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Expert Witnesses: An Update On Daubert, Discovery, Bias And Related Issues

Challenging Experts' Testimony In Federal Courts And Virginia Courts: A Distinction Without A Difference?

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In 1993, the United States Supreme Court ushered in a new era of "activism" by trial judges in screening what expert testimony could be heard by a jury. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*[1] eventually directed federal trial courts to engage in a careful and detailed scrutiny of expert witnesses, making the trial judges "gatekeepers" to ensure that the only expert testimony admitted is both scientifically reliable and relevant. This gatekeeping function requires judges to understand and evaluate the scientific principles and methods underlying proffered expert testimony.

Following some early ambiguity about which kind of experts must satisfy the *Daubert* test, the United States Supreme Court has clarified that all experts in federal court, not just experts espousing novel *scientific* theories, must make it through the reliability filter that *Daubert* has created. Evidentiary hearings have become commonplace in federal courts as experts' methodologies have become the subject of veritable mini-trials. In less than ten years, *Daubert* has fundamentally changed the litigation of federal cases in which the admissibility of expert testimony is disputed. Trial lawyers must, from the outset of a case, have a carefully developed strategy in preparation for the almost certain *Daubert* hearing that will likely determine if the case is viable.[2]

Many states have expressly adopted the federal *Daubert* approach,[3] but Virginia has not. In *John v. Im*,[4] the Virginia Supreme Court was presented with the opportunity to adopt *Daubert*. The case, however, was decided on different grounds and the Court expressly left the *Daubert* question "open for future consideration."[5] This decision not to decide the issue raises the question of whether our Court will eventually adopt the *Daubert* approach.

The purposes of this article are (1) to describe the evidentiary process in federal courts created by *Daubert* and opinions that have followed; (2) to identify the *types* of expert testimony to which *Daubert* challenges are now properly made; (3) to describe the standards developed and used by the Virginia courts to filter out unreliable expert testimony; and (4) to determine whether and how Virginia courts' evidentiary standards for expert witnesses differ from those in federal court under *Daubert*.

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1 509 U.S. 579 (1993).

2 *See Weisgram v. Marley Co*., 528 U.S. 440 (2000) (upholding appellate court's dismissal of action for insufficient evidence where appellate court found evidence unreliable); *Nelson v. Tennessee Gas Pipeline Co*., 243 F.3d 244 (6th Cir. 2001) (holding that once a plaintiff's expert testimony has been found inadmissible, it is not entitled to submit other expert testimony).

3 The highest courts in Alabama, Alaska, Arkansas, Colorado, Connecticut, Delaware, Hawaii, Iowa, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, New Hampshire, New Mexico, Ohio, Oregon, Rhode Island, South Dakota, Tennessee, Texas, Vermont, West Virginia, and Wyoming have followed *Daubert*'s approach to expert testimony.

4 263 Va. 315, 559 S.E.2d 694 (2002).

5 *Id.* at 322, 559 S.E.2d at 698.

I. *Daubert* And Its Offspring — The Federal System

A. The *Daubert* Decision Created Explicit Pretrial Duties for the Trial Judge

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[6] the U.S. Supreme Court addressed the issue of how best to screen out unreliable science from consideration at trial. The opinion created a detailed analytical framework and an active role for the trial judge in handling expert testimony. Since that decision giving federal trial judges their assignment as "gatekeepers" of what expert testimony is permitted to go to a jury, subsequent decisions, both by the Supreme Court and lower federal courts, have interpreted *Daubert* and provided a fairly clear map of the battlefield of expert testimony in federal court. Post-*Daubert* cases have clarified more precisely the significantly expanded role the Supreme Court has assigned to federal trial judges. Today's large body of opinions by federal appellate and trial courts makes plain the importance of the *Daubert* motion and hearing in any federal case involving expert testimony.

Daubert involved expert opinions about the effects of an anti-nausea drug on the developing fetus. The Court held that scientific expert testimony is admissible only if it is both reliable and relevant. Citing a distinguished federal trial judge and expert on federal evidentiary issues, the Court explicitly noted the danger of expert witnesses before a jury was that such testimony had the potential "to be both powerful and quite misleading because of the difficulty of evaluating it."[7]

Daubert identified four factors to consider when determining the reliability of a particular scientific theory or technique: (1) the "testability" of the scientific theory or technique, *i.e.*, whether the hypothesis is capable of repetition and verification; (2) whether the scientific opinion has been published after being subjected to peer review, *i.e.*, an independent evaluation of the scientific data and conclusions by unbiased professional peers; (3) the known or potential error rate of the technique; and (4) whether the opinion has been generally accepted in the relevant scientific community.[8] The Court emphasized that trial judges have the role of "gatekeeper" in ensuring that these requirements are considered, and counseled trial judges against abdicating their responsibility to screen scientific evidence by simply ruling that its reliability is a matter of weight for the jury. Instead, the Court stressed that the issue is one of admissibility to be determined by the trial judge. To consider these factors and carry out its

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[6] 509 U.S. 579, 113 S.Ct. 2786 (1993).

[7] 509 U.S. at 595 (citing RULE 702 OF THE FEDERAL RULES OF EVIDENCE IS SOUND, IT SHOULD NOT BE AMENDED, J. Weinstein, 138 F.R.D. 631, 632 (1991)).

[8] The precise issue in *Daubert* was the continued validity of the so-called common law *Frye* rule holding that expert opinion based on a scientific technique is inadmissible unless the technique is generally accepted in the relevant scientific community. *See Frye v. Unite States,* 293 F. 1013 (1923). The trial court, as affirmed by the Ninth Circuit Court of Appeals, granted summary judgment to defendant on the basis that the plaintiffs' eight experts' opinions did not meet the *Frye* standard. The Supreme Court granted certiorari to resolve the conflict in the lower courts as whether the *Frye* "general acceptance" test had been superseded by the Federal Rules of Evidence on the admissibility of expert evidence. Interestingly, in holding that *Frye* had been superseded, the Court's four-step approach is more broad-based than the *Frye* rule. Indeed, careful observers will readily note that *Daubert*'s fourth factor incorporates the *Frye*-rule concept.

gatekeeping function, a trial judge should conduct a preliminary hearing on the issue of the admissibility of the expert's opinion.

In short, the Court in *Daubert* put meat on the bare bones of the duties that Rule 702 imposes on a trial judge. It did so by explicating in detail what the responsibility entailed and how a court should go about discharging its duty.[9]

B. *Joiner:* Expanding the Gatekeeper's Authority

In *Joiner*, the Supreme Court, resolving a post-*Daubert* split among the federal circuits, underscored the wide discretion granted to federal trial courts with their gatekeeping function. *Joiner* held that trial court decisions applying *Daubert* are to be reviewed under a permissive abuse of discretion standard.[10] The *Joiner* decision also made clear that the trial court need not limit its reliability analysis to the methodologies used to reach a conclusion, but may also consider the reliability of the actual conclusions drawn by the experts.

In *Joiner*, the plaintiff electrician alleged he contracted lung cancer as a result of exposure to PCBs.[11] The district court granted defendant's motion for summary judgment, ruling that plaintiff's evidence on the issue of causation was inadmissible under Federal Rule of Evidence 702 and *Daubert*. Specifically, plaintiffs' experts relied on studies of infant mice purporting to establish a link between PCBs and small cell lung cancer in humans. In addition to the animal studies, plaintiffs also pointed to several publications which they contended supported their experts' opinions.

The district court made short work of the infant mice studies, taking note of various concessions from plaintiffs' own expert, including the facts that (1) the studies were preliminary in nature; (2) the type of lung cancer in the rodents was not the same as the plaintiff's; (3) the tumors were dose-related; and (4) the mice first had been given a known initiating carcinogen and then injected with pure PCBs directly into their stomachs.[12] With respect to the publications relied on by the plaintiffs as supportive of their experts, the court excluded them either because

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[9] As the majority opinion said in rejoinder to Chief Justice Rehnquist's concurring and dissenting opinion:

> The Chief Justice "do[es] not doubt that Rule 702 confides to the judge some gatekeeping responsibility," post, at 600, but would neither say how it does so nor explain what that role entails. We believe the better course is to note the nature and source of the duty.

509 U.S. at 589.

[10] General Electric Co. v. Joiner, 522 U.S. 136, 146-47 (1997). Prior to *Joiner*, the circuits were divided three ways on the standard of review for trial courts' *Daubert* rulings: (a) "manifestly erroneous"; (b) "abuse of discretion"; and (c) the "stringent, non-deferential" or "hard look" standard.

[11] *Joiner v. General Electric Co.*, 864 F. Supp. 1310, 1312 (N.D. Ga. 1994).

[12] *See id.* at 1322-24.

they were based upon epidemiological studies of statistically insignificant numbers of cases, did not address PCBs, or had not been subject to peer review.[13]

The Court of Appeals for the Eleventh Circuit reversed. According to the Eleventh Circuit, the district court erred in excluding the plaintiffs' expert evidence because the opinions expressed by plaintiffs' experts were based on scientifically reliable methodologies.[14] The Eleventh Circuit held that the district court's authority was limited under *Daubert* to evaluate the reliability of principles and methodology the experts used in reaching their opinions, and that evaluating the reliability of the conclusions drawn by plaintiffs' experts overstepped the bounds of the *Daubert* gatekeeping duties. In its decision, the Eleventh Circuit applied "a particularly stringent standard of review" to the trial court's exclusion of the evidence, based upon what the court characterized as the preference of the Federal Rules of Evidence for the admissibility of expert testimony.[15]

The United States Supreme Court reversed the decision of the Eleventh Circuit.[16] The Court held that the Eleventh Circuit's "particularly stringent" standard of review impermissibly deviated from the abuse of discretion standard ordinarily applicable to the review of evidentiary rulings.[17] The Court next held that it was not an abuse of discretion for the district court to have excluded plaintiffs' expert evidence. Addressing the Eleventh Circuit's emphasis on the distinction between the conclusions and methodologies of experts, the Court noted that

> conclusions and methodology are not entirely distinct from one another. Trained experts commonly extrapolate from existing data. But nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion preferred.[18]

Joiner thus underscores – in three important respects – the wide discretion afforded federal trial courts in exercising their gatekeeping function under *Daubert*. First, their review of the reliability of expert evidence may extend beyond the mere methodologies used by experts to reach the conclusions drawn by experts. Second, the decisions made by district courts in this area are to be afforded considerable deference by the courts of appeal. And finally, rather than

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[13] *See id.* at 1324-25. Moreover, one of the publications actually concluded that there were no grounds for associating lung cancer deaths with the decedents' exposure to PCBs in a capacitor manufacturing plant.

[14] *Joiner*, 78 F.3d at 531.

[15] *See id*. at 529.

[16] 522 U.S. 136 (1997).

[17] *See id*.

[18] *Id*. at 136.

the Eleventh Circuit's proposed bias favoring admission of expert testimony, the trial judge, when in doubt or equipose on a close case, may reasonably decide to exclude it.[19]

C. ***Kumho Tire:*** **Casting the *Daubert* Net Over All Types of Experts**

Kumho Tire v. Carmichael[20] arose out of a vehicle accident caused by a tire blowout. In their products liability suit against the tire's maker and distributor, the plaintiffs depended in significant part on deposition testimony provided by an expert in tire failure analysis. The expert testified based on a visual and tactile inspection of the tire and on the theory that in the absence of at least two of four specific symptoms indicating tire abuse, tire failure of the sort that occurred was caused by a defect. At the district court level, the defendants successfully moved to exclude the expert's testimony and for summary judgment.

The Eleventh Circuit reversed, asserting that a *Daubert* analysis applies only where an expert relies on "the application of scientific principles," rather than on "skill- or experience-based observation."[21] The Supreme Court granted certiorari to decide whether the *Daubert* gatekeeping obligation applies only to scientific testimony or to all expert testimony.

As a starting point, the Court looked to the language of Federal Rule of Evidence 702, which provides for the admission of expert testimony "if scientific, technical, or other specialized knowledge will assist the trier of fact." The Court emphasized that the Rule does not distinguish between scientific, technical, or other specialized knowledge. Accordingly, the Court determined that the relevance and reliability standard set forth in *Daubert* applies to all scientific,

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[19] The Court in *Daubert*, in one of the most significant passages of the majority opinion, makes clear the tension between the "quest for truth" in the courtroom and in the scientific arena, and holds that the trial judge's gatekeeping role and the Federal Rules of Evidence envision occasional exclusion of novel albeit "authentic" scientific views:

> Petitioners . . . suggest that recognition of a screening role for the judge that allows for the exclusion of "invalid" evidence will sanction a stifling and repressive scientific orthodoxy and will be inimical to the search for truth. It is true that open debate is an essential part of both legal and scientific analyses. Yet there are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory. Scientific conclusions are subject to perpetual revision. Law, on the other hand, must resolve disputes finally and quickly. The scientific project is advanced by broad and wide-ranging consideration of a multitude of hypotheses, for those that are incorrect will eventually be shown to be so, and that in itself is an advance. Conjectures that are probably wrong are of little use, however, in the project of reaching a quick, final, and binding legal judgment – often of great consequence – about a particular set of events in the past. We recognize that, in practice, a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations. That, nevertheless, is the balance that is struck by Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes.

509 U.S. at 596-97 (emphasis added).

[20] 526 U.S. 137 (1999).

[21] *Carmichael v. Samyang Tire, Inc.*, 131 F.3d 1433, 1435-36 (11th Cir. 1997).

technical, or other specialized knowledge, noting that *Daubert* referred to scientific testimony simply because that was the nature of the expertise at issue in that case.

Additionally, the Court explained that it would be difficult, if not impossible, for a trial judge to distinguish between scientific knowledge and other types of knowledge. Thus, the Court concluded that the principles enumerated in *Daubert* apply whether the expert testimony reflects scientific, technical, or other specialized knowledge, "and where such testimony's factual basis, data, principles, methods, or their application are called sufficiently into question ... the trial judge must determine whether the testimony 'has a reliable basis in the knowledge and experience of [the relevant] discipline.'"[22]

Another significant element of the Court's decision in *Kumho* was holding that a trial judge *may* (but is not required to) consider all four specific *Daubert* factors (testing, peer review, error rates, and general acceptance), if doing so will help determine the testimony's reliability. Stressing the flexible nature of the inquiry, the Court explained that in other cases, the relevant reliability concerns may focus upon the expert's personal knowledge or experience.

Having established the broad discretion the trial judge has in applying the *Daubert* four-factor test to any particular expert testimony, the Court then made equally clear that many different types of expert testimony are subject to a *Daubert* analysis. The Court held that expert testimony subject to *Daubert* can address a wide range of topics, and cited land valuation, agricultural practices, railroad procedures, and attorney's fee valuation as examples of expert testimony under Federal Rule of Evidence 702.[23] Because expert testimony is so varied, the Court stressed that the trial court must have wide latitude both in deciding *how* to test an expert's reliability (*e.g.,* by applying the four *Daubert* factors or by some other method).

The Court concluded that Rule 702 grants the district judge the discretionary authority, reviewable only for abuse, to determine reliability in light of the particular facts and circumstances of the particular case. After reviewing the methodology used by the tire expert and its application to the particular matter at issue – whether a defect caused the blowout – the Court reversed the Eleventh Circuit's judgment. The effect was the exclusion of the testimony and summary judgment for the defendant.

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[22] *Kumho*, 526 U.S. at 148 (citing *Daubert*, 509 U.S. at 592).

[23] For example, the Court noted a "perfume tester able to distinguish among 140 odors at a sniff" as an expert witness to whom the *Daubert* analysis would apply. *Id*. at 151, 119 S.Ct. at 1176.

II. Today's Applications Of The *Daubert* Trilogy

In cases decided after *Kumho*, courts have applied the *Daubert* reliability and relevance analysis to many different types of expert testimony. In criminal cases the topics have included voice identification,[24] money laundering techniques,[25] characteristics of child molesters[26] and psychopaths,[27] handwriting analysis, and the psychology of eyewitness identification.[28]

In the antitrust and commercial context, topics subject to the *Daubert* challenge have included profit margins in a trademark infringement case,[29] fair market value with respect to oil and gas leases,[30] economic loss and product sale data,[31] market share in cases alleging monopoly,[32] statistical analysis in an employment discrimination case,[33] cause of water damage,[34] and future earnings potential.[35]

In automobile accident cases, *Daubert* motions have dealt with the crashworthiness of a vehicle,[36] seat belt disengagement in rollover,[37] and design engineering and ergonomics.[38]

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[24] *United States v. Monaco*, 1999 U.S. App. LEXIS 26869 (2nd Cir. 1999).

[25] *United States v. Salimonu*, 182 F.3d 63 (1st Cir. 1999).

[26] *United States v. Romero*, 189 F.3d 576 (7th Cir. 1999).

[27] *United States v. Barnette*, 211 F. 3d 803 (4th Cir. 2000).

[28] *United States v. Hines*, 55 F.Supp.2d 62 (D. Mass. 1999).

[29] *See Seatrax, Inc. v. Sonbeck Int'l, Inc.*, 200 F. 3d 358 (5th Cir. 2000).

[30] *Atlantic Richfield Co. v. Farm Credit Bank of Wichita*, 226 F. 3d 1138 (10th Cir. 2000).

[31] *Irvine v. Murad Skin Research Lab., Inc.*, 194 F.3d 313 (1st Cir. 1999).

[32] *SMS Sys. Maintenance Servs, Inc.. v. Digital Equip. Corp.*, 188 F.3d 11 (1st Cir 1999).

[33] *Schanzer v. United Technologies Corp.*, 120 F. Supp. 2d 200 (D. Conn. 2000).

[34] *Mink Mart, Inc. v. Reliance Ins. Co.*, 65 F.Supp.2d 176 (S.D.N.Y. 1999).

[35] *Garay v. Missouri Pac. R.R. Co.*, 60 F.Supp.2d 1168, 1173 (D. Kan. 1999); *French v. Wal-Mart Stores, Inc.*, 1999 U.S. App. LEXIS 20054 (4th Cir. 1999).

[36] *See also Moisenko v. Volkswagenwerk Aktiengesellschaft*, 1999 U.S. App. LEXIS 29998 (6th Cir. 1999).

[37] *Clark v. Takata Corp.*, 192 F.3d 750 (7th Cir. 1999).

[38] *Bone v. Ames Taping Tool Sys., Inc.*, 179 F.3d 1080 (8th Cir. 1999).

Daubert motions are also common in environmental and toxic tort cases, particularly on issues of causation.[39]

After *Daubert*, courts now know that scientific questions, such as the impact on the body of breast implants, or whether a drug causes birth defects, should first be addressed by the judge evaluating the results of scientific research,[40] not what an expert is willing to testify to in a courtroom and perhaps persuade a jury to accept based on a sympathetic plaintiff. The *Daubert* analysis is also applied to expert testimony grounded primarily on skill or experience-based observations. The Advisory Committee Notes to Federal Rule of Evidence 702 expressly provide that the rule is broadly phrased and applies not only to experts in the strictest sense of the word, *e.g.* physicians, physicists, and architects, but also to "skilled" witnesses, such as bankers or landowners testifying to land values.

Under the current version of Rule 702, an expert witness may testify only if three requirements are met: (a) the testimony must be based upon sufficient facts or data; (b) the testimony is the product of reliable principles and methods; and (c) the witness has applied the principles and methods reliably to the facts of the case. Of course, these new requirements are straight from *Daubert*. They became effective in December 2000.

It is clear that courts are taking their gatekeeping responsibility seriously and that there is at least the potential for the *Daubert* analysis to be applied in an even wider variety of cases. Although a survey of cases decided after *Kumho* indicates that the *Daubert* analysis is most often applied to scientific testimony, there is a noticeable trend toward a broad application of *Daubert* to all types of expert testimony, whether based on scientific, technical or "other specialized" knowledge. Moreover, courts have not been reluctant to exclude an expert's testimony after conducting the *Daubert* analysis. In fact, according to a recent study conducted by the Federal Judicial Center, judges today are far more likely to exclude expert testimony in civil trials than they were less than a decade ago.[41] The federal courts, relying on *Daubert* and its progeny, will exclude experts' opinions not only in the absence of reliable support from hard data and accepted methodologies, but also where the subject of the opinion is unsettled and a matter of substantial scientific debate.[42]

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[39] *E.g., Curtis v. M&S Petroleum, Inc.*, 174 F.3d 661 (5th Cir. 1999); *Mancuso v. Consolidated Edison Co. of New York, Inc.*, 56 F. Supp. 2d 391 (S.D.N.Y. 1999); *Freeport-McMoran Resource Partners Ltd. Partnership v. B-B Paint Corp.*, 56 F. Supp. 2d 823 (1999).

[40] To assist the trial courts' sifting of the scientific evidence, the Federal Judicial Center has published an excellent and comprehensive handbook, Reference Manual on Scientific Evidence (2d ed. 2000). Practitioners would do well to study this publication.

[41] Hansem, M., Admissions Tests, 87 A.B.A.J. 28 (February 21, 2001). The study concluded that judges "are responding to the Supreme Court's invitation to examine the basis of expert testimony under the new standards and exclude evidence that doesn't meet those standards." *Id.*

[42] One novel approach to the scientific debate issue is the court's empanelling of its own expert panel, pursuant to Fed. R. Evid. 706. Former Chief Judge Sam C. Pointer of the U.S. District Court for the Northern District of Alabama appointed an expert panel in 1996 to assist him in assessing scientific evidence in a multidistrict litigation action involving the health effects of silicon breast implants. (Order available at <

In summary, the *Daubert* hearing and ruling have effectively become virtually as outcome-determinative as a class certification or a summary judgment ruling: once decided, a case either shrivels up and goes away, or becomes more dangerous to try. Thus, practitioners whose cases rely in any material way on expert testimony must familiarize themselves with the algorithm of how federal trial courts evaluate *Daubert* challenges, and be prepared for a full-blown trial within a trial that the *Daubert* hearing often becomes. Following the plain encouragement of the Supreme Court in *Daubert, Joiner* and *Kumho Tire*, the federal trial courts are vigorously pursuing their role as gatekeepers to ensure that speculative and scientifically conjectural expert testimony does not infect a jury trial.

III. Principles Of Virginia Law On Expert Witnesses

The admissibility of expert testimony in Virginia state courts is governed by Va. Code Ann. § 8.01-401.3(A):

> In a civil proceeding, 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.

The proffered evidence must "assist the trier of fact to understand the evidence or to determine a fact in issue." Though the rule itself, unlike the federal counterpart at Rule 702, does not provide substantial guidance as to how judges should assess the admissibility of expert testimony, the Virginia Supreme Court has developed a substantial body of case law to answer this question.

Virginia case law in this area has established the following criteria for admissibility of expert testimony: (a) it must be based on an adequate factual foundation, in order to avoid speculative testimony; (b) it must account for all variables that bear upon the inferences drawn by the expert; and (c) where tests are involved, there must be proof that the conditions at the time of the test were substantially similar to those at the time of the events at issue.[43]

First and perhaps foremost, the proposed expert testimony must not be speculative. Speculative expert testimony is not admissible.[44] The Supreme Court has expressed this concept in different ways. It is a "fundamental requirement" that expert testimony "be based on an

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www.fjc.gov/BREIMLIT/ORDERS/order31.rtf>.) The expert panel issued a report denying any link between silicone breast implants and immune disorders. *In re Silicon Gel Breast Implant Litig.*, MDL No. 926 (N.D. Ala., Nov. 30, 1998), *reported in* 26 Prod. Liab. Rptr. 1194 (Dec. 4, 1999).

[43] *Tittsworth v. Robinson*, 252 Va. 151, 154, 475 S.E.2d 261, 263 (1996).

[44] *John*, 263 Va. at 320, 559 S.E.2d at 696; *Tarmac Mid-Atlantic v. Smiley Block Co*., 250 Va. 161, 166; 458 S.E.2d 462, 466 (1995).

adequate factual foundation."[45] Similarly, expert testimony is inadmissible if "founded on assumptions that have an insufficient factual basis."[46]

A second question is whether the expert has considered "all the variables that bear upon the inferences to be deduced from the facts observed."[47] The seminal decision in the "missing variable" line of cases is *Grasty v. Tanner*.[48] In that case, an accident reconstructionist was permitted to testify at trial about the speed of a vehicle involved in a collision, based on the reconstructionist's examination of photographs, damage to the vehicle, the weight of the vehicle and its occupants, and application of fundamental principles of physics. The Supreme Court ruled the testimony inadmissible because the expert had not considered all the variables bearing on his ultimate conclusion. For instance, the expert merely estimated the weight of the occupants, and did not know the weight of the gasoline in the tank.[49]

The significance of the missing variable cases goes beyond experts testifying based on mathematical equations or physics. All experts must consider and include in their analysis those facts that are necessary to reach a reliable conclusion. As the Supreme Court noted in *Swiney v. Overby*, a trial court has an obligation not simply to scrutinize the method used, but also "to determine whether the factors required to be included in formulating the opinion were actually utilized."[50] Although employing different language, the Virginia Supreme Court's analysis is the functional equivalent of the requirement in Fed. R. Evid. 702(1) that "the testimony is based on *sufficient* facts and data." (Emphasis added.) This Virginia principle also runs parallel to the holding eight years later of *Joiner*, in which the United States Supreme Court encouraged trial courts to look beyond the reliability of the method to its application and result.

The advent of DNA testing in the 1980s resulted in several capital murder cases challenging the admissibility of novel scientific evidence. These cases are important in understanding the functional similarities between Virginia law and federal law.

In *Spencer v. Commonwealth*,[51] the Court reviewed the trial judge's responsibility to establish reliability when presented with scientific evidence:

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45 *The Countryside Corp. v. Taylor*, 263 Va. 549, 553, 561 S.E.2d 680, 682 (2002).

46 *Keesee v. Donigan*, 259 Va. 157, 161, 524 S.E.2d 645, 648 (2000); *Tarmac*, 250 Va. at 166, 458 S.E.2d at 466.

47 *Tittsworth,* 252 Va. at 154, 475 S.E.2d at 263.

48 206 Va. 723, 146 S.E.2d 252 (1966).

49 *Id.* at 727, 146 S.E.2d at 255. *See also Swiney v. Overby*, 237 Va. 231, 377 S.E.2d 372 (1989) (expert testimony about vehicle's stopping distance inadmissible because expert did not know condition of brakes).

50 237 Va. 231, 233, 377 S.E.2d 372, 374. *But compare Keesee*, 259 Va. at 161-62, 524 S.E.2d at 648 (noting the distinction between experts who testify merely as to general scientific or technical principles to educate the jury and those who apply such principles to the facts of the specific case).

51 240 Va. 78, 393 S.E.2d 609 (1990), *cert. denied* 498 U.S. 908 (1990).

> When scientific evidence is offered, the court must make a threshold finding of fact with respect to the reliability of the scientific method offered….[52]

Spencer further explained that the trial judge must usually rely on expert testimony to establish the reliability of the proffered scientific evidence.[53] In language reminiscent of *Daubert*'s later statements about the judge's role as "gatekeeper," *Spencer* held that the trial court must determine "whether the evidence is so inherently unreliable that a lay jury must be shielded from it."[54]

In *O'Dell v. Commonwealth*,[55] the Supreme Court of Virginia declined to adopt the pre-*Daubert* federal test of general acceptance in the scientific community from *Frye v. United States*, finding "no reason" to do so.[56] The Court made clear that general acceptance is not necessary as long as the trial court finds the scientific evidence to be reliable.[57] General acceptance may be one factor for the trial court to consider in evaluating reliability, but Virginia courts have declined to make it the *sine qua non* for admissibility.[58] The reasoning of the Court seems to have foreshadowed the United States Supreme Court's analysis in *Daubert* five years later.

IV. Virginia Standards For Admissibility Of Scientific Expert Testimony Are Essentially The Same As The Federal *Daubert* Regime

The difference between the evidentiary standards for admissibility of expert testimony in Virginia courts as opposed to federal courts is primarily superficial, at least as applied to scientific evidence. Non-scientific expert testimony can be had in Virginia court proceedings, where the expertise is based on knowledge "derived from study alone, or experience, or both,"[59] and expert testimony is considered appropriate to assist the jury "with issues that require [either] scientific or specialized knowledge or experience."[60] However, the applicability of the admissibility standards announced by cases like *John* and *Spencer* to expert testimony not based on scientific methods remains unclear. This is the same question left by *Daubert* and settled by

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[52] *Id.* at 97, 393 S.E.2d at 621.

[53] *Id.*

[54] *Id.* at 98.

[55] 234 Va. 672, 364 S.E.2d 491, *cert. denied*, 488 U.S. 871 (1988).

[56] *Id.* at 696; 364 S.E.2d at 504-05.

[57] *Id.*

[58] *Id.*; *Spencer v. Commonwealth*, 238 Va. 275, 289, 384 S.E.2d 775, 783 (1989), *cert. denied*, 493 U.S. 1036 (1990).

[59] *Wood v. Bass Pro Shops*, 250 Va. 297, 304, 462 S.E.2d 101, 105 (1995).

[60] *Holmes v. John Doe*, 257 Va. 573, 578, 515 S.E.2d 117, 120 (1999).

the *Kumho Tire* decision in the federal arena. In Virginia's *John*, the standards for admissibility and factors leading to a decision of inadmissibility are stated in terms of expert testimony generally, rather than limited to the testimony of experts relying on scientific methods. The facts of the case, however, involve a test to measure electrical activity in the brain, so the opinion discusses only expert opinion based on this scientific testing. In *Spencer*, the requirement of a threshold reliability finding is specifically stated in terms of scientific opinions: "When scientific evidence is offered, the court must make a threshold finding of fact with respect to the reliability of the scientific method offered." 240 Va. at 97, 393 S.E.2d at 621.

At least for scientifically based expert testimony, both the federal and Virginia tests focus on the same characteristic of expert scientific testimony – reliability. The courts also employ the same basic reasoning process in evaluating reliability of scientifically based expert testimony. Experts who engage in speculation and guesswork will not be allowed to testify at trial. In federal court, this would be characterized as failing to apply "the principles and methods reliably to the facts of the case," or testifying without "sufficient facts or data." In state court, it would be characterized as offering opinions with "an insufficient factual basis" or as leaving certain variables unaddressed. Either way, the result is the same.

Likewise, the expert must apply the scientific methods reliably to the facts of the case regardless of the forum. Virginia courts have frequently analyzed this in the context of "missing variables," where the expert must demonstrate that her methodology incorporates all the relevant facts of the case in a reliable way. Federal courts, after the *Joiner* case, also do not limit their analysis to the method used. Like Virginia jurists, the federal trial courts will review the application of the methods, to determine whether the expert's application of the method suggests a reliable result.

Regardless of the words used to state the legal standard, a trial judge in Virginia or federal courts will inevitably ask the same question when faced with a challenge to expert testimony: *Is this opinion based on a sound analytical method faithfully applied?* The evidence presented in favor of or against admissibility will be the same under either the federal or state standard. If a scholarly article bears on the reliability of the expert's opinions, it will be offered to the trial judge. If the expert has assumed facts contrary to the record in the case or has been selective in overlooking certain relevant factors, it will be brought to the court's attention. The parties may cite different cases and use different language in one forum or another, but in the end, a trial court will exclude what it considers junk science and will admit expert testimony that it considers to be reliable. The substantive result, therefore, is not dependent on an appellate court's characterization of the test to be used. The result depends on the quality of the expert testimony.

V. The Procedures And Depth Of Analysis Are Also Much The Same Under *Daubert* And Virginia Law

In addition to the similar results to be reached under the *Daubert* regime and Virginia law, the procedural path is also quite similar from one system to the other. In many cases, *Daubert* has thrust judges into the position of becoming experts themselves in order to evaluate expert testimony. A review of Virginia cases demonstrates that Virginia courts also scrutinize the underlying scientific principles when questionable expert testimony is offered. The scientific basis for the various forms of DNA testing was examined in great detail by the Supreme Court of Virginia.[61] The Court has similarly probed the methods and procedures of experts in civil cases.[62] The existing level of scientific inquiry and care with which Virginia courts approach questions of reliability and admissibility is therefore very much like that of the federal trial courts.

The procedural hallmark of the federal expert evidence issue is the "*Daubert* hearing," in which evidence is taken on the issue of scientific reliability. For their part, the Virginia trial courts have long had an obligation to make "a threshold finding of scientific reliability when unfamiliar scientific evidence is offered."[63] This threshold decision can be made at a pretrial hearing or at trial outside the jury's presence, and in either event this is the Virginia procedural equivalent of a *Daubert* hearing.

VI. How Federal Courts And Virginia Courts Apply Their Respective Reliability Factors

In order to review the effects of the screening factors established in each of the federal and Virginia systems, it is useful to consider the recent cases in which these standards have excluded testimony. For example, the Fourth Circuit in *Phelan v. Synthes* recently upheld the exclusion of a doctor's testimony where the witness was regarded as a qualified medical expert, but did not have sufficient factual basis for his opinion.[64] The doctor's testimony was excluded by the trial court because he had not performed any independent tests or examinations in forming his opinions about the defectiveness of a tibial nail, but was opining based on his experience in general.[65] Under the *Daubert* regime, if an expert fails to cite properly the source of his or her conclusions or proffers speculative assumptions without relevant supporting data, the opposing party will often be successful in moving to exclude the testimony based on its unreliability.

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61 *See, e.g., Spencer*, 238 Va. at 286-89, 384 S.E.2d at 781-83; *O'Dell*, 234 Va. at 695-97, 364 S.E.2d at 504; *Satcher v. Commonwealth*, 244 Va. 220, 238-43; 421 S.E.2d 821, 832-34 (1992).

62 *See, e.g., John*, 263 Va. at 319-21, 559 S.E.2d at 696-97; (QEEG testing of brain function); *Tittsworth*, 252 Va. at 154-55, 475 S.E.2d at 263-64 (bio-mechanical effects of G-forces from collisions),

63 *John*, 263 Va. at 322 n. 3, 559 S.E.2d at 698 n. 3.

64 No. 01-2045, 2002 U.S. App. LEXIS 9989 (4th Cir. May 28, 2002).

65 *Id*. at *7.

In another medical example, the Fourth Circuit upheld the exclusion of expert testimony where a doctor's opinion had been based on pre-existing opinions not tied to the facts of the case and not based on any physical examination of the plaintiff patient.[66] The court in *Cooper* based its finding in part on the expert's admitted deviation from the standards of his own practice when he assessed the plaintiff's injuries — the lack of a physical examination. The difference was viewed as an indication that the doctor's testimony was unreliable when considered in light of the standards he used in his own practice.[67]

Recent Virginia opinions excluding expert testimony have turned on the same kinds of considerations seen in the *Phelan* and *Cooper* opinions. In the Virginia Supreme Court's *Tittsworth* opinion, the testimony of a putative expert in the fields of mechanical engineering and impact analysis was deemed unreliable in large measure because he had not examined the cars involved in the accident at issue.[68] The insufficient factual basis resulting from the lack of a direct inspection of the vehicles is similar to the grounds for exclusion seen in the *Cooper* case, where the plaintiff's expert failed to examine the plaintiff. Virginia courts have also excluded evidence based on a plaintiff's failure to come to its expert's aid. Where an expert explained that his valuation of a business was based on a "discounted future earnings" method, but the plaintiff failed to put on any other evidence of the method's validity, the valuation theory was excluded because it had not been shown to be reliable in the factual context of the case.[69]

In Virginia's *John* case, the witness's lack of direct involvement in testing or personal observations of the plaintiff resulted in both an insufficient factual basis for the offered opinion and too many unaddressed variables in the test itself.[70] The expert had not been present during the test of plaintiff's brain function, and he did not know exactly who had performed the test or whether plaintiff had been drowsy or medicated at the time of the test. Similar to the *Phelan* case, the Virginia Supreme Court has held that even where an expert may be qualified to testify in a field generally, where the offered testimony is specific to the circumstances of a single case, all tests and analysis must be that specific as well. In *Keesee v. Donigan*, the court held that in order to apply a theory of accident reconstruction to the case before the court, the expert must use data specific to the driver in question, rather than an average value for all drivers.[71]

Both the federal and the Virginia courts keep a close eye on the issue of whether an expert's offered testimony is a "subject-matter fit" for the case at bar. In a recent Fourth Circuit example concerning the cause of an aerosol can explosion, *Daubert*'s concern for the "fit" of an

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66 *Cooper v. Smith & Nephew, Inc*., 259 F.3d 194 (4th Cir. 2001).

67 *Id*. at 203.

68 252 Va. at 195.

69 *Shooltz v. Shooltz*, 27 Va. App. 264, 274-75, 498 S.E.2d 437, 442 (Va. Ct. App. 1998).

70 263 Va. at 320-21.

71 259 Va. at 162.

expert's qualified testimony excluded it from evidence.[72] In *Free v. Bondo-Mar-Hyde Corp.*, the court agreed with the plaintiff that its expert was an "accomplished metallurgist," but held that the expert's lack of knowledge of aerosol cans in particular — their manufacture, filling, testing — made his opinion about the cause of one can's explosion unreliable. The complementary Virginia example is seen in *Jones v. CSX Transp., Inc*.[73] Plaintiff's experts testified that walking on "ballast" — essentially gravel — while working caused plaintiff's foot pathology, known as plantar fasciitis. Plaintiff alleged that the use of smaller ballast — more fine gravel — would have prevented his problem. The experts could not conclude that use of smaller-sized ballast would have made a difference for the plaintiff's feet, and their opinions were therefore excluded as inadmissible for lack of fit to the plaintiff's theory of the case.[74]

In the United States Supreme Court's *Joiner* case, the circumstances of the cancer tests on mice were too circumstantially remote to be reliable evidence of the causation of the plaintiff's cancer.[75] This rejection follows the same logic as the Virginia standard seen in cases such as *Mary Washington Hosp., Inc. v. Gibson*,[76] in which the court rejected testing performed by the plaintiff on the sidewalk where plaintiff had fallen. The court held that because plaintiff failed to show that the area was in the same condition it had been in at the time of plaintiff's fall, the testing could not be considered to be reliable.[77] The plaintiff's expert failed to establish that the drainage conditions and angle of the sidewalk had remained the same in spite of work done on and around that part of the sidewalk between the time of the plaintiff's fall and the expert's testing. In both *Joiner* and *Mary Washington Hospital*, therefore, where the tests did not match the plaintiff's circumstances nearly enough, the evidence was excluded from consideration altogether.

While moving past the *Frye* standard of general acceptance in the relevant field of study, *Daubert* maintains general acceptance as an aspect to be considered in the determination of reliability. Likewise, Virginia courts at times consider whether a theory offered as the basis for expert testimony is generally accepted. In *Davison v. Commonwealth*, the Virginia Court of Appeals rejected a therapist's testimony as unreliable in part because the recanted testimony phenomenon on which the expert testified was not established as a principle generally accepted as reliable among the relevant scientific community.[78]

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72 *Free v. Bondo-Mar-Hyde Corp*., No. 01-2240 (4th Cir. Jan. 10, 2002) (unpublished).

73 54 Va. Cir. 341 (2001).

74 *Id*. at 343.

75 864 F. Supp. at 1312.

76 228 Va. 95 (1984).

77 *Id*. at 99.

78 18 Va. App. 496, 503, 445 S.E.2d 683, 687 (Va. Ct. App. 1994).

On the other hand, where a plaintiff bolsters its expert's testimony by establishing relevant professional background and materials substantiating the expert's version of the relevant standards or methods, both federal and state trial courts in Virginia will admit the testimony for consideration by the finder of fact. One federal example is *Hatten v. Sholl,*[79] in which the District Court for the Western District of Virginia admitted plaintiff's expert testimony regarding proper procedure for driving a tractor-trailer in reverse, based on the expert's professional experience and the consistency of his opinion with both public and private publications on the issue. In Virginia state courts, *Stump v. Doe*[80] explains that expert testimony for the plaintiff on the subject of automobile and tractor-trailer aerodynamics was admitted by the trial court where the expert had previously authored government studies on the same subject.

VII. Conclusion

While many states have adopted the evidentiary standards of the federal courts' *Daubert* regime, Virginia has not. At least for scientifically based expert testimony, however, proffered expert testimony will be admitted or excluded based on the same few indicia of reliability whether the case is filed in federal court or in state court. In either venue, the expert must apply a reliable scientific method thoroughly and faithfully to the facts of the case. Courts in each system act as gatekeepers that review each of the methods used, the application of the methods, and the offered result, before the expert will be allowed to offer an opinion to the finder of fact. The principle difference in the two systems may be that while the federal trial courts are assured that the standards for admissibility that were announced in *Daubert* and developed since then apply to all expert witnesses, Virginia courts have not yet made clear whether the evidentiary screening standards that apply to scientific expert testimony apply to other kinds of experts as well.

[79] 2002 U.S. Dist. LEXIS 2583 (W.D. Va. Feb. 13, 2002).

[80] 250 Va. 57 (1995).