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The Curious Case of Differing Literary Emphases: The Contrast Between the Use of Scientific Publications at Pretrial Daubert Hearings and at Trial

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THE CURIOUS CASE OF DIFFERING LITERARY EMPHASES: THE CONTRAST BETWEEN THE USE OF SCIENTIFIC PUBLICATIONS AT PRETRIAL *DAUBERT* HEARINGS AND AT TRIAL

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I. INTRODUCTION

American courtrooms are awash in experts. It has been remarked that courtroom trials have become trial by expert.[1] The array of expert and technical services available to the nation's lawyers is staggering. A recent expert witness directory circulated to attorneys lists over 1,200 expert witnesses indexed by over 7,000 categories.[2] The back pages of lawyer magazines are filled with advertisements and listings for technical services, with experts ranging from standard professional fields to the innovative and exotic.[3] Trial judges face the task of determining which experts may testify at trial.[4]

There is not only a large number of experts available to litigants but also a large body of scientific literature experts may draw upon to support their testimony. One commentator observes that "the volume of expert literature is awesome."[5] He states:

> Even apart from the number of published texts and treatises devoted to expert topics, the regular periodicals dealing with such subjects now number in the thousands. The National Institutes of Health's Library of Medicine covers thousands of biomedical journals dating back to 1948. The Library includes *Index Medicus*, a database indexing domestic as well as international medical literature; 4,945 journals are currently indexed in *Medicus*.[6]

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[1] Edward J. Imwinkelried, *Rationalization and Limitation: The Use of Learned Treatises To Impeach Opposing Expert Witnesses*, 36 VT. L. REV. 63, 63 (2011).

[2] Seak 2013 Expert Witness Directory (2013), *available at* http://www.seakexperts.com/content/expertdirectory.pdf.

[3] Brian Benner & Ronald Carlson, *The Literary Arm of Michigan's Daubert Rule*, MICH. BAR J. 24, 24 (May 2012).

[4] JOHN B. MITCHELL & RICK T. BARRON, SKILLS AND VALUES: EVIDENCE 77 (2009) ("[I]n addition to the list of 'non-exclusive' factors specifically noted in *Daubert*—i.e. ability to test for accuracy, known error rate, any peer journaled review, evidence of standards, and 'general acceptance,' . . . courts have looked at [other features as well].").

[5] Imwinkelried, *supra* note 1, at 63.

[6] *Id.*

Just as they must decide which witnesses qualify as experts, judges must decide which texts and periodicals these experts may cite during their testimony to solidify their opinions.

Of course, in modern litigation the proponent of expert testimony must often present the expert's testimony at two different hearings: a pretrial *Daubert* hearing determining the threshold question of the admissibility of the expert's testimony and again at the trial on the merits. Initially, one might suppose that the proponent would generally make the same presentation at both hearings. More specifically, one might assume that if the expert relied on a text at the pretrial hearing, the expert's proponent would want the expert to cite the same material at the subsequent trial. As a trial practice professor, I have frequent occasion to consult with practicing litigators. Although my occasional conversations hardly amount to a systematic empirical study, those conversations lead me to believe that even litigators who make extensive use of scientific literature at pretrial hearings rarely resort to that material during the trial on the merits. That observation raises a key question. What explains the phenomenon that experts and their proponents make much less use of scientific texts and periodicals at the subsequent trial?

The first part of this Article focuses on the pretrial *Daubert* hearing. Although neither the Federal Rules of Evidence nor the Supreme Court mandate that judges rule on the admissibility of expert testimony before trial, judges often conduct such hearings. That practice is sensible as well as understandable. Suppose, for instance, that in a toxic tort case the judge conducts a hearing to determine the admissibility of the plaintiff's expert evidence regarding general causation. If the judge bars the evidence after a one-day hearing, the plaintiff's case will probably be disposed of by summary judgment, and the court may have avoided a two-week trial. Modernly, in federal court and a majority of the states, the judge's pretrial admissibility ruling will be governed by some variation of the Supreme Court's 1993 *Daubert* decision. In that decision, the Court announced that to be admissible, expert testimony must qualify as reliable "scientific . . . knowledge"

within the meaning of that expression in Rule 702.[7] The Court defined science in a methodological fashion and indicated that the proponent must establish that the proponent's expert's theory is supported by adequate, methodologically sound empirical reasoning and data.[8] The Court then provided a nonexclusive list of factors[9] that the judge should consider in determining whether the expert has provided enough validation for the expert's general theory or technique. One of those factors is whether there is published support for an expert's methodology.[10] As will become apparent, this factor explains in part why proponents use scientific literature so extensively at the pretrial hearing.

Part II of this Article will explain that it is easy for proponents to use scientific publications at the *Daubert* hearing and that the published opinions make it imperative for proponents to submit such publications at that stage in the proceeding. The second part of this Article turns to the related question of the use of such publications at the subsequent trial on the merits. If the judge, acting as gatekeeper, rules that the proponent's expert testimony is admissible, the proponent may submit the testimony to the trier of fact at the later trial. However, scientific literature is used much less extensively at the trial stage. Part III attempts to account for this phenomenon. Part III explains that the evidentiary rules in force at the final trial make it much more difficult to introduce the publications at this stage. Part II adds that, as a matter of trial advocacy, it is often counterproductive for the litigator to present the jury with the same detailed presentation submitted at the pretrial *Daubert* hearing. Those considerations, described in Part III, account for the much more sparing use of scientific publications during trial.

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[7] Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 580 (1993).

[8] *Id.*

[9] *Id.* at 592–95.

[10] *Id.* at 593.

II. THE PRETRIAL *DAUBERT* HEARING

An opponent's in limine motion raising a *Daubert* challenge is the most common reason for the judge to calendar a pretrial hearing on the admissibility of the proponent's expert testimony. These proceedings are often referred to as "*Daubert* hearings" because the opponent contends that that the proponent cannot lay an adequate foundation to satisfy *Daubert*'s prescriptions. As the introduction noted, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court announced that the test for the admissibility of purportedly scientific evidence is whether the underlying methodology has been empirically validated.[11] The Court not only imposed that foundational requirement on the proponent of the testimony; it also prescribed a gatekeeping role for the trial judge.[12] "The Court instructed trial judges to consider such factors as whether the proposition is testable, whether it has been tested, whether there is a known margin of error, and whether the research has been subject to peer review."[13] The last factor, peer review, has received substantial attention in the published opinions.[14]

Of course, the Court's mere mention of the peer-review factor counsels litigators to pay attention to it. However, several other considerations have prompted both litigators and judges to pay special attention to that factor. One is that at the pretrial hearing, relaxed evidentiary rules make it very easy for the proponent to introduce peer-reviewed publications. In his opinion in *Daubert*, Justice Blackmun specifically stated that the judge's ruling is governed by the preliminary fact-finding procedure codified in Federal Rule of Evidence 104(a).[15] Restyled Federal Rule of Evidence 104(a) reads:

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[11] *Id.* at 590.

[12] *Id.* at 592–93.

[13] MYRON H. BRIGHT, RONALD L. CARLSON & EDWARD J. IMWINKELRIED, OBJECTIONS AT TRIAL 74 (5th ed. 2008).

[14] *See, e.g.*, HNTB Ga., Inc. v. Hamilton–King, 697 S.E.2d 770, 774 (Ga. 2010) (holding that an expert's testimony failed to satisfy *Daubert* and emphasizing that expert could not cite any other publication to support his opinion).

[15] 509 U.S. at 592.

> The court must decide any preliminary question about deciding whether a witness is qualified, a privilege exists, or evidence is admissible. In so deciding, the court is not bound by evidence rules, except those on privilege.[16]

At first glance, the statute's second sentence might appear heretical—an evidence code provision dispensing with the necessity to comply with evidentiary rules. However, as the accompanying Advisory Committee Note argues, the provision is readily defensible.[17] The received orthodoxy is that the common law courts developed the technical exclusionary rules to compensate for the perceived limitations of lay jurors' competence to critically evaluate certain types of testimony. However, those concerns are irrelevant here because the judge, not the jury, makes this determination. In fact, the judge may rule pretrial before a jury has been selected. To the point, the courts have construed Rule 104(a) as meaning that the hearsay rule does not apply to foundational testimony proffered under that provision.[18] Hence, when at the *Daubert* hearing the expert's proponent invites the expert to quote a text or article supporting the expert's position, the opponent cannot object on hearsay grounds. The passage may be assertive and the proponent may be offering the passage to prove the truth of the assertion, but the hearsay objection is nonetheless unavailable at this stage. If the publication is relevant, the opponent cannot invoke the hearsay rule to block its use at the hearing.

Soon after the rendition of the *Daubert* decision, it became clear that scientific publications are highly relevant at the hearing. The

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[16] FED. R. EVID. 104(a).

[17] *See* FED. R. EVID. advisory committee's note (providing "practical necessity" as one justification for dispensing with "the exclusionary law of evidence" when courts decide preliminary questions of admissibility).

[18] *E.g.*, United States v. Moya–Matute, 735 F. Supp. 2d 1306, 1316 (D.N.M. 2008) (finding that the rules of evidence, except those with respect to privileges, do not bind the court when deciding preliminary questions relating to the admissibility of evidence); *see also* Summers v. Dretke, 431 F.3d 861, 875 (5th Cir. 2005) ("[T]he Constitution does not prevent a state court from considering possibly inadmissible evidence to determine the admissibility of other evidence.").

contents of such publications are potentially relevant to all of the factors that the *Daubert* Court tasked trial judges to consider. One factor is whether the expert's methodology has been tested.[19] A publication can document the controlled laboratory experimentation and systematic field observation conducted to test the expert's hypothesis. Another factor is whether the expert's methodology has been subjected to peer review and publication.[20] Scientific texts and articles bear directly on that factor. Still another factor is whether the technique has a known rate of error.[21] The publication may describe a study conducted for the very purpose of ascertaining the error rate. A further factor is whether the methodology enjoys general acceptance in the relevant scientific circles.[22] The publication may have introduced the hypothesis to the wider scientific community, or it may describe a later test, confirming the original research and strengthening the case for widespread acceptance of the methodology.

The proponent must do more than simply introduce scientific publications at the pretrial hearing. Two post-*Daubert* Supreme Court decisions have sent the signal that it is critical that the proponent make the strongest possible showing at the hearing. It is true that in the original 1993 *Daubert* decision, the Court described the Federal Rule provisions governing expert testimony as "liberal"[23] and "permissive."[24] However, by the time of its 2000 *Weisgram* decision, the Court had adopted a very different tone, alluding to "the exacting standards of reliability" mandated by Rule 702.[25] Moreover, in its 1997 *Joiner* decision,[26] the Court stated that the trial judge may reject the expert's *ipse dixit* as adequate validation.[27] When the expert can point to corroborative

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[19] 509 U.S. at 593.
[20] *Id.*
[21] *Id.* at 594.
[22] *Id.*
[23] *Id.* at 587, 588.
[24] *Id.* at 589.
[25] Weisgram v. Marley Co., 528 U.S. 440, 455 (2000).
[26] Gen. Elec. Co. v. Joiner, 522 U.S. 136 (1997).
[27] *Id.* at 146.

texts and articles, doing so demonstrates that the expert's position rests on more than his personal assertion. The *Joiner* Court also declared that even when the judge's ruling excludes vital evidence that the proponent needs to avoid summary judgment, the reviewing court must use the deferential "abuse of discretion" standard.[28] Together, *Weisgram* and *Joiner* sent the bar the unmistakable message that the proponent must make the strongest possible showing at the pretrial hearing. If the proponent fails to do so, the chances of obtaining relief on appeal are remote in the extreme. And, as we have seen, it is both relatively easy and highly probative for the proponent to make a powerful showing at the hearing by marshaling respected texts and articles bolstering the expert's testimony.[29]

These lessons have not been lost on the lower courts. Both the federal and state decisions bear out the critical role that the use of scientific publications can play under *Daubert* and state variations of that admissibility standard. As a practical matter, the courts often demand that the proponent present corroborative publications, and when the proponent does so, the courts closely scrutinize the contents of the publications.

A. FEDERAL OPINIONS

With great regularity, the federal courts render opinions emphasizing the need for published support for an expert's theories. The decision in *Hendrix ex rel G.P. v. Evenflo Co.*[30] is illustrative. The issue was whether a blow to the brain can cause autism. The trial court excluded a causation expert because the expert "presented no medical literature, described no relevant physiological process, and provided no other support for his conclusion that traumatic brain injury can cause autism."[31] Another expert was excluded, in part because of the court's view that the medical literature did not support his theory of

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[28] *Id.* at 143.

[29] *See supra* notes 15–18 and accompanying text.

[30] 609 F.3d 1183 (11th Cir. 2010).

[31] *Id.* at 1202–03; *see also* Benner & Carlson, *supra* note 3, at 25 (explaining the *Hendrix* court's evidentiary exclusion).

causation.[32] The court wrote: "The medical literature indicates that there are [sic] a dizzying array of other factors that have been mentioned as possible causes" of autism.[33] The focus of this court on published research is apparent.

In *Wells v. SmithKline Beecham Corp.*,[34] the Fifth Circuit struck expert testimony due to lack of support in published literature. There, the plaintiff proffered expert testimony to establish that the cause of the plaintiff's excessive gambling was ingestion of defendant's drug to treat Parkinson's disease.[35] The plaintiff was prescribed a drug called Requip, classified as a dopamine agonist. After he lost $10 million gambling during trips to Las Vegas, he told his doctor about the gambling problem. The plaintiff stopped taking Requip and apparently did not return to Las Vegas.

The plaintiff sued the drug maker, alleging that it did not warn patients about the side effect of pathological gambling. Although a scientific study called the Weintraub Poster suggested that Parkinson's patients medicated in the same fashion as the plaintiff exhibited impulsive behavior, including pathological gambling, the court decided that plaintiff's proof did not satisfy *Daubert*.[36] The court carefully dissected the study. "Perhaps Requip is a cause of problem gambling, but the scientific knowledge is not yet there."[37] In explaining its decision, the court critiqued the Weintraub study at length, engaging in a careful analysis and concluding that the proffered literary support did not adequately buttress the plaintiff's theory:

> Only one study—the Weintraub Poster—reached statistical significance. The Poster suggests that Parkinson's patients medicated with dopamine agonists exhibit increased impulsive behavior, including pathological gambling. But the study has

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[32] 609 F.3d at 1202.
[33] *Id.*
[34] 601 F.3d 375, 381 (5th Cir. 2010).
[35] *Id.* at 378.
[36] *Id.* at 381.
[37] *Id.*

> other scientific problems making it insufficient as a basis for expert opinion. First, "submission to scrutiny of the scientific community is a component of 'good science,'" but the Weintraub Poster was never peer-reviewed or published. Second, the study explains that its results "represented a class association, as opposed to a specific medication, finding." In other words, the Weintraub Poster does not report a "controlled" test for Requip, a drug that functions differently than other dopamine agonists. Finally, its authors conceded that the very "nature of the study precluded determination of causality."[38]

The federal courts emphasize scientific literature in criminal as well as civil cases. A recent federal decision from Texas barring voiceprint testimony is a case in point.[39] In criticizing voice spectrographic expert testimony, the court cited several published studies. "The studies, by different researchers, performed over decades, show that the voice spectrographic technique has been tested and found wanting in aspects critical for admission under Rule 702. The studies emphasize the subjective nature of the voice spectrographic analysis, even when combined with an aural analysis component, which is subjective."[40] The publications clearly had an impact, prompting the court to bar expert testimony based on voiceprints. "Although aspects of the voice spectrographic method have been subject to review in published studies, many of the studies conclude that voice spectrographic analysis is of questionable scientific validity as a method of identifying an unknown speaker."[41] The court granted the government's motion challenging the defense's expert proof and excluded the opinions of the voice analyst.[42]

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[38] *Id.* at 380 (citations omitted).

[39] United States v. Angleton, 269 F. Supp. 2d 892 (S.D. Tex. 2003).

[40] *Id.* at 899.

[41] *Id.*

[42] *Id.* at 905; *see also* United States v. Bahena, 223 F.3d 797, 810 (8th Cir. 2000) (approving trial court's exclusion of voice spectrography evidence from a particular expert witness); State v. Morrison, 867 So. 2d 740 (La. App. 2003) (citing uncertainty regarding the

Like the Fifth Circuit, the Eighth Circuit has recognized the relevance of published academic articles. Its decision in *United States v. Larry Reed & Sons Partnership*,[43] a case raising questions about the process of computer analysis of images, is illustrative. The government claimed that the defendants had submitted a false insurance claim for a loss of almost 200 acres of cotton. The jury found the claim violated the False Claims Act because the land in question was not planted during the year of the alleged loss.[44] The government's expert, John Brown, was prepared to testify that the cotton fields in question had not been planted. He rested his opinion on a computer analysis of satellite images.[45] To validate his scientific methodology, Brown referred to " 'hundreds and hundreds' " of academic articles published about the process, the use of this method by NASA and by major universities for the purpose of enhancing agricultural productivity, and the application of computer analysis of satellite images in assessing crop hail damage.[46] The *Reed* case demonstrates that in *Daubert* battles, scientific publications cut both ways. In the prior federal cases, the lack of supportive scientific literature played a significant role in the courts' decision to exclude. In *Reed*, the large body of supportive literature was probably the most

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reliability and admissibility of expert voice identification evidence). However, some decisions go the other way. The Alaska Supreme Court found voiceprint techniques reliable. State v. Coon, 974 P.2d 386, 402–03 (Alaska 1999). The court did so even while acknowledging that the "scientific literature cited by the [defendant] permits a conclusion that there is significant disagreement among experts in the field of voice spectrographic analysis regarding the reliability of the technique." *Id.* at 402. In addition to the publication factor, which the court considered significant, Professor Julie Seaman has suggested an added consideration. She references data that suggest that in criminal cases, controversial evidence is more likely to be admitted on behalf of the prosecution than in favor of the defense. Using handwriting identification as an example, she documents numerous cases where prosecutors successfully presented expert handwriting proof. That experience contrasts with the record of plaintiffs who offered this sort of evidence in civil cases and were effective at only a 36% rate. Julie A. Seaman, *A Tale of Two* Dauberts, 47 GA. L. REV. 889, 900–01 (2013).

[43] 280 F.3d 1212 (8th Cir. 2002).

[44] *Id.* at 1214.

[45] *Id.* at 1215.

[46] *Id.*

important factor influencing the court to admit Brown's expert testimony.

B. STATE OPINIONS

At this point, a majority of the states have opted for some variation of the *Daubert* standard.[47] Moreover, an even larger majority have adopted a provision similar to the last sentence of Federal Rule 104(a), rendering the hearsay rule inapplicable to foundational testimony proffered under that statute.[48] Given those substantive and procedural similarities, it is expectable that, like the lower federal courts, the state courts attach a good deal of significance to scientific publications in their rulings on the admissibility of scientific testimony.

Lack of published support for an expert's methodology was a major factor in the court's decision to reject a causation opinion in *Ranes v. Adams Laboratories, Inc.*[49] The plaintiff claimed that a prescription medication caused his brain injury, and an expert opined to that effect. The appeal to the Supreme Court of Iowa centered around "the admissibility of testimony from an expert witness that the injuries allegedly suffered by the plaintiff were caused" by the drug.[50] The trial court excluded the causation opinion of an expert, a specialist in toxicology who primarily practiced medicine as a pediatrician. The plaintiff appealed.

Citing the *Daubert* factors, the Iowa court tested the reliability of the evidence.[51] The decision observed that the facts of the case presented a methodology based upon "a somewhat novel scientific procedure characteristic of 'scientific knowledge.' "[52] The court stated that in drug cases, the "[f]ailure to . . . 'rule in' the defendant's drug as a cause of the injuries in a particular case is

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[47] 1 PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, SCIENTIFIC EVIDENCE §§ 1.14–.15 (4th ed. 2007) (listing states using factors and representative cases).

[48] 1 GREGORY P. JOSEPH & STEPHEN A. SALTZBURG, EVIDENCE IN AMERICA: THE FEDERAL RULES IN THE STATES § 4.2, at 1–3 (1989) (discussing state adoption of and variations on Federal Rule 104(a)).

[49] 778 N.W.2d 677 (Iowa 2010).

[50] *Id.* at 681–82.

[51] *Id.* at 686.

[52] *Id.* at 687.

commonly fatal" to the plaintiff's case.[53] The court concluded that the expert did not employ a reliable methodology in reaching his opinion that the drug was the cause of the injuries.[54] The court characterized his analysis as "inconsistent with the accepted methodology."[55] The decision underscored that the methodology the expert had used was "contrary to the methodology described by the scientific literature."[56]

Iowa is not the only state court to confront such issues. The Michigan courts have done so on several occasions. The Michigan Supreme Court analyzed a challenge to an expert in *Edry v. Adelman.*[57] The battle of the experts in *Edry* turned on a narrow but significant point: Can a cancer patient's odds of survival be correctly predicted from the number of lymph nodes to which the cancer has spread? The defendant's expect opined that a prediction on that basis is impossible and insisted that the opinion of Dr. Singer, the plaintiff's expert—that the larger the number of lymph nodes involved, the poorer the chances of survival—was not based on recognized scientific or medical knowledge.[58] When the Michigan Supreme Court reviewed the merits of the dispute in *Edry*, the court itself canvassed the peer-reviewed, published literature. The court inquired whether any textbook or journal passages supported the testimony of Dr. Singer who advocated the lymph node theory. In the court's opinion, the paucity of published research supporting the lymph node theory was fatal to Dr. Singer's theory.[59] "[I]n this case the lack of supporting literature, combined with the lack of any other form of support for Dr. Singer's opinion, renders his opinion unreliable and

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[53] *Id.* at 690.

[54] *Id.* at 695 ("Dr. Thoman's purported methodology in reaching his diagnosis was also unreliable.").

[55] *Id.* at 696.

[56] *Id.* at 697. For another authority that stresses the importance of publication, see *Fugate v. Commonwealth*, 993 S.W.2d 931, 937 (Ky. 1999) ("It is clear that the PCR method of DNA analysis has been subjected to extensive peer review. One court has estimated that over 4,000 published scientific articles exist addressing the merits of the method.").

[57] 786 N.W.2d 567 (Mich. 2010); *see* Benner & Carlson, *supra* note 3, at 24–25.

[58] 786 N.W.2d at 569.

[59] *Id.* at 570–71.

inadmissible. . . ."[60] While the *Edry* court cautioned that peer-reviewed, published literature is not always necessary to meet the requirements of the expert evidence rules, in this case the lack of supporting literature was critical. The court observed:

> Here, Dr. Singer's testimony failed to meet the cornerstone requirements of MRE 702. Dr. Singer's opinion was not based on reliable principles or methods; his testimony was contradicted by both the defendant's oncology expert's opinion and the published literature on the subject that was admitted into evidence, which even Dr. Singer acknowledged as authoritative. Moreover, no literature was admitted into evidence that supported Dr. Singer's testimony. Although he made general references to textbooks and journals during his deposition, plaintiff failed to produce that literature, even after the court provided plaintiff a sufficient opportunity to do so. Plaintiff eventually provided some literature in support of Dr. Singer's opinion in her motion to set aside the trial court's order, but the material consisted only of printouts from publicly accessible websites that provided general statistics about survival rates of breast cancer patients. The fact that material is publicly available on the Internet is not, alone, an indication that it is unreliable, but these materials were not peer-reviewed and did not directly support Dr. Singer's testimony.[61]

A year later in *Krohn v. Home-Owners Ins. Co.*,[62] the Michigan Supreme Court revisited the topic. *Krohn* involved an experimental surgical procedure. The plaintiff had suffered a severe spinal fracture in a two-vehicle collision. He filed an action against his no-fault insurer to recover for surgical benefits. A

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[60] *Id.* at 571.

[61] *Id.* at 570 (footnote omitted).

[62] 802 N.W.2d 281 (Mich. 2011).

medical expert for the plaintiff claimed that the experimental procedure was reasonably necessary. However, the court faulted the medical evidence offered to support the claim. "Whatever research [the doctor] may have conducted, it was unsupported by any controlled studies, it had not been subjected to peer review, and the medical evidence had not been debated in scholarly publications."[63] In the court's assessment, the expert testimony failed to provide an objective basis by which a jury could conclude that the experimental surgical procedure was reasonably necessary for plaintiff's care and recovery.[64]

Like the Michigan and Iowa courts, Georgia courts have addressed the issue. When Georgia recently installed the new Georgia Code of Evidence, it retained for civil cases an admissibility test similar to *Daubert*.[65] In a 2010 Georgia case, *HNTB Georgia Inc. v. Hamilton–King*, the testimony of an engineering expert was excluded due to the lack of support in peer-reviewed and published scholarship for his theories.[66] The expert had stated that a construction design plan was flawed, leading to injuries. The trial judge specifically noted the engineer's "failure to cite any treatise or authority supporting his belief that . . . the construction design plan was below standard."[67]

Hamilton–King involved a serious accident on a bridge at night where people were injured and killed. A car had become disabled on the bridge, and three people exited the vehicle. A van allegedly traveling close to 70 m.p.h. on the darkened interstate highway approached the disabled car. All three people standing on the bridge were struck, and one was killed. Because the tragedy occurred in a construction zone where work was being done on the bridge, the injured plaintiffs sued the designer of the bridge-

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[63] *Id.* at 296–97.

[64] *Id.* at 296.

[65] O.C.G.A. § 24-7-702 (2013). Criminal case experts are controlled by *Harper v. State*, 292 S.E.2d 389 (Ga. 1982). *See* Williams v. State, 312 S.E.2d 40, 48 (Ga. 1983) (citing *Harper* as authority for judging scientific evidence in a criminal use). As reported in Paul S. Milich, *Georgia's New Evidence Code—An Overview*, 28 GA. ST. U. L. REV. 379, 409 (2012), there was opposition to adopting *Daubert* in criminal cases.

[66] HNTB Ga., Inc. v. Hamilton–King, 697 S.E.2d 770, 775 (Ga. 2010).

[67] *Id.* at 773.

widening project and the general contractor. One of the claims was that the defendants failed to implement proper lighting in the bridge construction zone. In addition, they alleged that the design of the construction project was faulty. The plaintiffs called an engineering expert to substantiate that allegation, and the defendants challenged the expert's proposed testimony. Ultimately, the case reached the Georgia Supreme Court. In its opinion, court took the opportunity to remind trial judges of their responsibilities under *Daubert*: "In determining the admissibility of expert testimony, the trial court acts as a gatekeeper, assessing both the witnesses' qualifications to testify in a particular area of expertise and the relevancy and reliability of the proffered testimony."[68] The court concluded that the trial judge had acted within his discretion when he excluded the expert.[69] The court cited a prior Georgia decision, *Mason v. Home Depot U.S.A.*,[70] as authority for the principle that expert testimony based solely on the witness's personal experience and unsupported by scientific journals or reliable testing procedures does not pass muster under *Daubert*.[71]

In the very next year, another Georgia court reinforced the importance of scientific literature in *Daubert* litigation. In *Butler v. Union Carbide Corp.*, the Georgia Court of Appeals upheld a lower court decision that had barred expert opinion, holding that the expert's theory was not adequately supported by scientific literature.[72] In *Butler* a plaintiff's expert advanced a theory of asbestos injury that would allow the plaintiff to recover. In sustaining the trial judge's exclusion of this expert testimony, the court analyzed the scientific literature that the expert used to support the theory, reviewing his research sources one by one.[73] In each instance, the court found that the source furnished

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[68] *Id.* at 772 (citation omitted).

[69] *Id.* at 775.

[70] 658 S.E.2d 603 (Ga. 2008).

[71] *Hamilton-King*, 697 S.E.2d at 773–74. The court observed that the plaintiff's expert could not cite "any other publication, standard, statute, or regulation" requiring the use of shoulders on the roadway or lighting that the expert recommended. *Id.* at 774.

[72] 712 S.E.2d 537, 544 (Ga. Ct. App. 2011).

[73] *Id.* at 542.

inadequate support for the expert's causation theory.[74] The court concluded that even considered cumulatively, the scientific literature cited by the plaintiff's expert did not justify the admission of the expert's causation opinion.[75]

In another decision by an intermediate appellate court in Georgia, a burial expert concluded that concrete burial vaults stand up better in wet soil than steel caskets do.[76] Approving the trial judge's admission of this expert's opinion, the court observed that the expert under attack had been a funeral director and a vault manufacturer.[77] The court noted that the expert had pointed to research articles relating to the shelf life of steel vaults in marine and underground environments. The articles established the reliability of his conclusion.[78]

Cases from New York fit the same general pattern as the decisions from Iowa, Michigan, and Georgia. In *Ratner v. McNeil-PPC, Inc.*,[79] the plaintiff proffered expert testimony about a novel theory of medical causation. Plaintiff claimed that the ingestion of acetaminophen caused liver cirrhosis.[80] In barring the testimony, the court observed that

> [t]he plaintiff did not put forward any clinical or epidemiological data or peer reviewed studies showing that there is a causal link between the therapeutic use of acetaminophen and liver cirrhosis. Consequently, it was incumbent upon the plaintiff to set forth other scientific evidence based on accepted principles showing a causal link. We find that the methodology employed by the plaintiff's experts, correlating long term, therapeutic acetaminophen use to the occurrence

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[74] *Id.* at 542–43.

[75] *Id.*

[76] Savannah Cemetery Grp., Inc. v. Depue–Wilbert Vault Co., 704 S.E.2d 858, 865 (Ga. Ct. App. 2010).

[77] *Id.*

[78] *Id.* at 866.

[79] 933 N.Y.S.2d 323, 325 (N.Y. App. Div. 2011).

[80] *Id.*

> of liver cirrhosis, primarily based upon case studies, was fundamentally speculative . . . .[81]

The court concluded:

> We emphasize that when an expert seeks to introduce a novel theory of medical causation without relying on a novel test or technique, the proper inquiry begins with whether the opinion is properly founded on generally accepted methodology, rather than whether the causal theory is generally accepted in the relevant scientific community. Here, the plaintiff failed to meet that burden.[82]

III. THE SUBSEQUENT TRIAL

Suppose that after the proponent's expert cites supportive scientific publications at the pretrial hearing, the judge rules that the expert's testimony is admissible. The case proceeds to trial. Can the expert reference the same studies and research used in open court in front of the jury? At first, one might suppose that the expert should be entitled to do so and that the expert's proponent would want the expert to do so. However, as previously stated, conversations with veteran litigators lead me to believe that experts cite scientific publications at trial far less often than they quote them at the pretrial hearing. A review of the published judicial opinions tends to confirm that belief; although we see a large number of federal and state opinions mentioning the citation of scientific texts and articles at pretrial *Daubert* hearings, the cases which mention the use of learned treatises at trial under Federal Rule of Evidence 803(18) are few and far between. What could possibly account for this phenomenon? I submit that the phenomenon is explicable. To be specific, the evidentiary standards in force at trial make it more difficult for the expert to expressly rely on scientific publications, and practical trial

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[81] *Id.* at 334.
[82] *Id.*

advocacy considerations make it inadvisable to cite a large number of publications during the trial on the merits.

A. THE EVIDENTIARY RULES MAKING IT MORE DIFFICULT TO CITE SCIENTIFIC PUBLICATIONS DURING THE SUBSEQUENT TRIAL

1. Rule 104(a). As Part II noted, at the pretrial *Daubert* hearing the expert's proponent can take advantage of the last sentence in Federal Rule of Evidence 104(a). By virtue of that sentence, the proponent need not comply with the technical requirements of the hearsay rule. Thus, so long as the expert can authenticate a scientific text or article and the publication's contents are logically relevant, the trial judge will liberally allow the expert to refer to and quote from such publications. However, the proponent cannot rely on Rule 104(a) to surmount a hearsay objection during the trial on the merits. The passage in the scientific publication is ordinarily assertive under Rule 801(a), the author of the publication is an out-of-court declarant under Rule 801(b), and the proponent usually wants to put the passage to a hearsay use under Rule 801(c). A hearsay objection is not well taken at the pretrial hearing, but at the subsequent trial it can be a formidable barrier to utilizing the scientific text or article.

2. Rule 703. Pressed by a hearsay objection, the expert's proponent might turn to Federal Rule of Evidence 703. Restyled Federal Rule of Evidence 703 now reads:

> An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.

The last sentence was added in 2000. Although most states have adopted a version of Federal Rule 703,[83] to date many have yet to amend their version of the rule to incorporate the last sentence. Especially in those jurisdictions, there would appear to be a strong argument that Rule 703 allows the expert to cite during trial the same publications he relied on at the pretrial hearing. The argument runs that the scientific texts and articles are "data" that the expert may "reasonably rely on."

Although the argument initially seems plausible, ultimately such an argument rests on a flawed interpretation of the statute. Rule 703 is part of Article VII governing the admissibility of opinion testimony. It must be construed in context. As the Supreme Court has repeatedly noted, statutory interpretation is a contextual process.[84] As one commentator has explained, the key to understanding the interrelationship of the provisions in Article VII is the realization of the syllogistic structure of the typical expert's testimony.[85] Of course, an expert can be used for several purposes at trial. An expert could: (1) simply testify to observed facts under Rule 602, (2) express a lay opinion under Rule 701, or (3) give the jury an overview lecture about a theory or technique under Rule 702. However, in the vast majority of cases when the proponent calls an expert to the stand, the proponent wants the expert to do more. To wit, the proponent wants the expert to derive an opinion about the specific facts in the case by applying a general theory or technique to the specific facts. The following syllogism is illustrative:

> Major Premise: If a patient displays symptoms A, B, and C, the patient is suffering from illness D.
> Minor Premise: This patient's case history includes symptoms A, B, and C.
> Conclusion: This patient is suffering from illness D.

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[83] *See* 2 JOSEPH & SALTZBURG, *supra* note 48, § 52.2 (noting that twenty-five states have adopted verbatim rules and three others have adopted similar rules).

[84] *E.g.*, King v. St. Vincent's Hosp., 502 U.S. 215, 221 (1991).

[85] Edward J. Imwinkelried, *The "Bases" of Expert Testimony: The Syllogistic Structure of Scientific Testimony*, 67 N.C. L. REV. 1, 23–24 (1988).

The most sensible construction of the expert opinion provisions of Article VII is that *Daubert* and Rule 702 govern the major premise, Rule 703 regulates the minor premise,[86] and Rule 704 controls the wording of the final conclusion. Under *Daubert*, the proponent must demonstrate that the expert's general theory or technique qualifies as reliable "scientific, technical, or other specialized knowledge" within the meaning of that expression in Rule 702. In contrast, the reference to "facts or data" in Rule 703 encompasses case-specific information such as a particular patient's case history or the physical evidence analyzed in the laboratory. Lastly, Rule 704, partially abolishing the ultimate issue prohibition, governs the propriety of the phrasing of the expert's ultimate opinion.

If this is the correct construction of Article VII, the expert's proponent cannot short circuit the hearsay objection to the expert's citation of scientific literature by invoking Rule 703. The expert is citing these texts and articles for the precise purpose of establishing the reliability of his major premise, that is, the expert's general theory or technique. Rule 702—not Rule 703—is apposite. Rule 703 would apply if the expert forensic pathologist contemplated relying on a toxicology laboratory's report of the level of toxin in a decedent's body. However, Rule 703 is inapplicable when the pathologist attempts to cite a toxicology text's discussion of the validity of the gas chromatography/mass spectrometry technique employed by the laboratory. In this setting, Rule 703 does not provide an escape from the hearsay objection.

3. Rule 803(18). By process of elimination, when the proponent confronts that hearsay objection, she must comply with Rule 803(18). Rule 803(18) fashions a hearsay exception for learned treatises. Restyled Rule 803(18) provides:

> The following are not excluded by the rule against hearsay, regardless of whether the declarant is available as a witness:

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[86] *Id.* at 5.

> (18) Statements in Learned Treatises, Periodicals, or Pamphlets. A statement contained in a treatise, periodical, or pamphlet if:
>
> (A) the statement is called to the attention of an expert witness on cross-examination or relied on by the expert on direct examination; and
>
> (B) the publication is established as a reliable authority by the expert's admission or testimony, by another expert's testimony, or by judicial notice.
>
> If admitted, the statement may be read into evidence but not received as an exhibit.[87]

When the proponent cannot invoke Rule 104(a) but rather must satisfy Rule 803(18), he or she must overcome a significant challenge to defeating the hearsay objection. Without the benefit of Rule 104(a), it is no longer enough for the proponent to demonstrate that the scientific publication is authentic and relevant. In addition, the proponent must establish that the publication qualifies as a standard "reliable" authority in the field. The upshot is that at the trial, the expert may be precluded from citing texts or articles that he or she was allowed to rely on as a matter of course at the pretrial hearing.

B. THE TRIAL ADVOCACY CONSIDERATIONS THAT OFTEN MAKE IT INADVISABLE FOR THE PROPONENT TO UTILIZE SCIENTIFIC PUBLICATIONS AS EXTENSIVELY AT TRIAL AS AT THE PRETRIAL *DAUBERT* HEARING

It may be difficult for the expert's proponent to overcome a hearsay objection when the expert wants to cite chapter and verse from a scientific publication to support his or her position. There are also practical trial advocacy considerations that make it

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[87] FED. R. EVID. 803(18). In Georgia there is an additional barrier to the use of treatises on direct examination. The Georgia statute limits the use of learned treatises to cross-examination and impeachment. O.C.G.A. § 24-8-803(18) (2013).

inadvisable for the proponent to widely employ scientific publications at the subsequent trial.

To begin with, while the solitary focus of the pretrial hearing may be the reliability of the theory or technique that the publications substantiate, at trial that issue is only one of the questions to be decided by the trier of fact. To be sure, just as the trial judge must decide the admissibility of testimony based on the theory or technique, the jury must determine the weight of that testimony. However, there are other issues in play, and the testimony relating to the theory or technique is only part of a much larger mosaic of evidence. At trial, in addition to resolving the question of general causation to the publications are relevant, the jury may have to grapple with questions of credibility, special causation, and damages. The proponent may need to present a considerable amount of testimony on those other issues. Given the volume of information relevant to those other issues, the expert's proponent may quite rightly fear that eliciting the same detailed discussion of twelve corroborative articles that the expert presented at the pretrial hearing will be counterproductive. The presentation of the additional, detailed testimony may pass the point of diminishing returns.[88]

That risk is especially acute when, at trial, the attack on the validity of the expert's general theory or technique is not the opponent's primary point of attack. During the pretrial *Daubert* hearing, the focal point is the validity of the expert's methodology. However, even if the judge denies the opponent's in limine motion to exclude, under amended Rule 103(b) that issue is adequately preserved for appeal so long as the trial judge makes clear that the ruling is definitive or final. Knowing that that issue has been preserved for appeal, at trial the opponent may shift to another point of attack. If the proponent's expert has detailed a large body of corroborative literature at the pretrial hearing, at trial it would be foolish for the proponent to go into the same detail. And that is so, even assuming that the proponent can lay a complete Rule 803(18) foundation for every text or article cited pretrial. At

[88] Kenneth Graham, *"There'll Always Be an England": The Instrumental Ideology of Evidence*, 85 MICH. L. REV. 1204, 1211–12 (1987).

this point in the proceeding, the proponent knows that under *Joiner*,[89] she can be relatively confident of victory on appeal; as previously stated, *Joiner* teaches that on appeal the court will apply the deferential "abuse of discretion" standard.[90] In that light, it is safe—and prudent—for the proponent to devote most of the evidentiary presentation to meeting the issue that the opponent has made the central controversy at trial.

Finally, any experienced litigator appreciates that at trial, the primary demon requiring exorcism is unnecessary complexity and detail. In an American Bar Association Litigation Section survey of jurors, their primary complaint about the trial attorneys was that the attorneys deluged them with an excessive amount of information.[91] At trial, the attorney must minimize the unnecessary noise and "clutter."[92] In the words of one commentator, "The key to winning is being able to simplify in a clear and powerful way. It's the single most important thing to accomplish at trial."[93] It is particularly important for the litigator to bear in mind the need for simplicity when presenting expert testimony. As the *Daubert* Court itself acknowledged, the arcane nature of some expert subjects can create a heightened risk that the jury will find the expert testimony confusing.[94] For that reason, the conventional wisdom among experienced trial attorneys is that unless the proponent knows that the validity of the expert's general methodology will be the opponent's principal attack in trial, it is important to

> [p]are the direct examination down to the bare minimum. If the expert, for example, is going to testify about experiments, have her testify to the impressive, overall numbers: 50 experiments worldwide, 10,000

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[89] Gen. Elec. Co. v. Joiner, 522 U.S. 136 (1997).

[90] *See supra* notes 26–29 and accompanying text.

[91] Daniel H. Margolis, *Jury Comprehension in Complex Cases*, 1990 A.B.A. SEC. LITIG. 27–28, 31.

[92] James W. McElhaney, *Clutter*, 77 A.B.A. J. 73, 73 (Mar. 1991).

[93] Margaret C. Fisk, *Juries Need Guidance Without Condescension*, NAT'L L.J., Feb. 3, 1992, at 23.

[94] 509 U.S. at 595.

> subjects, and a 99% accuracy rate. Confine the direct to such eye-popping numbers and eye-catching names such as "Harvard" and "the Mayo Clinic." All the other details can be saved for redirect examination.[95]

Rather than inviting the expert to go into the same exquisite detail about the scientific literature as during the pretrial hearing, the expert's proponent ordinarily confines the expert's direct examination to "the tip of the iceberg."[96] If the opponent mounts an unanticipated cross-examination attack on the validity of the expert's general methodology, the proponent can respond on redirect examination or in a later rebuttal stage of the case. However, as a general rule, veteran litigators are not regularly observed presenting the same extensive testimony about the relevant scientific literature that they feel compelled to offer at the pretrial *Daubert* hearing.

IV. CONCLUSIONS

Today pretrial practice is the center of gravity of modern litigation.[97] Civil trials are "vanishing."[98] In 1962, 11.5% of the cases filed in federal court culminated in trial.[99] By 2002, that figure had fallen to 1.8%.[100] In some states, that figure is now 0.6%.[101] Simply stated, in the overwhelming majority of cases there is no trial.

It should therefore come as no surprise that the pretrial *Daubert* admissibility hearing has assumed such central importance in litigation posing scientific issues. That hearing is

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[95] RONALD L. CARLSON & EDWARD J. IMWINKELRIED, DYNAMICS OF TRIAL PRACTICE: PROBLEMS AND MATERIALS § 11.5(B), at 334 (4th ed. 2010).

[96] Edward J. Imwinkelried, *A Minimalist Approach to the Presentation of Expert Testimony*, 31 STETSON L. REV. 105, 120 (2001).

[97] John W. Cooley, *Puncturing Three Myths About Litigation*, 70 A.B.A. J. 75, 76 (Dec. 1984).

[98] Patricia Lee Refo, *The Vanishing Trial*, 30 LITIG., Winter 2004, at 1, 1.

[99] Marc Galanter, *The Vanishing Trial: An Examination of Trials and Related Matters in Federal and State Courts*, 1 J. EMPIRICAL LEGAL STUD. 459, 461 (2004).

[100] *Id.*

[101] Refo, *supra* note 98, at 2.

often where the case is won or lost. In many instances the case will settle after the hearing, and the judge's ruling at the hearing will largely determine the terms of the settlement agreement.

Just as it is clear that the hearing is important, it is evident that at the hearing the proponent's ability to marshal scientific publications supporting the expert's theory or technique is vital. Concededly, in *Daubert*, the Court listed several factors that the trial judge should consider,

> including whether a theory or technique can be tested, whether it has been subjected to peer review and publication, the known or potential rate of error for the theory or technique, the general degree of acceptance in the relevant scientific or professional community, and the expert's range of experience and training.[102]

Nevertheless, the survey of the case law in Part II of this Article strongly suggests that the existence of a large body of corroborative scientific literature is often the most influential factor—the first among "equals." As the Michigan Supreme Court commented, "while not dispositive, a lack of supporting literature is an important factor in determining the admissibility of expert witness testimony."[103] If anything, the Michigan court understated the significance of the publication factor. As Part II explained, the availability of corroborative texts and articles is pivotal because the proponent can often use the contents of those very publications to prove up the other factors in the *Daubert* calculus. As we saw in Part III, litigators tend to make sparing use of such publications at trial. However, at the pretrial hearing the dispositive question is often whether the theory rests on more than the expert's *ipse dixit*.[104] In that setting, the proponent's very best proof can be the corroborative views of impartial giants in the technical field, stated in prestigious scientific texts and articles.

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[102] *Hamilton-King*, 697 S.E.2d at 772–73 (paraphrasing *Daubert*, 509 U.S. at 580).

[103] *Edry*, 786 N.W.2d at 570.

[104] Kumho Tire Co. v. Carmichael, 526 U.S. 137, 157 (1999); Gen. Elec. Co. v. Joiner, 522 U.S. 136, 146 (1997).