventional approach to the regulatory function of tort law:

And it may, therefore, prove particularly important to see that judges fulfill their *Daubert* gatekeeping function, so that they help assure that the powerful engine of tort liability, which can generate strong financial incentives to reduce, or to eliminate, production, points toward the right substances and does not destroy the wrong ones. It is, thus, essential in this science-related area that the courts administer the Federal Rules of Evidence in order to achieve the "end[s]" that the rules themselves set forth, not only so that the proceedings may be "justly determined," but also so "that the *truth* may be ascertained." (*Joiner* 1997 at 520, emphasis added)

Here the Court draws a correlation between the accuracy (or "truth") of expert evidence and the proper operation of tort in regulating civil wrongs, particularly corporate malfeasance (Abel 1987; Bogus 2001; Calabresi 1970).

In *Kumho*, *Daubert* is used as authority for the gatekeeping *obligation*. In deciding whether the *Daubert* criteria would extend to non-scientific expert evidence the Court explained:

We conclude that *Daubert's* general holding – setting forth the trial judge's general "gatekeeping" obligation – applies not only to testimony based on "scientific" knowledge. But also to testimony based on "technical" and "other specialized" knowledge. (*Kumho* 1999 at 1171, 1174, 1175)

Daubert comes to stand as a surrogate for gatekeeping:

Neither is the evidentiary rationale that underlay the Court's basic *Daubert* "gatekeeping" determination limited to "scientific" knowledge. (*Kumho* 1999 at 1174)

And,

To say this is not to deny the importance of *Daubert's* gatekeeping requirement. (*Kumho* 1999 at 1176)

If there were lingering doubts about the implications of *Daubert* the appeal in *Weisgram v Marley* (2000 at 1021) appears to resolve them conclusively. There, the Supreme Court characterized the impact of the admissibility jurisprudence in the following terms: "Since *Daubert*, moreover, parties relying on expert evidence have had notice of the exacting standards of reliability such evidence must meet."

The *Joiner*, *Kumho*, and *Weisgram* decisions provide evidence of a court more determined to exclude plaintiffs' evidence (Edmond 2002a: 399). Justice Stevens suggested that the Joiners' expert evidence, excluded by the majority, was "not the sort of 'junk science' with which *Daubert* was concerned" (*Joiner* 1997 at 522). *Daubert* is characterized as a case concerned with the exclusion of "junk science." In *Kumho*, Scalia, O'Connor and Thomas JJ, insisted that any discretion invested in the trial judge, like the discretion endorsed previously in *Joiner*, "is not discretion to abandon the gatekeeping function." Continuing, they explained: "Rather, it is discretion to choose among reasonable means of excluding expertise that is false and science that is junky" (*Kumho* 1999 at 1179).

There are other differences between the Supreme Court judgments. *Joiner* and *Kumho* do not rehearse the confidence in the lay jury expressed in *Daubert*. In *Kumho* the jury is mentioned in the context of the trial judge's obligation to guarantee the reliability of evidence:

The trial judge's efforts to assure that the specialized testimony is reliable and relevant can help the jury evaluate that foreign experience, whether the testimony reflects scientific, technical, or other specialized knowledge. (*Kumho* 1999 at 1174–5, 1177; cf. *US v Staggs* 1989)

Justice Stevens, in his partial dissent in *Joiner*, was the only judge to refer to a more conventional image of the jury as fact-finder (*Joiner* 1999 at 523; Berger 2001).

Another important difference between *Daubert* and the later appeals concerns the assessment of the plaintiffs' evidence. In *Daubert* the case was remanded to the Ninth Circuit Court of Appeals at a stage in the "Bendectin cycle" described by almost all academic commentators as pathological (Green 1996: 328; Sanders 1992, 1998). In *Joiner* and *Kumho*, by contrast, Supreme Court judges personally undertook the assessment of the evidence. Notwithstanding references to flexibility, the *Joiner* and *Kumho* judgments are distinguished by critical assessment of the plaintiffs' expert evidence. In

these exemplary judgments, the *Daubert* criteria were inflexibly applied to exclude the plaintiffs' evidence (*Joiner* 1997 at 517–19; *Kumho* 1999 at 1176–79). *Joiner* and *Kumho* represent authoritative and influential demonstrations of judicial gatekeeping in cases where the admissibility decisions were dispositive: no admissible expert evidence, no further litigation. Some commentators have described these outcomes as a double win for defendants (Cranor & Eastmond 2001: 6; Gottesman 1998: 766).

One final difference between the judgments is *Daubert's* emphasis on a more pragmatic model of justice, whereas *Joiner* and *Kumho* represent a shift in the direction of *truth*. In *Daubert*, Blackmun J had explained that:

There are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory . . . [the] Rules of Evidence [are] designed not for the exhaustive search for *cosmic understanding* but for the particularized resolution of legal dispute. (*Daubert* 1993 at 600, emphasis added)

In *Joiner*, acknowledging offers of assistance from peak scientific and medical organizations, such as the AAAS, NAS, and the *New England Journal of Medicine*, Breyer explained that:

Given the various Rules-authorized methods for facilitating the courts' task, it seems to me that *Daubert's* gatekeeping requirements will not prove inordinately difficult to implement, and that it will help secure the basic objectives of the Federal Rules of Evidence, which are, to repeat, the ascertainment of *truth* and the just determination of proceedings. (*Joiner* 1997 at 521, emphasis added)

The FRE required not only the just determination of suits, but that “the truth may be ascertained” (*Joiner* 1997 at 520, 521; *Kumho* 1999 at 1176). The efficient operation of the tort system requires judges to make factually accurate decisions. In *Joiner* and *Kumho*, in the general approach advocated by Breyer, concern with scientific truth was characterized as an overriding purpose of the FRE. And, this truth is to be obtained through the *flexible* application of the *Daubert* criteria.

III. GATEKEEPING IN TOXIC TORTS: *NEWMAN V MOTOROLA, INC.* (2002)

Newman v Motorola, Inc. (2002) provides a recent example of the application of the *Daubert* criteria. This case, not atypically for cases at the beginning of potentially large litigation clusters, provides an informative illustration of judicial sensitivities and the flexible possibilities endowed by *Daubert*. In *Newman* the trial judge adopted a strict reading of the *Daubert* criteria, involving an exhaustive assessment of the background to the some of the scientific publications relied upon by the plaintiffs which made it difficult for them to meet the (developing) admissibility threshold.

Christopher Newman, a neurologist, filed a complaint in the Baltimore City circuit court against Motorola, and others, claiming that his use of an

analog mobile telephone (between 1992 and 1998) manufactured by Motorola had caused the development of a brain tumor behind his right ear. The case was/is extremely significant for the cell phone industry. At the time of the hearing, another eleven personal injury cases were pending against cell phone manufacturers, with the likelihood of more to follow: five cases were filed in Washington D.C. courts (seeking over six billion dollars in damages) in February 2002 alone (Parker 2002). Newman's case was moved to the United States District Court for Maryland and heard by District Court Judge Catherine Blake. Both sides filed motions to exclude expert evidence and an evidentiary (*Daubert*) hearing was held from 25 February to 1 March 2002 (Slesin 2002). In a memorandum delivered on 1 October 2002, Blake excluded Newman's expert testimony, explaining that it failed to meet the *Daubert* criteria. This decision was affirmed on appeal (*Newman v Motorola, Inc.* 2003). As it stands, Blake's judgment and the appeal are likely to have a dampening effect on future mobile-phone health litigation and represent the crystallization of a pro-defendant trend in mobile phone litigation (Grasso 1998).

Blake interpreted *Daubert* and its progeny as an injunction to execute her gatekeeping role rigorously. The case exemplifies the strategic manipulation of the *Daubert* criteria. According to Blake, the theory and technique of demonstrating cancer causation relied on by the plaintiffs had not attained acceptance in the scientific community. Blake attached weight to a number of published epidemiological studies which "have found no scientifically reliable basis to conclude that the use of wireless handheld phones causes brain cancer" (*Newman* 2002 at 5) and reports "from numerous international organizations . . . finding no reliable evidence of cancer causation from exposure to wireless handheld phones" (*ibid.* at 6). Conforming to a more general judicial trend, Blake determined that animal studies alone were insufficient: "there must be reliable epidemiological evidence of link between cell phones and cancer to support a theory of cancer causation in humans" (*ibid.* at 7).

In her assessment of the expert evidence, Blake assiduously applied "the *Daubert* factors" (*Newman* 2002 at 11) to the evidence proffered by Newman's epidemiological and oncological expert, Lennart Hardell. Hardell has published numerous studies on cancer epidemiology and is Professor of Oncology at the University Hospital in Orebro, Sweden. The judge acknowledged that Hardell held relevant qualifications, but would only allow him to testify "if those opinions otherwise satisfy the *Daubert* standards" (*ibid.* at 7). Blake determined that Hardell's evidence did not satisfy the standards required by *Daubert*.

Hardell sought to support his expert opinion with a number of his own epidemiological studies which, he claimed, showed an association between the development of malignant brain tumors and "ipsilateral" phone use (tumors appearing on the same side of the head as reported phone use). Two of Hardell's most important papers detailing these claims were published in peer-reviewed journals during 2002. Though, at the time of the *Daubert*

hearing these papers were still under review. Citing *Daubert*, Blake attached significance to the fact that neither paper had yet been accepted for publication. Denying the plaintiff's motion to "seal" (or privilege) documents relating to the peer review of Hardell's submissions (with the exception of the peer review comments themselves), Blake undertook an assessment of the correspondence between Hardell and the editors of scientific journals. Blake placed emphasis on the fact that one of Hardell's manuscripts had been rejected by the leading British medical journal, *The Lancet*, "based on substantial criticism by the peer reviewers, including concerns about the 'large confidence intervals' and that 'the overall message of the paper was written much too forcefully'" (*Newman* 2002 at 11). That paper was subsequently published in the *European Journal of Cancer Prevention*. Blake noted that the paper had been accepted after the journal had received only two of three referee reports it had solicited. The editorial correspondence around the other paper, subsequently published in the *International Journal of Radiation Biology*, was also scrutinized. Blake quotes the editor, who indicated that: "never before have we accepted a paper in the face of such low scores by referees" (*ibid.* at 12).

While limits to peer review have been widely acknowledged, Blake's skepticism and forensic investigation of the correspondence between Hardell and various journal editors places her judgment on what might appear to be a scientifically unaccountable basis. In a discussion of problems with the "use and abuse" of research subpoenas and judicial misconceptions of the role of scientific peer review Sheila Jasanoff explained that:

[s]cientific peer review is likely to differ markedly in its objectives and impact from review carried out by an expert in a litigation context. In legal review, the goal is neither to make good work better nor to retrieve what might be of value from work of lesser significance. It is instead, to seek to aggressively as possible discredit the proffered evidence and to deploy in the process all the skeptical resources that experts specifically engage for this purpose can muster. (*Jasanoff* 1996: 113–14)

Having challenged the circumstances surrounding the publication of Hardell's work, Blake continued the critical assessment of Hardell's claims: "The fact of publication, of course, does not eliminate the need to examine the results and methodology of the study, keeping the inquiry focused on relevance and validity as it relates to the causation opinions offered in this case" (*Newman* 2002 at 12). Blake criticized Hardell's "methodology", highlighting: problems of recall bias; lack of a demonstrated dose-response relationship; the relationship of ipsilateral causation to general causation; problems with sub-group comparisons; and lastly, the reliance on a methodology for testing laterality, that "has not been used by any other scientist proffered to the court . . . nor . . . been replicated" (*ibid.* at 14).

Furthermore, Blake's references to testing and replication provide a good example of the flexible ways ideal images of the scientific method can be used in legal settings to help deconstruct or marginalize particular forms of

expertise. For example, Blake suggested that Hardell's work had not been replicated because "[t]he Inskip and Muscat studies [two alternative epidemiological studies] which tested laterality by other means and admittedly with a smaller number of people do not show increased risk" (ibid. at 14).

Sociologists of science, most notably Harry Collins, have provided detailed accounts of how the meaning and interpretation of an experimental replication are highly negotiable and often controversial (Collins 1985). Blake engages in precisely this kind of interpretive exercise when she accords a sufficient degree of similarity to all of the epidemiological studies in question which allows them to be characterized as a failure to replicate Hardell's findings. Notwithstanding this view, it would have been open to Blake to dismiss Hardell's work even if the Inskip and Muscat studies had supported his findings. The studies could have been distinguished, drawing upon Blake's categories, on the grounds that they tested laterality "by other means" and with a "smaller number of people."

Blake's critiques of the testing and replication also demonstrate the way post-*Daubert* visions of science, coupled with a tough gatekeeping ethos, can be used to restrict the entry of (novel) scientific claims. One of the general features of the mobile-telephone health debate (and no doubt many other controversies around uncertain risks to health) has been the difficulty in achieving standardization of study methodologies and establishing what types of scientific studies should be accorded weight in ascertaining causation (Berger 1997; Edmond & Mercer 2000; Mercer 2002; Miller 2003). While simplistic images of the sciences are *de rigueur* in legal formulations and contexts (exemplified in *Daubert*), "real world" science is considerably more complex. Current research into the health effects of mobile telephones exemplifies this complexity in a manner that might inform our understanding of Blake's *Newman* decision.

The World Health Organization (WHO) is currently running an international epidemiological study examining the medical records of cancer patients while endeavoring to establish their past mobile-telephone use. Whatever its findings, this study will be vulnerable to future legal/methodological deconstruction by claims that its results embody an unscientific recall bias. The study's *retrospective* approach has already encountered criticism from epidemiologists who favor *prospective* methods. Prospective methods tend to start by monitoring phone use and then track future health outcomes. Prospective studies, interestingly, have limited relevance to current mobile-phone tort litigation (or regulation) as they often take decades to complete. Furthermore, even if prospective studies did indicate a *positive* correlation between adverse health effects and mobile phone use they may be vulnerable to challenge unless (future) plaintiffs can identify physical causal mechanisms that explain why mobile phones appear to be harmful. The debate over possible causal mechanisms for mobile telephone health problems also suffers from entrenched theoretical disagreements, and a lack of acceptance around protocols for experimental work (Stewart 2000;

Swicord 2003). Somewhat ironically, these entrenched theoretical disagreements are some of the factors originally motivating policymakers, such as the WHO, to oversee the retrospective epidemiological studies (Graham-Rowe 2003).

The extended gatekeeping undertaken by Blake in *Newman* illustrates how *Daubert*-inspired quests to establish scientific truth at the pre-trial stage of litigation may assist in discouraging ongoing legal scrutiny of intransigent scientific controversies involving uncertain risks. At this juncture we intend to shift our analysis to assess the impact of such extended gatekeeping on civil litigation more generally. This will act as a prelude to an examination of some of the possible reasons for critical readings of the litigation landscape and the emergence of an *exclusionary ethos* among trial and appellate judges.

IV. BROADER IMPACTS OF *DAUBERT*: JUDICIAL SURVEYS

In the decade since *Daubert*, only a handful of empirical studies have examined its impacts. Two surveys, in particular, are instructive for obtaining some sense of civil litigation trends in the federal courts. The first, conducted for the Rand Corporation by Dixon and Gill, provides quantitative support for *Daubert's* exclusionary impact (Dixon & Gill 2000: 19–20). This survey compared approximately four hundred pre- and post-*Daubert* opinions (between January 1980 and June 1999) from federal cases involving expert evidence. Dixon and Gill reported that after *Daubert*, expert evidence was more regularly contested and more frequently excluded. After *Daubert general acceptance* persisted as an important barrier to admission, but judges incorporated additional admissibility criteria which included the consideration of theories, methods, and the qualifications of experts (Bernstein 1996, 2001; Dixon & Gill 2001: xiii).

These findings are consistent with a survey conducted for the Federal Judicial Center by Krafska et al. (2002). Krafska et al. compared three surveys, two of federal judges in 1991 and 1998, and a survey of attorneys in 1999. According to the authors, the surveys suggest that judges were more likely to scrutinize, limit, and exclude expert testimony before trial in 1998 than in 1991. Before *Daubert* (1993), judges reported that they had excluded or limited some of the expert testimony in 25 percent of cases. This figure had risen to 41 percent by 1998. Krafska et al. explain that this finding may understate the exclusionary effect of *Daubert*, as the survey did not include cases where all expert testimony was ruled inadmissible (Krafska et al. 2002: 15). Another difference between 1991 and 1998 was the prevalence of pre-trial hearings (now called *Daubert* hearings) on the admissibility of expert evidence. In 1991, only 51 percent of judges reported using pre-trial hearings, and 13 percent of these were limited to cases with complicated scientific or technical evidence. By 1998, in contrast, 77 percent of judges reported

using pre-trial admissibility hearings (Krafka et al. 2002: 20). Most attorneys reported that they had altered their post-*Daubert* practices: 48 percent scrutinized their own experts more carefully; 41 percent said they were more likely to object to the admissibility of opposing expert testimony at trial; and 24 percent make more motions for summary judgment (ibid. 23). While Krafka et al. believe their survey identifies an exclusionary effect that can be linked to *Daubert*, they reported that judicial explanations for excluding evidence did not vary markedly over the decade. The most frequent reference to a criterion that could be specifically linked to *Daubert* was the rejection of evidence, by 18 percent of judges in 1998, on the basis that the principles and methods underlying the expert's testimony were unreliable (ibid. 16). This observation is consistent with our contention, developed below, that over time, the more specialized *Daubert* indicia, like falsification, error rates and peer review, are being transformed into simplified and legally tractable *folk epistemologies*. These epistemologies emphasize the importance of "testing" and "mainstream science" and draw upon legal rather than formal philosophical authority (Edmond & Mercer 2002).

V. CONVERGENCES IN JUDICIAL AND CORPORATE ATTITUDES

A. CONSERVATIVE THINK TANKS

The results of empirical surveys can be assessed against, and partially explained by, the activities of a variety of interest groups: most notably corporate-sponsored think tanks. A number of politically conservative think tanks have persistently claimed responsibility for the exclusionary orientation affirmed by *Daubert*. In particular the Atlantic Legal Foundation (ALF) and the Manhattan Institute both claim to have directly influenced evidence jurisprudence in the U.S.

The ALF and Manhattan Institute are engaged in a range of activities including the promotion of law reform and the submission of amicus curiae briefs. The ALF, for example, promotes itself as "a non-profit public interest law firm advocating traditional American values in the courts" with the aim of "redressing the bias against big business which manifests itself in favor of narrow 'consumer' or 'environmental concerns'" (ALF 1999: 1; Olson 1991, 2003). The list of benefactors, members, award recipients, and endorsees of the ALF and the Manhattan Institute reads like a "who's who" of peak trade organizations, insurers, major manufacturing, and pharmaceutical corporations. These are precisely the type of organizations widely perceived to benefit from stricter admissibility thresholds and a reduction in civil litigation.

The ALF submitted amicus briefs in *Daubert*, *Joiner*, and *Kumho*. The brief in *Daubert*, endorsed by eighteen scientists – including six Nobel laureates,

emphasized the importance of publication, peer review, and referred to testing: citing the work of Popper (*Brief of Bloembergen et al.* at 3). The briefs submitted in *Joiner* and *Kumho* provide a strategic exemplification of the *Daubert* criteria, often incorporating liberal references to Popper, gate-keeping obligations, the *Daubert* judgment as well as scientific and technical evidence in favor of the corporate defendant. On the basis of such activities the ALF claims credit for the ongoing elaboration of *Daubert's* exclusionary trajectory. In its *Annual Report* (2002) the ALF explained that one of its briefs:

was cited by the appellate court in its stunning reversal of its own earlier opinion . . . In their petition for *certiorari* to the United States Supreme Court, the unsuccessful plaintiffs attributed the Ninth Circuit's about face to the brief "of a so called think tank called the Atlantic Legal Foundation," once again demonstrating ALF's effectiveness in promoting sound science. (Atlantic Legal Foundation 2002: 3)

Similar claims emanate from the Manhattan Institute. Their alleged impact is primarily attributed to the role of Peter Huber – a senior fellow, trained in law and engineering, attached to the Institute's "Center for Legal Policy." Huber is largely responsible for the popularization of the concept "junk science." Several of his texts, including *Galileo's Revenge: Keeping Junk Science out of the Courtroom* and *Judging Science* (with Kenneth Foster – an associate with the ALF) have been widely cited by commentators and judges.

While claims about the influence of think tanks may represent examples of institutional self-promotion, bravado, and hubris, the association of a more exclusionary ethos with post-*Daubert* evidence jurisprudence is consistent with the emerging empirical evidence and the role of think tanks in (*informal*) judicial education.

In a recent public address, Larry Mone, president of the Manhattan Institute, listed the Institute's success with "legal reform," alongside welfare reform and the implementation of anti-crime policies in New York, as one of its three main achievements. Mone's account of legal reform is illuminating. In addition to aggressive publishing campaigns and financial support for Huber's writings, the Manhattan Institute sponsored judicial forums:

We took Peter around the country, and hosted a series of judicial forums with both federal and state court judges who were the key decision makers in shaping what was valid scientific testimony. He sat down to dinner with the judges and explained his point of view . . . and as they became more aware, the system became more rigorous. Some key court decisions imposed higher standards for scientific testimony. In particular the 1993 Supreme Court decision in *Daubert* versus Dow Corning [sic], which cited Peter's book [*Galileo's Revenge*] instructed lower courts to eliminate mere speculation posing as science. (Foster & Huber 1997; Mone 2002; Solomon 1998)

The Manhattan Institute is not alone in disseminating its message among the judiciary via educational seminars. The role of corporate-sponsored

organizations in promoting politically conservative viewpoints has been considered by the Community Rights Counsel (CRC). The CRC is a Washington-based public interest law firm ostensibly committed to defending environmental laws against corporate attempts at deregulation. One of its recent reports provides a detailed account of the role played by privately sponsored judicial education programs in promoting “corporate friendly” views of risk, public health, and environmental litigation (Kendall 2000; Miltenberg 2001).

One factor that may help to explain widespread judicial acceptance of a range of problems attributed to “junk science” is the manner in which organizations such as the ALF and Manhattan Institute (and groups identified by the CRC) packaged their perspectives of the legal landscape and marketed reform implications. The ALF and Manhattan Institute seem to have developed simplistic images of science designed to be digested and mobilized by judges (and the media). For example, judges are encouraged to become conversant with bowdlerized versions of falsification. Longstanding and extensive philosophical critiques are either ignored or trivialized. Concerns about the need for judges to become amateur scientists (or, more appropriately, philosophers of science), echoed by Rehnquist CJ in *Daubert*, are glossed over. The practical demands of judging merge falsification with testing and other indicia as part of a common sense, efficacious, positivist “tool kit” (Lynch 1998; Wynne 1989).

Huber articulates this pragmatic mix of positivism, legalism, and “common sense” in *Galileo’s Revenge*:

With or without a philosophically certain demarcation between science and pseudoscience, courts are still going to issue certain judgments. *Judging is the ultimate exercise in positivism*, a faith in facts strong enough to justify transferring fortunes, ruining reputations, and putting people to death. Anyone who does that for a living has a moral obligation to maintain faith in external, discoverable truth. Those who can’t should practice their uncontained credulity elsewhere. (Huber 1991: 223, emphasis added)

A conspicuous feature of the “junk science” polemic has been the claim that criticism of new technologies, concern with technological risk, and scientific uncertainties represent paranoia predicated upon ignorance (Park 2000). According to these corporate voices, the model of science espoused in *Daubert* provides a straightforward means of determining the validity of expertise and risk (Edmond & Mercer 1998, 1999).

B. AMICUS CURIAE BRIEFS IN *KUMHO*

As indicated, one of the ways in which interest groups, such as think tanks, endeavor to influence courts and public policy debates is through the production and submission of amicus curiae briefs. These briefs provide a particularly fertile resource for examining the aspirations of interests groups. The briefs submitted in *Kumho* contain an illuminating set of claims which

provide some indication of convergence between corporate interests and Supreme Court jurisprudence. These briefs can be divided into roughly two groups: those in support of the petitioners (Kumho Tire Co.) and those in support of respondents (the Carmichaels, who were also the plaintiffs). As a generalization, those in support of the petitioners represent industrial/commercial/state/scientific organizations and those in support of the respondents represent plaintiff organizations/trial lawyers and legal academics. The ALF was among the amici in support of Kumho Tire Co.

In the context of the *Kumho* case, the arguments of the various amici tend to be quite revealing. Remembering that the *Kumho* appeal was concerned with whether the *Daubert* criteria should be applied to non-scientific forms of expert evidence, petitioners tended to champion the extension of *Daubert*. These amici, especially the industrial and commercial organizations, were apprehensive that the advantages conferred by *Daubert* and *Joiner* would be eviscerated if the *Daubert* gatekeeping obligation was not extended to other forms of expertise. The following extract is taken from the brief supported by the ALF:

The major lesson of *Daubert* is that the district courts must act as “gatekeepers” to ensure the “reliability” of expert testimony submitted to the jury . . . Rule 702’s “knowledge” requirement “connotes more than subjective belief or unsupported speculation.” . . . The criteria enumerated in *Daubert* were merely hallmarks of “good science.” When dealing with the field of engineering or other technical disciplines, one or more of the *Daubert* criteria may not be appropriate, but some of the *Daubert* tests and perhaps other criteria should be applied. (*Brief of Bobo et al.* at 14)

Here, the preferred admissibility standard is deliberately inflected with post-*Daubert* judicial practice perceived as advantageous. The ALF submission emphasizes “reliability,” the importance of gatekeeping, and recognizes the potential for some flexibility in the application of the *Daubert* criteria. Anxious that the Court might not extend *Daubert* to non-scientific testimony, other amici hedged their bets, expressing a preference for the return of *Frye* over any new or more liberal admissibility standard.

In contrast, most legal academics, trial lawyers, and plaintiff organizations stressed the need for liberal admissibility standards, which were linked back to the enactment of the FRE, as explained in *Daubert*:

Yet given that this Court in *Daubert* overruled *Frye*, expressly urging a more liberal allowance of expert testimony than had previously prevailed, it is instructive to look at whether the testimony of Dennis Carlson, the expert in this case, would have been permitted in the *Frye* era (*Brief of Trial Lawyers for Public Justice* at 14; *Brief of The National Academy of Forensic Engineers* at 19)

Judicial commitment to liberal admissibility standards was on the wane and defendants secured another victory. The Court explained, recognizing the need for flexibility and judicial discretion, that the *Daubert* criteria *may* be applied to non-scientific forms of expertise. The language and outcome of the *Kumho* decision resonate with the articulated concerns of many large

corporations and peak professional bodies, as expressed in their briefs and public lobbying.

C. *DAUBERT*, EMF AND THINK TANKS: *COVALT V SAN DIEGO GAS & ELECTRICITY CO.*

A more elaborate example of the exclusionary effects of post-*Daubert* jurisprudence on toxic torts and their links to corporate lobbying can be drawn from EMF litigation during the 1990s (Depew 1994; Mercer 2002; Walsh, Wilson & Kauffman 1997). From the late 1980s, a number of scientific studies emerged suggesting a possible link between exposure to EMFs (generally associated with high-voltage power lines and other electricity infrastructure) and increased risks of cancer, especially childhood leukemia (Neutra, DelPizzo & Lee 2002). Several commentators speculated on whether EMF would become the next major toxic tort (Gerjuoy 1994). In *Covalt v San Diego Gas & Electric Co.* the Supreme Court of California considered plaintiffs' claims for loss of property value and fear of health risks resulting from exposure to EMF. Because a number of other EMF cases involving property devaluation and personal injury claims were, at that time, pending, *Covalt* became something of a test case (Slesin 1995).

The case attracted a number of amicus briefs in favor of San Diego Gas & Electricity (SDGE), including a brief filed by the ALF. The *Covalt* brief was the first of a number filed by the foundation in EMF cases (Wilson 2003). For the purposes of this discussion, one of the most significant features of the case was the way in which the ALF brief integrated strict standards for the admissibility of scientific evidence with an hybridized version of scientific and legal authority. The purview of *Daubert* was extended beyond pragmatic questions of admissibility to assessments of scientific truth.

The ALF brief offered a compressed review of EMF science designed primarily to impugn the significance of positive epidemiological evidence and the inability to explain several studies using physical causal mechanisms. The brief relied on the well-known Bradford Hill criteria – for assessing the reliability of epidemiological studies – integrated with the legal-scientific authority of *Daubert*:

Hill also mentions, under this heading [attribute 7] coherence with laboratory experiments on animals and *in vitro*. Many experiments on the effect of electromagnetic fields have been quoted as evidence that low intensity magnetic fields cause effects in biological systems. It has been suggested that the experiments on calcium efflux on chicken brains substantiate the epidemiological results. There are two problems with such a statement. Firstly the results of these efflux experiments have not been closely similar when repeated, so that the ordinary scientific concept of *repeatability*, which can and should be applied to laboratory experiments and which is closely connected with factor (3) on the United States Supreme Court's list of criteria in *Daubert v. Merrell Dow Pharmaceuticals, Inc.* . . . is not satisfied. (*Brief of Adair et al.* at 6, emphasis in original)

Expressly approving the ALF brief, Justice Stanley Mosk dismissed the Covalts' actions. Subsequently, several commentators have described the case as an example of *Daubert* triumphing over "junk science."² Typically, these accounts do not refer to the socio-legal context of the litigation or the ALF's allegiances. The ALF expressed few reservations in its own assessment of influence:

In 1990 it was estimated that these claims [that EMF causes leukemia or brain cancer] had already cost the United States a billion dollars as utility companies buried and rerouted power lines, and fended off law suits. Many law suits were instituted. The Atlantic Legal Foundation, representing a number of distinguished amici in each case, filed briefs of amicus curiae in several key cases. The most crucial was before the supreme court of California where a Mr Covalt had sued San Diego Power and Light Company. The case was dismissed in this court. Mr Ford's case in a lower California Court was rejected on appeal. No legal case claiming an effect has ever survived appeal. *ALF believes that was largely due to its activities.* (Wilson 2003: 3, emphasis added)

Robert Park, of the American Physical Society, associate of the ALF and one of the signatories to the *Covalt* brief, provides a commentary on the *Covalt* judgment in his popular book *Voodoo Science*:

Citing the U.S. Supreme Court decision in *Daubert v. Merrell Dow*, the California Supreme Court assumed the gatekeeper role and undertook its own thorough review of the science. (Park 2000: 167–68)

In his account of the litigation, Park contends that the brief gained authority because it represented objective consensus science: "none of us [signatories to the ALF brief] had any conceivable connection to the power industry" (Park 2000: 168). Park does not mention the ALF's broader political objectives as an advocate for industry nor the ALF's lobbying strategies. In a commentary on the ALF in the EMF newsletter, *Microwave News*, editor Louis Slesin records that one of the co-signatories and organizers of the brief, physicist Richard Wilson from Harvard University, had forwarded numerous letters attached to drafts of the brief to electrical utilities seeking financial donations to support the ALF's EMF campaign (Slesin 1995).

D. AUTHORITY AND THE SOCIAL SCIENCES

Another way of gauging the impact of *Daubert* is by examining references to non-legal literatures as forms of authority in federal jurisprudence. Using the WESTLAW database we searched for references in federal court judgments to eminent scholars (more than a hundred) from the history, philosophy, and sociology of science. These were compared with references to commentators associated with think tanks, such as Peter Huber. In addition to assessing the frequency of citations the analysis considered the context and use (Edmond & Mercer 2002, n.d.). Our research suggests that federal

judges prefer, and are presumably more susceptible to, the work of polemicists and proponents of reform than more serious scholarly endeavors. While the philosophy of Popper and the sociology of Jasanoff were cited authoritatively in *Daubert* (see criteria [1] and [2] above), the “junk science” polemic and “folk versions” of Popper promoted by Huber appear to have received more sustained judicial attention.

In federal court judgments following *Daubert*, citations of Popper have an identifiable trajectory (Edmond & Mercer 2002). In the immediate aftermath of *Daubert*, Popper received a few direct citations in judgments emphasizing the importance of “testing.” Gradually these direct citations diminish. They are replaced by references to “testing” which rely on legal rather than philosophical authority. Popper’s entry into jurisprudence may have helped legitimize “testing” and the *Daubert* approach to admissibility. Continued reliance on Popper, however, may have required judges to acknowledge the practical and philosophical complexities of setting strict demarcation criteria between science and non-science (or “junk science”). Consequently, in post-*Daubert* jurisprudence, simplified, or *folk*, epistemologies of testing have developed. These folk epistemologies have converted testing into a jurisprudential category. That conversion has displaced testing from its philosophical origins and conferred considerable discretion upon the judiciary. Judges can apply testing selectively: they are able to apply strict versions to the evidence in toxic tort litigation and weaker versions in policy-sensitive areas such as the forensic sciences (Nordberg 2003).

Sheila Jasanoff is one of America’s leading academic commentators on law and science. Apart from the rather superficial reference she receives in *Daubert* – expressing reservations about peer review – her ideas have not been recognized, let alone embraced by the federal judiciary (Edmond & Mercer 2004; Kroll-Smith & Jenkins 1996). Most judges use peer review and publication in the way they employ testing: as a presumptive test of reliability. Even where judges refer to limitations with peer review and publication they frequently exclude the plaintiffs’ non-reviewed or non-published expert evidence and frequently admit the state’s non-reviewed (or tested) forensic science.

Over time references to Popper, Jasanoff, and the qualifications incorporated with the *Daubert* criteria have been effaced. In *Kumho* the first two criteria were cited as *legal* authority exactly as they appear below:

- Whether a “theory or technique . . . can be (and has been) tested”;
- Whether it “has been subjected to peer review and publication”. . . . (*Kumho* 1999 at 1175)

The first two *Daubert* criteria are now devoid of non-legal authority and qualifications.

If we consider the (apparent) influence of Huber we can contrast the proliferation of “junk science” and social problem rhetoric after *Daubert*. Huber’s writings on expertise and science have never been cited by the

Supreme Court. Nevertheless, *Galileo's Revenge* and *Judging Science* have been cited many more times by federal judges than Popper and Jasanoff combined. If we include Huber's highly inflammatory, and radically under-theorized concept, "junk science," in this tally, the relative frequency of citations increases by an order of magnitude (Edmond & Mercer 2004).

Huber's description of expert evidence and admissibility decision-making may have influenced (and/or represented) the sentiments of a broad section of the federal judiciary. Concerns about "junk science" are ubiquitous in federal court judgments. They reinforce the need for vigilant gatekeeping to ensure the viability of American business and to protect the efficacy (and efficiency) of its courts.

The judicial refinement of an impoverished Popperian-inspired image of testing, the embrace of social problem rhetorics sponsored by conservative think tanks and the inability to recognize problems with the *Daubert* criteria would appear consistent with the more quantitative conclusions of the Rand and Federal Judicial Center surveys. *Daubert* and its progeny are intended, and this intention is understood by most federal courts judges to have raised the admissibility standard for expert evidence. Sources that might be used to temper the austerity of *Daubert* and post-*Daubert* jurisprudence are conspicuously absent.

VI. CONCLUSION

Despite recent claims that judges are seeing (or aspiring to see) more like experts (Jasanoff 1995, 2002), in this essay it has been our contention that in practice judicial approaches to expert evidence have tended to converge with the way corporate defendants desire the social world, including expertise, to be interpreted (Galanter 1983, 1998, 2002; Saks 1992). We would suggest that *Daubert* was intended to provide a jurisprudential platform for an exclusionary orientation, notwithstanding reference to the jury and the liberal thrust of the FRE. The selection of the *Daubert* criteria, especially testing, would seem to provide some degree of pessimism about plaintiffs, juries, and the functioning of tort and product liability law. If this exaggerates our evidence, it is less controversial to contend that the *Daubert* criteria were affirmed and extended in subsequent Supreme Court decisions. At these stages the exclusionary implications and *chilling effects* of *Daubert* could not have passed unnoticed. Even if recourse to testing in *Daubert* is considered benign, its reiteration in *Joiner* and extension to non-scientific forms of expert evidence in *Kumho* constitutes a deliberate policy choice. These observations are supported by the Court's interpretation of *Daubert*, and its progeny, in *Weisgram*. By that stage testing, along with publication and error rates (and general acceptance), had become prized weapons in the gatekeeper's armory (Berger 1997). And, as we have intimated, these legal weapons were crafted or refined in corporate foundries.

Accepting the difficulties in demonstrating judicial motivations and beliefs, we have endeavored to produce a strong circumstantial case examining the lobbying by corporate think tanks and the apparent convergence between *judicial* and *corporate* attitudes. But we should note that evidence jurisprudence is merely one dimension of the civil justice system which has gradually made it more difficult for plaintiffs to succeed in litigation. Our account of an exclusionary ethos is therefore partial. We have merely outlined the evidentiary dimensions of a more extensive process and more concerted efforts.

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NOTES

1. Rule 702 was revised in December 2000. The version extracted above is as it appeared for the *Daubert* appeal. Rule 702 may operate in conjunction with several other rules, including Rules 104(a), 402, 403, 703.
2. While the major proponents of restrictive models of science and the rigorous application of admissibility criteria have been corporate groups intent on restricting the scope of tort and product liability claims, a number of other actors and commentators, not necessarily sharing the same ideological proclivities, have enthusiastically encouraged (or embraced) the reforms associated with *Daubert*. (We would include many judges and legal commentators in this group.) These actors and commentators have promoted *Daubert* as vehicle capable of addressing concerns about liberal admissibility standards – such as weak formulations of *Frye* – permitting "fringe" or "weak" (or "junk") scientific claims to be heard by courts and to produce legal outcomes which are apparently inconsistent with those dictated by "mainstream" science. In this sense, advocates of "mainstream" science may have, along with corporations and corporate-sponsored NGOs, interpreted or promoted *Daubert* and its exclusionary trajectory as necessary reforms.

In making this claim we would contend that categories like "mainstream" and "weak" (and "junk") science are not static, nor always obvious and uncontested (Gieryn 1998; Edmond & Mercer 1998). In the past, the attempt strictly to delimit the "essence of science" has encouraged "fringe" groups like creation scientists to endeavor to reconcile their knowledge claims to versions of falsification, and embark on processes of publication and peer review. While we do not endorse creation science, these responses demonstrate that attempts to

demarcate between “good” and “bad” science, on the basis of established criteria, are not always as simple as they might appear in the abstract (Quinn 1984). Perhaps a more challenging contemporary example involves the way some forensic sciences, like fingerprinting, which were once viewed as (the epitome of) “mainstream” now appear “weaker” in the wake of *Daubert* (Cole 2001). Changed legal definitions of science and expertise have required expert communities, especially those like fingerprint examiners who expect (and want) their knowledge to have ongoing legal significance, to endeavor to repackage their evidence in ways designed to satisfy the expectations raised by *Daubert* and *Kumho*. These tendencies raise a number of novel political issues, including the way expert groups mobilize outside courtrooms and, with regard to practice, the manner in which the *Daubert* criteria (as surrogates for “mainstream” science) seem to be applied more stringently to the evidence proffered by plaintiffs in civil litigation than the state’s forensic evidence in criminal prosecutions. In practice, many judges appear reluctant to extend fully the *Daubert* criteria to exclude fingerprinting identification on the basis of untested assumptions or questionable processes of peer review. A broader analysis of the effects of *Daubert* across all of the sciences and its possible effect on what is considered “marginal” and “fringe” scientific practices is, however, beyond the scope of this article.

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