

# ARTICLE

## EIGHT GATES FOR EXPERT WITNESSES: FIFTEEN YEARS LATER

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### ABSTRACT

Expert testimony can make or break a case at trial. And in Texas, it can make or break the case on appeal too. This Article examines developments in the law—with an emphasis on Texas law—governing the admissibility and evidentiary weight of expert evidence over the last fifteen years. We endeavor to draw out rules, trends, and unifying principles useful to practitioners facing the substantive complexities and procedural pitfalls of successfully offering or opposing expert evidence. While some attention is given to recent decisions addressing an expert’s qualifications or the relevance and helpfulness of an expert’s opinion, the focus of the Article and the recent case law is on the reliability of an expert’s opinions. Breaking the reliability requirement into subcategories, we explore exactly what it takes for an expert opinion to be reliable and examine when and how an unreliable expert opinion can be challenged for the first time postverdict, even if admitted without objection.

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## INTRODUCTION

This Article addresses significant developments in admissibility and reliability challenges to expert evidence in the fifteen years since the *Houston Law Review's* 1999 article, *Eight Gates for Expert Witnesses*.<sup>1</sup> “The expert witness occupies a unique place in our adversarial system of justice.”<sup>2</sup> A jury may view an expert witness as “an objective authority figure more knowledgeable and credible than the typical lay witness,”<sup>3</sup> and because an expert necessarily testifies about a subject that is beyond the common knowledge of the jury,<sup>4</sup> the jury is not as well

1. See generally Harvey Brown, *Eight Gates for Expert Witnesses*, 36 HOUS. L. REV. 743 (1999).

2. *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d 434, 440 (Tex. 2007).

3. *Id.*

4. Expert testimony is admissible only when “the expert’s knowledge and experience on a relevant issue are beyond that of the average juror and the testimony helps the trier-of-fact understand the evidence or determine a fact issue.” *K-Mart Corp. v. Honeycutt*, 24 S.W.3d 357, 360 (Tex. 2000). “When the jury is equally competent to form an opinion about the ultimate fact issues or the expert’s testimony

equipped to question the reliability of the expert's opinion. In addition to this heightened potency and considerable insulation from the jury's typical assessment of reliability,<sup>5</sup> an expert witness is "generally unfettered"<sup>6</sup> by many of the evidentiary constraints that cabin the testimony of lay witnesses—testifying experts need not have firsthand knowledge,<sup>7</sup> they may base their testimony on material that is otherwise inadmissible,<sup>8</sup> and they may opine on mixed issues of law and fact, including even ultimate issues in the case.<sup>9</sup> For these reasons, although the jury assesses the reliability of other types of evidence,<sup>10</sup> the reliability of an expert opinion is initially assessed by the judge as a "gatekeeper."<sup>11</sup> This gatekeeping role is mandatory.<sup>12</sup>

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is within the common knowledge of the jury, the trial court should exclude the expert's testimony." *Id.*

5. "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it." *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993) (quoting Jack B. Weinstein, *Rule 702 of the Federal Rules of Evidence Is Sound; It Should Not Be Amended*, 138 F.R.D. 631, 632 (1991)); *see also* *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1364 (Fed. Cir. 2008) (warning of mischief presented by experts offering "seemingly sound conclusions" without well-grounded basis, such as patent law expert without any technical expertise who testifies on infringement and validity).

6. *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d at 440.

7. FED. R. EVID. 602; TEX. R. EVID. 602.

8. FED. R. EVID. 703; TEX. R. EVID. 703. "Thus, in many instances, experts may rely on inadmissible hearsay, privileged communications, and other information that the ordinary witness may not." *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d at 440.

9. FED. R. EVID. 704; TEX. R. EVID. 704.

10. *Perry v. New Hampshire*, 132 S. Ct. 716, 728 (2012) ("[T]he jury, not the judge, traditionally determines the reliability of evidence."). In *State v. Smith*, the court stated that although a jury determines the credibility of a witness, "unreliable evidence should never reach the jury." *State v. Smith*, 335 S.W.3d 706, 714 (Tex. App.—Houston [14th Dist.] 2011, pet. ref'd). This is true for expert testimony but is not true for other "unreliable" evidence that is admissible under the rules of evidence.

11. *Brown*, *supra* note 1, at 744; *see also* *Southland Lloyds Ins. Co. v. Cantu*, 399 S.W.3d 558, 563 (Tex. App.—San Antonio 2011, pet. denied) ("[T]he trial court serves as an evidentiary gatekeeper by screening out irrelevant and unreliable expert evidence . . .").

12. *Russell v. Whirlpool Corp.*, 702 F.3d 450, 456 (8th Cir. 2012) ("[T]he assumption of the gatekeeper role is mandatory, not discretionary."). The Tenth Circuit recently stated that a trial judge's gatekeeping role is sufficiently important so that the judge (1) cannot simply "say on the record that [he] has decided to admit the expert testimony after due consideration" but rather should "furnish enough of a record to permit a reviewing court to say with confidence that it 'properly applied the relevant law'" and (2) "must reply in some meaningful way to the *Daubert* concerns the objector has raised," although the judge does not have to discuss every *Daubert* factor. *Storagecraft Tech. Corp. v. Kirby*, 744 F.3d 1183, 1190 (10th Cir. 2014). Similarly the Ninth Circuit stated that given "[t]he potentially significant influence of expert testimony," trial judges must engage in "assiduous 'gatekeeping.'" *Barabin v. AstenJohnson, Inc.*, 700 F.3d 428, 432 (9th Cir. 2012), *on reh'g en banc sub nom. Estate of Barabin v. AstenJohnson, Inc.*, 740 F.3d 457 (9th Cir. 2014). On rehearing en banc the court stated that trial judges "cannot abdicate" their role as gatekeeper by "delegating that role to the jury." *Estate of Barabin*, 740 F.3d at 464.

We focus on expert gatekeeping developments in Texas civil law, but are mindful of developments in federal law that have impacted or likely will impact the evolution of this area of law. We examine five of the eight gates from the 1999 article: the assist requirement (gate one in the 1999 article),<sup>13</sup> the qualifications gate (gate two),<sup>14</sup> and the three reliability gates (gates four, five, and six).<sup>15</sup> We particularly emphasize the three reliability gates because they have undergone the most development and because they are the most common basis on which courts accept or reject the admissibility or probative value of expert testimony.<sup>16</sup> An expert's opinion must be based on a

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13. Brown, *supra* note 1, at 751–57.

14. *Id.* at 757–72.

15. *Id.* at 778–875. In the 1999 article, the reliability gates were addressed in this order: methodological reliability (gate four), connective reliability (gate five), and foundational reliability (gate six). *Id.* In this Article, we begin with foundational reliability, which we have renamed “predicative reliability,” *see infra* Part III.B, because it provides useful groundwork for the other reliability sections. Predicative reliability is followed by methodological reliability, then connective reliability.

We do not separately address Rule 403 (gate eight in the 1999 article). *See In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 746 (3d Cir. 1994) (“Rule 702 analysis partly incorporates Rule 403 analysis but leaves some room for Rule 403 to operate independently.”); *Scott v. State*, 165 S.W.3d 27, 57 (Tex. App.—Austin 2005) (concluding testimony was unhelpful, unreliable, and violated Rule 403), *rev'd on other grounds*, 227 S.W.3d 670 (Tex. Crim. App. 2007). In *ATA Airlines, Inc. v. Federal Express Corp.*, the Seventh Circuit concluded that an expert's testimony was not only unreliable but also violated Rule 403 when the lawyer could not even explain the testimony. *ATA Airlines, Inc. v. Fed. Express Corp.*, 665 F.3d 882, 890, 896 (7th Cir. 2011). The lawyers' examinations of the expert during trial

“were perfunctory and must have struck most, maybe all, of the jurors as gibberish . . . If a party's lawyer cannot understand the testimony of the party's own expert, the testimony should be withheld from the jury. Evidence unintelligible to the trier or triers of fact has no place in a trial.”

*Id.* at 896.

Reliance on inadmissible evidence (gate seven) is discussed as part of “predicative reliability,” the first of the three reliability gates. *See infra* Part III.B. Because it is more accurate to describe the inquiries under this gate as part of the predicative reliability gate, we now believe there are seven, not eight, gates. We briefly discuss the relevance gate (gate three) in Part II.B.

16. In this Article, we do not address the distinction between expert and lay witness testimony. *See United States v. Yanez Sosa*, 513 F.3d 194, 200 (5th Cir. 2008) (stating that “lay testimony ‘results from a process of reasoning familiar in everyday life,’ while expert testimony ‘results from a process of reasoning which can be mastered only by specialists in the field’” (quoting FED. R. EVID. 701 advisory committee's note (2000 Amendment))). Nor do we address when expert testimony is necessary. *See, e.g., Wills v. Amerada Hess Corp.*, 379 F.3d 32, 46 (2d Cir. 2004) (“[W]here an injury has multiple potential etiologies, expert testimony is necessary to establish causation.”); *Guevara v. Ferrer*, 247 S.W.3d 662, 668 (Tex. 2007) (explaining when medical testimony is necessary on medical causation); *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 583 (Tex. 2006) (stating expert testimony is necessary to establish design defects and causation); *FFE Transp. Servs., Inc. v. Fulgham*, 154 S.W.3d 84, 91 (Tex. 2004) (holding expert testimony necessary because jurors do not “know what the standard of care is for the inspection and

reliable foundation, and this foundation is found in the three reliability gates.<sup>17</sup> As stated by the U.S. Supreme Court, the standards of reliability applicable to expert evidence are “exacting.”<sup>18</sup> Our choice to focus on these five gates is driven in part by the text of Rule 702. The Ninth Circuit recently paraphrased the text of Rule 702 as identifying these five gates:

Rule 702 of the Federal Rules of Evidence provides that expert opinion evidence is admissible if: (1) the witness is sufficiently qualified as an expert by knowledge, skill, experience, training, or education; (2) the scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (3) the testimony is based on sufficient facts or data; (4) the testimony is the product of reliable principles and methods; and (5) the expert has reliably applied the relevant principles and methods to the facts of the case.<sup>19</sup>

The Sixth Circuit also states that a “[p]arsing [of] the language of the Rule” reveals that a proposed expert’s opinion must satisfy three requirements:<sup>20</sup> the expert is qualified, the opinion is sufficiently reliable under *Daubert*,<sup>21</sup> and the testimony assists the

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maintenance of the upper coupler assembly, kingpin, and base rail of a refrigerated trailer”); *Alexander v. Turtur & Assocs.*, 146 S.W.3d 113, 119–20 (Tex. 2004) (finding expert testimony to be necessary in attorney malpractice cases to prove cause-in-fact); *Rehabilitative Care Sys. of Am. v. Davis*, 73 S.W.3d 233, 234 (Tex. 2002) (per curiam) (holding expert testimony necessary to establish standard of care for negligent-supervision-of-physical-therapist claim). We also do not address whether expert testimony should be excluded because the expert’s testimony “misapplies established legal rules and principles,” see *Williams v. State*, 406 S.W.3d 273, 283–84 (Tex. App.—San Antonio 2013, pet. denied) (holding that the appraiser did not violate legal principles); see also *Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC*, 386 S.W.3d 256, 262 (Tex. 2012) (stating that “[i]f an appraiser utilizes improper methodology or misapplies established rules and principles, the resulting testimony is unreliable and must be excluded” and concluding that expert’s testimony violated value-to-the-taker rule and was inadmissible), or because it is not a proper subject of expert testimony, see *United States v. Adams*, 271 F.3d 1236, 1245 (10th Cir. 2001) (finding that expert testimony concerning credibility is generally not an appropriate subject for expert testimony).

17. In the 1999 article, the three reliability gates were labeled: foundational reliability, methodological reliability, and connective reliability. Because courts have used the term “foundation” broadly to encompass all three types of reliability and the foundation of an expert’s opinion may be a methodology or reasoning, we have renamed “foundational reliability” as “predicative reliability” in this Article. The phrase “predicative reliability” focuses better on the data, facts, and assumptions underlying an expert opinion.

18. *Weisgram v. Marley Co.*, 528 U.S. 440, 455 (2000) (“Since *Daubert*, moreover, parties relying on expert evidence have had notice of the exacting standards of reliability such evidence must meet.”).

19. *City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1043 (9th Cir. 2014).

20. *In re Scrap Metal Antitrust Litig.*, 527 F.3d 517, 528–29 (6th Cir. 2008).

21. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590 (1993).

trier of fact.<sup>22</sup> Because the reliability inquiry is three gates, it therefore likewise concludes that there are five gates. The Sixth,<sup>23</sup> Seventh,<sup>24</sup> Eighth,<sup>25</sup> and Eleventh<sup>26</sup> Circuits all utilize the same summary of Rule 702's requirements.<sup>27</sup> The Third Circuit agrees that "Rule 702 embodies a trilogy of restrictions on expert testimony" and lists qualification and reliability as two restrictions but defines the third restriction as the fit requirement, which it describes as requiring the expert's testimony to be relevant and helpful.<sup>28</sup> The Tenth Circuit also applies a three-part inquiry with these same questions.<sup>29</sup>

The Eleventh Circuit has explained:

[A]lthough there is some overlap among the inquiries into an expert's qualifications, the reliability of his proffered opinion and the helpfulness of that opinion, these are distinct concepts that courts and litigants must take care not to conflate. Thus, for example, while an expert's overwhelming qualifications may bear on the reliability of his proffered testimony, they are by no means a guarantor of reliability. By the same token, a reliable opinion expressed by a genuinely qualified expert may not help the jury if it does not pertain to a fact at issue in the case.<sup>30</sup>

Texas courts use essentially the same trilogy of tests to analyze the admissibility of expert testimony.<sup>31</sup> The Texas

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22. *In re Scrap Metal Antitrust Litig.*, 527 F.3d at 528–29.

23. *Id.* at 528.

24. *Myers v. Ill. Cent. R.R. Co.*, 629 F.3d 639, 644 (7th Cir. 2010).

25. *Polski v. Quigley Corp.*, 538 F.3d 836, 839 (8th Cir. 2008); *Sappington v. Skyjack, Inc.*, 512 F.3d 440, 448 (8th Cir. 2008); *Kudabeck v. Kroger Co.*, 338 F.3d 856, 859 (8th Cir. 2003).

26. *Hendrix ex rel. G.P. v. Evenflo Co.*, 609 F.3d 1183, 1194 (11th Cir. 2010); *Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1340 (11th Cir. 2003).

27. *See also* 4 JACK B. WEINSTEIN & MARGARET A. BERGER, *WEINSTEIN'S FEDERAL EVIDENCE* § 702.02[3], at 702-9 (Joseph M. McLaughlin ed., 2d ed. 2014) (identifying these tests as the "three basic prerequisites to the admissibility of evidence from expert witnesses").

28. *Schneider ex rel. Estate of Schneider v. Fried*, 320 F.3d 396, 404 (3d Cir. 2003); *see also* *Pineda v. Ford Motor Co.*, 520 F.3d 237, 244 (3d Cir. 2008) (describing three major requirements for admissibility of expert testimony but using helpfulness rather than fit as third requirement).

29. In *North America Specialty Insurance Co. v. Britt Paulk Insurance Agency, Inc.*, the court stated that *Daubert* establishes a two-part inquiry for expert testimony: reliability and helpfulness to the jury. *N. Am. Specialty Ins. Co. v. Britt Paulk Ins. Agency, Inc.*, 579 F.3d 1106, 1112 (10th Cir. 2009). In *Conroy v. Vilsack*, the court also stated that there were two inquiries: (1) qualifications and (2) reliability and relevance. *Conroy v. Vilsack*, 707 F.3d 1163, 1168 (10th Cir. 2013). It stated that the relevance inquiry examines whether the evidence is helpful to the jury. *Id.* Thus, it uses the same three questions.

30. *Quiet Tech. DC-8, Inc.*, 326 F.3d at 1341.

31. *Compare* *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 215 (Tex. 2010) ("An expert witness may testify regarding 'scientific, technical, or other specialized' matters if

Supreme Court typically references relevance, rather than assistance to the jury, as the third prong, but the Court has defined relevancy in this context as imposing an “assistance to the jury” requirement.<sup>32</sup>

This division into separate gates does run a risk: it may “make[] the task of determining admissibility sound more mechanical and less judgmental than it really is.”<sup>33</sup> But in fact, these gates are inextricably intertwined and their assessment, individually and collectively, is as flexible and context-specific as the subjects they attempt to evaluate.<sup>34</sup> Overlap is inevitable not only in the reliability gates but with all the gates: expert evidence that is not reliable necessarily is neither helpful nor relevant (even if it sounds like it would be and even if it is persuasive to the actual factfinder, who overlooks its flaws);<sup>35</sup>

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the expert is qualified and if the expert’s opinion is relevant and based on a reliable foundation.” (quoting *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578 (Tex. 2006)), with *McMahon v. Zimmerman*, 433 S.W.3d 680, 686 (Tex. App.—Houston [1st Dist.] 2014, no pet.) (recognizing three tests composed of whether the expert is qualified, the testimony assists the trier of fact, and the testimony satisfies the three-part reliability inquiry). See also *Vela v. State*, 209 S.W.3d 128, 131 (Tex. Crim. App. 2006) (“These rules require a trial judge to make three separate inquiries, which must all be met before admitting expert testimony: (1) the witness qualifies as an expert by reason of his knowledge, skill, experience, training, or education; (2) the subject matter of the testimony is an appropriate one for expert testimony; and (3) admitting the expert testimony will actually assist the fact-finder in deciding the case. These conditions are commonly referred to as (1) qualification, (2) reliability, and (3) relevance.” (footnote omitted)).

32. See, e.g., *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 234 (Tex. 2010) (“For an expert’s testimony to be admissible, the expert witness must be qualified to testify about ‘scientific, technical, or other specialized knowledge,’ and the testimony must be relevant and based upon a reliable foundation. An expert’s testimony is relevant when it assists the jury in determining an issue or in understanding other evidence.” (citation omitted)).

33. *Alaska Rent-A-Car, Inc. v. Avis Budget Grp., Inc.*, 738 F.3d 960, 969 (9th Cir.), cert. denied, 134 S. Ct. 644 (2013).

34. See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999) (observing that “there are many different kinds of experts, and many different kinds of expertise,” such that the test for admissibility under Rule 702 is necessarily “a flexible one” (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 594 (1993))); see also *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (noting that, while *Daubert* analysis focuses on the principles and methodology employed by an expert, rather than the correctness of the expert’s conclusions, an expert’s conclusions and methodology “are not entirely distinct from one another”); *Lees v. Carthage Coll.*, 714 F.3d 516, 521 (7th Cir. 2013) (“The Court also noted in *Kumho* that because there are ‘many different kinds of experts, and many different kinds of expertise,’ the reliability analysis should be geared toward the precise sort of testimony at issue and not any fixed evaluative factors.”); 5 MICHAEL H. GRAHAM, HANDBOOK OF FEDERAL EVIDENCE § 702:5, at 234–37 (7th ed. 2012) (noting that although the text of Federal Rule 702 suggests that the trial court must examine each of the three prongs separately, “the dividing line between the three requirements is often at best incredibly unclear” and contending that all three requirements focus on one inquiry: whether the expert’s approach is reasonable to draw the conclusion in question).

35. *TXI Transp.*, 306 S.W.3d at 234 (“[E]xpert testimony based on an unreliable foundation or flawed methodology is unreliable and does not satisfy Rule 702’s relevancy requirement.”); *Morales v. State*, 32 S.W.3d 862, 865 (Tex. Crim. App. 2000) (“Naturally,

and expert evidence that is not relevant is necessarily not helpful. Thus, the gates perhaps are best pictured as interlocking gates. But “[w]hile there is inevitably some overlap among the basic requirements—qualification, reliability, and helpfulness—they remain distinct concepts and the courts must take care not to conflate them.”<sup>36</sup>

Before addressing these interlocking gates, it bears emphasizing that the gates apply not only to all types of expert testimony but also to expert testimony offered by all parties. “[A]ny expert’s opinions should be based upon methods and research which are reliable regardless of which party has the burden of proof.”<sup>37</sup>

### I. THE QUALIFICATIONS GATE<sup>38</sup>

Rule 702 allows expert testimony in scientific, technical, or other specialized areas provided the “witness [is] qualified as an expert by knowledge, skill, experience, training, or education.” The test and standard of review for determining whether an expert is qualified has not changed in the past fifteen years.<sup>39</sup> An expert must achieve “a meaningful threshold” of qualifications to ensure “the effective functioning of the gatekeeper process.”<sup>40</sup>

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testimony which is unreliable or irrelevant would not assist a juror in understanding the evidence or determining a fact in issue, as is required by Rule 702.”); *Schronk v. Laerdal Med. Corp.*, No. 10-12-00118-CV, 2013 WL 6570907, at \*4 (Tex. App.—Waco Dec. 12, 2013, pet. denied) (“[U]nreliable expert testimony is not relevant evidence and, therefore, constitutes no evidence.”); see also *JEFF BROWN & REECE RONDON, TEXAS RULES OF EVIDENCE HANDBOOK* 690 (2014 ed.) (stating that unreliable expert testimony should be excluded because it “would be more likely to prejudice or confuse than to assist the trier of fact”).

36. *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004).

37. *Brownsville Pediatric Ass’n v. Reyes*, 68 S.W.3d 184, 195 (Tex. App.—Corpus Christi 2002, no pet.). The court of appeals framed the issue as whether *Daubert* “and its Texas progeny apply to a defense expert who is testifying for a party who does not have the burden of proof on the issue, but who is testifying only about possible causes that could have led to injuries and damages in this case.” *Id.* While the court undoubtedly reached the correct conclusion, it is worth noting that an opinion identifying a plausible cause of an injury is different than an opinion identifying the most likely cause of an injury. Thus, the defense expert who is only testifying as to possible causes does not have to provide a reliable basis for concluding that the identified cause is the most likely cause of the injury. But the defense expert nonetheless needs a reliable basis for an opinion that another cause is plausible; otherwise, the expert is engaging in pure speculation.

38. For additional discussion of this gate, see *Brown*, *supra* note 1, at 757–72.

39. The standard of review continues to remain abuse of discretion. *Vela v. State*, 209 S.W.3d 128, 136 (Tex. Crim. App. 2006) (“[B]ecause the possible spectrum of education, skill, and training is so wide, a trial court has great discretion in determining whether a witness possesses sufficient qualifications to assist the jury as an expert on a specific topic in a particular case.” (quoting *Rodgers v. State*, 205 S.W.3d 525, 527–28 (Tex. Crim. App. 2006)) (internal quotation marks omitted)); *Larson v. Downing*, 197 S.W.3d 303, 304–05 (Tex. 2006) (reaffirming abuse of discretion standard applies to whether expert is qualified, and therefore “close calls” must go to the trial court).

40. *Prado Alvarez v. R.J. Reynolds Tobacco Co.*, 405 F.3d 36, 40 (1st Cir. 2005).

Other than some language in one opinion that may modify the qualifications inquiry in cases where methodology is more important than credentials,<sup>41</sup> the Texas Supreme Court's only substantive modification is to grant entities the benefit of the Property Owner Rule—like an individual, an entity's officers, if they have adequate knowledge of a property, may now testify regarding the value of the entity's property.<sup>42</sup> In this section, we first review the seven decisions by the Texas Supreme Court in the last fifteen years that address qualification issues, then some general principles from decisions by the intermediate courts, and conclude with a brief discussion of error preservation.

### A. *Texas Supreme Court Decisions*

Since 1999, the Texas Supreme Court has three times determined that experts were qualified and four times determined that they were not. The experts were qualified in *Helena Chemical Co. v. Wilkins*,<sup>43</sup> *Roberts v. Williamson*,<sup>44</sup> and *In re Commitment of Bohannan*.<sup>45</sup>

*Helena Chemical* exemplifies how a court's characterization of the breadth of an expert's testimony can affect whether the court finds the expert qualified to testify.<sup>46</sup> One issue in the case was whether seeds sold by Helena Chemical were well suited for

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41. See *In re Commitment of Bohannan*, 388 S.W.3d 296, 305–06 (Tex. 2012), discussed *infra* notes 56–71 and accompanying text.

42. See *Reid Rd. Mun. Util. Dist. No. 2 v. Speedy Stop Food Stores, Ltd.*, 337 S.W.3d 846, 852–53 (Tex. 2011). Under the Property Owner Rule, “a property owner is qualified to testify to the value of her property even if she is not an expert and would not be qualified to testify to the value of other property.” *Id.* For entities, “the Property Owner Rule is limited to those witnesses who are officers of the entity in managerial positions with duties related to the property, or employees of the entity with substantially equivalent positions and duties.” *Id.* at 849. Importantly, however, “the Property Owner Rule falls within the ambit of Texas Rule of Evidence 701 and therefore does not relieve the owner of the requirement that a witness must be personally familiar with the property and its fair market value . . .” *Id.*

The Court also addressed the distinction between lay opinion testimony under Rule 701 and expert testimony under Rule 702. The Court noted that “[t]he line between who is a Rule 702 expert witness and who is a Rule 701 witness is not always bright.” *Id.* at 851. However, as a general notion, “when the main substance of the witness’s testimony is based on application of the witness’s specialized knowledge, skill, experience, training, or education to his familiarity with the property, then the testimony will generally be expert testimony within the scope of Rule 702.” *Id.* The Court then held that, “subject to the provisions of Rule 701,” a witness giving opinion testimony regarding the value of real estate “must be disclosed and designated as an expert.” *Id.* at 851.

43. *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 498 (Tex. 2001).

44. *Roberts v. Williamson*, 111 S.W.3d 113, 122 (Tex. 2003).

45. *In re Commitment of Bohannan*, 388 S.W.3d at 306.

46. *Helena Chem.*, 47 S.W.3d at 499 (quoting *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 719 (Tex. 1998) (quoting *Broders v. Heise*, 924 S.W.2d 148, 152 (Tex. 1996))).

dryland farming and were resistant to charcoal rot, as represented by Helena Chemical.<sup>47</sup> Helena Chemical argued that the expert—who had a bachelor’s degree in wildlife management, a doctorate in plant physiology, and had worked as a plant scientist and consultant for more twenty years—was not qualified because he was not a plant pathologist and had not established that he was an expert on charcoal rot.<sup>48</sup> The Court rejected this argument, stating that Helena had “incorrectly frame[d] the issue” because the factual issue in the case was not only whether the seeds were susceptible to charcoal rot but also whether they were particularly suited for dryland farming.<sup>49</sup>

After reiterating the *Broders/Gammill* standard that trial courts “must ensure that those who purport to be experts truly have expertise concerning the actual subject about which they are offering an opinion,”<sup>50</sup> the *Helena Chemical* Court concluded that the trial court did not abuse its discretion in finding the expert qualified to testify regarding the cause of a crop failure because his “knowledge would aid the jury in understanding the evidence.”<sup>51</sup> Arguably, the Court’s conclusion utilizes a lower threshold for examining an expert’s qualifications<sup>52</sup> by equating the qualifications test with a helpfulness test; i.e., experts who are not qualified concerning a subspecialty nevertheless might be considered qualified under such a standard because they know far more than a jury on the topic. But subsequent cases from the Court, discussed below, demonstrate that would be a misreading of *Helena Chemical*.

In *Roberts*, a medical malpractice case, the Court reaffirmed *Broders*<sup>53</sup> and concluded that the trial court did not abuse its

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47. *Id.* at 500.

48. *Id.* at 499–500.

49. *Id.*

50. *Id.* at 499 (quoting *Gammill*, 972 S.W.2d at 719 (quoting *Broders*, 924 S.W.2d at 152 (Tex. 1996))).

51. *Id.* at 500 (“Thus, to determine whether [the expert] is a qualified expert, the question is whether [he] has scientific, technical, or other specialized knowledge that would assist the jury to understand this evidence and determine if [the] seed is suitable for dryland farming as represented.”).

52. For a lower threshold, see *Robinson v. GEICO Gen. Ins. Co.*, 447 F.3d 1096, 1100–01 (8th Cir. 2006) (“Rule 702 only requires that an expert possess ‘knowledge, skill, experience, training, or education’ sufficient to ‘assist’ the trier of fact, which is ‘satisfied where expert testimony advances the trier of fact’s understanding to any degree. Gaps in an expert witness’s qualifications or knowledge generally go to the weight of the witness’s testimony, not its admissibility.” (quoting 29 CHARLES ALAN WRIGHT & VICTOR JAMES GOLD, FEDERAL PRACTICE AND PROCEDURE: FEDERAL RULES OF EVIDENCE § 6265, at 245, 249–50 (1997))).

53. *Broders*, 924 S.W.2d at 148, 153–54 (holding that trial court correctly excluded expert testimony of emergency room physician because “[w]hile he knew both that

discretion in admitting a board-certified pediatrician's testimony concerning neurological injuries.<sup>54</sup> The expert had "studied the effects of pediatric neurological injuries and has extensive experience advising parents about the effects of those injuries," consulted "several peer-reviewed medical-journal articles and textbooks on pediatric neurology," and "had experience and expertise regarding the specific causes and effects" of the neurological injuries at issue.<sup>55</sup>

In its most recent opinion on qualifications, *In re Commitment of Bohannon*, the Court found that the expert was qualified and the trial court erred in excluding the expert's testimony.<sup>56</sup> *In re Commitment of Bohannon*, a case arising from the commitment of an individual deemed to be a sexually violent predator (SVP), held that an expert in an SVP proceeding does not have to be licensed as a physician or psychologist to be qualified.<sup>57</sup> The Court began with the "general rule" that "an expert must be qualified by knowledge, skill, experience, training, or education to assist the trier of fact to understand the evidence or to determine a fact in issue," and then stated that a witness's expertise "does not necessarily mean that the witness can assist the trier-of-fact. Expert testimony assists the trier-of-fact when the expert's knowledge and experience on a relevant issue are beyond that of the average juror and the testimony helps the trier-of-fact understand the evidence or determine a fact issue."<sup>58</sup> But that helpfulness inquiry only begins the analysis. "Credentials are important, but credentials alone do not qualify an expert to testify."<sup>59</sup>

Reiterating *Broders*, the Court stressed that the expertise must concern the precise matter at hand.<sup>60</sup> As part of the qualifications issue, courts must also examine whether the expert's testimony is reliable.<sup>61</sup> The Court observed that a person's mental health is part—but only part—of determining

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neurosurgeons should be called to treat head injuries and what treatments they could provide, he never testified that he knew, from either experience or study, the effectiveness of those treatments in general, let alone in this case"). The Court in *Broders* expressly rejected the notion "that only a neurosurgeon can testify about the cause in fact of death from an injury to the brain, or even that an emergency room physician could never so testify." *Id.*

54. *Roberts v. Williamson*, 111 S.W.3d 113, 121–22 (Tex. 2003).

55. *Id.* at 122.

56. *In re Commitment of Bohannon*, 388 S.W.3d 296, 307 (Tex. 2012).

57. *Id.* at 306.

58. *Id.* at 304.

59. *Id.*

60. *Id.* at 305.

61. *Id.*

whether a person is predisposed to sexually violent conduct, and that a factfinder must consider “all available information” in making that determination.<sup>62</sup> In determining that issue, “the kind of evaluation done by a psychologist may be at least as important as a medical diagnosis.”<sup>63</sup>

The usefulness of the expert’s opinion in assisting the trier-of-fact rests not on the type of license the expert holds but on the expert’s knowledge, training, and experience in dealing with sexual offenders. A person’s training and experience in clinical interviews and actuarial tests is no less helpful merely because the person is not licensed as a psychologist.<sup>64</sup>

The Court concluded that “a person is not disqualified from testifying as an expert in an SVP commitment proceeding merely because the person is not licensed as a physician or psychologist.”<sup>65</sup>

*In re Commitment of Bohannan* may be read to expand the issues involved in a qualifications inquiry. Even with the best of credentials, an expert may not be qualified to opine on a subject because the techniques involved may not be reliable. On the other hand, an expert with less impressive credentials may nevertheless be qualified if the expert’s technique used for reaching a conclusion is more important than the credentials. One federal court has likewise indicated that an expert’s qualifications are reviewed in the context of the opinion the expert offers. “[S]hoddy preparation by an expert might evidence a lack of professional qualifications on the part of a proffered witness.”<sup>66</sup>

Finally, like *Helena Chemical*, *In re Commitment of Bohannan* demonstrates the important role of issue-framing in assessing expert qualifications. The court of appeals had held in another SVP proceeding involving the same expert that the SVP statute contained two distinct issues: whether the defendant has an acquired or congenital condition and whether the defendant has a predisposition to commit a sexually violent offense.<sup>67</sup> The

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62. *Id.* at 305–06. The Court distinguished commitment proceedings, based on a person’s “unsound mind” from SVP proceedings, which expressly did not require a showing of “unsound mind.” *Id.* at 303–04. The Court noted that the Legislature had expressly indicated “that medical and psychiatric testimony, a constitutional prerequisite for committing a person of unsound mind, is not necessary to SVP proceedings.” *Id.* at 304.

63. *Id.* at 306.

64. *Id.*

65. *Id.*

66. *Walker v. Soo Line R.R. Co.*, 208 F.3d 581, 590–91 (7th Cir. 2000).

67. *In re Commitment of Dodson*, 311 S.W.3d 194, 199 (Tex. App.—Beaumont 2010, pet. denied), *abrogated by In re Commitment of Bohannan*, 388 S.W.3d 296.

court of appeals held that medical evidence was necessary to prove the first issue but not the second.<sup>68</sup> Thus, under the court of appeals' construction of the statute, the expert, trained in applying actuarial tests evaluating the risk of recidivism and experienced in identifying that risk among her patients, but not a medical doctor—was qualified to offer an opinion on the second issue but not the first.<sup>69</sup> The Texas Supreme Court rejected that “bisection” of the statute, concluding that the statutory inquiry focused on whether the defendant has “a condition that . . . predisposes' sexually violent conduct,” such that the conduct and predisposition could not be considered separately.<sup>70</sup> Under the Court's single-issue approach, a nonphysician, nonpsychologist, like the expert in *In re Commitment of Bohannon*, may be deemed qualified to offer all opinion testimony on all necessary components of the statute. Conversely, under the court of appeals' bifurcated approach, medical expertise was necessary for the “condition” component of the statute.<sup>71</sup>

The Court found experts to be unqualified in *General Motors Corp. v. Iracheta*,<sup>72</sup> *Larson v. Downing*,<sup>73</sup> *Cooper Tire & Rubber Co. v. Mendez*,<sup>74</sup> and *In re McAllen Medical Center, Inc.*<sup>75</sup> In *Iracheta*, a products liability case, the Court concluded that Sanchez, one of plaintiffs' experts, was not qualified to offer opinion testimony on where siphoning occurred in the fuel line of an Oldsmobile Toronado.<sup>76</sup> Sanchez and the plaintiffs' other expert both admitted that Sanchez was not qualified to offer this opinion.<sup>77</sup> While Sanchez and the plaintiffs' other expert subsequently “equivocated” on the subject of Sanchez's qualifications to opine on this subject, “experts cannot be as ambivalent as these two were and establish the privilege of offering opinion testimony under Rule 702 of the Texas Rules of Evidence.”<sup>78</sup>

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68. *Id.* at 199–200.

69. *Id.* at 200–01.

70. *In re Commitment of Bohannon*, 388 S.W.3d at 302–03.

71. *Id.* at 299.

72. *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470 (Tex. 2005).

73. *Larson v. Downing*, 197 S.W.3d 303, 305 (Tex. 2006) (per curiam).

74. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 807 (Tex. 2006).

75. *In re McAllen Med. Ctr., Inc.*, 275 S.W.3d 458, 463 (Tex. 2008).

76. *Iracheta*, 161 S.W.3d at 463–64, 470.

77. *Id.*

78. *Id.* The *Iracheta* Court went on to address the conclusory, self-contradictory nature of Sanchez's testimony even after determining he was unqualified to offer an opinion, echoing the implication in *In re Commitment of Bohannon* that the qualifications inquiry may implicate not only the expert's credentials but also his methods and analysis. *Id.* at 470–71.

In *Larson v. Downing*, a medical malpractice claim, the Court held that the trial court did not abuse its discretion in excluding a plastic surgeon as unqualified to testify on the standard of care for a plastic surgeon.<sup>79</sup> The defendant-physician objected that the expert lacked experience with the procedure the defendant-physician utilized.<sup>80</sup> The Beaumont appellate court found the expert qualified because he was a licensed physician with a board certification in plastic and reconstructive surgery and was actively practicing medicine when the claim arose.<sup>81</sup> He also “expressed knowledge of the accepted standards of medical care for the diagnosis, care, or treatment of the injury involved in the claim.”<sup>82</sup> The high court reversed the judgment of the court of appeals and affirmed the trial court’s exclusion of the physician expert and entry of summary judgment.<sup>83</sup> Although the expert had a number of credentials, the Texas Medical Liability Act requires a court to consider whether the expert “was actively practicing medicine in rendering medical care services relevant to the claim,” and the expert had not performed the surgery at issue in over fifteen years, and there was no evidence that he had ever taught the procedure.<sup>84</sup> “The trial court was well within its discretion in determining that [the expert] was too far removed from surgical practice and even from teaching.”<sup>85</sup> Whether to exclude the expert’s testimony was a close call, and close calls must be left to the trial court.<sup>86</sup>

In *Cooper Tire & Rubber Co. v. Mendez*, a products liability case, the Court applied the *Broders* rule that experts must have expertise “concerning the actual subject about which they are offering an opinion”<sup>87</sup> to hold that the trial court should have excluded a chemist from opining on whether a tire had a manufacturing defect.<sup>88</sup> In *Broders*, the Court observed that “given the increasingly specialized and technical nature of medicine, there is no validity, if there ever was, to the notion that every licensed medical doctor should be automatically qualified

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79. *Larson v. Downing*, 197 S.W.3d 303, 303–05 (Tex. 2006).

80. *Downing v. Larson*, 153 S.W.3d 248, 253 (Tex. App.—Beaumont 2004), *rev’d*, 197 S.W.3d 303 (Tex. 2006).

81. *Id.* at 252–53.

82. *Id.*

83. *Larson*, 197 S.W.3d at 305.

84. *Id.* at 304–05.

85. *Id.* at 305.

86. *Id.* at 304.

87. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800 (Tex. 2006) (quoting *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 719 (Tex. 1998) (quoting *Broders v. Heise*, 924 S.W.2d 148, 152 (Tex. 1996))).

88. *Id.* at 806–07.

to testify as an expert on every medical question.”<sup>89</sup> *Cooper Tire* applies the same principle to other highly specialized fields.<sup>90</sup> Though the expert had a degree in chemistry, he had no specialized expertise in tire chemistry and never worked for a tire company or published any articles on tire chemistry. He also conceded that he did not consider himself an expert in tire design or a forensic tire examiner, and did not hold himself out as having any expertise in the field of tire manufacturing. The Court found that he was not qualified to testify on the subject of wax migration and contamination in tires and their effect on tire adhesion without more specialized education, training, or experience in tire chemistry. “[C]hemistry is an exceedingly vast science divided into several branches and is far beyond the capacity of one person to master.”<sup>91</sup>

*In re McAllen Medical Center, Inc.* concerned whether a physician was qualified to testify in support of a negligent credentialing claim.<sup>92</sup> The Court held that she was not.<sup>93</sup> The Court initially noted that “a negligent credentialing claim involves a specialized standard of care.”<sup>94</sup> Her curriculum vitae (CV) was “a model of brevity”: it did not list where she went to medical school, identify any details about her twenty years of practice, list any hospital where she was on staff, or identify any special knowledge regarding hospital credentialing.<sup>95</sup> Nothing in her CV, or anywhere else in the record, suggested she had any

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89. *Broders*, 924 S.W.2d at 152. For a full discussion of *Broders*, see Brown, *supra* note 1, at 747, 763–65.

90. *Cooper Tire*, 204 S.W.3d at 801–07.

91. *Id.* at 806. Here again, although the Court held that the expert was not qualified to offer an opinion, it discussed not only the expert’s credentials but also the reliability of his opinion. *Id.* The Court noted that the expert opined that the wax on the skim stock identified in a report was the result of contamination rather than migration even though the authors of the report had concluded that they could not determine whether migration was the source of the wax. *Id.* “[He] also opined that the wax would adversely affect adhesion, though he could not identify any testing [on the subject] and offered no testimony as to the amount of wax needed to cause a belt or tread to separate.” *Id.* (internal quotation marks omitted). Although the Court did not state that the expert’s testimony was unreliable, it at least implied that the reliability of the testimony was questionable. See *id.* at 806–07. Like *Iracheta*, *Cooper Tire* is consistent with the *In re Commitment of Bohannon* concept that the qualifications standards for experts may be something of a sliding scale, depending on the reliability of the testimony offered and how much of the reliability must be derived from his credibility as an expert in the field. At a minimum, courts may point to the unreliability of an expert’s opinion to buttress their conclusion that the expert lacks the necessary qualifications.

92. *In re McAllen Med. Ctr., Inc.*, 275 S.W.3d 458, 462–63 (Tex. 2008).

93. *Id.*

94. *Id.* at 463.

95. *Id.*

special knowledge or expertise regarding hospital credentialing.<sup>96</sup> Therefore, the offering party failed to satisfy its burden of showing that she was qualified to testify about standards that govern a hospital's credentialing process.<sup>97</sup>

To flesh out the qualifications inquiry mandated by *Broders* and *Cooper Tire*, civil cases might consider adopting the Court of Criminal Appeals' qualifications test. In criminal cases, "[q]ualification is a two-step inquiry": the witness must "have a sufficient background in a particular field," and the witness's background must "go[] to the matter on which the witness is to give an opinion."<sup>98</sup> The first inquiry is more general in nature—such as examining whether an expert on medical issues is a physician—while the second examines whether the expert has "knowledge, skill, experience, training, or education regarding the specific issue before the court that would qualify the expert to give an opinion on that particular subject. The focus is on the fit between the subject matter at issue and the expert's familiarity with it."<sup>99</sup> As the Court of Criminal Appeals explained a year earlier,

"fit" is not just a component of reliability and relevance—it is also a component of the qualification inquiry. Just as the subject matter of an expert's testimony should be tailored to the facts of a case, the expert's background must be tailored to the specific area of expertise in which the expert desires to testify.<sup>100</sup>

At least one opinion in a civil case has also used the fit requirement to mandate that the expert's qualifications must match the precise question at hand:

Whether a physician qualifies as an expert is determined by comparing the area in which the witness has such knowledge, skill, experience, or training with the subject matter of the proposed testimony. The focus is on the "fit" between the subject matter at issue and the expert's familiarity of the subject matter . . . .<sup>101</sup>

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96. *Id.*

97. *Id.*

98. *Davis v. State*, 329 S.W.3d 798, 813 (Tex. Crim. App. 2010) (alteration in original) (citation omitted) (quoting *Vela v. State*, 209 S.W.3d 128, 131 (Tex. Crim. App. 2006)).

99. *Id.* at 813 (citations omitted). The qualifications standard is lower in criminal cases if the expert's opinion "is close to the jury's common understanding"; conversely, the expert's qualifications are more important "when the evidence is well outside the jury's own experience." *Rodgers v. State*, 205 S.W.3d 525, 528 (Tex. Crim. App. 2006).

100. *Vela*, 209 S.W.3d at 133.

101. *Hayes v. Carroll*, 314 S.W.3d 494, 504 (Tex. App.—Austin 2010, no pet.). One federal court has explained:

### B. General Principles

Turning from the holdings in these cases to general principles, courts should separately examine the expert's qualifications for each proffered opinion.<sup>102</sup> Courts do not examine "whether an expert witness is qualified in general, but whether [the expert's] 'qualifications provide a foundation . . . to answer a specific question.'"<sup>103</sup> Thus, courts may find an expert qualified for one opinion, but not for another.<sup>104</sup> And, as discussed above, how broadly or narrowly a court defines the "specific question" at issue impacts what kind of qualifications the expert must possess.<sup>105</sup>

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An expert's opinion is helpful only to the extent the expert draws on some special skill, knowledge, or experience to formulate his opinion; the opinion must be an *expert* opinion (that is, an opinion informed by the witness's expertise) rather than simply an opinion broached by a purported expert. Unless the expertise adds something, the expert at best is offering a gratuitous opinion, and at worst is exerting undue influence on the jury . . . .

United States v. Hall, 93 F.3d 1337, 1343 (7th Cir. 1996) (citation omitted).

102. Broders v. Heise, 924 S.W.2d 148, 151–53 (Tex. 1996) (concluding trial court did not abuse discretion in excluding emergency room physician's opinion concerning patient's prognosis had proper treatment been given for neurological injury).

103. Gayton v. McCoy, 593 F.3d 610, 617 (7th Cir. 2010) (quoting Berry v. City of Detroit, 25 F.3d 1342, 1351 (6th Cir. 1994)).

104. Myers v. Ill. Cent. R.R. Co., 629 F.3d 639, 643 (7th Cir. 2010) (concluding that ergonomist was qualified to opine about railroad yard's dangers, but not about what caused plaintiff's injuries); *Gayton*, 593 F.3d at 617–18 (finding expert unqualified to testify that inmate would not have died if she had been given heart medications because he lacked training in cardiology or pharmacology, but qualified to testify whether vomiting and diuretic medications contributed to tachycardia and subsequent death); *Calhoun v. Yamaha Motor Corp., U.S.A.*, 350 F.3d 316, 323 (3d Cir. 2003) (holding that trial court properly limited expert's testimony; expert was qualified to address operation of jet skis, but was not qualified in product design of jet skis nor did he provide any evidence evaluating relative safety of different jet ski models; and expert could "testify about how to frame an effective warning in general" but could not testify on specific substance of such warnings); *Goodyear Tire & Rubber Co. v. Rios*, 143 S.W.3d 107, 116 (Tex. App.—San Antonio 2004, pet. denied) (concluding in tire defect case, research scientist was qualified to testify regarding general adhesion principles but not adhesion principles as they applied to specific tire); *Pack v. Crossroads, Inc.*, 53 S.W.3d 492, 507 (Tex. App.—Fort Worth 2001, pet. denied) (holding in a nursing home malpractice claim that trial court did not err in limiting nurse to testimony concerning deficiencies in care of the decedent instead of standard of care of nursing home generally because, despite her experience in nursing home investigations, knowledge of nursing home regulations, and clinical training, she was not qualified to testify to specific standard of care of a nursing home or defendant nursing home's breach of such a standard); *Morton Int'l v. Gillespie*, 39 S.W.3d 651, 655–56 (Tex. App.—Texarkana 2001, pet. denied) (concluding that the trial court did not err in allowing a mechanical engineer who was a professor of vehicular dynamics to testify concerning an alleged manufacturing defect in the plaintiff's airbag and noting that "[d]espite not meeting the technical requirements set forth under Rule 702 as they relate to testimony about specialized knowledge regarding airbag technology, [the expert] never exceeded the scope of his qualifications nor the scope of the testimony for which he was offered as an expert").

105. See *supra* Part I.A.

In examining each opinion, the overriding principle that emerges from appellate opinions is that the level of “knowledge, skill, experience, training or education” a person must have to be considered an expert on a particular topic is difficult to quantify by “definite guidelines.”<sup>106</sup> There is no “bright-line” test to determine whether a particular witness is qualified to testify as an expert:

Special knowledge [of the specific matter about which his expertise is sought], which qualifies a witness to give an expert opinion[,] may be derived entirely from a study of technical works, or specialized education, or practical experience, or varying combinations thereof.<sup>107</sup>

Some general guidelines do exist. First, there are some guidelines that favor finding an expert qualified. Rule 702 does not mandate that an expert be highly qualified in order to testify about a given issue.<sup>108</sup> An expert is not disqualified simply because he was not “the best qualified” or “the most appropriate” expert.<sup>109</sup> “Differences in expertise”—once the threshold has been satisfied—“bear chiefly on the weight to be assigned to the testimony by the trier of fact, not its admissibility.”<sup>110</sup> Nor does the Rule require a degree, license, or certification;<sup>111</sup> practical experience may suffice.<sup>112</sup> Titles and labels also are not

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106. *Rittger v. Danos*, 332 S.W.3d 550, 559 (Tex. App.—Houston [1st Dist.] 2009, no pet.); *Mem'l Hermann Healthcare Sys. v. Burrell*, 230 S.W.3d 755, 762 (Tex. App.—Houston [14th Dist.] 2007, no pet.); *Rogers v. Gonzales*, 654 S.W.2d 509, 513 (Tex. App.—Corpus Christi 1983, writ ref'd n.r.e.).

107. *Holloway v. State*, 613 S.W.2d 497, 501 (Tex. Crim. App. 1981) (en banc); *Agbogun v. State*, 756 S.W.2d 1, 4 (Tex. App.—Houston [1st Dist.] 1988, writ ref'd).

108. *Huss v. Gayden*, 571 F.3d 442, 452 (5th Cir. 2009).

109. *Physicians Dialysis Ventures, Inc. v. Griffith*, No. 06-2468, 2007 WL 3125197, at \*9 (D.N.J. Oct. 24, 2007).

110. *Huss*, 571 F.3d at 452.

111. *Zuzula v. ABB Power T & D Co.*, 267 F. Supp. 2d 703, 713 (E.D. Mich. 2003) (“[A]lthough a degree might be helpful in determining qualifications . . . it is neither a necessary nor a sufficient condition for qualification as an expert . . .” (citation omitted)); *Tidwell v. Terex Corp.*, No. 01-10-01119-CV, 2012 WL 3776027, at \*12 (Tex. App.—Houston [1st Dist.] Aug. 30, 2012, no pet.) (mem. op.) (“[I]t is well settled that one need not have a license to qualify as an expert witness under Rule 702 . . . .”); *Harnett v. State*, 38 S.W.3d 650, 659 (Tex. App.—Austin 2000, pet. ref'd) (“[L]icensure, or certification in the particular discipline is not a *per se* requirement.”); see also *In re Commitment of Bohannon*, 388 S.W.3d 296, 306 (Tex. 2012) (“[A] person is not disqualified from testifying as an expert in an SVP commitment proceeding merely because the person is not licensed as a physician or psychologist.”); *Roberts v. Williamson*, 111 S.W.3d 113, 121 (Tex. 2003) (stating that “a medical license does not automatically qualify the holder ‘to testify . . . on every medical question’” but likewise rejecting the notion that only a subspecialist can testify about brain injuries).

112. *Fleming v. Kinney ex rel. Shelton*, 395 S.W.3d 917, 926–27 (Tex. App.—Houston [14th Dist.] 2013, pet. denied) (concluding that while “practical experience may be a factor” in assessing qualifications, it was not deciding factor in determining whether

necessarily determinative.<sup>113</sup> Expertise may be gained from experience, rather than academic knowledge.<sup>114</sup> But academic knowledge without experience also may suffice,<sup>115</sup> as may some combination of experience and education.<sup>116</sup> An expert may be particularly qualified in a narrow part of a field but still be permitted to give a team opinion encompassing the entire field.<sup>117</sup>

There are also some general guidelines that favor concluding that an expert is unqualified. The first of these, and the one repeatedly cited by Texas courts, is the *Broders/Gammill* requirement that the expert's qualifications must be on the precise question presented in the case.<sup>118</sup> Federal courts have articulated the same principle in a number of similar formulations: The expert must "possess skill, experience, or knowledge in the 'particular field'" in question;<sup>119</sup> the specific question presented must fall "within the reasonable confines" of

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lawyer was qualified to address fiduciary duties owed by lawyers in charging litigation expenses as part of an aggregate settlement where lawyer's practice focused on attorney ethics and she had written and testified on legal ethics).

113. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 693 (5th Cir. 2012) (rejecting "concept of expertise" that would turn qualifications inquiry into "a battle of labels—label the needed expertise narrowly and the offered expert's field broadly").

114. 2 STEVEN GOODE, OLIN GUY WELLBORN III & M. MICHAEL SHARLOT, GUIDE TO THE TEXAS RULES OF EVIDENCE § 702.2, at 23 (3d ed. 2002) ("Formal education will often suffice to provide the requisite expertise, but is by no means a sine qua non."); *see also* *Johnson v. Hermann Hosp.*, 659 S.W.2d 124, 125–26 (Tex. App.—Houston [14th Dist.] 1983, writ ref'd n.r.e.) (holding that, although expert was not a registered nurse at time of her testimony, "she was qualified to testify because of her experience" in the specific practices at issue—an environment similar to the relevant environment in the case). In the classic beekeeper analogy, for example, a beekeeper who has observed "enough bees in various circumstances to show a pattern" of behavior can offer testimony "that bees take off into the wind" because this is knowledge he has gained from his experience. *See Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998).

115. *Elcock v. Kmart Corp.*, 233 F.3d 734, 741 (3d Cir. 2000).

116. *Brown*, *supra* note 1, at 758–59 (noting that expertise "may be derived entirely from a study of technical works, specialized education, practical experience, or varying combinations thereof" and that "qualifications can be based upon formal or informal education, experience, or a combination of these factors" (quoting *Agbogun v. State*, 756 S.W.2d 1, 4 (Tex. App.—Houston [1st Dist.] 1988, writ ref'd)).

117. *Walker v. Soo Line R.R. Co.*, 208 F.3d 581, 589 (7th Cir. 2000) ("[T]he leader of a clinical medical team [does not need to be] qualified as an expert in every individual discipline encompassed by the team in order to testify as to the team's conclusions.").

118. *Gammill*, 972 S.W.2d at 719 (stating that expert must "truly have expertise concerning the actual subject about which they are offering an opinion" (quoting *Broders v. Heise*, 924 S.W.2d 148, 152 (Tex. 1996))). Federal courts have a similar inquiry. For example, one court stated, "Whether a witness is qualified as an expert can only be determined by comparing the area in which the witness has superior knowledge, skill, experience, or education with the subject matter of the witness's testimony." *Gayton v. McCoy*, 593 F.3d 610, 616 (7th Cir. 2010) (quoting *Carroll v. Otis Elevator Co.*, 896 F.2d 210, 212 (7th Cir. 1990)).

119. *Conroy v. Vilsack*, 707 F.3d 1163, 1169 (10th Cir. 2013) (quoting *LifeWise Master Funding v. Telebank*, 374 F.3d 917, 928 (10th Cir. 2004)).

her expertise”;<sup>120</sup> and “the area of the witness’s competence [must] match[] the subject matter of the witness’s testimony.”<sup>121</sup> An expert may be deemed unqualified if the expert equivocates or is ambivalent on qualifications.<sup>122</sup>

Under *Cooper Tire*, proper qualifications sometimes require an expert to have experience in a subspecialty.<sup>123</sup> “General experience in a specialized field is insufficient to qualify a witness as an expert.”<sup>124</sup> On the other hand, when a party can show that the issue on which the expert opines is governed by standards and principles that are common across subspecialties in the expert’s field, testimony can come from a qualified expert in any one of those subspecialties.<sup>125</sup> If both common and

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120. *Id.* (citing *Ralston v. Smith & Nephew Richards, Inc.*, 275 F.3d 965, 969–70 (10th Cir. 2001) (stating that lack of specialization goes to weight, not admissibility, of an expert opinion “[a]s long as an expert stays ‘within the reasonable confines of his subject area’”).

121. *Robinson v. GEICO Gen. Ins. Co.*, 447 F.3d 1096, 1100–01 (8th Cir. 2006) (quoting 29 *WRIGHT & GOLD*, *supra* note 52, § 6265, at 255–56).

122. *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470 (Tex. 2005).

123. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 806–07 (Tex. 2006).

124. *Gen. Motors Corp. v. Burry*, 203 S.W.3d 514, 526 (Tex. App.—Fort Worth 2006, pet. denied); *see also* *Champion v. Great Dane Ltd. P’ship*, 286 S.W.3d 533, 545 (Tex. App.—Houston [14th Dist.] 2009, no pet.) (holding in products liability case that trial court did not err in excluding engineer’s opinion that truck trailer was defectively designed because although engineer was an expert in product safety engineering and manufacture engineering, he did not have any specialized knowledge in design or manufacturing of refrigerated trailers or the rear uncovered gutter of refrigerated trailers).

125. *See Hayes v. Carroll*, 314 S.W.3d 494, 504–05 (Tex. App.—Austin 2010, no pet.) (holding that vascular surgeon could opine on standard of care for physicians and nurses bandaging and maintaining bandages on the leg of an unconscious or semiconscious patient, “a basic medical skill’ learned by all physicians and nurses as part of their basic medical training,” and known to all physicians and nurses); *Collini v. Pustejovsky*, 280 S.W.3d 456, 464–65 (Tex. App.—Fort Worth 2009, no pet.) (holding that medical expert did not have to practice in same field as defendant-physician or have experience with particular drug and disease at issue to offer an opinion on the applicable standard of care because standard of care involved “minimum, general standards of prescribing medication that are common to all physicians and all schools of practice”).

Chapter 150 of the Texas Civil Practice and Remedies Code mandates expert reports in suits against design professionals such as architects and engineers, similar in some ways to the expert report requirement in health care liability cases. *See* TEX. CIV. PRAC. & REM. CODE ANN. § 150.002 (West 2011) (referring to expert affidavit as a “Certificate of Merit”). In the context of these expert affidavits, Texas courts of appeals have rejected arguments that Chapter 150 requires a certificate of merit from an affiant with expertise in a particular subspecialty. *See, e.g., Gaertner v. Langhoff*, No. 01-13-00555-CV, 2014 WL 1047028, at \*6 (Tex. App.—Houston [1st Dist.] Mar. 18, 2014, no pet.) (holding that architect was qualified for purposes of certificate of merit even though he did not have expertise in historical preservation architecture); *Dunham Eng’g, Inc. v. Sherwin-Williams Co.*, 404 S.W.3d 785, 794 (Tex. App.—Houston [14th Dist.] 2013, no pet.) (rejecting argument that affiant’s knowledge must relate to particular area of specialty); *Morrison Seifert Murphy, Inc., v. Zion* 384 S.W.3d 421, 426–27 (Tex. App.—Dallas 2012, no pet.) (“We cannot agree with MSM’s contention we must evaluate certificates of merit on the basis of sub-specialties . . .”).

subspecialty-specific issues are at play, an expert with a different subspecialty may be qualified to offer on the common issue but not the subspecialty-specific issue.<sup>126</sup>

Parties frequently challenge the qualifications of experts in medical malpractice cases. The proper inquiry in assessing a physician's qualifications is not the physician's area of practice but the physician's familiarity with the specific issues involving the claim.<sup>127</sup> A physician, therefore, does not need to be a practitioner in the same specialty as the defendant health care provider.<sup>128</sup> The test is whether the witness has "knowledge, skill, experience, training, or education" regarding the specific issue on which the witness seeks to give an opinion.<sup>129</sup> Stated differently, "[t]he focus is on the 'fit' between the subject matter at issue and the expert's familiarity of the subject matter, and not on a comparison of the expert's specialty or experience with that of the defendant."<sup>130</sup>

Numerous courts have found physicians qualified to testify in health care claims.<sup>131</sup> But they are also frequently not

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126. *E.g.*, *Collini*, 280 S.W.3d at 464–66 (holding that medical expert was qualified to offer an opinion on general medication-prescribing standards but not causation because the expert had no experience with particular drug and disease in question).

127. *Hillery v. Kyle*, 371 S.W.3d 482, 487 (Tex. App.—Houston [1st Dist.] 2012, no pet.) ("An expert need not be practicing in the same field as a defendant in a health care liability claim in order to qualify as an expert."); *Foster v. Richardson*, 303 S.W.3d 833, 843 (Tex. App.—Fort Worth 2009, no pet.) ("[T]he proper inquiry concerning whether a doctor is qualified to testify is not his area of practice but his familiarity with the issues involved in the claim before the court.")

128. *Children's Med. Ctr. of Dall. v. Durham*, 402 S.W.3d 391, 399 (Tex. App.—Dallas 2013, no pet.) (holding that pediatrician could offer testimony in suit against orthopedic surgeon because issue was not whether surgeon met the standard of care for orthopedic surgery process but whether he met standard of care when "acting in his role as an attending physician to a hospitalized patient needing, and having, orthopedic surgery"); *Rittger v. Danos*, 332 S.W.3d 550, 558–59 (Tex. App.—Houston [1st Dist.] 2009, no pet.) (holding that board-certified neurologist could testify on standard of care for emergency room physician); *McKowen v. Ragston*, 263 S.W.3d 157, 162–65 (Tex. App.—Houston [1st Dist.] 2007, no pet.) (holding that board certified infectious disease specialist was qualified to opine about standard of care for thoracic surgeon to manage an infection postoperatively, and that when "the subject matter is common to and equally recognized and developed in all fields of practice, any physician familiar with the subject may testify as to the standard of care"); *Blan v. Ali*, 7 S.W.3d 741, 745 (Tex. App.—Houston [14th Dist.] 1999, no pet.) ("[A] general surgeon is qualified to testify regarding the standard of care for post-operative procedures performed by a gynecologist because post-operative procedures are common to both fields."); *see also* *Baylor Coll. of Med. v. Pokluda*, 283 S.W.3d 110, 118–19 (Tex. App.—Houston [14th Dist.] 2009, no pet.); *Kelly v. Rendon*, 255 S.W.3d 665, 674 (Tex. App.—Houston [14th Dist.] 2008, no pet.).

129. *Roberts v. Williamson*, 111 S.W.3d 113, 121 (Tex. 2003) (citing *Broders v. Heise*, 924 S.W.2d 148, 153 (Tex. 1996)); *Baylor Coll. of Med.*, 283 S.W.3d at 118–19.

130. *Hayes*, 314 S.W.3d at 504.

131. *N.H. Ins. Co. v. Allison*, 414 S.W.3d 266, 274 (Tex. App.—Houston [1st Dist.] 2013, no pet.) (finding no error in concluding that Louisiana cardiologist was qualified to testify because Rule 702 does not require a Texas physician); *Ortiz v. Patterson*, 378 S.W.3d 667, 672, 674 (Tex. App.—Dallas 2012, no pet.) (holding emergency medicine

qualified.<sup>132</sup> And sometimes physicians are qualified to testify about some, but not all, of the medical issues in a case.<sup>133</sup> Federal courts have recognized that general practitioners often are qualified to testify on a wide assortment of medical issues in personal injury cases.<sup>134</sup>

Whether police officers are qualified to testify on accident reconstruction and the cause of an accident is a fact-intensive

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physician who had seven years of experience in family practice was qualified to opine about standard of care and cause of death); *Menefee v. Ohman*, 323 S.W.3d 509, 518–19 (Tex. App.—Fort Worth 2010, no pet.) (holding that trial court erred in excluding psychiatrist’s opinion addressing timeliness of pediatrician’s prescribing of anticonvulsants because his training and experience in both psychiatric and acute care settings made him familiar with appropriate standard of care); *Hayes*, 314 S.W.3d at 504–05 (holding vascular surgeon and registered nurse were qualified to opine on standard of basic medical care in emergency room because their opinions were not directed at a matter that was unique to particular medical specialization); *Rittger*, 332 S.W.3d at 558–59 (stating that qualifications inquiry under the TMLA “focuses not on the defendant doctor’s area of expertise, but on the condition involved in the claim,” and holding that board-certified neurologist could testify on standard of care for emergency room physician).

132. *Tenet Hosps. Ltd. v. De La Riva*, 351 S.W.3d 398, 406–07 (Tex. App.—El Paso 2011, no pet.) (holding that board certified obstetrician and gynecologist was not qualified to opine on pediatric neurological injuries); *Tenet Hosps. Ltd. v. Love*, 347 S.W.3d 743, 750–51 (Tex. App.—El Paso 2011, no pet.) (holding that physicians were not qualified to opine on hospital’s negligence; their testimony that they had worked at multiple hospitals and served on committees at hospitals was insufficient to establish hospital administration expertise); *Pink v. Goodyear Tire & Rubber Co.*, 324 S.W.3d 290, 296 (Tex. App.—Beaumont 2010, pet. dism’d) (observing in dicta that an oncologist might not be qualified to testify that benzene exposure caused renal cell carcinoma because “[w]hile the etiology of a disease is often significant to a clinician’s care of a patient, as well as to public health issues, and while a clinician may have training and experience in the study of cancer and its etiology, the clinician may nevertheless lack the expertise necessary to present a causation opinion related to a toxic chemical exposure”); *Hendrick Med. Ctr. v. Conger*, 298 S.W.3d 784, 788–89 (Tex. App.—Eastland 2009, no pet.) (holding that emergency room physician who was board certified in internal medicine did not demonstrate “any familiarity, training, or experience that would allow him to opine as to the standard of care in formulating policies and procedures at the hospital level in the ICU” and therefore his expert report was deficient).

133. *Bailey v. Amaya Clinic, Inc.*, 402 S.W.3d 355, 363–65 (Tex. App.—Houston [14th Dist.] 2013, no pet.) (holding that board-certified orthopedic surgeon who once directed orthopedic rehabilitation center and nonoperative care of patients at neurosurgery center was qualified to opine concerning standards of care applicable to dermatologist and medical clinic in claim arising out of injury suffered while using exercise machine after a weight-loss procedure but board-certified dermatologist was not qualified to opine as to standard of care for weight-loss health care providers); *Collini v. Pustejovsky*, 280 S.W.3d 456, 464–66 (Tex. App.—Fort Worth 2009, no pet.) (finding physician qualified to offer opinion on standard of care but not causation).

134. *Gayton v. McCoy*, 593 F.3d 610, 617 (7th Cir. 2010) (“[S]imply because a doctor has a medical degree does not make him qualified to opine on all medical subjects. That said, courts often find that a physician in general practice is competent to testify about problems that a medical specialist typically treats.” (citation omitted)); *Robinson v. GEICO Gen. Ins. Co.*, 447 F.3d 1096, 1100–01 (8th Cir. 2006) (“Most courts have held that a physician with general knowledge may testify regarding medical issues that a specialist might treat in a clinical setting.”).

inquiry. Police officers are qualified in some, but not all, instances to reconstruct accidents because “different accidents require different levels of expertise” and the expert’s qualifications “must be measured against the particular opinion the expert is offering.”<sup>135</sup>

For example, in *Pilgrim’s Pride Corp. v. Smoak*, a patrolman was not qualified to give expert opinion testimony on the cause of a tractor-trailer accident.<sup>136</sup> The officer had served as a patrolman for one and one-half years, but had only basic training in accident reconstruction and did not identify how many accidents he had previously investigated.<sup>137</sup> His opinion was not based on any specialized or scientific knowledge or observations of the accident scene, but based on his witness interviews.<sup>138</sup> He did not possess any knowledge “not generally possessed by a layperson.”<sup>139</sup> As a result of that holding, the court also concluded that the patrolman’s opinions in his police report were inadmissible under Rule 803(8).<sup>140</sup>

In contrast, in *Ter-Vartanyan v. R & R Freight, Inc.*, a police officer was qualified to testify that an automobile accident was caused by driver inattention.<sup>141</sup> He had investigated hundreds of accidents and was certified as an accident investigator.<sup>142</sup> The court rejected the argument that the officer had to be an expert

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135. *Lopez-Juarez v. Kelly*, 348 S.W.3d 10, 20–25 (Tex. App.—Texarkana 2011, pet. denied) (refusing “to recognize a per se rule that the testimony of a police officer with a Level II certification is always admissible” on accident reconstruction, and holding that officer was not qualified to opine regarding cause of a traffic accident when incident involved multiple vehicles traveling at high speeds and required mathematical modeling because expert disclaimed expertise, did not have extensive experience in reconstruction, had not taken advanced classes, and did not explain how earlier investigations equipped him with accident reconstruction expertise, and distinguishing and refusing to follow two Waco memorandum opinions which held that investigating officer with level two reconstruction is qualified to testify concerning the cause of accident); *Brown v. State*, 303 S.W.3d 310, 319–21 (Tex. App.—Tyler 2009, pet. ref’d) (holding that police officer was qualified to state the location of an accident because it did not require mathematical modeling or “formal accident reconstruction”); *Gainsco Cnty. Mut. Ins. v. Martinez*, 27 S.W.3d 97, 104–05 (Tex. App.—San Antonio 2000, pet. dism’d by agr.) (holding trial court erred in admitting police officer’s opinion on vehicle speed and force of impact, when officer did not have any formal training, had only served on police force four months, and had not investigated any prior auto fatalities).

136. *Pilgrim’s Pride Corp. v. Smoak*, 134 S.W.3d 880, 891–92 (Tex. App.—Texarkana 2004, pet. denied).

137. *Id.* at 892.

138. *Id.* at 893.

139. *Id.*

140. *Id.* at 892.

141. *Ter-Vartanyan v. R & R Freight, Inc.*, 111 S.W.3d 779, 781–82 (Tex. App.—Dallas 2003, pet. denied).

142. *Id.* at 781.

in driver attention.<sup>143</sup> It stated that the subject matter of his testimony was not driver inattention per se, but accident investigation and the cause of the accident.<sup>144</sup> The court cautioned that the qualification issue must not be too narrowly interpreted.<sup>145</sup>

### C. *Preserving a Qualifications Objection*

As discussed below in the context of the reliability gates,<sup>146</sup> expert evidence is subject to two kinds of attacks in Texas: attacks on the admissibility of the evidence that must be raised before it is admitted into evidence and attacks on the competency of the evidence which, in many circumstances, can be raised for the first time after the verdict. The Texas Supreme Court has never specified any limitations on the applicability of the requirement that an objection was necessary to avoid waiver, but it also has not explicitly considered an argument that objections to an expert witness's qualifications do not have to be raised when the qualifications are described in a conclusory manner. In *Nissan Motor Co. v. Armstrong*, the Court declined to address a challenge to an expert witness's qualifications when the opposing party's pretrial motion to exclude the expert's testimony "asserted not that he was unqualified but that his opinions were unreliable."<sup>147</sup> On this basis, the Court held that the party's complaint about the expert's qualifications "was not preserved for appeal."<sup>148</sup>

Consistently, several courts of appeals have stated that "[a]n objection to an expert's qualifications must be raised in the trial court in order to preserve error."<sup>149</sup> The courts of appeals have

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143. *Id.*

144. *Id.*

145. *Id.* at 781–82. Courts also found a police officer qualified to testify on accident reconstruction in a number of other cases. *See, e.g.,* DeLarue v. State, 102 S.W.3d 388, 396–97 (Tex. App.—Houston [14th Dist.] 2003, pet. ref'd) (stating that "police officers are not qualified to render expert opinions regarding accidents based on their position as police officers alone," but the officer had twenty years of experience in accident reconstruction and "perform[ed] accident reconstruction on a daily basis").

146. *See infra* Part III.A.1–2.

147. *Nissan Motor Co. v. Armstrong*, 145 S.W.3d 131, 143–44 (Tex. 2004).

148. *Id.*

149. *Adams v. State Farm Mut. Auto. Ins. Co.*, 264 S.W.3d 424, 429 (Tex. App.—Dallas 2008, pet. denied); *see also* *Vuong v. Taiwai Luk*, No. 01-11-00178-CV, 2013 WL 6728992, at \*10 n.4 (Tex. App.—Houston [1st Dist.] Dec. 17, 2013, pet. denied) (mem. op.) (holding that objection to expert witness's qualifications was waived because it was not raised in trial court); *Expro Ams., LLC v. Sanguine Gas Exploration, LLC*, 351 S.W.3d 915, 919–20 (Tex. App.—Houston [14th Dist.] 2011, pet. denied) ("Failure to designate a testifying expert and an expert's alleged lack of qualifications are defects of form on which an appellant must object and obtain a ruling to preserve error."); *Duncan-Hubert v. Mitchell*, 310 S.W.3d 92, 105 (Tex. App.—Dallas 2010, pet. denied) (quoting same language from *Adams*); *Reinhardt v. Walker*, No. 14-07-00304-CV, 2008 WL 2390482, at

differed, however, on whether an expert's qualifications to offer an opinion can be challenged on appeal in the absence of a waiver when the qualifications-based challenge is combined with a challenge that the opinion offered is speculative or conclusory, which generally does not require an objection. One court held that the qualifications challenge was waived while the conclusory challenge was not;<sup>150</sup> another concluded that neither challenge is waived when they are combined.<sup>151</sup> The San Antonio Court of Appeals, over twenty years ago, described an opinion by an unqualified witness as incompetent, and therefore not evidence, thus obviating the need for a preverdict objection.<sup>152</sup> A few subsequent cases have also found expert testimony to be incompetent based on lack of qualifications.<sup>153</sup>

The Texas Supreme Court has indicated that an objection raised in motion to exclude under *Daubert/Robinson*<sup>154</sup> may be sufficient to preserve a challenge to an expert's qualifications, even if the objection is not reiterated when the expert's opinion is offered at trial. In *Iracheta*, the party whose expert was

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\*5 (Tex. App.—Houston [14th Dist.] June 12, 2008, pet. denied) (mem. op.) (“Concerning Walker’s qualifications, even assuming expert testimony was required to establish the reasonableness and necessity of the airplane repairs involved in this case, we find that Reinhardt did not preserve this argument by raising a proper and timely objection in the trial court.”); *Paradigm Oil, Inc. v. Retamco Operating, Inc.*, 242 S.W.3d 67, 74 n.4 (Tex. App.—San Antonio 2007, pet. denied) (“[A]n objection to an expert’s qualifications must be preserved by objection or it is waived.”).

150. *Paradigm Oil*, 242 S.W.3d at 74 n.4.

151. *Duncan-Hubert*, 310 S.W.3d at 105 n.6. The Dallas Court of Appeals asserted in *Duncan-Hubert* that a qualifications objection raises a defect of form, which defects must be objected to in the trial court to preserve error. *Id.* at 105. *But see* *Bray v. Fuselier*, 107 S.W.3d 765, 770 (Tex. App.—Texarkana 2003, pet. denied) (“[W]e cannot say the court’s granting of summary judgment was an implicit ruling on Fuselier’s *Robinson* challenge. Nonetheless, we will consider Fuselier’s contentions, because whether Naples is qualified as an expert in the case goes to the substance of the affidavit.” (citing *Crow v. Rockett Special Util. Dist.*, 17 S.W.3d 320, 324 (Tex. App.—Waco 2000, pet. denied))). But the Dallas court stated in a footnote that “case law demonstrates an objection is one addressing the substance of the testimony when the objection to the insufficiency of an expert’s qualifications is combined with an objection that the expert’s opinion is conclusory.” *Duncan-Hubert*, 310 S.W.3d at 105 n.6 (citing *Yancy v. United Surgical Partners Int’l, Inc.*, 170 S.W.3d 185, 191 (Tex. App.—Dallas 2005), *aff’d*, 236 S.W.3d 778 (Tex. 2007); *Cain v. Rust Indus. Cleaning Servs., Inc.*, 969 S.W.2d 464, 467 (Tex. App.—Texarkana 1998, pet. denied)).

152. *Mo. Pac. R.R. Co. v. Buenrostro*, 853 S.W.2d 66, 76–77 (Tex. App.—San Antonio 1993, writ denied) (finding an unqualified engineer’s opinion—which did not draw an objection—was no evidence that defendant had right to control plaintiff and thus had obligation to exercise care in his safety).

153. *E.g.*, *Leitch v. Hornsby*, 935 S.W.2d 114, 119 (Tex. 1996); *Pilgrim’s Pride Corp. v. Smoak*, 134 S.W.3d 880, 891 (Tex. App.—Texarkana 2004, pet. denied).

154. *See Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590 (1993) (the seminal case interpreting Federal Rule of Evidence 702); *E.I. du Pont de Nemours & Co v. Robinson*, 923 S.W.2d 549 (Tex. 1995) (the seminal case interpreting Texas Rule of Evidence 702).

challenged argued in the court of appeals that the opposing party waived any objection to the expert's qualifications by failing to object.<sup>155</sup> The court of appeals rejected this contention, observing that the opposing party had filed a "*Robinson* type" motion to exclude the expert's testimony in which the party argued that the expert was unqualified to testify.<sup>156</sup> The Texas Supreme Court did not expressly address the question of waiver with respect to the qualifications-based challenge to the expert testimony in *Iracheta*, but it too reached the issue, indicating that the issue was not waived.<sup>157</sup> Courts of appeals have generally treated pretrial motions to exclude expert testimony as preserving error with respect to the objections raised in the motions.<sup>158</sup>

## II. THE ASSISTANCE AND RELEVANCY GATES

The Texas Supreme Court has frequently linked the requirement that expert evidence "assist the trier of fact" with the requirement that the evidence be relevant. In *Exxon Pipeline Co. v. Zwahr*, the Court stated, "[t]he relevance requirement, which incorporates traditional relevancy analysis under Texas Rules of Evidence 401 and 402, is met if the expert testimony is 'sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute.'"<sup>159</sup> In *TXI Transportation Co. v. Hughes*, the Texas Supreme Court said, "An expert's testimony is relevant when it assists the jury in determining an issue or in understanding other evidence."<sup>160</sup>

While these two inquiries are inherently related, they are best viewed as two separate hurdles to the admission of expert

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155. *Gen. Motors Corp. v. Iracheta*, 90 S.W.3d 725, 731 n.6 (Tex. App.—San Antonio 2002), *rev'd*, 161 S.W.3d 462 (Tex. 2005).

156. *Id.*

157. *Iracheta*, 161 S.W.3d at 470–71.

158. *See* *Bishop v. Miller*, 412 S.W.3d 758, 784 & n.2 (Tex. App.—Houston [14th Dist.] 2013, no pet.) (Christopher, J., concurring) (citing *Greenberg Traurig of N.Y., P.C. v. Moody*, 161 S.W.3d 56, 91 (Tex. App.—Houston [14th Dist.] 2004, no pet.)) ("Unlike a motion in limine which preserves nothing for review, a motion to exclude testimony can preserve a complaint about the admission of evidence."); *Austin v. Weems*, 337 S.W.3d 415, 422 (Tex. App.—Houston [1st Dist.] 2011, no pet.) (holding that a motion to exclude expert witness based on lack of qualifications had same effect as a running objection: "it eliminates the need to repeat the objection each time evidence is admitted on a topic"); *City of Sugar Land v. Home & Hearth Sugarland, L.P.*, 215 S.W.3d 503, 511 n.4 (Tex. App.—Eastland 2007, pet. denied) (holding pretrial motion to exclude preserved appellate complaint concerning reliability of expert testimony).

159. *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629 (Tex. 2002) (quoting *Robinson*, 923 S.W.2d at 556).

160. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 234 (Tex. 2010). The Texas Court of Criminal Appeals has not only linked, but also conflated the two issues. *See infra* Part II.B, at note 222.

evidence because evidence that clears one of these hurdles may still fall short of the other. Helpfulness requires more than just a good “fit” between the expert evidence and the issues in the case (which is required for relevance); the evidence must also be based on expertise beyond the ken of the average juror.<sup>161</sup> Inversely, relevance requires more than just useful expertise; the evidence must fit the legal and factual issues in the case.<sup>162</sup>

A. *The Helpfulness Gate*<sup>163</sup>

Rule 702 of the Texas Rules of Evidence erects the first gate to admission of expert testimony: it must “assist the trier of fact.”<sup>164</sup> Or as stated in the restyled Federal Rules of Evidence: it must “help the trier of fact to understand the evidence or to determine a fact in issue.”<sup>165</sup> Helpfulness is a “threshold determination” that must be satisfied before expert testimony is admissible.<sup>166</sup> Our review of this gate will be brief because the parameters of this gate have remained largely unaltered over the past fifteen years. Only one Texas Supreme Court case, *K-Mart Corp. v. Honeycutt*,<sup>167</sup> has focused on this requirement. That does not mean helpfulness is not important. On the contrary, the entire reliability inquiry can be summarized with a helpfulness test: Does this particular expert testimony actually provide the help a reasonable juror needs?<sup>168</sup> Expert testimony is permitted

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161. See discussion *infra* Part II.A.

162. See discussion *infra* Part II.B.

163. For additional discussion of these issues, see Brown, *supra* note 1, at 751–57.

164. TEX. R. EVID. 702. See generally *Coble v. State*, 330 S.W.3d 253, 273 (Tex. Crim. App. 2010) (stating that in addition to determining whether expert evidence is reliable, the trial court “must decide whether, on balance, that expert testimony might nonetheless be unhelpful or distracting for other reasons”); *Holloway v. State*, 613 S.W.2d 497, 501 (Tex. Crim. App. 1981) (en banc).

165. FED. R. EVID. 702(a).

166. *Emerson v. State*, 880 S.W.2d 759, 763 (Tex. Crim. App. 1994) (en banc) (“The threshold determination in an inquiry into the admissibility of expert testimony under Rule 702 is whether such testimony is helpful to the trier of fact.”).

167. *K-Mart Corp. v. Honeycutt*, 24 S.W.3d 357, 360 (Tex. 2000) (per curiam).

168. See generally *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1374 (Fed. Cir. 2013) (“[The expert’s] layered assumptions lack the hallmarks of genuinely useful expert testimony. Such unreliable testimony frustrates a primary goal of expert testimony in any case, which is meant to place experience from professional specialization at the jury’s disposal, not muddle the jury’s fact-finding with unreliability and speculation.” (citation omitted)); *United States v. Corey*, 207 F.3d 84, 88 n.5 (1st Cir. 2000) (“[U]nder Rule 702 the only inquiry is whether the expert opinion, taken as a whole, may assist the jury in resolving an ultimate issue of fact . . . .”); *Wood v. Minn. Mining & Mfg. Co.*, 112 F.3d 306, 309 (8th Cir. 1997) (“The exclusion of an expert’s opinion is proper only if it is ‘so fundamentally unsupported that it can offer no assistance to the jury . . . .’”); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 801 (Tex. 2006) (“If the expert brings only his credentials and a subjective opinion, his testimony is

because of the assistance it can provide to the jury. If an expert is not qualified, his testimony will not assist the jury. If the expert is qualified but the testimony is irrelevant or unreliable, it will not assist the jury.

In *Honeycutt*, the Texas Supreme Court held that the trial court did not abuse its discretion by excluding the testimony of a human factors and safety expert concerning whether a missing top rail on a grocery cart corral would induce people to sit on the lower railing and whether the lack of the top railing caused the accident.<sup>169</sup> An expert's impressive qualifications do not ensure that the expert will aid the jury. Instead the proffering party must show that "the expert's knowledge and experience . . . are beyond that of the average juror."<sup>170</sup> The Court instructed the trial court to exclude an expert's opinion whenever "the jury is equally competent to form an opinion" on the topic of the expert's testimony.<sup>171</sup>

The *Honeycutt* Court concluded the expert's opinion that the defendant was negligent and that the lack of a top railing served as an invitation to sit on the railing was not helpful because the jury had "viewed photographs of the cart corral from which it

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fundamentally unsupported and therefore of no assistance to the jury. Rule 702, by its terms, only provides for the admission of expert testimony that actually assists the finder of fact." (citation omitted); *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629 (Tex. 2002) ("The relevance requirement, which incorporates traditional relevancy analysis under Texas Rules of Evidence 401 and 402, is met if the expert testimony is sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute. Evidence that has no relationship to any issue in the case does not satisfy rule 702 and is thus inadmissible under rule 702, as well as rules 401 and 402." (citations omitted) (internal quotation marks omitted)); *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 720 (Tex. 1998) ("Unreliable evidence is of no assistance to the trier of fact and is therefore inadmissible under Rule 702."); *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79, 83 (Tex. App.—Houston [1st Dist.] 2009, no pet.) ("Unreliable scientific or technical evidence is of no assistance to the jury . . ."); *U.S. Rest. Props. Operating L.P. v. Motel Enters., Inc.*, 104 S.W.3d 284, 292 (Tex. App.—Beaumont 2003, pet. denied) ("To be relevant, expert testimony must be sufficiently tied to the facts of the case that it will aid the jury in answering the questions presented."); *Star Enter. v. Marze*, 61 S.W.3d 449, 461 (Tex. App.—San Antonio 2001, pet. denied) ("[U]nreliable evidence is of no assistance to the trier of fact and is therefore inadmissible . . ."). See also *BROWN & RONDON*, *supra* note 35, at 670–71, 706 (stating that Rule 702 emphasizes "whether the expert can 'assist' the trier of fact" and that when an expert opines on a topic "near the fringes" of the relevant field, the helpfulness of the opinion "should be determinative"); *id.* at 706 (equating relevance and fit requirement); *cf.* 2 *GOODE, WELLBORN & SHARLOT*, *supra* note 114, § 702.1, at 7 (suggesting that expert testimony must be sufficiently reliable to enhance the likelihood of accurate factfinding).

169. *Honeycutt*, 24 S.W.3d at 360–61.

170. See *id.* at 360; see also *In re Commitment of Bohannon*, 388 S.W.3d 296, 304 (Tex. 2012) ("Expert testimony assists the trier-of-fact when the expert's knowledge and experience on a relevant issue are beyond that of the average juror and the testimony helps the trier-of-fact understand the evidence or determine a fact issue.").

171. *Honeycutt*, 24 S.W.3d at 360.

could draw its own conclusions.”<sup>172</sup> In other words, the jury needed only its “collective common sense,” not an expert, to assist it in deciding that issue.<sup>173</sup> The Court concluded that the expert’s other opinions—relating to whether the lack of a top railing caused the injuries, whether K-Mart’s employee received proper training for pushing shopping carts, and whether the K-Mart employee kept a proper lookout while pushing the shopping carts into the corral—were not helpful because “they involve matters within the average juror’s common knowledge” that did not “require[] scientific or technical explanation.”<sup>174</sup> The Court cited a number of federal cases indicating skepticism of human factors experts.<sup>175</sup>

The San Antonio Court of Appeals relied on *Honeycutt* in affirming a trial court’s exclusion of testimony from a safety engineer that the uneven surface condition of a sidewalk posed an unreasonable danger to those walking on it.<sup>176</sup> But the El Paso Court of Appeals reached the opposite conclusion under similar circumstances, reversing a trial court’s exclusion of expert testimony from a safety engineer that the design of a parking garage floor and curb created an “optical illusion of a flat surface,” which created an unreasonable danger to those walking in the garage.<sup>177</sup> Although the evidence in the El Paso case included photographs of the parking garage floor, showing that the floor in the area of the injury was painted with diagonal

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172. *Id.* at 360–61.

173. *Id.* at 361.

174. *Id.*

175. *Id.* at 360–61 (citing *Persinger v. Norfolk & W. Ry.*, 920 F.2d 1185, 1188 (4th Cir. 1990) (excluding expert testimony about whether the weight the plaintiff had to carry was unreasonable because the testimony “did no more than state the obvious”); *see also* *Scott v. Sears, Roebuck & Co.*, 789 F.2d 1052, 1055 (4th Cir. 1986) (holding it was error to permit a human factors expert to testify that persons wearing high heels tend to avoid walking on grates); *Stepney v. Dildy*, 128 F.R.D. 77, 80 (D. Md. 1989) (“Nor is the testimony of a human factors expert required to advise the jury that moisture will freeze at 32 degrees or colder.”); Douglas R. Richmond, *Human Factors Experts in Personal Injury Litigation*, 46 ARK. L. REV. 333, 337 (1993) (“[M]any experts misuse human factors expertise in litigation by either testifying about matters clearly within the jury’s common knowledge or offering opinions without adequate foundation.”).

176. *Dietz v. Hill Country Rests., Inc.*, 398 S.W.3d 761, 765–66 (Tex. App.—San Antonio 2011, no pet.) (finding no error in trial court’s exclusion of the expert’s opinion on the dangerousness of the walkway because the jury could “observe the photographs of the walkway where the fall took place,” evaluate “testimony about prior falls or near falls” at the site, and consider evidence about prior complaints to “form its own conclusion about whether the walkway posed an unreasonable risk of harm”).

177. *Burns v. Baylor Health Care Sys.*, 125 S.W.3d 589, 595–96, 600 (Tex. App.—El Paso 2003, no pet.) (holding that trial court erred in excluding safety engineer’s testimony on how the parking garage floor may have created the optical illusion that there was no curb because the testimony “provide[d] depth or precision to the trier of fact’s understanding of a relevant issue in this case”).

yellow stripes and the abutting curb top was painted yellow, the court did not conclude that the jury could “view[] the photographs” and “draw its own conclusions”;<sup>178</sup> it concluded that the expert possessed “specialized knowledge of the human visual process, which is not obviously within the common knowledge of jurors.”<sup>179</sup>

There are no definitive rules for determining when expert evidence will assist a jury. Sometimes it does,<sup>180</sup> but often it does not.<sup>181</sup> For example, courts have split on whether mathematical calculations that can be made with a calculator are helpful.<sup>182</sup> Courts sometimes rely on this gate to limit expert testimony that

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178. *Id.* at 592; see *Honeycutt*, 24 S.W.3d at 361.

179. *Burns*, 125 S.W.3d at 596.

180. See, e.g., *United States v. Huether*, 673 F.3d 789, 796–98 (8th Cir. 2012) (rejecting the contention that trial court erred in permitting a law enforcement agent to testify that he believed defendant put child pornography on computer hard drive because it helped jury to better understand evidence and because “knowledge of computers and internet use differ widely among lay jurors”); *Rosenfeld v. Oceania Cruises, Inc.*, 654 F.3d 1190, 1194 (11th Cir. 2011) (holding that trial court erred in excluding expert testimony “about whether the slip resistance of the flooring posed a danger to passengers aboard” because subject was one that was beyond knowledge and experience of average juror).

181. See, e.g., *Florek v. Vill. of Mundelein, Ill.*, 649 F.3d 594, 603 (7th Cir. 2011) (explaining that expert testimony about “how long it takes to walk from room to room” did not assist the jury); *Youa Vang Lee v. Anderson*, 616 F.3d 803, 808–09 (8th Cir. 2010) (stating that expert testimony on whether individual had gun in hand was based on “simple observation” of enhanced surveillance film and “would not have assisted the jury but rather would have told it what result to reach”); *N. Am. Specialty Ins. Co. v. Britt Paulk Ins. Agency, Inc.*, 579 F.3d 1106, 1112 (10th Cir. 2009) (concluding that district court did not abuse discretion in excluding expert testimony regarding standard insurance industry practice because “the jury was fully capable of deciding this case without expert testimony”); *Hoffman v. Caterpillar, Inc.*, 368 F.3d 709, 714 (7th Cir. 2004) (holding trial court did not abuse discretion in prohibiting expert from testifying regarding a particular employee’s ability to operate a particular machine, when a videotape of machine operations was in evidence from which jurors could make a determination for themselves with respect to his abilities); *Vogler v. Blackmore*, 352 F.3d 150, 153, 155–56 (5th Cir. 2003) (holding that trial court did not err in admitting the testimony of a thanatologist, a grief expert, who did not testify regarding the grief of the plaintiffs because while grief is a universally experienced emotion, the testimony was relevant even if it was “highly unlikely” that it aided the jury); *United States v. Sebagala*, 256 F.3d 59, 66 (1st Cir. 2001) (stating Rule 702 excludes expert testimony when “a lay person can be expected to decide the issue intelligently without an expert’s help”); cf. *WWP, Inc. v. Wounded Warriors Family Support, Inc.*, 628 F.3d 1032, 1039–40 & n.7 (8th Cir. 2011) (rejecting a *Daubert* challenge to a forensic accountant’s testimony that did not involve complicated mathematical calculations).

182. Compare *Powell v. Carey Int’l, Inc.*, 547 F. Supp. 2d 1281, 1285 (S.D. Fla. 2008) (finding expert calculations of attorney’s fees under the Fair Labor Standards Act to be unnecessary because a court could make a determination itself without hearing testimony), with *WWP, Inc.*, 628 F.3d at 1039–40 (holding district court did not abuse discretion in overruling helpfulness objection to forensic accountant’s testimony about damages because it is unnecessary for an expert “to make *complicated* mathematical calculations”), and *In re Prempro Prods. Liab. Litig.*, 514 F.3d 825, 831 (8th Cir. 2008) (holding district court did not abuse discretion in failing to exclude expert testimony that represented “an exercise in basic math using simple deductive reasoning”).

“offers nothing more than what lawyers for the parties can argue in closing arguments,”<sup>183</sup> or when experts act as “superlawyers” whose primary function is to make a final argument for a party.<sup>184</sup> On the other hand, courts have held that expert testimony can be helpful when it discusses general principles without applying those principles to the particular facts of the case, allowing the jury to apply those principles to the evidence presented.<sup>185</sup> Even testimony that does not reach a firm conclusion may, in some cases, aid a jury.<sup>186</sup>

In the end, the helpfulness test requires “decisions that are very much *ad hoc*.”<sup>187</sup> In other words, “a large gray area” exists where it is unclear whether expert testimony is helpful—“matters respecting which expert testimony may help the trier of fact, but that arguably fall within the realm of common knowledge and common sense.”<sup>188</sup> In these situations, courts generally resolve the issue in favor of admissibility,<sup>189</sup> perhaps because if the testimony does not particularly aid the jury it may not particularly harm the opposing party either.

Setting aside the applications of the rule, there have not been any substantive changes in the helpfulness inquiry in the

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183. United States v. Frazier, 387 F.3d 1244, 1262–63 (11th Cir. 2004).

184. Hogan v. Novartis Pharm. Corp., No. 06 Civ. 0260(BMC)(RER), 2011 WL 1533467, at \*5 (E.D.N.Y. Apr. 24, 2011). In this pharmaceutical claim that the defendant failed to warn of the risk of developing osteonecrosis of the jaw from Zometa, the court observed that “all of plaintiff’s experts, to some degree, are being proffered as ‘superlawyers’ to serve as scientifically informed advocates of conclusions that plaintiff wants the jury to reach and which belong only in summation, not expert testimony.” *Id.* The court, therefore, “cautioned” counsel that the expert “must keep his characterizations of defendant’s responses and opinion regarding its conduct to himself.” *Id.*

185. See Vogler, 352 F.3d at 155–56 (holding that trial court did not err in admitting testimony of a grief expert who testified about grief generally but not about plaintiffs’ grief); Bocanegra v. Vicmar Servs., Inc., 320 F.3d 581, 587 (5th Cir. 2003) (concluding district court erred in finding expert’s testimony unhelpful regarding effect of marijuana on cognitive functions because it would have aided jury despite lack of testimony concerning its impact upon defendant).

186. See Walker v. Soo Line R.R. Co., 208 F.3d 581, 589–90 (7th Cir. 2000) (holding that district court abused its discretion in excluding electrical engineer’s testimony that lightning could have penetrated tower in which employee was working even if it did not hit tower through several different means directly because experts can “posit alternate models to explain their conclusion” and testimony would have aided jury even if expert could not say where exactly the lightning struck).

187. 3 CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, FEDERAL EVIDENCE § 7:9, at 759 (4th ed. 2013).

188. 4 WEINSTEIN & BERGER, *supra* note 27, § 702.03[2][b], at 702-43.

189. See, e.g., Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 588 (1993) (observing the Federal Rules of Evidence’s “general approach of relaxing the traditional barriers to ‘opinion’ testimony” (quoting Beech Aircraft Corp. v. Rainey, 488 U.S. 153, 169 (1988))); United States v. Lamarre, 248 F.3d 642, 648 (7th Cir. 2001) (holding that the trial judge erred in excluding an expert’s testimony “merely because it overlaps with matters within the jury’s experience”).

last fifteen years. Courts continue to restate the rule without changing its substance. Stated positively, expert testimony is helpful in those situations where “the expert’s knowledge and experience . . . are beyond that of the average juror.”<sup>190</sup> It is helpful “when it relates to issues that are beyond the ken of people of ordinary intelligence.”<sup>191</sup> When the expert’s testimony concerns matters “within the knowledge and experience of ordinary lay people,” the jury is “fully capable of understanding the evidence . . . through the use of its common knowledge and common sense.”<sup>192</sup> A Texas intermediate court explained, “The question under Rule 702 is not whether the jurors know something about this area of expertise but whether the expert can expand their understanding of this area in any way that is relevant to the disputed issues in the trial.”<sup>193</sup> As the Texas Supreme Court stated in *Honeycutt*, “Expert testimony assists the trier-of-fact when the expert’s knowledge and experience on a relevant issue are beyond that of the average juror and the testimony helps the trier-of-fact understand the evidence or determine a fact issue.”<sup>194</sup>

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190. *Dunnington v. State*, 740 S.W.2d 896, 898 (Tex. App.—El Paso 1987, writ denied). The court there explained:

The jury is the ultimate fact finder in our system. Procedures which curtail or impinge upon the jury’s role are strictly drawn, strictly scrutinized and viewed with skepticism. This applies not only to direct impositions upon the jury’s prerogatives . . . but also to practices which tend to seduce the jury into abrogating its function and deferring its responsibility to other evaluators. Thus . . . the use of expert testimony presents a risk of overbearing the jury in its deliberative responsibility. The disparate expertise of the witness and the average juror tends to produce a natural inclination to accept the expert testimony as gospel. . . . To avoid, or at least minimize these effects, the use of expert testimony is restricted to those situations in which the expert’s knowledge and experience on a relevant issue are beyond that of the average juror. The decision is still the jury’s, but the testimonial expertise is provided to enable it to better comprehend the full significance of the evidence. The use of expert testimony in any other situation can overbear the jury and tantalize its inclination to defer its responsibility.

*Id.*

191. *United States v. Davis*, 457 F.3d 817, 824 (8th Cir. 2006) (quoting *United States v. French*, 12 F.3d 114, 116 (8th Cir. 1993)).

192. See 4 WEINSTEIN & BERGER, *supra* note 27, § 702.03[2][a], at 702-41.

193. *Greenberg Traurig of N.Y., P.C. v. Moody*, 161 S.W.3d 56, 97 (Tex. App.—Houston [14th Dist.] 2004, no pet.) (quoting *Glasscock v. Income Prop. Servs., Inc.*, 888 S.W.2d 176, 180 (Tex. App.—Houston [1st Dist.] 1994, writ dismissed by agr.); see also *First Marblehead Corp. v. House*, 541 F.3d 36, 42 (1st Cir. 2008) (“Testimony that provides a necessary context and framework, especially in cases involving complex or unfamiliar concepts, can be appropriate for expert testimony without improperly interfering with the jury’s assessment of credibility.”); *United States v. Welch*, 368 F.3d 970, 974 (7th Cir. 2004), *vacated*, 543 U.S. 1112 (2005).

194. *K-Mart Corp. v. Honeycutt*, 24 S.W.3d 357, 360 (Tex. 2000); see also *In re Commitment of Bohannon*, 388 S.W.3d 296, 304 (Tex. 2012) (“That a witness has

Stated negatively, expert testimony is unhelpful when the subject does not need expert “illumination.”<sup>195</sup> Or, expert testimony is not admissible when it is “directed solely to lay matters which a jury is capable of understanding and deciding without the expert’s help.”<sup>196</sup> Expert opinions are not helpful when the jury’s common sense or general experiences common to the community enable it to determine the matter without any other assistance.<sup>197</sup>

The helpfulness gate does not mean that an expert can only testify about something that the jury knows nothing about. While the expert “must possess some additional [insight] beyond that possessed by the average person, the gap need not necessarily be monumental.”<sup>198</sup> An expert may aid the jury in understanding even familiar matters if the expert’s experience or training provides a more thorough or refined understanding than ordinary experience provides.<sup>199</sup> Evidence is helpful when it provides a further depth or precision of understanding about subjects which lie well within common experience.<sup>200</sup> As explained by the Texas Court of Criminal Appeals, “It is only when the expert offers no appreciable aid that his testimony fails to meet the Rule 702 standard. The question under Rule 702 is not whether the jurors know something about this subject, but whether the expert can expand their understanding in a relevant way.”<sup>201</sup> Thus, the

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knowledge, skill, expertise, or training does not necessarily mean that the witness can assist the trier-of-fact. Expert testimony assists the trier-of-fact when the expert’s knowledge and experience on a relevant issue are beyond that of the average juror and the testimony helps the trier-of-fact understand the evidence or determine a fact issue.”)

195. United States v. Seschillie, 310 F.3d 1208, 1212 (9th Cir. 2002).

196. United States v. Mulder, 273 F.3d 91, 101 (2d Cir. 2001) (quoting United States v. Castillo, 924 F.2d 1227, 1232 (2d Cir. 1991)) (internal quotation marks omitted).

197. Amakua Dev. LLC v. Warner, No. 05 C 3082, 2007 WL 2028186, at \*6 (N.D. Ill. July 10, 2007) (“Expert testimony does not assist the trier of fact when the jury is able to evaluate the same evidence and is capable of drawing its own conclusions without the introduction of a proffered expert’s testimony.” (citing Taylor v. Ill. Cent. R.R. Co., 8 F.3d 584, 586 (7th Cir. 1993))).

198. Davis v. State, 313 S.W.3d 317, 350 (Tex. Crim. App. 2010).

199. See Brown, *supra* note 1, at 751.

200. Rodgers v. State, 205 S.W.3d 525, 527 (Tex. Crim. App. 2006) (“A trial court need not exclude expert testimony simply because the subject matter is within the comprehension of the average jury. . . . [S]pecial knowledge or additional insight into the field . . . ‘may add precision and depth to the ability of the trier of fact to reach conclusions about subjects which lie well within common experience.’” (footnote omitted)).

201. Coble v. State, 330 S.W.3d 253, 288 (Tex. Crim. App. 2010) (footnote omitted); see also Morris v. State, 361 S.W.3d 649, 669 (Tex. Crim. App. 2011) (observing that while many jurors will be aware of the subject matter of the expert’s testimony, that does not mean that they “all” will have that knowledge “or that the jurors will have the depth of understanding needed to resolve the issues before them”).

inquiry is whether the expert can help the jury to better understand the issues in question.<sup>202</sup>

It is wrong to apply the standard so stringently that “only evidence completely inaccessible to the jury could come in under Rule 702.”<sup>203</sup> “[A] trial court is not compelled to exclude expert testimony ‘just because the testimony may, to a greater or lesser degree, cover matters that are within the average juror’s comprehension.’”<sup>204</sup> The helpfulness test considers “whether the untrained layman would be qualified to determine intelligently and *to the best possible degree* the particular issue without enlightenment from those having a specialized understanding of the subject involved in the dispute.”<sup>205</sup> In evaluating the helpfulness of expert testimony, courts “must be cautious not to overstate the scope of the average juror’s common understanding and knowledge.”<sup>206</sup>

Areas of expertise that have been held helpful include business practice,<sup>207</sup> valuation,<sup>208</sup> product safety,<sup>209</sup> level of force used by police officers,<sup>210</sup> economic damages,<sup>211</sup> and characteristics commonly exhibited by sexually assaulted children.<sup>212</sup> On the other hand, expert testimony on eyewitness identifications has been held not to be helpful in at least one case.<sup>213</sup> Courts have likewise affirmed exclusion of testimony on

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202. See *Gaydar v. Sociedad Instituto Gineco-Quirurgico & Planificacion Familiar*, 345 F.3d 15, 24 (1st Cir. 2003) (declaring that the judge must decide “whether the scientific, technical, or other specialized knowledge [the expert] offers ‘will assist the trier better to understand a fact in issue’”).

203. *Tyus v. Urban Search Mgmt.*, 102 F.3d 256, 263 (7th Cir. 1996).

204. *Id.* (quoting *United States v. Hall*, 93 F.3d 1337, 1342 (7th Cir. 1996)).

205. *United States v. Locascio*, 6 F.3d 924, 936 (2d Cir. 1993) (emphasis added) (quoting Mason Ladd, *Expert Testimony*, 5 VAND. L. REV. 414, 418 (1952)) (internal quotation marks omitted).

206. *United States v. Finley*, 301 F.3d 1000, 1013 (9th Cir. 2002).

207. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:9, at 759–60.

208. *Id.* at 760.

209. *Id.* at 762.

210. *Id.*

211. *Id.* at 763.

212. *United States v. Lukashov*, 694 F.3d 1107, 1116 (9th Cir. 2012) (finding district court did not abuse discretion in allowing pediatrician to give expert testimony about characteristics that she looked for when assessing whether a child has been sexually abused, and “to opine that her evaluation of [alleged victim] was consistent with [alleged victim’s] allegations of sexual abuse” because the testimony was “helpful to the jury because some jurors would not have a general understanding of an eight-year-old’s sexual knowledge and vocabulary and the level of sensory detail to look for in a child’s allegations of sexual abuse”).

213. *United States v. Davis*, 690 F.3d 226, 257 (4th Cir. 2012) (holding trial court did not abuse discretion in excluding expert testimony regarding lineup procedure and unreliability of eyewitness testimony because “jurors using common sense and their faculties of observation can judge the credibility of an eyewitness identification” (quoting *United States v. Harris*, 995 F.2d 532, 535 (4th Cir. 1993))).

this basis when the testimony related to whether a defendant acted with “malice,”<sup>214</sup> whether parties acted with the intent to deceive,<sup>215</sup> whether conduct was “outrageous” for purposes of intentional infliction of emotion distress,<sup>216</sup> and whether severe depression and drug abuse increased the risk of suicide.<sup>217</sup>

Expert testimony that is unreliable is, categorically, not helpful to the jury.<sup>218</sup> And an expert’s opinion is not helpful when it does not draw on the expert’s qualifications:

“[T]he opinion must be an *expert* opinion (that is, an opinion informed by the witness’s expertise) rather than simply an opinion broached by a purported expert. Unless the expertise adds something, the expert at best is offering a gratuitous opinion, and at worst is exerting undue influence on the jury . . . .”<sup>219</sup>

Thus, although this gate is not usually dispositive of the admissibility of expert testimony, it can be, and it therefore must remain in the lawyer’s arsenal.

### B. *The Relevancy Gate*<sup>220</sup>

The relevance inquiry originated from *Daubert*’s requirement that the opinion must “fit” the issues in the case; it must be “sufficiently tied to the facts of the case that it will aid the jury in

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214. See *Gonzales v. Hearst Corp.*, 930 S.W.2d 275, 283 (Tex. App.—Houston [14th Dist.] 1996, no writ) (stating that expert’s testimony was “objective in nature and does not assist the trier of fact in determining the *subjective* truth of whether [the defendants] entertained serious doubts as to the accuracy of the names published in the November 1 article”); see also *Jianguang Wang v. Tang*, 260 S.W.3d 149, 160 (Tex. App.—Houston [1st Dist.] 2008, pet. denied) (quoting *Gonzales* and noting that “actual malice inquires only into the mental state of the defendant, and [the expert] claimed no expertise in that field”).

215. *Sec. Exch. Comm’n v. Johnson*, 525 F. Supp. 2d 70, 77 (D.D.C. 2007).

216. *GTE Sw., Inc. v. Bruce*, 998 S.W.2d 605, 619–20 (Tex. 1999) (“Except in highly unusual circumstances, expert testimony concerning extreme and outrageous conduct would not meet [Rule 702’s] standard. Where, as here, the issue involves only general knowledge and experience rather than expertise, it is within the province of the jury to decide, and admission of expert testimony on the issue is error.”).

217. *Moses v. Payne*, 555 F.3d 742, 749–50, 756–59 (9th Cir. 2008) (rejecting constitutional challenge to exclusion of evidence).

218. *E.g.*, *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591–92 (1993) (“Rule 702’s ‘helpfulness’ standard requires a valid *scientific* connection to the pertinent inquiry as a precondition to admissibility.” (emphasis added)); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 712 (Tex. 1997) (citing *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 421 (5th Cir. 1987), for the proposition that expert testimony that lacks an adequate foundation offers no assistance to the jury).

219. *United States v. Hall*, 93 F.3d 1337, 1343 (7th Cir. 1996) (citation omitted) (quoting *United States v. Benson*, 941 F.2d 598, 604 (7th Cir. 1991)).

220. For additional discussion of these issues, see *Brown*, *supra* note 1, at 773–78.

resolving a factual dispute.”<sup>221</sup> Except to the extent that the connective reliability gate is based on the requirement that the expert opinion is linked to the underlying predicate data or methodology, the relevancy gate is infrequently at issue in civil cases challenging expert testimony.<sup>222</sup> It was, however, the deciding issue in *Exxon Pipeline Co. v. Zwahr*.<sup>223</sup>

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221. *Daubert*, 509 U.S. at 591 (quoting *United States v. Downing*, 753 F.2d 1224, 1242 (3d Cir. 1985)) (internal quotation marks omitted); see also *Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039, 1055–56 (8th Cir. 2000) (stating that the U.S. Supreme Court has placed “renewed emphasis on the importance of the ‘fit’ of an expert’s opinion to the data or facts in the case” and that even when an opinion satisfies the *Daubert* factors, it is inadmissible “if it does not apply to the specific facts of the case”). “[I]ncluding relevance in the gatekeeping inquiry reinforces . . . the importance of ensuring that the proffered opinion . . . is linked to the facts of the case.” 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 63. The fit “casts an additional spin to [the] relevanc[y] analysis . . .” *Id.* As explained by Professors Mueller and Kirkpatrick, “[t]he degree of ‘fit’ between the proffered testimony and the facts and issues in the case is an aspect of relevancy.” 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:10, at 787.

222. In criminal cases—which are not our focus—relevance is often a determinative issue because the Texas Court of Criminal Appeals several years ago in *Vela v. State* identified relevance as one of “three separate conditions” that must be satisfied for expert testimony. *Vela v. State*, 209 S.W.3d 128, 130–31 (Tex. Crim. App. 2006) (stating that the evidence rules “require a trial judge to make three separate inquiries, which must all be met before admitting expert testimony: (1) the witness qualifies as an expert by reason of his knowledge, skill, experience, training, or education; (2) the subject matter of the testimony is an appropriate one for expert testimony; and (3) admitting the expert testimony will actually assist the fact-finder in deciding the case.” These conditions are commonly referred to as (1) qualification, (2) reliability, and (3) relevance” (footnote omitted) (quoting *Rodgers v. State*, 205 S.W.3d 525, 527 (Tex. Crim. App. 2006))). *But see, e.g.,* *Rosenfeld v. Oceania Cruises, Inc.*, 654 F.3d 1190, 1193 (11th Cir. 2011) (describing the third inquiry—assistance to the factfinder—as “helpfulness” rather than “relevance” (quoting *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004))). The Court of Criminal Appeals in *Vela* was summarizing the evidence rules implicated in expert challenges and specifically relied on Rule 402 for this last “condition.” In explaining these rules, however, the *Vela* Court quoted from an opinion earlier that same year, *Rodgers v. State*, in which the Court stated that the third condition, relevance, examines whether the “expert testimony will actually assist the fact-finder in deciding the case.” *Vela*, 209 S.W.3d at 131 (quoting *Rodgers*, 205 S.W.3d at 527). *Vela*’s summary equates relevance with assistance. *Rodgers* relied solely on the text of Rule 702, which explicitly requires the expert testimony to “assist the trier of fact to understand the evidence or to determine a fact in issue.” *Rodgers*, 205 S.W.3d at 527 (quoting TEX. R. EVID. 702). *Vela* looked to both Rule 402 and 702. *Vela*, 209 S.W.3d at 131. Thus, the Court conflated relevance and helpfulness, which are separate, though overlapping, inquiries. They overlap because evidence that is not relevant is not helpful to the factfinder in determining the issues in dispute. But they can also be distinct: evidence may be relevant but excluded as unhelpful because the subject of the testimony is within the common knowledge of the jury and the expert offers no knowledge or insight beyond the jury’s purview. While the identification of the gates and the terms differ, the Court of Criminal Appeals’ test does not alter the issues presented by expert testimony. For example, the Court has stated that the relevance inquiry examines both whether evidence “will assist the trier of fact” and whether it “is sufficiently tied to the facts of the case.” *Tillman v. State*, 354 S.W.3d 425, 438 (Tex. Crim. App. 2011) (quoting *Jordan v. State*, 928 S.W.2d 550, 555 (Tex. Crim. App. 1996)) (internal quotation marks omitted). The helpfulness requirement therefore is a hurdle for expert testimony in criminal cases in Texas, even if it is considered part of the relevance inquiry.

223. *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 631 (Tex. 2002).

The sole issue in *Zwahr* was whether the trial court erred in admitting expert testimony regarding the value of land taken by eminent domain.<sup>224</sup> Exxon argued, and the Texas Supreme Court agreed, that the expert had impermissibly relied on the enhanced value a property would have after the condemnation in determining the value of the plaintiffs' land at the time of the taking.<sup>225</sup> Specifically, the expert had testified that the area of land Exxon had condemned for its pipeline easement was a separate economic unit, created and defined by the parameters of Exxon's easement, with its "highest and best use" as a pipeline, and that the plaintiffs' interest in the area condemned by Exxon was "negligible" before Exxon's project.<sup>226</sup> The Court held that the expert's testimony violated the "project-enhancement" rule, which prohibits the jury from considering any enhancement to the value of the landowner's property that results from the taking itself,<sup>227</sup> and also failed to apply the "before-and-after" valuation method, which dictates that the value of condemned land be measured by the difference in the market value of the land immediately before and immediately after the taking.<sup>228</sup> Because of these flaws, the Court observed that, "at best," the expert had "determined the value of the easement to Exxon, not the value of the loss to the Zwahrs for the taking of the easement."<sup>229</sup> Thus, the testimony "was irrelevant to determining the value of the land taken from the [plaintiffs] and therefore inadmissible under Texas Rule of Evidence 702."<sup>230</sup>

*Zwahr* teaches that, to be relevant, expert testimony must fit not only the facts of the case but also the applicable legal parameters.<sup>231</sup> Ultimately, the test for relevance looks at the fit between the testimony and the issues the factfinder must decide, which will be determined not only by the factual disputes but also by the relevant legal inquiries. For damages experts in particular, expert evidence that examines the wrong measure of

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224. *Id.* at 625.

225. *Id.*

226. *Id.* at 629–30.

227. *Id.* at 630. The project-enhancement rule is subject to "narrow exceptions" that were not implicated by the facts of the case. *See id.* at 628.

228. *Id.* at 627–28, 631. The case involved a partial taking, in which "the before-and-after rule still applies, but compensation is measured by the market value of the part taken plus any diminution in value to the remainder of the land." *Id.* at 627. But the plaintiffs in the case did not allege any damage to the remainder of their land as a result of the Exxon easement, only the market value of the land taken. *Id.*

229. *Id.* at 631.

230. *Id.*

231. *See id.* at 629–31 (discussing how the expert applied a skewed version of the facts to an incorrect legal parameter causing his testimony to be irrelevant).

damages under the law, even if otherwise reliable and applicable, is neither relevant nor admissible.<sup>232</sup> Responsibility for ensuring that damages and other experts offer opinions that are based on the proper legal standards falls primarily on the shoulders of the proffering party's attorney, who is the party's legal expert. Practitioners thus must be careful to oversee the work of retained experts to ensure that the evidence the expert provides is the kind of evidence that advances the client's case—including ensuring that experts are using a legally correct measure of damages, are not relying on elements of damages that the law precludes, and do not overlook limitations and discounts that the law requires.

### III. THE RELIABILITY GATES

The admissibility of expert opinion testimony is analyzed under a three-fold inquiry: whether the expert opinion testimony will be helpful to the jury, whether the expert is qualified to offer the opinion testimony, and whether the opinion testimony the expert offers is sufficiently reliable to be admitted.<sup>233</sup> The inquiry into whether expert opinion testimony is sufficiently reliable also can be broken down into three parts: predicative reliability,<sup>234</sup> methodological reliability,<sup>235</sup> and connective reliability.<sup>236</sup> These three parts are succinctly summarized in *Mack Trucks, Inc. v. Tamez*: “[T]he trial court should undertake a rigorous examination of the facts on which the expert relies, the method by which the expert draws an opinion from those facts, and how the expert applies the facts and methods to the case at hand.”<sup>237</sup>

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232. See, e.g., *id.* at 631; *Rojas v. Duarte*, 393 S.W.3d 837, 845–46 (Tex. App.—El Paso 2012, pet. denied) (stating that although damages identified “the financial aspects of the business that he considered important in determining its value” and provided “his calculation, the source of the numbers inputted into his calculation, and the result of his calculation,” his data and valuation methods were “pertinent only to the value of the partnership as of December 31, 2008,” not the date in question, May 31, 2005, and that “as a result of these shortcomings, the jury lacked sufficient data from which to extrapolate properly” the partnership’s value on that date); *Dallas Cnty. v. Crestview Corners Car Wash*, 370 S.W.3d 25, 37 (Tex. App.—Dallas 2012, pet. denied) (affirming exclusion of damages expert who failed to use accepted appraisal methods).

233. See *supra* notes 20–22, 31–32 and accompanying text.

234. See *infra* Part III.B.

235. See *infra* Part III.C.

236. See *infra* Part III.D.

237. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 579 (Tex. 2006) (quoting *Amorgianos v. Nat’l R.R. Passenger Corp.*, 303 F.3d 256, 267 (2d Cir. 2002)) (internal quotation marks omitted); see also *Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC*, 386 S.W.3d 256, 262 (Tex. 2012) (“If an [expert] utilizes improper methodology or misapplies established rules and principles, the resulting testimony is unreliable and must be excluded.”).

Stated differently, the trial court should rigorously examine “the three components of the reliability inquiry—namely, the expert’s methodology, foundational data, and whether too great an analytical gap exists as the expert connects the foundational data or methodology with the opinion.”<sup>238</sup> As one federal court put it: “[T]he reliability analysis applies to all aspects of an expert’s testimony: the methodology, the facts underlying the expert’s opinion, [and] the link between the facts and the conclusion . . . .”<sup>239</sup> Another observed that the reliability inquiry examines “the adequacy of the facts or data underlying an opinion, the scientific reliability of the witness’s methodology, and the reliability of the witness’s application of that methodology to the facts.”<sup>240</sup>

Rule 702 of the Federal Rules of Evidence likewise divides the reliability inquiry into three prongs. It requires that expert testimony (1) be “based on sufficient facts or data”; (2) be “the product of reliable principles and methods”; and (3) “reliably appl[y] the principles and methods to the facts of the case.”<sup>241</sup> As summarized by the Fifth Circuit, trial courts act as “gate-keepers” by making a “preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.”<sup>242</sup> This three-fold inquiry applies to each step of

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238. *Wilson v. Shanti*, 333 S.W.3d 909, 913 (Tex. App.—Houston [1st Dist.] 2011, pet. denied) (footnote omitted) (internal quotation marks omitted); *see also* *Harris Cnty. Appraisal Dist. v. Hous. 8th Wonder Prop., L.P.*, 395 S.W.3d 245, 253–54 (Tex. App.—Houston [1st Dist.] 2012, pet. denied) (“As to reliability, the court must examine the expert’s methodology, foundational data, and whether too great an analytical gap exists between the data and methodology, on the one hand, and the expert’s opinions, on the other.”); *Plunkett v. Conn. Gen. Life Ins. Co.*, 285 S.W.3d 106, 116 (Tex. App.—Dallas 2009, pet. denied) (“[O]pinions drawn either from unreliable foundational data or flawed methodology and reasoning are unreliable and legally no evidence.”); *Quiroz v. Covenant Health Sys.*, 234 S.W.3d 74, 88 (Tex. App.—El Paso 2007, pet. denied) (listing the same four tests but describing the connective reliability test as examining whether “notwithstanding the validity of the underlying data and methodology, there is an analytical gap in the expert evidence”); *Allstate Tex. Lloyds v. Mason*, 123 S.W.3d 690, 698 (Tex. App.—Fort Worth 2003, no pet.) (stating these three tests and adding a fourth test that the expert must rule out other plausible causes); *In re J.B.*, 93 S.W.3d 609, 621–22 (Tex. App.—Waco 2002, pet. denied) (observing that expert must show foundational, methodological, and connective reliability); *cf.* *State v. Cent. Expressway Sign Assocs.*, 302 S.W.3d 866, 870 (Tex. 2009) (“[T]o be reliable, the opinion must be based on sound reasoning and methodology.”).

239. *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir. 1999). In *Knight v. Kirby Inland Marine Inc.*, the court quoted *Heller* with approval. *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 355 (5th Cir. 2007).

240. *United States v. Diaz*, 300 F.3d 66, 75 (1st Cir. 2002).

241. FED. R. EVID. 702(b)–(d).

242. *Pipitone v. Biomatrix, Inc.*, 288 F.3d 239, 243–44 (5th Cir. 2002) (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592–93 (1993)) (internal quotation marks omitted).

the expert's reasoning process. Thus, the rigorous examination requires "each material part of an expert's theory [to] be reliable."<sup>243</sup> "[I]t is critical that an expert's analysis be reliable at every step."<sup>244</sup> And examining every step means repeatedly evaluating all three reliability gates because this evaluation process is utilized for each challenged opinion.<sup>245</sup>

While courts utilize a three-fold reliability inquiry, they also sometimes focus on a broader overall inquiry, examining whether experts "employ[] in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field."<sup>246</sup> "The court should ensure that [an expert's] opinion comports with applicable professional standards outside the courtroom and that it will have a reliable basis in the knowledge and experience of the discipline."<sup>247</sup> Stated differently, courts

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243. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 637 (Tex. 2009); *Wilson v. Shanti*, 333 S.W.3d 909, 913 (Tex. App.—Houston [1st Dist.] 2011, pet. denied); see also *Knight*, 482 F.3d at 355; *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004) (en banc) (stating that Rule 702's "critical 'gatekeeping' function" for expert evidence "inherently requires the trial court to conduct an exacting analysis of the foundations of expert opinions"); *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 267 (2d Cir. 2002) ("[I]t is critical that an expert's analysis be reliable at every step."); *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994) ("[A]ny step that renders the analysis unreliable . . . renders the expert's testimony inadmissible.").

244. *Amorgianos*, 303 F.3d at 267; see also *Knight*, 482 F.3d at 355 ("The reliability analysis applies to all aspects of an expert's testimony: the methodology, the facts underlying the expert's opinion, the link between the facts and the conclusion, et alia." (quoting *Heller*, 167 F.3d at 155)).

245. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 55–57.

246. *United States v. Valencia*, 600 F.3d 389, 424 (5th Cir. 2010) (quoting *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999)); see also *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 693 (5th Cir. 2012); 5 GRAHAM, *supra* note 34, § 702:5, at 234–36 (contending that the three-fold reliability requirement set forth in Rule 702 envisions three separate requirements but "the dividing line between the three requirements is often at best incredibly unclear . . . and more importantly, all three are in fact part and parcel of a single determination," and stating the *Kumho* Court discussed all three requirements "more or less together").

Professor Bernstein argues that the "same level of intellectual rigor" test cannot be applied as a substitute for Rule 702's three-prong reliability inquiry because the Rule's requirements are specific and do not incorporate this inquiry. David E. Bernstein, *The Misbegotten Judicial Resistance to the Daubert Revolution*, 89 NOTRE DAME L. REV. 27, 56 (2013). He states that outside the courtroom an "expert may be forced to rely on speculation because there is insufficient data to support his conclusion, or because there might be sufficient data but the expert's reasoning process is invalid." *Id.* at 56 n.171. Professor Goode and his co-authors also state that "this formulation has value only if the expert works in a sufficiently rigorous field." 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 60–61. Professor Faigman and his co-authors make the same point. 1 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 1:28, at 89 (2013). They also argue that the "same level of intellectual rigor" test cannot be used as "a shortcut around application" of the *Daubert* reliability factors and should instead be simply another factor for assessing the reliability of the expert's opinion. *Id.* at 88–89. We agree.

247. *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 499 (Tex. 2001).

should ensure that the expert “is being as careful” and as unbiased “as he would be in his regular professional work outside his paid litigation consulting.”<sup>248</sup>

But reliability does not require certainty.<sup>249</sup> In some circumstances, even an implausible theory may be reliable.<sup>250</sup> “The reliability inquiry as to expert testimony does not ask whether the expert's conclusions appear to be correct; it asks whether the methodology and analysis used to reach those conclusions is reliable.”<sup>251</sup>

#### A. *Legal-Sufficiency Challenges to Expert Reliability*

One key aspect of reliability challenges in Texas differs from most jurisdictions. Although federal courts treat expert reliability almost exclusively as an admissibility issue,<sup>252</sup> Texas courts test reliability both at the admissibility stage (before or during trial) and at the legal-sufficiency-of-the-evidence stage (after the close of evidence). This unique aspect of Texas law springs from *Havner*.<sup>253</sup> When it first adopted and applied the U.S. Supreme Court's *Daubert* analysis in *Robinson*, the Texas Supreme Court stated that Rule 702 governed the standard for the admission of scientific evidence.<sup>254</sup> The *Robinson* Court stated that the legal

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248. *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997).

249. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590 (1993) (“[A]rguably, there are no certainties in science.”); *Ortiz v. City of Chicago*, 656 F.3d 523, 537 (7th Cir. 2011) (stating that the expert “need not conclusively and indisputably attest to” causation opinion); *Primiano v. Cook*, 598 F.3d 558, 565 (9th Cir. 2010) (“Lack of certainty is not, for a qualified expert, the same thing as guesswork.”); *United States v. Sandoval-Mendoza*, 472 F.3d 645, 655 (9th Cir. 2006) (“A trial court should admit medical expert testimony if physicians would accept it as useful and reliable [but it need not be conclusive because] medical knowledge is often uncertain. The human body is complex, etiology is often uncertain, and ethical concerns often prevent double-blind studies calculated to establish statistical proof.”).

250. *Anderson v. Griffin*, 397 F.3d 515, 521 (7th Cir. 2005) (stating that defense expert's testimony that accident was caused by “road junk . . . was implausible; but that is not the test” because “[e]vents that have a very low antecedent probability of occurring nevertheless do sometimes occur . . . and if in a particular case all the alternatives are ruled out, we can be confident that the case presents one of those instances in which the rare event did occur”).

251. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 581 (Tex. 2006); *see also* *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*15 (Tex. Aug. 22, 2014) (citing *Mack Trucks* for this proposition); *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239 (Tex. 2010) (“The court's ultimate task . . . is not to determine whether the expert's conclusions are correct, but rather whether the analysis the expert used to reach those conclusions is reliable and therefore admissible.”).

252. *See infra* note 458 and accompanying text.

253. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 708–10, 712 (Tex. 1997).

254. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 554 (Tex. 1995). The *Daubert* reliability test is discussed in detail below, as part of “methodological reliability.” *See infra* notes 1172–86 and accompanying text.

sufficiency of scientific evidence “is outside the scope of Rule 702.”<sup>255</sup> As in *Daubert*, the issue in *Robinson* was whether the trial court erred in excluding expert testimony under Rule 702.<sup>256</sup> That same issue was presented to the Texas Supreme Court in *Havner*.<sup>257</sup> But the petitioner in *Havner* also argued that the expert testimony at issue was legally insufficient to support the verdict, and the Court decided the case under the legal-sufficiency analysis rather than under an admissibility analysis.<sup>258</sup> The *Havner* Court applied the *Daubert/Robinson* reliability standards to hold that, because the plaintiff’s expert evidence on causation was unreliable, it constituted no evidence and could not support the verdict for the plaintiff.<sup>259</sup>

A year after *Havner*, the Court faced another legal-sufficiency challenge to expert testimony in *Maritime Overseas*.<sup>260</sup> But unlike *Havner*, the opposing party in *Maritime Overseas* had not objected to the experts’ testimony until after the jury verdict.<sup>261</sup> The Court held the opposing party had waived its

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255. *Robinson*, 923 S.W.2d at 554. The Court noted in *Robinson* that it had addressed the legal sufficiency of scientific evidence in a previous opinion: *Duff v. Yelin*. *Id.* In *Duff*, the court held that a trial court properly granted an instructed verdict in favor of a hospital-defendant because the plaintiff’s medical expert testified to one of two possible causes of the plaintiff’s injury and never stated that one cause or the other was, in “reasonable medical probability,” a cause of the injury. *Duff v. Yelin*, 751 S.W.2d 175, 176–77 (Tex. 1988).

256. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 582 (1993); *Robinson*, 923 S.W.2d at 550.

257. The first issue presented in the application for writ of error to the Texas Supreme Court in *Havner* was whether “[t]he court of appeals erred in affirming the trial court’s admission of unreliable and irrelevant causation evidence.” Application for Writ of Error at \*X, *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706 (Tex. 1997) (No. 95-1036), 1995 WL 17064851. Legal sufficiency of the evidence was the second issue presented. *Id.*

258. *Havner*, 953 S.W.2d at 709, 711, 713; *see also Daubert*, 509 U.S. at 596 (noting that even when expert evidence is admissible, the trial court may conclude that it is legally insufficient evidence to create a question of fact and may grant a directed verdict or summary judgment).

259. *Havner*, 953 S.W.2d at 730; *see also Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 643 (Tex. 2009).

260. *Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 409 (Tex. 1998) (“Here, like in *Havner*, *Maritime* contends that because *Ellis*’s scientific evidence ‘is not reliable, it is not evidence,’ and the court of appeals and this Court are ‘barred by the rules of law or of evidence from giving weight’ to *Ellis*’s experts’ testimony.”).

261. *Id.* at 410. In *Maritime Overseas*, the plaintiff won a jury verdict on his claim that he suffered from acute and long-term effects from exposure to a chemical pesticide. *Id.* at 407. The defendant contended that the standards “articulated in *Robinson* and *Havner* are the proper standards for reviewing the sufficiency of [the plaintiff’s] damages evidence.” *Id.* at 408. But the defendant did not challenge the admissibility of the expert testimony nor contend that there was no evidence of any damages. *Id.* Rather, it argued that the evidence was not reliable for demonstrating the claimed long-term damages and therefore “would be legally insufficient” if the court of appeals had applied the proper standard for a factual-sufficiency review. *Id.*

complaint, stating broadly: “To preserve a complaint that scientific evidence is unreliable and thus, no evidence, a party must object to the evidence before trial or when the evidence is offered.”<sup>262</sup>

If this had been the Texas Supreme Court’s last word on error preservation, the dual nature of expert challenges in Texas courts would not be greatly distinguishable from expert challenges in other jurisdictions. Although parties could challenge expert evidence on either admissibility or legal-sufficiency grounds, they would have to raise any challenge before admission of the evidence, and offering parties would have an opportunity to cure defects. The principal difference between expert challenges in Texas and those in other jurisdictions would be the availability of the less deferential de-novo standard of review available for legal-sufficiency challenges.<sup>263</sup>

But that was not the Court’s last word. Six years later in *Coastal Transport Co. v. Crown Central Petroleum Corp.*,<sup>264</sup> the

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262. *Id.* at 409. The Court stated that to hold otherwise would be “unfair” because it would “usurp the orderly and efficient disposition of appeals, deprive the proffering party of an opportunity to cure any defects in its evidence that the objecting party might pose,” permit trial or appeal “by ambush,” and “in some cases, place appellate courts in the undesirable position of making decisions about evidentiary reliability absent a fully developed record.” *Id.* at 409, 412. Then-Justice, now-Chief Justice, Hecht dissented from the pronouncement of this rule, stating:

As early as 1912, and as recently as last year, this Court has held that a party may complain after verdict and on appeal that evidence admitted without objection is neither legally nor factually sufficient to support the verdict. The Court ignores a solid line of cases establishing this principle with respect to all kinds of evidence, including scientific testimony. There is no authority for the Court’s holding that “[t]o preserve a complaint that scientific evidence is unreliable and thus, no evidence, a party must object to the evidence before trial or when the evidence is offered.”

*Id.* at 417 (Hecht, J., dissenting) (citation omitted).

263. The standard of review for admissibility challenges is abuse of discretion, which sets a high bar for reversal. *See, e.g., Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578 (Tex. 2006). The standard of review for legal-sufficiency challenges is de novo, which affords the trial court little, if any, deference. *See, e.g., FFE Transp. Servs., Inc. v. Fulgham*, 154 S.W.3d 84, 89–90 (Tex. 2004).

264. *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227 (Tex. 2004). In *Coastal Transport*, the Court held that expert opinion testimony on gross negligence was conclusory. *Id.* at 233. The plaintiff had asked its expert three questions regarding whether the defendant’s conduct constituted gross negligence: (1) did it involve a high degree of risk; (2) did the defendant have “actual subjective awareness of the risk”; and (3) did the defendant “proceed with conscious indifference.” *Id.* at 231. The expert answered each question affirmatively but was not asked to explain the basis for his affirmative answer to each question. *Id.* at 231–32. In a postjudgment legal-sufficiency challenge, the defendant argued that the testimony “amounted to no more than a ‘bare conclusion’ that was ‘factually unsubstantiated’ and therefore constituted no evidence.” *Id.* The Court agreed, and held that the conclusory testimony was “mere *ipse dixit*,” “incompetent evidence,” and “not relevant.” *Id.* at 232. Therefore, *Maritime Overseas*—which required an objection to expert testimony—was inapplicable. Under *Coastal*

Court recognized a significant exception to *Maritime Overseas's* objection requirement: no preverdict objection is necessary when the expert evidence is “conclusory or speculative and therefore non-probative on its face.”<sup>265</sup> The *Coastal Transport* Court stated that challenges to the reliability of an expert’s methodology,<sup>266</sup> technique, or foundational data<sup>267</sup> require courts to look beyond

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*Transport*, no “objection is needed to preserve a no-evidence challenge to conclusory expert testimony.” *Id.*

265. *Id.* at 233. The Court explained that when the expert’s underlying methodology is challenged, a court must “look[] beyond what the expert said” to evaluate the reliability of the expert’s opinion. *Id.* at 253 (quoting *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 712 (Tex. 1997)).

When the testimony is challenged as conclusory or speculative and therefore non-probative on its face, however, there is no need to go beyond the face of the record to test its reliability. We therefore conclude that when a reliability challenge requires the court to evaluate the underlying methodology, technique, or foundational data used by the expert, an objection must be timely made so that the trial court has the opportunity to conduct this analysis. However, when the challenge is restricted to the face of the record—for example, when expert testimony is speculative or conclusory on its face—then a party may challenge the legal sufficiency of the evidence even in the absence of any objection to its admissibility.

*Id.* at 233 (alteration in original).

*Coastal Transport* backpedaled from *Maritime Overseas's* objection requirement and adopted much of the dissent in that case. Of the six cases relied upon by the Court in *Coastal Transport*, four were cited by the *Maritime Overseas* dissent. *See Mar. Overseas Corp.*, 971 S.W.2d at 418, 420 (Hecht, J., dissenting). The *Coastal Transport* Court distinguished *Maritime Overseas* because the expert challenge there addressed the expert’s methodology, “an analysis that should [not] be undertaken for the first time on appeal.” *Coastal Transp.*, 136 S.W.3d at 233. Relying on a quote from *Maritime Overseas* where the Court distinguished the “non-probative” value cases relied on by the dissent, the Court held that an objection to expert testimony is unnecessary when the testimony is conclusory or speculative and therefore is not probative on its face. *Id.* at 233; *see also id.* at 229. If the defect in the expert’s testimony is apparent on the face of the record, an objection to admissibility is not required. *Id.* at 229, 233 (recognizing a distinction between challenges to an expert’s scientific methodology and “no evidence challenges where, on the face of the record, the evidence lacked probative value” (quoting *Mar. Overseas Corp.*, 971 S.W.2d at 412)).

266. *Coastal Transp.*, 136 S.W.3d at 233 (“[W]hen the expert’s underlying methodology is challenged, the court ‘necessarily looks beyond what the expert said’ to evaluate the reliability of the expert’s opinion.” (quoting *Havner*, 953 S.W.2d at 712)). The distinction between a challenge to an expert’s methodology and a challenge that the expert testimony constitutes no evidence was recognized by the Fourteenth Court of Appeals in *Graves v. Tomlinson*. *Graves v. Tomlinson*, 329 S.W.3d 128, 141 (Tex. App.—Houston [14th Dist.] 2010, pet. denied). When a legal-sufficiency challenge focuses in significant part on expert testimony, an appellate court “must consider the difference between (1) a challenge to an expert’s methodology; and (2) a legal sufficiency challenge predicated on a contention that an expert’s testimony lacks probative value” because “[t]hese are two distinct inquiries.” *Id.* In this divorce proceeding, the wife, as part of her legal-sufficiency challenge, argued that her former husband’s valuation expert used an unreliable methodology to determine the value of a community property. *Id.* at 140–41. Because the former wife did not object before or during trial to the expert’s valuation methodology, she could not raise the issue on appeal. *Id.* at 146.

267. Although this reference to “foundational data” appears to place inadequate predicative materials in the “objection required” category, that is not always the case. As

the face of the record, and therefore require an objection; but challenges based on the conclusory or speculative nature of expert testimony do not require courts to go beyond the face of the record, and therefore do not require an objection.<sup>268</sup> As a result, a party can preserve error regarding the reliability of expert testimony by raising the issue for the first time in postverdict legal-sufficiency challenges, provided the testimony is deemed conclusory or speculative.<sup>269</sup>

At the time, the *Coastal Transport* exception may have been viewed as a narrow one.<sup>270</sup> But in subsequent cases, the Court

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discussed in Part III.A and in Part III.B, below, when an expert fails to identify any basis for his opinion, or when the basis the expert identified for his opinion does not actually support his opinion, the opinion is conclusory. For example, as *Havner* and its progeny demonstrate, when an expert relies on epidemiological studies to support his causation opinion but those studies do not actually support a causal relationship, the expert's opinion is conclusory and constitutes no evidence. See *infra* notes 633–61 and accompanying text.

268. *Coastal Transp.*, 136 S.W.3d at 232–33; see also *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009) (quoting *Coastal Transp.*, 136 S.W.3d at 233). The *Coastal Transport* Court stated, “When the testimony is challenged as conclusory or speculative and therefore non-probative on its face, however, there is no need to go beyond the face of the record to test its reliability.” *Coastal Transp.*, 136 S.W.3d at 233.

269. *Coastal Transp.*, 136 S.W.3d at 233 (“We therefore conclude that when a reliability challenge requires the court to evaluate the underlying methodology, technique, or foundational data used by the expert, an objection must be timely made so that the trial court has the opportunity to conduct this analysis. However, when the challenge is restricted to the face of the record—for example, when expert testimony is speculative or conclusory on its face—then a party may challenge the legal sufficiency of the evidence even in the absence of any objection to its admissibility.” (alteration in original)). *Coastal Transport*, thus, raised the stakes when the issue on appeal is whether expert testimony can be labeled conclusory. See Professor Goode's criticism of *Coastal Transport* in *infra* notes 469–72 and accompanying text.

270. The unanimous holding in *Coastal Transport* was supported by strong precedent. See, e.g., *Havner*, 953 S.W.2d at 712; *Dall. Ry. & Terminal Co. v. Gossett*, 294 S.W.2d 377, 380–81 (Tex. 1956). The Texas Supreme Court had previously found expert testimony conclusory and no evidence in summary judgment proceedings and in trial. It did so in the summary judgment context in *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999), and *Anderson v. Snider*, 808 S.W.2d 54, 55 (Tex. 1991) (per curiam). In *Schaefer v. Texas Employers' Insurance Ass'n*, the basis for the expert's trial causation opinion had no evidentiary support and therefore, his causation testimony was “mere possibility.” *Schaefer v. Tex. Emp'rs' Ins. Ass'n*, 612 S.W.2d 199, 204 (Tex. 1980). Similarly, in *Burroughs Wellcome Co. v. Crye*, a jury verdict was reversed because the opinion of the plaintiff's treating physician had no factual basis and therefore, was no evidence despite the absence of any objection to his opinion. *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499 (Tex. 1995). The dissent in *Maritime Overseas* relied on both *Schaefer* and *Burroughs. Mar. Overseas Corp.*, 971 S.W.2d at 419–20 (Hecht, J., dissenting). Neither is discussed in *Coastal Transport*. But in all of these cases, the expert opinion was without support on its face; the Court did not review a stated basis for the opinion and decide that it failed to actually support the opinion.

After *Maritime Overseas*, and before *Coastal Transport*, many courts had refused to entertain legal-insufficiency challenges to expert testimony when *Robinson*-type “admissibility” objections were not made before or during trial. See, e.g., *Cass v. Stephens*, No. 08-97-00582-CV, 2001 WL 28092, at \*17 (Tex. App.—El Paso Jan. 11, 2001,

has defined “conclusory” and “speculative” to incorporate a broad array of reliability challenges, and as a result, the *Coastal Transport* exception to *Maritime Overseas’s* objection requirement has nearly swallowed the rule.<sup>271</sup> Thus, in Texas, appellate challenges to expert evidence are routinely raised and decided under a legal-sufficiency rubric, not the admissibility rubric. The distinction between these is key to determining when and how a party opposing expert opinion evidence must raise challenges to the reliability of the evidence, and it shapes the nature of appellate court review of expert testimony in Texas.

1. *Preservation of Error.* For purposes of challenging the reliability of expert evidence, the primary procedural distinction between admissibility challenges and legal-sufficiency challenges is in how a party preserves an objection to expert evidence. The rules for preserving a reliability-based challenge to the admissibility of expert evidence are well established. A party must raise reliability objections—which are distinct from qualifications objections and must be separately preserved<sup>272</sup>—

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pet. denied) (not designated for publication) (refusing to consider challenge to expert testimony on damages because of failure to object at trial), *vacated*, 538 U.S. 1054 (2003); *Energen Resources MAQ, Inc. v. Dalbosco*, 23 S.W.3d 551, 557 (Tex. App.—Houston [1st Dist.] 2000, pet. denied) (holding that party waived complaint that expert testimony was unreliable and speculative because of failure to object at trial); *Weidner v. Sanchez*, 14 S.W.3d 353, 366 (Tex. App.—Houston [14th Dist.] 2000, no pet.) (rejecting sufficiency of evidence point when defendant failed to object “before trial, when the evidence was offered, or before the close of evidence”); *Reliance Ins. Co. v. Denton Cent. Appraisal Dist.*, 999 S.W.2d 626, 630 (Tex. App.—Fort Worth 1999, no pet.) (holding that although plaintiff “artfully cross-examined” the expert, it could not show any record references showing it had objected to the testimony as unreliable); *Retzlaff v. Tex. Dep’t of Protective & Regulatory Servs.*, No. 03-98-00201-CV, 1999 WL 546960, at \*4 (Tex. App.—Austin July 29, 1999, pet. denied) (not designated for publication) (finding waiver when defendant did not object before or during trial to the state’s expert on pedophilia tendencies even though the subject matter of his testimony was not disclosed before trial); *Gen. Motors Corp. v. Castaneda*, 980 S.W.2d 777, 780 n.2 (Tex. App.—San Antonio 1998, pet. denied) (refusing to consider challenge that expert testimony was not supported by the evidence and was speculative in absence of objection at trial).

271. *E.g.*, *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 839–40 (Tex. 2010); *Pollock*, 284 S.W.3d at 817–18.

272. A qualifications objection does not preserve a reliability challenge. *United States v. Diaz*, 300 F.3d 66, 75–76 (1st Cir. 2002) (“Rule 702 encompasses an array of expert witness issues . . . . Diaz’s general references at trial to *Daubert* or competency, particularly in light of a pretrial challenge limited to the qualifications of the experts, was woefully deficient for the purpose of advising the district court that Diaz was raising a challenge to the reliability of the expert’s methods . . . .”); *Nissan Motor Co. v. Armstrong*, 145 S.W.3d 131, 143–44 (Tex. 2004) (finding pretrial motion to exclude the expert’s opinions because of lack of qualifications did not preserve objection that his opinions were unreliable); *Schindler Elevator Corp. v. Anderson*, 78 S.W.3d 392, 404 (Tex. App.—Houston [14th Dist.] 2001, pet. granted, judgment vacated w.r.m.) (holding that pretrial motion that focused on expert’s qualifications did not preserve objection to reliability of testimony and stating that “objections to qualifications are thus distinct from objections

before the evidence is admitted and obtain a ruling from the trial court.<sup>273</sup> The objection is frequently made pretrial through a motion to exclude or strike expert testimony.<sup>274</sup> But a party should be cautious about relying exclusively on a pretrial motion because the expert's trial testimony may differ from the pretrial disclosures.<sup>275</sup> "[A] careful party will urge its objections both before trial and re-urge them when the evidence and any similar

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about reliability"), *abrogated by* *Roberts v. Williamson*, 111 S.W.3d 113 (Tex. 2003); *cf. Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1341 (11th Cir. 2003) (noting that although qualifications, reliability, and helpfulness objections may overlap to some degree, they "are distinct concepts that courts and litigants must take care not to conflate"); *Guadalupe-Blanco River Auth. v. Kraft*, 39 S.W.3d 264, 266 (Tex. App.—Austin 2001) (finding error was preserved to expert testimony on market value of easement when the appellant objected that the expert's methodology did not meet the reliability standards articulated by *Gammill*, and stating that "[t]his objection adequately informed the trial court to rule on the reliability of [the expert's] methodology and hence, its admissibility"), *rev'd*, 77 S.W.3d 805 (Tex. 2002). Similarly, a reliability objection does not preserve a qualifications objection. *Kroger Co. v. Betancourt*, 996 S.W.2d 353, 360–61 (Tex. App.—Houston [14th Dist.] 1999, pet. denied) (holding that Kroger's objection that the expert's opinion was speculative and not reliable did not preserve any error based on lack of qualifications).

273. See *Pollock*, 284 S.W.3d at 818; *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245, 251–52 (Tex. 2004), *abrogated by* *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008); *Mar. Overseas Corp.*, 971 S.W.2d at 409; *Guadalupe-Blanco River Auth.*, 77 S.W.3d at 807.

274. A pretrial motion to strike will generally be sufficient to preserve error for a challenged expert opinion. *Fleming v. Kinney ex rel. Shelton*, 395 S.W.3d 917, 926 (Tex. App.—Houston [14th Dist.] 2013, pet. denied) (observing that a motion to exclude expert testimony was sufficient to preserve issue); *Marvelli v. Alston*, 100 S.W.3d 460, 470 n.3 (Tex. App.—Fort Worth 2003, pet. denied) (noting that a pretrial ruling is sufficient to preserve the error); *Huckaby v. A.G. Perry & Son, Inc.*, 20 S.W.3d 194, 203–04, 206 (Tex. App.—Texarkana 2000, pet. denied). A motion in limine will not preserve error unless the content of the motion makes it clear that the party is seeking the exclusion of expert testimony. *Brookshire Bros. v. Smith*, 176 S.W.3d 30, 35 n.3 (Tex. App.—Houston [1st Dist.] 2004, pet. denied) (finding a motion in limine preserved error because it sought to exclude expert testimony); *Huckaby*, 20 S.W.3d at 203–04 (explaining difference between motions in limine and motions to exclude).

275. David F. Johnson, *Appellate Issues Regarding the Admission or Exclusion of Expert Testimony in Texas*, 52 S. TEX. L. REV. 153, 186 (2010) ("[I]f a party solely relies on a pretrial motion to preserve error, it should take great caution to foresee all objectionable bases and to assert them. Otherwise, the party will not be able to allege an objection that was not expressly raised in the pretrial motion or raised at trial."). Stated differently, a pretrial objection to the reliability of expert testimony must encompass all of the expert challenges that are raised in the appeal; a trial court generally cannot be reversed for an evidentiary objection that was never presented or an objection for which no ruling was obtained (unless the evidence is legally "no evidence"). In *Nip v. Checkpoint Systems, Inc.*, the appellant raised six separate challenges to the reliability of the expert's testimony. *Nip v. Checkpoint Sys., Inc.*, 154 S.W.3d 767, 771 (Tex. App.—Houston [14th Dist.] 2004, no pet.). The appellee contended that the points were waived because they were not part of the basis for the challenge in the trial court. *Id.* at 770–71. The court of appeals held that it first had to "determine whether appellants have preserved each of their six contentions" by raising them in their motion to strike the expert in the trial court. *Id.* at 771. Finding that only one of the six arguments had been raised below, the court found the other five points were waived. *Id.*

evidence is offered at trial and obtain a ruling.”<sup>276</sup> A single objection at trial will sometimes preserve error,<sup>277</sup> but not always. A running objection will preserve error, if made appropriately.<sup>278</sup> When a party timely objects to the admissibility of expert evidence on reliability grounds and is overruled, the party has preserved the right to appeal the trial court’s decision to admit the evidence.<sup>279</sup> A party who fails to object to the admissibility of expert testimony cannot, however, cure the lack of objection through cross-examination or controverting expert testimony.<sup>280</sup>

The rules for preserving a reliability-based challenge to the legal sufficiency of expert evidence, however, are less clearly defined. Outside the context of expert evidence, a legal-sufficiency challenge may be raised for the first time after the trial court signs a judgment.<sup>281</sup> But many jurisdictions have

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276. Johnson, *supra* note 275, at 186–87.

277. The normal rule is that a party must object to evidence each time it is offered. Austin v. Weems, 337 S.W.3d 415, 421 (Tex. App.—Houston [1st Dist.] 2011, no pet.) (“[A]ny error in the admission of evidence is waived if the objecting party subsequently permits the same or similar evidence to be introduced without objection. Thus, a party fails to preserve error if it does not object to the same or similar evidence that is offered by the opposing party.” (citation omitted)). In *Guadalupe-Blanco River Authority v. Kraft*, the Court stated that “a party must object to the testimony before trial or when it is offered.” *Guadalupe-Blanco River Auth.*, 77 S.W.3d at 807. In that case the party made the objection when the witness began testifying. *Id.* “After voir dire, the trial court overruled the objection.” *Id.* David Johnson interprets this case as holding that “[a] clear objection at the beginning of the expert’s testimony does preserve error.” Johnson, *supra* note 275, at 191. Whether an objection in the middle of the expert’s direct examination would fall under this rule is unclear. David Johnson states that it will: “[A]n objection in the middle of the expert’s testimony, before the objectionable matter is offered, will be sufficient to preserve error.” *Id.* He relies on *In re Estate of Robinson*. *Id.* In that case, the party made a motion to exclude the expert before the first trial and renewed its motion to exclude in the middle of the direct examination in the second trial. *In re Estate of Robinson*, 140 S.W.3d 782, 789 (Tex. App.—Corpus Christi 2004, pet. denied). Because the party did not merely object, but made a motion to exclude, the precedential value of that case may be limited. A party would be wise to make a pretrial motion to exclude at trial, or, better yet, a pretrial motion to exclude with a running objection at trial. *But see* TEX. R. EVID. 103(a)(1) (stating that “[w]hen the court hears objections to offered evidence out of the presence of the jury and rules that such evidence be admitted,” it is unnecessary to repeat the objection)

278. *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 907 (Tex. 2004) (“Because [the party’s] initial objection to the evidence complied with Texas Rule of Appellate Procedure 33.1(a) and its requested running objection clearly identified the source and specific subject matter of the expected objectionable evidence prior to its disclosure to the jury, recognition of the running objection for more than one witness was appropriate.”).

279. *See Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 716, 718–19 (Tex. 1998).

280. *City of San Antonio v. Pollock*, 284 S.W.3d 809, 828 (Tex. 2009) (“[T]he failure to object to expert testimony cannot be cured through cross-examination or counter-expert testimony.”).

281. *See Horrocks v. Tex. Dep’t of Transp.*, 852 S.W.2d 498, 498–99 (Tex. 1993) (per curiam); *see also* *Arkoma Basin Exploration Co. v. FMF Assocs. 1990-A, Ltd.*, 249 S.W.3d 380, 387–88 (Tex. 2008) (discussing preservation of legal-sufficiency challenge to expert testimony). In *Aero Energy, Inc. v. Circle C Drilling Co.*, the Texas Supreme Court observed that

considered challenges to expert opinion evidence only with respect to admissibility objections,<sup>282</sup> which must be raised prior to admission of the evidence. Because Texas courts allow both types of challenges (legal-sufficiency and admissibility) to the reliability of expert opinion evidence, a question arises about when an objection to the reliability of expert evidence must be raised before the evidence is admitted and when it can be raised for the first time postverdict.

Over the last fifteen years, the answer to this question has largely come down to whether the evidence is categorized as “conclusory” or “speculative” and therefore, “non-probative on its face.” If it is, no preverdict objection is required; if it is not, then failure to object before the expert is admitted waives the complaint. Determining whether expert evidence is “conclusory” or “speculative” is thus a critical issue for parties offering or opposing expert evidence in Texas. This issue is discussed in the next section.<sup>283</sup>

2. *When Is Opinion Evidence “Conclusory” or “Speculative”?* Objections to the admissibility of evidence must be raised before the evidence is admitted, but Texas courts have long allowed late challenges to incompetent evidence.<sup>284</sup> Any unreliable expert opinion is inadmissible and thus subject to an admissibility objection before or at trial. But only “conclusive” or “speculative” expert opinions are incompetent such that an objection can be raised for the first time postverdict.<sup>285</sup> Because a conclusory

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[n]o evidence points must be preserved through one of the following procedural steps in the trial court: (1) a motion for instructed verdict; (2) a motion for judgment notwithstanding the verdict; (3) an objection to the submission of the issue to the jury; (4) a motion to disregard the jury’s answer to a vital fact issue; or, (5) a motion for new trial.

Aero Energy, Inc. v. Circle C Drilling Co., 699 S.W.2d 821, 822 (Tex. 1985); *see also* T.O. Stanley Boot Co. v. Bank of El Paso, 847 S.W.2d 218, 220–21 (Tex. 1992); Cecil v. Smith, 804 S.W.2d 509, 510–11 (Tex. 1991). Although the Texas Supreme Court has repeatedly identified these five procedures as the proper means for preserving a no-evidence complaint, it is possible that a party may be able to preserve such a complaint in another form of postjudgment motion, such as a motion to modify the judgment, if the substance of the motion is to the same effect as a motion for JNOV or a motion to disregard a jury finding. Harris Cnty. Bail Bond Bd. v. Blackwood, 41 S.W.3d 123, 126–27 (Tex. 2001).

282. *See* cases cited *infra* note 458.

283. *See* discussion *infra* Part III.A.2.

284. *City of Keller v. Wilson*, 168 S.W.3d 802, 812 (Tex. 2005) (citing *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 232 n.1 (Tex. 2004)); *Dall. Ry. & Terminal Co. v. Gossett*, 294 S.W.2d 377, 380–81 (Tex. 1956); *Cas. Underwriters v. Rhone*, 132 S.W.2d 97, 99 (Tex. 1939).

285. *City of Keller*, 168 S.W.3d at 812; *see also* *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*8, \*11–12 (Tex. Aug. 22, 2014) (concluding that incompetent opinions did not support judgment and treating

objection can be raised postverdict even if the opinion was admitted without objection, it is important to define when an opinion is conclusory. But it is sometimes difficult to draw a line between conclusory expert testimony, and expert testimony that is unreliable but not conclusory or speculative. “[S]ome objections will fall close to the line” between evidence that is conclusory and evidence that is unreliable but not conclusory.<sup>286</sup> Because of these uncertainties, the best rule of practice from an appellate standpoint is to object to the witness’s opinion testimony both before trial and during trial.

The Texas Supreme Court has struggled with trying to find a middle course that simultaneously allows legal-sufficiency challenges but also prevents appeals on issues never raised before the trial court—that is, “appeal by ambush.”<sup>287</sup> And this struggle not only impacts legal-sufficiency challenges, but also may impact factual-sufficiency challenges; arguably a factual-insufficiency challenge could incorporate an argument raised for the first time postverdict that the expert’s opinion is conclusory or speculative. Thus, when a claim or defense is supported by other evidence (and therefore, a successful challenge to the expert’s opinion cannot result in a legal-sufficiency challenge), the conclusory objection may still be available to argue that the expert evidence must be disregarded as no evidence and therefore, the remaining evidence is factually insufficient.

*a. Ipse Dixit.* A principal basis the Texas Supreme Court has used to identify “conclusory” expert testimony is whether the expert has identified the basis for his opinion or whether the jury essentially must take the expert’s word for it.<sup>288</sup> Thus, the Court held in *Burrow v. Arce*, *City of San Antonio v. Pollock*, and

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issue of whether opinions were competent or conclusory as synonymous); *Pollock*, 284 S.W.3d at 816 (“Bare, baseless opinions will not support a judgment even if there is no objection to their admission in evidence.”).

286. *Arkoma Basin Exploration Co. v. FMF Assocs. 1990–A, Ltd.*, 249 S.W.3d 380, 388 (Tex. 2008).

287. *See Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 409 (Tex. 1998) (observing that requiring an objection to expert evidence before it is admitted at trial gives the offering party an opportunity to cure defects in the evidence and prevents “trial and appeal by ambush”).

288. *Elizondo v. Krist*, 415 S.W.3d 259, 264 (Tex. 2013); *Pollock*, 284 S.W.3d at 823; *Burrow v. Arce*, 997 S.W.2d 229, 236 (Tex. 1999); *see also Hous. Unlimited*, 2014 WL 4116810, at \*15 (“[T]he law requires experts to substantiate their opinions, and for good reasons. Experts who testify on behalf of parties to a lawsuit are subject to biases and potential abuses that are not always present outside the courtroom, and the courtroom itself may afford experts a veneer of credibility not present in other contexts. Legal-sufficiency review requires courts to ensure that a jury that relies on an expert’s opinion has heard factual evidence that demonstrates that the opinion is not conclusory on its face.”).

*Elizondo v. Krist* that expert testimony was conclusory because the expert essentially asked the jury to “take my word for it.”<sup>289</sup> Conversely, in *Arkoma Basin* the Court held that expert testimony was not conclusory because the expert “did not simply state a conclusion without any explanation, or ask jurors to ‘take my word for it.’”<sup>290</sup> And in *General Motors Corp. v. Sanchez*,<sup>291</sup> a products liability suit, the Court rejected a challenge to the speculativeness of expert testimony because the expert offered “more . . . than [his] bald assertion that his design would be safer.”<sup>292</sup> The expert had described the product’s operation “at length, and explained in some detail how his proposed design would make the transmission safer,”<sup>293</sup> and his “testimony about the engineering principles underlying his proposed design support[ed] his conclusion.”<sup>294</sup>

The applicability of the “baseless” and “*ipse dixit*” labels has evolved over time. Even before *Robinson* and *Havner*, the Court held “conclusory statements made by an expert witness are insufficient to support summary judgment.”<sup>295</sup> Initially, this rule of law was applied to preclude a judgment entered in reliance on an expert opinion for which the expert provided no basis or explanation whatsoever, instead merely stating an opinion.<sup>296</sup> But beginning in *Havner*,<sup>297</sup> the rule began to expand to include opinion testimony for which an expert offered some basis or

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289. *Elizondo*, 415 S.W.3d at 264–66; *Burrow*, 997 S.W.2d at 236; see *Pollock*, 284 S.W.3d at 816, 819–20.

290. *Arkoma Basin*, 249 S.W.3d at 389 (footnote omitted) (quoting *Burrow*, 997 S.W.2d at 236). In *Arkoma Basin*, the Texas Supreme Court provided further guidance on when opinion evidence is conclusory or speculative (such that a challenge may be raised for the first time postverdict) and when it is unreliable but not conclusory or speculative (such that an objection must be raised before or during trial). An admissibility objection is necessary to preserve error “if the objection ‘requires the court to evaluate the underlying methodology, technique, or foundational data[.]’” *Id.* at 388 (quoting *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 233 (Tex. 2004)). But if the objection “‘is restricted to the face of the record,’ as when the complaint is that an opinion was speculative or conclusory on its face, or assumed facts contrary to those on the face of the record,” then the objection can be raised for the first time postverdict. *Id.* at 388–89 (quoting *Coastal Transp.*, 136 S.W.3d at 233) (footnote omitted). The Court recognized that “some objections will fall close to the line between these categories.” *Id.*

291. *Gen. Motors Corp. v. Sanchez*, 997 S.W.2d 584, 591 (Tex. 1999).

292. *Id.*

293. *Id.*

294. *Id.*

295. *Anderson v. Snider*, 808 S.W.2d 54, 55 (Tex. 1991) (per curiam) (holding that expert affidavit was incompetent to support summary judgment).

296. *Id.* at 54–55. In *Anderson*, an attorney testified in an affidavit that he had not committed legal malpractice and that the plaintiff had “suffered no damages or legal injury as a result of my representation of her,” but he gave no basis for those opinions. See *id.*

297. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706 (Tex. 1997).

explanation, but the explanation or basis offered was facially defective in some manner. The *Havner* Court stated that an expert's "bare opinion" does not constitute evidence, and to determine whether it qualifies as evidence "[t]he substance of the testimony must be considered."<sup>298</sup> To begin with, an expert's "bald assurance of validity is not enough. . . . The underlying data should be independently evaluated in determining if the opinion itself is reliable."<sup>299</sup> Additionally, an appellate court looks "at the testimony in its entirety," because "to accept the expert's opinion as some evidence 'simply because he used the magic words' would effectively remove the jurisdiction of the appellate courts to determine the legal sufficiency of the evidence in any case requiring expert testimony."<sup>300</sup>

The Court stated in *Burrow v. Arce* that "it is the basis of the witness's opinion, and not the witness's qualifications or his bare opinions alone, that can settle an issue as a matter of law; a claim will not stand or fall on the mere *ipse dixit* of a credentialed witness."<sup>301</sup> Like *Anderson v. Snider*, *Burrow* involved the legal sufficiency of an attorney's expert affidavit to support a judgment in a legal malpractice action.<sup>302</sup> In *Burrow*, a well-qualified lawyer stated in a summary judgment affidavit that the plaintiffs were "reasonably and fairly compensated" in their settlements in the underlying claim.<sup>303</sup> Unlike the attorney in *Anderson*, the expert expressly identified the basis for his conclusion: the available elements of damages, the losses suffered

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298. *Id.* at 711.

299. *Id.* at 712–13.

300. *Id.* at 711–12 (quoting *Schaefer v. Tex. Emp'rs' Ins. Ass'n*, 612 S.W.2d 199, 205 (Tex. 1980)). The Court explained:

It could be argued that looking beyond the testimony to determine the reliability of scientific evidence is incompatible with our no evidence standard of review. If a reviewing court is to consider the evidence in the light most favorable to the verdict, the argument runs, a court should not look beyond the expert's testimony to determine if it is reliable. But such an argument is too simplistic. It reduces the no evidence standard of review to a meaningless exercise of looking to see only what words appear in the transcript of testimony, not whether there is in fact some evidence.

*Id.* at 712. Whether expert testimony "rises to the level of *evidence* is determined under our rules of evidence, including Rule 702, which . . . offers substantive guidelines in determining if the expert testimony is some evidence of probative value." *Id.* Thus, while *Robinson* concerned admissibility, the *Havner* Court held that its "factors may be applied in a no evidence review of scientific evidence." *Id.* at 714. As discussed below, the *Robinson* factors have also been applied to a no evidence review of nonscientific evidence. See *infra* notes 850–51 and accompanying text.

301. *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999).

302. *Id.* The *Burrow* expert's affidavit was far more detailed than the affidavit in *Anderson*. *Id.*

303. *Id.* at 234–35.

by each plaintiff, and the liability facts.<sup>304</sup> But the affidavit did not “explain why” those three factors supported his conclusion; it was therefore conclusory.<sup>305</sup> An expert “cannot simply say, ‘Take my word for it . . . .’ Credentials qualify a person to offer opinions, but they do not supply the basis for those opinions. The opinions must have a reasoned basis . . . . That basis is missing [here].”<sup>306</sup> The expert’s failure to explain made his assertions “as deficient as those in the *Anderson* affidavit.”<sup>307</sup> The failure to provide that basis “did not merely make the affidavit unclear or indirect; it deprived” it of any probative value.<sup>308</sup>

*Burrow*’s holding was consistent with well-settled law that conclusory affidavits are insufficient evidence in a summary judgment context.<sup>309</sup> And there was no issue of error preservation; the appellant had objected in the trial court that the evidence was conclusory and could not support a summary judgment.<sup>310</sup> Subsequent cases, however, reveal that *Burrow*’s examination of whether the expert had not only identified the basis of his conclusion but more importantly had “explain[ed] why” the underlying data led to the conclusion testimony was a significant requirement that would be repeatedly relied on for analyzing the reliability of expert testimony under Rule 702.<sup>311</sup> Thus, while *Burrow* did not cite Rule 702 or mention reliability, it became a precursor to legal-sufficiency challenges to conclusory expert testimony even in the absence of a preverdict objection.<sup>312</sup>

Thus, in the Court’s early expert-evidence reviews, categorization of expert testimony as conclusory or speculative was largely attributable to a lack of explanation by the expert or

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304. *Id.*

305. *Id.* at 236.

306. *Id.*

307. *Id.* at 235.

308. *Id.* at 236.

309. See *Anderson v. Snider*, 808 S.W.2d 54, 55 (Tex. 1991) (per curiam); *Hidalgo v. Sur. Sav. & Loan Ass’n*, 487 S.W.2d 702, 703 (Tex. 1972); *Vinklarek v. Cane*, 691 S.W.2d 108, 111 (Tex. App.—Austin 1985, writ ref’d n.r.e.); see also *Arce v. Burrow*, 958 S.W.2d 239, 252 (Tex. App.—Houston [14th Dist.] 1997) (“Summary judgment may not be granted on conclusory evidence.”), *aff’d in part, rev’d in part*, 997 S.W.2d 229.

310. *Arce*, 958 S.W.2d at 252 & n.11.

311. *Earle v. Ratliff*, 998 S.W.2d 882, 890 (Tex. 1999); see also *Romero v. KPH Consolidation, Inc.*, 166 S.W.3d 212, 223 (Tex. 2005).

312. The Court reaffirmed these principles a few months later in another opinion arising out of a summary judgment: *Earle*, 998 S.W.2d at 890. After stating that an expert affidavit “must not be conclusory,” the Court explained, “An expert’s simple *ipse dixit* is insufficient to establish a matter; rather, the expert must explain the basis of his statements to link his conclusions to the facts.” *Id.* And as in *Burrow*, the expert’s affidavit did “not explain why” the expert reached the opinion. *Id.* It therefore was no evidence. *Id.*

an explanation that lacked a basis in fact. In 2004, when the Court held in *Coastal Transport* that a legal-sufficiency challenge to conclusory or speculative expert evidence could be raised on appeal despite the lack of a preverdict objection,<sup>313</sup> it did so in reliance on this precedent, holding that the expert opinion evidence in the case constituted the expert's "bare conclusions" or "mere *ipse dixit*."<sup>314</sup> After *Coastal Transport*, however, the use of the terms "conclusory" and "speculative" continued to expand.

*b. The Analytical Gap Test.*<sup>315</sup> In the same year it decided *Coastal Transport*,<sup>316</sup> the Texas Supreme Court decided *Kerr-McGee Corp. v. Helton*<sup>317</sup> and *Volkswagen of America, Inc. v. Ramirez*.<sup>318</sup> These opinions refined the application of the "conclusory" label to expert evidence in an important way by holding that the expert opinions in those cases were speculative or conclusory, and therefore no evidence, because they failed the analytical gap test—i.e., they lacked connective reliability.<sup>319</sup> The

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313. *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 233 (Tex. 2004).

314. *Id.* at 232 (quoting *Burrow*, 997 S.W.2d at 235). The Court reached the same result on expert evidence in *Romero v. KPH Consolidation, Inc.*, where it held that an expert opinion was legally insufficient evidence because the expert offered no support for his opinion, only his own "*ipse dixit*." *Romero*, 166 S.W.3d at 223. The Court in *Romero* combed through the evidence but found no factual basis for the expert's opinion that the hospital acted with malice. *Id.* The Fourteenth Court of Appeals had earlier concluded that the expert's testimony that the hospital should not have allowed a physician with a drug addiction to operate "was vague" and the expert offered "no basis" for the opinion. *KPH Consolidation, Inc. v. Romero*, 102 S.W.3d 135, 154 n.12 (Tex. App.—Houston [14th Dist.] 2003), *aff'd*, 166 S.W.3d 212. In affirming, the Texas Supreme Court stated that the opinion had "no factual support" and constituted the "mere *ipse dixit*" of the expert. *Romero*, 166 S.W.3d at 223. The Court expanded this somewhat several years later when it stated, "Expert testimony lacking a proper foundation is incompetent." See *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239 (Tex. 2010). While the *Romero* court did not use the word conclusory, its reference to "the mere *ipse dixit* of a credentialed witness" shows that it treated the opinion as such. *Romero*, 166 S.W.3d at 223–34 (quoting *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 913 (Tex. 2004)) (internal quotation marks omitted).

315. The "analytical gap" test is the fundamental test for connective reliability. The parameters of this test are discussed in greater detail in the "connective reliability" section below. See *infra* notes 1540–44 and accompanying text.

316. *Coastal Transp.*, 136 S.W.3d 227.

317. *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245 (Tex. 2004), *abrogated by Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008). *Kerr-McGee* is discussed in detail in Part III.D.1. See *infra* notes 1597–1615 and accompanying text.

318. *Ramirez*, 159 S.W.3d 897. *Ramirez* is discussed in detail in Part III.D.1. See *infra* notes 1616–33 and accompanying text.

319. *Ramirez*, 159 S.W.3d at 906 ("Walker does not close the 'analytical gap' by explaining how the Passat's wheel could behave as he described, especially in light of the fact that there are no other studies, publications, or peer review that support his position. The tucked or floating wheel theory that Walker offers is not supported by objective scientific analysis and is based solely upon his subjective interpretation of the facts. As

holdings in *Burrow* and *Ratliff* set the stage for this aspect of the “conclusory” definition when they stressed the need for an opinion witness to “explain why” and “link his conclusions to the facts.”<sup>320</sup> Since *Kerr-McGee* and *Ramirez*, expert testimony that is unreliable due to a lack of connective reliability has been frequently treated as conclusory or speculative, such that it cannot support a judgment even if admitted without objection.<sup>321</sup>

In 2009 the Texas Supreme Court decided *City of San Antonio v. Pollock*,<sup>322</sup> in which it held that there was no evidence that the Pollocks’ daughter contracted a particular form of leukemia as a result of benzene exposure from a closed landfill located near the Pollocks’ home.<sup>323</sup> The Court held that the experts’ causation opinions were conclusory and that this defect had not been waived by the city’s failure to raise it in a pre-admission objection.<sup>324</sup> The Court held that the causation opinion offered by the Pollocks’ first expert, Kraft, suffered a fatal “analytical gap” and was conclusory because it was based on exposure levels that the expert failed to tie back to the Pollocks’ exposure levels.<sup>325</sup> The Court held that the causation opinion offered by the Pollocks’ second expert, Dr. Patel, was also conclusory because there was a “large gap” between the plaintiffs’ claimed exposure levels and the exposure levels found to have

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such, Walker’s opinion is unreliable and constitutes no evidence of causation.”); *Kerr-McGee*, 133 S.W.3d at 257 (“[W]e must determine whether the analysis Riley used to reach his conclusions was reliable. Based on this record, there is simply ‘too great an analytical gap between the data and the opinion’ to conclude that it is. As in *Gammill v. Jack Williams Chevrolet, Inc.*, the gap in Riley’s analysis was his ‘failure to show how his observations, assuming they were valid, supported his conclusions.’” (citation omitted)).

320. *Earle v. Ratliff*, 998 S.W.2d 882, 890 (Tex. 1999); *Burrow v. Arce*, 997 S.W.2d 229, 235–36 (Tex. 1999).

321. Connective reliability is discussed in detail below. See *infra* Part III.D.

322. *City of San Antonio v. Pollock*, 284 S.W.3d 809 (Tex. 2009). Refer to *infra* notes 355–62 and accompanying text for additional discussion of *Pollock*.

323. *Pollock*, 284 S.W.3d at 818–19.

324. *Id.* at 816. The city did raise the objection post-admission in a motion for directed verdict, a motion for judgment notwithstanding the verdict, and a motion for new trial. *Id.*

325. *Pollock*, 284 S.W.3d at 814, 819. Kraft relied on evidence of benzene concentrations in a nearby monitoring well. *Id.* at 818. “Using an EPA-approved gas model, Kraft” determined that the gas in a sealed monitoring well thirty feet from the Pollocks’ property “would have been more than 50% methane with 160 ppb benzene by volume.” *Id.* Based on this alone, he opined that that the Pollocks were exposed to benzene concentrations of 160 ppb. *Id.* The Court rejected this testimony because the evidence of the gas concentration in the sealed monitoring well near the Pollocks’ property did not support an opinion that the gas concentration would be the same in the ambient air on the Pollocks’ property. *Id.* at 819. In fact, it contradicted such an opinion. *Id.* The Pollocks had a second expert, Dr. Patel, who was a treating pediatric oncologist. The Court held his testimony was conclusory under the “analytical gap” test discussed above. *Id.*

caused the disease in question in the literature relied on by the expert.<sup>326</sup>

Justice Medina dissented in *Pollock*, joined by Justice O'Neill. The dissent observed that an objection is generally "required to preserve error regarding the admission of evidence, and expert testimony is no exception."<sup>327</sup> The reason is simple: "Without an objection, a trial court simply cannot be expected to fulfill its role as gatekeeper. Nor can an appellate court assume this role, particularly after the witnesses have testified, been dismissed, and the record closed."<sup>328</sup> According to Justice Medina, unreliability caused by analytical gaps does not render opinion testimony conclusory and should also require a trial objection.<sup>329</sup> Relying on *Arkoma Basin*, Justice Medina argued the difference is "between something and nothing."<sup>330</sup> "An expert's testimony is [treated as] conclusory if the expert merely gave an unexplained conclusion or asked the jury to 'take my word for it' because of his status as an expert."<sup>331</sup> But, for Justice Medina, the opinion is not conclusory "if the expert purports to rely on something more than his credentials or reputation."<sup>332</sup>

This complaint is, in part, why some commentators disfavor Texas's legal-sufficiency review of expert evidence, as discussed in the next section.<sup>333</sup> But the *Pollock* standard prevailed and has

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326. Additionally, none of the literature in the record supported the expert's assertion that "long-term exposure to a low level of toxin might" cause the disease. *Id.* at 819–20. Finally, all the epidemiological studies on the disease did not satisfy the *Havner* standards for causation evidence in a toxic tort case. *Id.* at 820.

327. *Id.* at 822 (Medina, J., dissenting).

328. *Id.*

329. *Id.* at 823.

330. *Id.* Justice Medina stated that the Pollocks' experts did not "ask[] the jury to trust their opinion merely on the basis of their expertise. They instead purported to analyze" the data underlying their opinion. *Id.* at 828. Thus, the city's "complaints about analytical gaps [are] nothing more than an unpreserved reliability challenge. Analytical gaps are not complaints about naked opinions, lacking any basis in the record, but rather are assertions that specific errors or omissions in an expert's analysis render his or her opinion unreliable." *Id.* He concluded:

The Court's opinion today unfortunately blurs the distinction between expert testimony that purports to have a basis in science (unreliable expert testimony) and expert testimony that lacks any apparent support apart from the expert's claim to superior knowledge (conclusory expert testimony). The Court's decision today is not only wrong, it is also unfair and may encourage gamesmanship in the future. Why have a pretrial *Robinson* hearing or make a reliability objection during trial and run the risk that the proffering party may fix the problem, when the expert's opinion can be picked apart for analytical gaps on appeal?

*Id.* at 828–29 (footnote omitted).

331. *Id.*

332. *Id.* at 824.

333. See *infra* Part III.A.5.

been largely unquestioned in Texas law for the last five years.<sup>334</sup> The Court recently reaffirmed *Pollock's* application of the “analytical gap” test to legal-sufficiency challenges in *Elizondo v. Krist*, holding that an attorney’s affidavit was conclusory because although the attorney identified a number of facts that he said supported his conclusion about the settlement value of a case, the attorney’s failure to connect the facts to his conclusion left a “fatal analytical gap.”<sup>335</sup>

c. *The Robinson Factors*.<sup>336</sup> In *Havner*, the Texas Supreme Court stated that, although *Robinson* addressed the admissibility of expert evidence, “the *Robinson* factors” may be applied in a no evidence review of scientific evidence.<sup>337</sup> But after *Havner*, the Court did not rely on the *Robinson* factors in a legal-sufficiency review for nearly a decade. In 2006, the Texas Supreme Court began incorporating the *Robinson* factors in legal-sufficiency reviews of expert evidence again, further broadening the applicability of the “conclusory or speculative” label. In *Cooper Tire & Rubber Co. v. Mendez*<sup>338</sup> and *Mack Trucks, Inc. v. Tamez*,<sup>339</sup> both products liability cases, the Court utilized the *Robinson* factors in holding that an expert’s opinion was speculative and therefore no evidence.<sup>340</sup> In both cases, the Court determined that the expert’s testimony lacked connective reliability.<sup>341</sup> But because the Court reviewed the experts’

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334. See, e.g., *Elizondo v. Krist*, 415 S.W.3d 259, 264 (Tex. 2013); *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (per curiam); *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009).

335. *Elizondo*, 415 S.W.3d at 265.

336. The *Robinson* factors (which we generally refer to as the *Daubert* factors except in this subsection) are discussed in detail as part of “methodological reliability” below. See *infra* notes 1165–1216 and accompanying text.

337. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997).

338. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800–01 (Tex. 2006). *Cooper Tire* is discussed in greater detail in Part III.D.1. See *infra* notes 1642–45 and accompanying text.

339. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578–79 (Tex. 2006). *Mack Trucks* is discussed in greater detail in Part III.D.1. See *infra* notes 1643–45 and accompanying text.

340. *Cooper Tire*, 204 S.W.3d at 804–05 (describing expert testimony as “speculation” and “unsupported speculation”); *Mack Trucks*, 206 S.W.3d at 583 (holding that expert testimony was “speculative and . . . insufficient to prevent summary judgment”).

341. *Cooper Tire*, 204 S.W.3d at 805–06 (holding that two experts’ opinions were speculative due to analytical gaps); *Mack Trucks*, 206 S.W.3d at 581 (holding that trial court properly excluded expert testimony because expert set out facts that were consistent with his opinion but failed to connect those facts to his conclusion). The Court in *Cooper Tire* relied on the failure to satisfy the *Robinson* factors to support its holding that one expert’s testimony was speculative and another expert’s opinion was conclusory, demonstrating that a failure to show the reliability of the expert’s methodology not only violates the methodological-reliability prong of the reliability inquiry but may also violate

methodology in reaching that determination, *Cooper Tire* and *Mack Trucks* indicate that a lack of methodological reliability can contribute to a lack of connective reliability, resulting in “conclusory” or “speculative” expert testimony.

The Court reaffirmed this principle in *Whirlpool Corp. v. Camacho*,<sup>342</sup> when it applied the *Robinson* factors to hold that expert opinion testimony was conclusory and therefore not entitled to probative weight.<sup>343</sup>

If *Cooper Tire* and *Mack Trucks* indicate that methodological and *connective* reliability are overlapping and may combine to render evidence conclusory or speculative, then *Whirlpool* indicates that methodological and *predicative* reliability are overlapping and the former may combine to render evidence conclusory or speculative. In *Whirlpool*, the Court relied both on *Pollock*—in which it held that expert testimony is conclusory and “no evidence” if the predicate relied upon in reaching the opinion does not actually support the opinion reached (predicative probativeness)<sup>344</sup>—and the *Robinson* factors (particularly the failure to test the expert’s theory) to hold that the expert opinion testimony offered was “no evidence” of causation.<sup>345</sup>

In short, while *Cooper Tire*, *Mack Trucks*, and *Whirlpool* did not involve error preservation issues, they could be read expansively to support the proposition that when the record demonstrates that an expert’s methodology fails under *Robinson*, if that failure leaves the expert with no predicate that supports his opinion or unable to bridge the gap between the methodology he employed and the opinion he reached, the opinion is “speculative” or “conclusory” and thus, will not support a judgment regardless of whether an objection was made before or during trial.

The Court’s reliance on the *Robinson* factors to conclude that the expert opinions in *Cooper Tire*, *Mack Trucks*, and *Whirlpool*

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the connective-reliability prong of that inquiry. *Cooper Tire*, 204 S.W.3d at 801–06. One of the three experts in *Cooper Tire* was held to be unqualified. *Id.* at 807. This is discussed above in Part I.A. See *supra* notes 87–88, 90–91 and accompanying text.

342. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631 (Tex. 2009). *Whirlpool* and connective reliability are discussed in greater detail under Part III.D.1. See *infra* notes 1646–56 and accompanying text.

343. *Whirlpool*, 298 S.W.3d at 643.

344. *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817–18 (Tex. 2009) (positing an opinion is conclusory and therefore does not rise to the level of probative evidence “if no basis for the opinion is offered” or even when a basis is offered for the opinion—“if that basis does not, on its face, support the opinion,” and stating that if “the basis offered provides no support, the opinion is merely a conclusory statement and cannot be considered probative evidence, regardless of whether there is no objection”).

345. *Whirlpool*, 298 S.W.3d at 643.

were “conclusory” or “speculative” is somewhat inconsistent with the Court’s statement in *Coastal Transport* that the “examination of the expert’s underlying methodology [is] a task for the trial court in its role as gatekeeper, and [is] not an analysis that should be undertaken for the first time on appeal.”<sup>346</sup> Neither a conclusory objection<sup>347</sup> nor a speculation objection<sup>348</sup> needs to be made preverdict to preserve error. In

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346. *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 233 (Tex. 2004).

347. *See City of Keller v. Wilson*, 168 S.W.3d 802, 812 (Tex. 2005) (“[I]ncompetent evidence is legally insufficient to support a judgment, even if admitted without objection.”); *Coastal Transp.*, 136 S.W.3d at 232 (“Opinion testimony that is conclusory or speculative is . . . ‘incompetent evidence,’ and . . . conclusory testimony cannot support a judgment.” (quoting *Cas. Underwriters v. Rhone*, 132 S.W.2d 97, 99 (Tex. 1939))); *United Servs. Auto. Ass’n v. Croft*, 175 S.W.3d 457, 463–64 (Tex. App.—Dallas 2005, no pet.) (“An expert opinion is conclusory when it offers an opinion with no factual substantiation. A conclusory opinion is not competent evidence and will not support a verdict.” (citations omitted)).

As discussed earlier, in order to preserve a legal-sufficiency (no-evidence) challenge the appellant must make (1) a motion for directed verdict; (2) a motion for judgment notwithstanding the verdict; (3) an objection to the submission of the question to the jury; (4) a motion to disregard the jury’s answer to a vital fact question; or (5) a motion for new trial. *See supra* note 281. Thus, in order to argue on appeal that an expert’s opinion was conclusory and no evidence, one of these procedural devices must be used in the trial court. *City of Dallas v. Redbird Dev. Corp.*, 143 S.W.3d 375, 385 (Tex. App.—Dallas 2004, no pet.) (“We reject the City’s reliance on *Coastal Transport* as authority that it was not required to raise its legal sufficiency challenge in the trial court to preserve its complaint on appeal.”).

348. “[T]estimony is speculative if it is based on guesswork or conjecture.” *Natural Gas Pipeline Co. of Am. v. Justiss*, 397 S.W.3d 150, 156 (Tex. 2012) (citing BLACK’S LAW DICTIONARY 1529 (9th ed. 2009) (defining “speculation” as “[t]he act or practice of theorizing about matters over which there is no certain knowledge”). Another court defined speculation as “mere theorizing or guessing about the possible meaning of facts and evidence presented.” *Hooper v. State*, 214 S.W.3d 9, 16 (Tex. Crim. App. 2007) (distinguishing speculation from an inference, which is “a conclusion reached by considering other facts and deducing a logical consequence from them”).

One court has stated that speculative objections are distinct from conclusion objections. *Custom Transit, L.P. v. Flatrolled Steel, Inc.*, 375 S.W.3d 337, 351 (Tex. App.—Houston [14th Dist.] 2012, no pet.). Although the issue of whether testimony is speculative may overlap to some degree with whether the testimony is conclusory, and the two “often are asserted in the same breadth and argued together,” they are “distinct concepts.” *Id.* In contrast, “[t]estimony is conclusory ‘if it is essentially a conclusion without any explanation.’” *Id.* (quoting *Pink v. Goodyear Tire & Rubber Co.*, 324 S.W.3d 290, 296–97 (Tex. App.—Beaumont 2010, pet. dism’d) (internal quotation marks omitted) (quoting *Arkoma Basin Exploration Co. v. FMF Assocs. 1990–A, Ltd.*, 249 S.W.3d 380, 389 & n.32 (Tex. 2008))).

An example of speculative testimony is expert testimony about what “could” have happened. *See Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 805 (Tex. 2006) (expert testimony “amounted to no more than ‘subjective belief or unsupported speculation’” (quoting *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995))); *Brinker v. Evans*, 370 S.W.3d 416, 423–24 (Tex. App.—Amarillo 2012, pet. denied) (finding the soil engineer’s testimony that it was “possible, probable or likely” that accident was caused by a road collapse was speculative and unreliable (internal quotation marks omitted)). An expert’s lack of familiarity with details of the underlying facts

*Mack Trucks*, *Cooper Tire*, and *Whirlpool*, the opponent of the expert testimony had objected to its admission at trial. In *Mack Trucks*, the issue was, in fact, whether the trial court had erred by admitting the opinion evidence. But by labeling the testimony “speculative,”<sup>349</sup> the *Mack Trucks* Court indicated that the testimony was nonprobative on its face and therefore, could not support the verdict even in the absence of an objection.<sup>350</sup> And the Court decided *Cooper Tire* and *Whirlpool* under a legal-sufficiency challenge—a challenge that can be raised for the first

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contributed to a court holding that the opinion was speculative. *Star Enter. v. Marze*, 61 S.W.3d 449, 460–61 (Tex. App.—San Antonio 2001, pet. denied).

Courts on occasion treat speculative and conclusory opinions as equivalent faults in expert testimony. *See, e.g., Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (per curiam) (“An expert’s failure to explain or adequately disprove alternative theories of causation makes his or her own theory speculative and conclusory.”); *Davis v. Aetrex Worldwide, Inc.*, 392 S.W.3d 213, 216–17 (Tex. App.—Amarillo 2012, no pet.) (affirming exclusion of the podiatrist’s expert opinion that black shoes caused the purchaser’s blisters as unreliable, conclusory, and speculative); *Beaumont v. Basham*, 205 S.W.3d 608, 621 (Tex. App.—Waco 2006, pet. denied) (“Expert testimony is considered ‘conclusory or speculative’ when it has no factual substantiation in the record.”).

Speculative testimony is no evidence. *See Coastal Transp.*, 136 S.W.3d at 232 (“Opinion testimony that is conclusory or speculative . . . is ‘incompetent evidence,’ and . . . cannot support a judgment.”); *see also J.B. Hunt Transp., Inc. v. Gen. Motors Corp.*, 243 F.3d 441, 444 (8th Cir. 2001) (holding that testimony of an accident reconstructionist based primarily upon impressions of photographs was based on speculative assumptions and inadmissible and stating that speculative expert testimony is not competent evidence and “contributes nothing to a legally sufficient evidentiary basis”); *Ingram v. Deere*, 288 S.W.3d 886, 903 (Tex. 2009) (holding that testimony of a defense expert, who admitted “that his statements were unsupported and mere assumptions,” constituted speculation insufficient to establish that plaintiff contributed valuable property to clinic). And because it is no evidence, a speculation objection can be raised for the first time after the verdict. *Marin Real Estate Partners, L.P. v. Vogt*, 373 S.W.3d 57, 78 (Tex. App.—San Antonio 2011, no pet.) (stating that an objection that expert testimony was “pure speculation . . . is the type of challenge for which an objection is not required because the court need look no further than the face of the record to determine the reliability of the expert’s opinion”); *Merrell v. Wal-Mart Stores, Inc.*, 276 S.W.3d 117, 127 (Tex. App.—Texarkana 2008), *rev’d on other grounds*, 313 S.W.3d 837 (noting that party may contend that expert’s opinion is conclusory or speculative for first time after verdict because such evidence is incompetent).

Even when an expert’s testimony has elements of speculation, it may nonetheless be considered admissible. *Custom Transit, L.P.*, 375 S.W.3d at 353 (holding testimony “was not unduly speculative”). In some circumstances, “[a] certain amount of speculation is necessary, an even greater amount is permissible (and goes to the weight of the testimony), but too much is fatal to admission.” *Grp. Health Plan, Inc. v. Philip Morris USA, Inc.*, 344 F.3d 753, 760 (8th Cir. 2003) (affirming exclusion of expert testimony as speculative); *see also Weitz Co. v. MH Washington*, 631 F.3d 510, 528 (8th Cir. 2011) (“Expert opinion necessarily involves some speculation.”). For example, “all appraisal opinion is at best something of a speculation” but nevertheless may be admissible. *Williams v. State*, 406 S.W.3d 273, 284 (Tex. App.—San Antonio 2013, pet. denied) (quoting *LaSalle Pipeline, LP v. Donnell Lands, L.P.*, 336 S.W.3d 306, 315 (Tex. App.—San Antonio 2010, pet. denied)).

349. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 583 (Tex. 2006).

350. *Id.*

time postverdict.<sup>351</sup> Thus, despite the Texas Supreme Court's statement in *Coastal Transport* that challenges to an expert's methodology must be preserved by an objection to the admission of the expert evidence, it may be possible to raise such a challenge in the absence of an objection if the challenging party can demonstrate, on the face of the record,<sup>352</sup> that the expert's flawed methodology or predicate renders his conclusion speculative or conclusory. *Cooper Tire* also confirms *Havner's* rule that the *Robinson* factors may be raised for the first time in a postverdict legal-sufficiency challenge.<sup>353</sup>

*d. Nonprobative Predicates.*<sup>354</sup> In *City of San Antonio v. Pollock*,<sup>355</sup> the Court defined "conclusory" expert evidence to include not only when "no basis for the opinion is offered" but also when "the basis offered provides no support" for the opinion.<sup>356</sup> The Court formulated the test this way:

When a scientific opinion is admitted in evidence without objection, it may be considered probative evidence even if the basis for the opinion is unreliable. But if no basis for the opinion is offered, or the basis offered provides no support, the opinion is merely a conclusory statement and cannot be considered probative evidence, regardless of whether there is no objection.<sup>357</sup>

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351. *Cooper Tire*, 204 S.W.3d at 799; *Whirlpool Corp. v. Camacho*, 298 S.W.3d 634 (Tex. 2009).

352. The "face of the record" appears to be a critical distinction. While *Coastal Transport* declares that challenges to the expert's "methodology, technique or foundational data" must be timely raised, it made an exception "when the challenge is restricted to the face of the record." *Coastal Transp.*, 136 S.W.3d at 233. The presence or absence of many of the *Daubert* factors is often included in the record; for example, an expert may readily concede on cross-examination that he did not conduct any testing and lacks supporting literature. Similarly, predicate data is often part of the record and therefore may be reviewed postverdict. See *infra* notes 404–05 and accompanying text for a discussion of this distinction. The Texas Supreme Court cases discussing when expert objections can be reviewed on the face of the record are discussed below. See *infra* notes 404–34 and accompanying text.

353. *Cooper Tire*, 204 S.W.3d at 800–01; *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997) (stating that while *Robinson* concerned admissibility, its "factors may be applied in a no evidence review of scientific evidence").

354. Predicate reliability is discussed in detail below. See *infra* Part III.B.

355. *City of San Antonio v. Pollock*, 284 S.W.3d 809 (Tex. 2009). *Pollock* is discussed in *supra* notes 322–35 and accompanying text.

356. *Pollock*, 284 S.W.3d at 818 ("But if no basis for the opinion is offered, or the basis offered provides no support, the opinion is merely a conclusory statement and cannot be considered probative evidence, regardless of whether there is no objection. '[A] claim will not stand or fall on the mere *ipse dixit* of a credentialed witness.' . . . [T]he City contends that there is no basis in the record for the experts' ultimate opinions, and therefore they cannot support the judgment. We examine each expert in turn and conclude that there was no evidence to support an award of personal injury damages on the Pollocks' theories of nuisance or negligence." (footnote omitted)).

357. *Id.*

The Court's most recent expert decision, *Houston Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, quoted and reaffirmed *Pollock's* definition of "conclusory," explaining that the rationale for this rule is that "the evidentiary value of expert testimony is derived from its basis, not from the mere fact that the expert has said it."<sup>358</sup>

The conclusory nature of the expert testimony in *Pollock* arises largely under the "analytical gap" test discussed above. But the *Pollock* Court's definition of conclusory, and particularly its rejection of Dr. Patel's opinion testimony, underscored that a "gap" can arise not just from an expert's failure to logically connect supporting data to his conclusion (a connective reliability issue<sup>359</sup>), but also from an expert's connection of his conclusion to data that simply does not support the conclusion (a predicative reliability issue<sup>360</sup>). Dr. Kraft's testimony fit squarely in the first category,<sup>361</sup> but Dr. Patel's testimony also fit into the latter. Dr. Patel's opinion essentially fell short in the same way that the expert opinions in *Havner* fell short: he cited studies and articles but they did not tend to prove a causal connection between the Pollocks' level of benzene exposure and birth defects. Thus, *Pollock* may be viewed as further eroding *Maritime Overseas's* objection requirement. In holding that an objection was necessary to preserve the expert opinion challenges in *Maritime Overseas*, the Court there distinguished *Havner* on the ground that the party opposing the expert testimony in *Havner* had timely objected to the testimony.<sup>362</sup> But *Pollock* may be read to suggest that *Havner* would have come out the same way even in the absence of an objection.

The year after *Pollock*, the Court issued two more opinions holding that expert opinion testimony on causation was conclusory because, while the experts explained the basis for their opinions, "the basis offered provide[d] no support"<sup>363</sup> for their conclusions.<sup>364</sup> Both of these cases were products liability

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358. *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*7 (Tex. Aug. 22, 2014).

359. *See infra* Part III.D.

360. *See infra* Part III.B.

361. *See infra* Part III.D. Dr. Kraft's testimony suffered from a connective reliability issue because, while evidence of high benzene concentrations in a nearby well could help support a conclusion about benzene levels on the Pollocks' property, Dr. Kraft failed to demonstrate how or whether it did so. *Pollock*, 284 S.W.3d at 818–19.

362. *Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 410–11 (Tex. 1998).

363. *Pollock*, 284 S.W.3d at 818.

364. *See Jelinek v. Casas*, 328 S.W.3d 526, 536 (Tex. 2010); *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010).

cases in which the expert's causation opinion was predicated on facts that were equally consistent with alternative theories of causation; the predicates thus failed to tend to prove the expert's causation theory was more likely than the alternative causation theories.

In the first of these, *Wal-Mart Stores, Inc. v. Merrell*,<sup>365</sup> the plaintiffs' expert theorized that a house fire was most likely caused by the explosion of a halogen bulb in a lamp purchased at Wal-Mart, which sent "burning glass shards onto" a nearby recliner, where the shards "smoldered for several hours" and then grew into a fire.<sup>366</sup> The Wal-Mart expert, on the other hand, concluded that "[t]he more likely cause of [the] fire was careless disposal of smoking materials."<sup>367</sup> Wal-Mart argued that the plaintiffs' expert testimony constituted no evidence of causation because it "lack[ed] factual substantiation," and the Texas Supreme Court agreed.<sup>368</sup> The Court noted that the plaintiffs' expert had ruled out smoking materials as the cause of the fire because there was no evidence of burnt cigarettes near the recliner, but there was "no evidence of charred or exploded glass" near the recliner either.<sup>369</sup> The Court held that, because the plaintiffs' expert failed to "explain or adequately disprove alternate theories of causation," his own theory was "speculative and conclusory."<sup>370</sup>

More damaging to the reliability of the plaintiffs' expert than his failure to discredit opposing causation theories was his failure to provide support for his own "specific causation theory."<sup>371</sup> Although he had demonstrated generally the dangers of halogen lamps and the possibility that a fire could be ignited by the explosion of a halogen bulb, the Court concluded that "[e]vidence that halogen lamps can cause fires generally . . . does not establish that the lamp in question caused *this* fire."<sup>372</sup> The

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365. *Merrell*, 313 S.W.3d at 838–40.

366. *Id.*

367. *Id.* (internal quotation marks omitted). The evidence showed that the living room where the fire occurred contained "candles, melted wax, an ashtray, and a 'blunt'" and there was other "smoking paraphernalia throughout the house, including ashtrays, a bong, and marijuana cigarette butts." *Id.* (footnotes omitted). Additionally, the postmortem toxicology reports established that the decedents had been smoking on the night of the fire. *Id.*

368. *Id.* at 839–40.

369. *Id.* at 839.

370. *Id.* at 840 (citing *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470 (Tex. 2005)) ("An expert's failure to explain or adequately disprove alternative theories of causation makes his or her own theory speculative and conclusory.").

371. *Id.*

372. *Id.*

Court thus concluded that there was no evidence of causation, and Wal-Mart's failure to object to the reliability of the expert testimony was not fatal.<sup>373</sup> The underlying defect in the plaintiffs' expert's testimony in *Merrell* was that the facts on which the expert based his causation conclusion (his predicate) were equally consistent with the alternative causation theories espoused by the opposing party's expert. This shows how a lack of predicative reliability can result in a lack of connective reliability—i.e., an analytical gap. An expert's efforts to “connect” her conclusion to a factual or scientific predicate cannot succeed when the predicate does not, in fact, logically support the expert's conclusion.

The Court applied the same principle in *Jelinek v. Casas*, a medical malpractice case in which the plaintiff asserted that the hospital's failure to administer antibiotics caused an infection.<sup>374</sup> The plaintiff's expert conceded that the circumstantial evidence supporting his causation opinion was “equally consistent” with two other theories of causation—neither of which could be attributed to the negligence of the hospital.<sup>375</sup> “[W]hen the facts support several possible conclusions, only some of which establish that the defendant's negligence caused the plaintiff's injury,” the Court stated, “the expert must explain to the factfinder why those conclusions are superior based on verifiable medical evidence, not simply the expert's opinion.”<sup>376</sup>

Applying the equal inference rule, the *Jelinek* Court explained that it was “equally plausible that [the patient] had [an anaerobic] infection or that she did not. [The expert] opined that she did, but he did not explain why that opinion was superior to the opposite view. Such evidence raises no more than a possibility of causation, which is insufficient.”<sup>377</sup> The expert also relied on evidence of a foul smell, a finding consistent with an anaerobic infection, to support his opinion that she suffered from an undetected anaerobic infection.<sup>378</sup> The hospital, however,

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373. *Id.*; *Merrell v. Wal-Mart Stores, Inc.*, 276 S.W.3d 117, 126 (Tex. App.—Texarkana 2008) (“Wal-Mart failed to make a *Robinson* challenge . . . in the trial court.”), *rev'd on other grounds*, 313 S.W.3d 837.

374. *Jelinek v. Casas*, 328 S.W.3d 526, 535 (Tex. 2010).

375. *Id.*

376. *Id.* Here again connective reliability and predicative reliability overlap. The explanation (or connection) the expert provided was inadequate because the predicate he tied his conclusions to did not tend to prove the correctness of his conclusions. This underscores our earlier statement that the reliability gates overlap and interrelate.

377. *Id.* at 537.

378. *Id.* at 538.

offered other explanations for the smell.<sup>379</sup> Because the evidence included “competing explanations for the smell” and only “meager” circumstantial evidence, the jury would be compelled to speculate and “could not reasonably infer an infection caused by the Hospital’s negligence.”<sup>380</sup> In short, in the same way that a jury may not reasonably infer one fact over the other from evidence that is equally consistent with either,<sup>381</sup> an expert may not draw one conclusion over the other from predicate data that is equally consistent with either.

The Court recently explained the rule as follows: “When the facts support several possible conclusions, only some of which support the expert’s conclusions, the expert must explain to the factfinder why those conclusions are superior based on verifiable evidence, not simply the expert’s opinion.”<sup>382</sup> The Court explained the rationale for rejecting conclusory expert testimony:

[T]he law requires experts to substantiate their opinions, and for good reasons. Experts who testify on behalf of parties to a lawsuit are subject to biases and potential abuses that are not always present outside the courtroom, and the courtroom itself may afford experts a veneer of credibility not present in other contexts. Legal sufficiency review requires courts to ensure that a jury that relies on an expert’s opinion has heard factual evidence that demonstrates that the opinion is not conclusory on its face. Here, [the expert’s] reliance on insufficient data and unsupported assumptions and the analytical gaps in her analysis render her opinion conclusory and without evidentiary value.<sup>383</sup>

*e. Predicates Without Evidentiary Support.*<sup>384</sup> Shortly after *Coastal Transport* another kind of “conclusory” opinion came into focus: opinions based on facts or assumptions that lack evidentiary support.<sup>385</sup> In 2005, the Court issued its magnum opus on the standards of evidentiary review: *City of Keller v.*

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379. *Id.*

380. *Id.*

381. *See, e.g., id.*; *City of Keller v. Wilson*, 168 S.W.3d 802, 813–14 (Tex. 2005).

382. *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*9 (Tex. Aug. 22, 2014).

383. *Id.* at \*15.

384. Predicative reliability is discussed in detail below. *See infra* Part III.B.

385. This aspect of legal-sufficiency review of expert evidence, like so many others, has its origins in *Havner*, where the Court held the expert opinion testimony was no evidence of causation not because the experts failed to identify and explain the basis for their opinions but because their causation opinions were based on epidemiological and animal studies that did not tend to prove a causal connection. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 724–30 (Tex. 1997).

*Wilson*.<sup>386</sup> Under *City of Keller*, if an expert's opinion is incompetent—for whatever reason—no objection is necessary.<sup>387</sup> The Court observed in *City of Keller* that contrary evidence may “render[] supporting evidence incompetent.”<sup>388</sup> “[I]ncompetent evidence [does not] support a judgment, even if admitted without objection.”<sup>389</sup> As an example of incompetent expert testimony, the Court noted that when “an expert's opinion is based on certain [factual] assumptions,” other evidence may demonstrate that those “assumptions were unfounded,” making the opinion unreliable.<sup>390</sup> Thus, an appellate court conducting a no-evidence review cannot consider only an expert's bare opinion, but must also consider contrary evidence showing it has no scientific basis.<sup>391</sup>

*f. Conclusion.* The Texas Supreme Court treats expert testimony as conclusory or speculative, such that no objection is necessary to preserve error, when (1) the expert fails to provide any explanation or predicate for her opinion; (2) the explanation the expert provides for her opinion suffers from too great an “analytical gap”; (3) the explanation is predicated on facts, data, or assumptions that do not actually support the expert's explanation or that are not supported by the evidence; (4) the expert's explanation is at such a general level that it offers no meaningful information to the jury to enable it to review the reliability of the opinion;<sup>392</sup> and (5) in the context of causation

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386. *City of Keller*, 168 S.W.3d 802.

387. *Id.* at 812.

388. *Id.* at 811.

389. *Id.* at 812. The Court offered numerous examples of how contrary evidence may render evidence that otherwise would create a fact issue incompetent and no evidence, and observed that looking at contrary evidence to determine if evidence is legally competent “frequently applies to expert testimony.” *Id.*

390. *Id.* at 813.

391. *Id.* Similarly, review of an expert's damage estimates cannot disregard the expert's admission on cross-examination that none can be verified. “[E]vidence that might be ‘some evidence’ when considered in isolation is nevertheless rendered ‘no evidence’ when contrary evidence shows it to be incompetent.” *Id.*

392. See *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*15 (Tex. Aug. 22, 2014) (“[T]he law requires experts to substantiate their opinions, and for good reasons. . . . Legal sufficiency review requires courts to ensure that a jury that relies on an expert's opinion has heard factual evidence that demonstrates that the opinion is not conclusory on its face.”); *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d 434, 440 (Tex. 2007) (detailing reasons why it is essential that the jury have access to facts and data underlying an expert's testimony in order “to accurately assess the testimony's worth”); *Anderson v. Snider*, 803 S.W.2d 54, 55 (Tex. 1991) (per curiam) (holding that expert affidavit that did not include “legal basis or reasoning” for expert's opinion was “wholly conclusory”); *Shenoy v. Jean*, No. 01-10-01116-CV, 2011 WL 6938538, at \*6 (Tex. App.—Houston [1st Dist.] Dec. 29, 2011, pet. denied) (mem. op.) (observing that the rule precluding conclusory testimony “is not a mere procedural hurdle.

opinions, the expert fails to rule out other plausible causes or explain why the theory of causation adopted by the expert is superior to other plausible theories of causation.<sup>393</sup>

Following Texas Supreme Court precedent, numerous intermediate appellate courts have held that an expert challenge raised for the first time after the jury verdict is not waived when the challenge is not directed to the reliability of the expert's methodology, but instead is part of a legal-sufficiency challenge that contends that the opinions were conclusory, speculative, or based on faulty assumptions.<sup>394</sup> Numerous other intermediate

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Juries—or in the case of expert reports, judges—are often confronted with conflicting expert testimony. One expert may testify that X caused the plaintiff's injuries while a different expert may testify that X did not cause the plaintiff's injuries. The factfinder typically lacks the expertise necessary to form an opinion without expert assistance—this is why expert testimony is admitted in the first place. It is the expert's explanation of 'how' and 'why' causation exists that allows the factfinder to weigh the credibility of the expert's opinion and, when expert opinions conflict, to decide which testimony to disregard").

A jury cannot evaluate the basis of an expert's opinion, for example, when the expert claims to rely on general scientific principles like the laws of physics or general principles of a field such as engineering. *See Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 905–06 (Tex. 2004) (holding that expert's incantation of "basic scientific and some engineering principles" and "reliance on the 'laws of physics', without more, is an insufficient explanation"). Similarly, a jury cannot evaluate the basis of the expert's opinion when an expert testifies that unspecific literature or unidentified experience supports the opinion. *See infra* notes 415, 420, 851–53, 866–69 and accompanying text. *But see infra* notes 430–32. In *Elizondo v. Krist*, the expert's opinion was unreliable despite his reliance on his experience because of the lack of an adequate explanation for how the experience led to his conclusion. *Elizondo v. Krist*, 415 S.W.3d 259, 265 (Tex. 2013).

393. *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (holding that, because the plaintiffs' expert failed to "explain or adequately disprove alternate theories of causation," his own theory was "speculative and conclusory."). This requirement originates in *Robinson* and was revisited recently in *Houston Unlimited*. *See Hous. Unlimited*, 2014 WL 4116810, at \*11 (stating that expert did not "attempt to rule out other plausible causes"). An expert cannot assume away "alternative possible causes as the actual cause." *Id.* at \*12. Instead, the expert must offer some "evidentiary basis" for excluding these causes. *Id.* The Texas Supreme Court has recognized an exception to the strict application of this rule in certain multi-defendant toxic tort cases. *See Bostic v. Ga.-Pac. Corp.*, 10-0775, 2014 WL 3797159, at \*11 (Tex. July 11, 2014).

394. *See, e.g., Twin City Fire Ins. Co. v. Vega-Garcia*, 223 S.W.3d 762, 771 (Tex. App.—Dallas 2007, pet. denied) (finding no objection is necessary to challenge the legal sufficiency of speculative testimony); *Gabriel v. Lovewell*, 164 S.W.3d 835, 846 (Tex. App.—Texarkana 2005, no pet.) (stating that speculative and conclusory expert testimony is incompetent and will not support a verdict); *Capital Metro. Transp. Auth. v. Cent. of Tenn. Ry. & Navigation Co.*, 114 S.W.3d 573, 578 (Tex. App.—Austin 2003, pet. denied) ("An attack on an expert opinion on the basis that it is premised on unsupported assumptions, speculation, and surmise does not constitute an attack on the reliability of the methodology of the expert. Therefore, a *Robinson/Havner* challenge is not required."); *Gen. Motors Corp. v. Harper*, 61 S.W.3d 118, 130 (Tex. App.—Eastland 2001, pet. denied) (holding that expert's testimony "was based on an assumption that was rebutted"); *Offshore Pipelines, Inc. v. Schooley*, 984 S.W.2d 654, 663 (Tex. App.—Houston [1st Dist.] 1998, no pet.) (noting that although "no timely objection was asserted at trial regarding

appellate court decisions have rejected contentions that an expert's opinion was conclusory.<sup>395</sup>

Thus, for purposes of error preservation, it is critical to distinguish between expert testimony that is unreliable in a manner that merely renders it inadmissible and expert testimony that is unreliable in a manner that renders it conclusory or speculative, such that it constitutes no evidence as a matter of law, regardless of whether the opposing party objected to its admission.

3. *Standards of Review.* Evidentiary and legal-sufficiency challenges are subject to different standards of review and procedural rules.<sup>396</sup> Generally, a trial court's decision to admit or exclude testimony, including expert testimony, is reviewed for an abuse of discretion, but legal-sufficiency challenges are reviewed *de novo*.<sup>397</sup> When the reliability of expert testimony is challenged

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the reliability" of expert testimony, "when on the face of the record the scientific evidence lacks probative value, no objection is needed to preserve a sufficiency of the evidence complainant"); *see also* *McIntyre v. Ramirez*, 109 S.W.3d 741, 749 (Tex. 2003) (stating that an affidavit by a Maryland physician that a physician was entitled to bill for his services for delivery of baby was a conclusion "with no supporting facts or rationale"); *Sparks v. Booth*, 232 S.W.3d 853, 863 (Tex. App.—Dallas 2007, no pet.); *Rizkallah v. Conner*, 952 S.W.2d 580, 587 (Tex. App.—Houston [1st Dist.] 1997, no writ) (stating conclusory opinions constitute "a defect in substance" in summary judgment evidence, and no objection is necessary to preserve error); *cf.* *KMG Kanal-Muller-Gruppe Deutschland GmbH & Co. KG v. Davis*, 175 S.W.3d 379, 390–91 (Tex. App.—Houston [1st Dist.] 2005, no pet.) (holding testimony on valuation of company based on projected lost profits by expert with doctorate in economics, who taught a university course in corporate evaluation and whose method of business valuation was not shown to have been rejected by any authority or opposing expert, was reliable under *Gammill* even though expert conceded that "corporate valuation necessarily entails a fundamental degree of speculation").

395. *See, e.g., Miller v. Churches*, 418 S.W.3d 749, 756 (Tex. App.—Dallas 2013, no pet.) (holding the expert opinion on neurological injuries resulting from natural progression of preexisting degenerative disease over time was not speculative or conclusory); *HealthTronics, Inc. v. Lisa Laser USA, Inc.*, 382 S.W.3d 567, 580–81 (Tex. App.—Austin 2012, no pet.) (holding that affidavit of attorney that other attorney's hours were reasonable and necessary, based on the information in other attorney's affidavit and affiant's personal knowledge, was not conclusory); *Custom Transit, L.P. v. Flatrolled Steel, Inc.* 375 S.W. 3d 337, 352 (Tex. App.—Houston [14th Dist.] 2012, pet. denied) (holding that the expert "sufficiently explained" basis for opinion); *Barzoukas v. Found. Design, Ltd.*, 363 S.W.3d 829, 840 (Tex. App.—Houston [14th Dist.] 2012, pet. denied) (rejecting contention that expert damage evidence regarding necessary foundation repairs was conclusory because the expert "adequately link[ed] the stated cost to the installation of additional piers to address differential movement attributed to interrelated foundation problems").

396. *See City of Keller*, 169 S.W.3d at 813–15.

397. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578 (Tex. 2006) (holding that abuse of discretion standard applies to admissibility determination); *FFE Transp. Servs., Inc. v. Fulgham*, 154 S.W.3d 84, 89–90 (Tex. 2004) (holding that question of whether expert testimony is necessary is reviewed under *de novo* rather than abuse of discretion because, as one party argued, it was not a question of admissibility but, rather, a question

in a legal-sufficiency review, however, the applicable standard of review is less clear because the appellate court may be performing the same type of analysis it would apply in a challenge to the admissibility of the expert evidence.

The Texas Supreme Court's opinion in *Whirlpool Corp. v. Camacho*<sup>398</sup> may be read as adopting the de-novo standard of review for legal-sufficiency challenges even when the challenge is based on the reliability of expert testimony, an issue that could have been raised in a challenge to the admissibility of the evidence.<sup>399</sup> While the *Whirlpool* Court stated both the abuse-of-discretion standard of review for admissibility challenges and the de-novo standard of review for "no evidence" challenges, the case was decided under the "no evidence" review, and thus presumptively under its less deferential standard of review.<sup>400</sup>

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of "what legal weight should be given to the non-expert evidence in the record"); *Bishop v. Miller*, 412 S.W.3d 758, 777 (Tex. App.—Houston [14th Dist.] 2013, no pet.) ("Appellate courts generally review challenges to the admission of expert testimony under an abuse of discretion standard, but when a trial court admits expert testimony that is challenged on appeal as constituting 'no evidence,' we review the reliability of the expert testimony using a de novo standard of review.").

398. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631 (Tex. 2009).

399. *Id.* at 637–38. *Whirlpool* argued that the court of appeals erred by "applying an abuse of discretion rather than a 'de novo-like' review" in analyzing *Whirlpool's* challenge to the legal sufficiency of the plaintiffs' only causation evidence: the testimony of an expert. *Id.* Without explicitly stating that the applicable standard of review is "de novo," the Texas Supreme Court stated:

Generally, rulings on objections as to admissibility of evidence, including whether expert testimony is reliable, are reviewed for abuse of discretion. But a party may assert on appeal that unreliable scientific evidence or expert testimony is not only inadmissible, but also that its unreliability makes it legally insufficient to support a verdict.

Unlike review of a trial court's ruling as to admissibility of evidence where the ruling is reviewed for abuse of discretion, in a no-evidence review we independently consider whether the evidence at trial would enable reasonable and fair-minded jurors to reach the verdict.

*Id.* at 638 (citations omitted). In performing its legal-sufficiency review, the Court made no mention of discretion in, or deference to, the trial court. *Id.*

400. *Id.* at 638. Before *Whirlpool*, the Amarillo, Fort Worth, and Texarkana Courts of Appeals had applied "an almost de novo-like review" when a no-evidence challenge is combined with a challenge to the reliability of expert testimony. *See, e.g.,* *Gross v. Burt*, 149 S.W.3d 213, 237 (Tex. App.—Fort Worth 2004, pet. denied); *Couch v. Simmons*, 108 S.W.3d 338, 342 (Tex. App.—Amarillo 2003, no pet.); *Austin v. Kerr-McGee Ref. Corp.*, 25 S.W.3d 280, 285 (Tex. App.—Texarkana 2000, no pet.). Other courts of appeals had applied a pure de-novo standard. *See, e.g.,* *Thomas v. Uzoka*, 290 S.W.3d 437, 447 (Tex. App.—Houston [14th Dist.] 2009, no pet.); *Walker v. Thomasson Lumber Co.*, 203 S.W.3d 470, 475 (Tex. App.—Houston [14th Dist.] 2006, no pet.) ("When a trial court admits expert testimony and on appeal that testimony is challenged as constituting no evidence, an appellate court considers whether the expert testimony is reliable under a *de novo* standard of review."); *Goodyear Tire & Rubber Co. v. Rios*, 143 S.W.3d 107, 113 (Tex. App.—San Antonio 2004, pet. denied) ("Where the trial court has admitted expert testimony and, on appeal, the appellant challenges the expert testimony as constituting 'no evidence,' we consider whether the expert testimony is reliable under a de novo

Ultimately, in a legal-sufficiency review of expert evidence, whether the standard of review is labeled “de novo” or “abuse of discretion” may be a matter of semantics. A legal-sufficiency review considers only questions of law—whether there is a complete absence or no more than a scintilla of legally competent evidence to support a vital fact or whether the evidence conclusively establishes the opposite of a vital fact<sup>401</sup>—and questions of law are reviewed de novo even under an abuse-of-discretion standard.<sup>402</sup>

*4. Developing a Record.* While Texas courts recognize that a party proffering expert evidence has the burden of establishing the reliability of the evidence, they have reached different conclusions about the parameters of that burden. In the context of an expert’s predicative materials,<sup>403</sup> Texas courts disagree about when and to what extent a proffering party must include the expert’s predicative materials in the record, when and what objections are necessary to preserve a challenge, and how to handle predicative material that is otherwise inadmissible. These issues are complicated by differences in the types of evidence on which an expert may rely and in the types of reliability challenges that may be raised in Texas, where reliability attacks can come in the form of before-the-fact challenges to the admissibility of the evidence or after-the-fact challenges to the legal sufficiency of the evidence to support a jury verdict.

Whether a challenge to expert evidence will fail or succeed frequently depends on the nature of the complaint, what is in the record, what is not in the record, and who bears the burden of creating the record. This is particularly true in a legal-sufficiency challenge, which, as discussed above, is limited to the “face of the record.”<sup>404</sup> The Court’s “face of the record” reviews are sometimes

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standard of review.”). Since *Whirlpool*, courts of appeals have been careful to quote or carefully follow its standard-of-review language; they generally have not expressly stated that the applicable standard of review is “de novo,” though they have sometimes cited to pre-*Whirlpool* cases so stating. *See, e.g.*, *Vega v. Fulcrum Energy, LLC*, 415 S.W.3d 481, 489–90 (Tex. App.—Houston [1st Dist.] 2013, pet. filed); *Williams v. State*, 406 S.W.3d 273, 282 n.3 (Tex. App.—San Antonio 2013, pet. denied); *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 143 (Tex. App.—Houston [14th Dist.] 2012, pet. filed); *Cent. Appraisal Dist. of Taylor Cnty. v. W. AH 406, Ltd.*, 372 S.W.3d 672, 688 (Tex. App.—Eastland 2012, pet. denied); *Methodist Hosp. v. German*, 369 S.W.3d 333, 339 (Tex. App.—Houston [1st Dist.] 2011, pet. denied); *U.S. Renal Care, Inc. v. Jaafar*, 345 S.W.3d 600, 606 (Tex. App.—San Antonio 2011, pet. denied).

401. *See Whirlpool*, 298 S.W.3d at 639 (citing *City of Keller*, 168 S.W.3d at 827).

402. *See, e.g.*, *Stockton v. Offenbach*, 336 S.W.3d 610, 615 (Tex. 2011) (“Under an abuse of discretion standard, the appellate court defers to the trial court’s factual determinations if they are supported by evidence, but reviews the trial court’s legal determinations de novo.”); *Whirlpool*, 298 S.W.3d at 638.

403. For a discussion of predicate materials, see *infra* Part III.B.

404. *See supra* notes 265, 268–69, 290, 352 and accompanying text.

based on the content of the expert's predicative facts, data, or studies.<sup>405</sup> This raises questions about when predicative material must be put in the record and who bears the burden of creating that record. Both the Federal and Texas Rules of Evidence expressly permit an expert to testify as to his opinion and give his reasons for the opinion without first disclosing the underlying facts or data on which the opinion is based.<sup>406</sup> And both rules note that the expert may nevertheless be required to disclose the underlying facts or data on cross-examination.<sup>407</sup> The Texas Rule expressly contemplates that the expert may be required to disclose underlying material on direct examination.<sup>408</sup>

The Texas Supreme Court held that the expert testimony in *Pollock* was conclusory by examining the predicative studies the expert relied on to determine whether they provided any support for the expert's causation opinion.<sup>409</sup> It is not clear what the Court would have done if the studies identified by the expert as supporting his conclusion had not been in the record, although it seems unlikely that the absence of predicative studies in the record would convert an expert opinion from "no evidence" into "some evidence."<sup>410</sup> But in *Arkoma Basin*,<sup>411</sup> in addition to

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405. In *Pollock*, for example, the Court rejected expert testimony that exposure to benzene had caused plaintiffs' daughter, Sarah, to develop leukemia *in utero*. *City of San Antonio v. Pollock*, 284 S.W.3d 809, 815–16 (Tex. 2009). The defendant did not contest that exposure to benzene could cause leukemia; only specific causation—whether benzene exposure had actually caused Sarah's leukemia—was challenged. *Id.* at 818; *see also infra* notes 604–07 and accompanying text (discussing general and specific causation). The Court reviewed the studies relied on by the plaintiffs' expert, observing that the studies recognized that the causal connection between benzene and chromosomal aberrations was "clear[ly] dose dependent" and none of the studies showed chromosomal aberrations resulting from benzene exposure of "less than 10 ppm—more than 60 times" Sarah's level of exposure. *Pollock*, 284 S.W.3d at 819 (footnotes omitted). The Court thus concluded that the studies relied on by the expert did not support his conclusion that Sarah's low-level benzene exposure caused her chromosomal aberrations. *Id.* Under the *Pollock* Court's earlier preservation-of-error analysis, then, the expert's basis did "not, on its face, support the opinion." *Id.* at 817.

406. FED. R. EVID. 705; TEX. R. EVID. 705(a).

407. FED. R. EVID. 705; TEX. R. EVID. 705(a).

408. TEX. R. EVID. 705(a).

409. *Pollock*, 284 S.W.3d at 818–20; *see also supra* note 405 and accompanying text.

410. The Texas Supreme Court likely would have treated the defendant's no-evidence challenge as the other kind of "on the face of the record" review—failure to offer any basis for the opinion. *See Pollock*, 284 S.W.3d at 818. Otherwise, at least in the absence of an objection, a plaintiff's expert who puts no predicative materials into the record would be better off than one who put some predicative materials into the record, because the Court would be unable to review the materials to determine whether they actually supported the expert's conclusion. But only a year before *Pollock*, the Court said in *Arkoma Basin* that "experts are not required to introduce such foundational data at trial unless the opposing party or the court insists." *Arkoma Basin Exploration Co. v. FMF Assocs. 1990-A, Ltd.*, 249 S.W.3d 380, 389–90. At least to some degree, this statement conflicts with the implication that when an expert offers into evidence no foundational material to support

challenging the expert's methodology for determining the value of the plaintiffs' mineral interests, the defendant objected that the foundational data on which the expert relied was not in the record.<sup>412</sup> Specifically, the expert testified that he had run price projections to yield the prices he used to calculate damages, but neither the projections nor the underlying data used in the runs was in the record.<sup>413</sup> The Court held that the proponent of the evidence was not required to identify or put into the record the underlying data, stating that "experts are not required to introduce such foundational data at trial unless the opposing party or the court insists."<sup>414</sup>

Texas courts of appeals are split on whether a party must introduce, or at least put into the record, foundational data on which the party's expert relied. The Texarkana Court of Appeals stated in *Minnesota Mining & Manufacturing Co. v. Atterbury* that when a party's expert relies on a study, the party must "identify the study, get it admitted into evidence, and explain how the methodology of the study is scientifically reliable. An

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his or her opinion, the opinion is nonprobative and can be challenged even in the absence of an objection by the opposing party. See *Pollock*, 284 S.W.3d at 823–25 (Medina, J., dissenting) (discussing *Arkoma Basin* and arguing that the challenge to the plaintiff's expert testimony should have been treated as an attack on methodology that had to be raised by objection). Along these lines, it could be argued that an objection that the expert's testimony is conclusory—which was the objection made in *Pollock*—notifies the opposing party and trial court under Rule 705(a) that the party is "insisting" on the underlying evidence being presented. Under this interpretation, a party challenging expert testimony that the expert states is supported by data not part of the record should object that the opinion is conclusory (thereby arguably invoking Rule 705(a)'s provision that a party may insist on the underlying data); to do so may cause the opinion to be treated as having no basis under *Pollock* rather than having a basis that is not in the record under *Arkoma Basin*.

Alternatively, one could argue that the identification of studies that are not in the record provides "some explanation" of the basis of the opinion. If the plaintiff in *Pollock* had merely recited the studies but the studies had not been made part of the trial record, would it have prevailed under the reasoning of *Arkoma Basin*? Justice Brister, the author of *Arkoma Basin*, while sitting on the Fourteenth Court of Appeals, once ordered the parties in a case involving the benzene scientific issues at issue in *Pollock* to supplement the record on appeal with literature relied on by the experts even though it was not part of the trial record. See *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 183 (Tex. App.—Houston [14th Dist.] 2003, pet. denied). *Pollock* also suggests that an objecting party should probably consider putting any studies relied upon by the expert in the record if the studies clearly do not support the expert's opinion. If the studies' significance are debatable, the party faces the more difficult question of whether it is better to have the studies omitted from the record, and to argue that under Texas law the absence of the studies makes the opinion *ipse dixit* and without any factual basis.

411. *Arkoma Basin*, 249 S.W.3d at 380. See *supra* note 290 and accompanying text (discussing *Arkoma Basin*).

412. *Arkoma Basin*, 249 S.W.3d at 389.

413. *Id.*

414. *Id.* at 389–90 (citing TEX. R. EVID. 705(a)).

error in any of the preceding steps will likely result in the study not being considered by a reviewing court.”<sup>415</sup>

The Waco Court of Appeals reached a similar holding in *Schronk v. Laerdal Medical Corp.*, in which the husband and son of a woman who died of cardiac failure alleged that her death was caused by a defective automatic external defibrillator (AED) manufactured by one of the defendants.<sup>416</sup> In reaching his conclusion, the plaintiffs’ causation expert relied extensively on statistical data relating to success rates for cardiopulmonary resuscitation in combination with electronic defibrillation.<sup>417</sup> The court of appeals noted the sources of the data were not included in the expert’s report “for purposes of corroboration.”<sup>418</sup> “Without this information,” the court stated, “a reviewing court cannot accurately assess the reliability of [the expert’s] theories” and is instead “left to simply take [the expert’s] word for the theories espoused in his testimony and report—something we cannot do.”<sup>419</sup>

In rejecting expert testimony that lacked an adequate predicate in *Brookshire Bros., Inc. v. Smith*, the First Court of Appeals in Houston gave little credence to the expert’s reliance on unspecified “other peer review articles,” looking for support for the expert’s conclusion only in the one article specifically

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415. *Minn. Mining & Mfg. Co. v. Atterbury*, 978 S.W.2d 183, 198 (Tex. App.—Texarkana 1998, pet. denied) (citation omitted); *see also Mitchell v. Gencorp Inc.*, 165 F.3d 778, 783 (10th Cir. 1999) (observing that a “scientist would [not] attach weight to a study that he did not carefully examine and consider;” stating that because the expert only reviewed a summary of the study, not the study itself, and did not produce the study to the court, it was not an adequate foundation for his testimony, and noting that only by examining a study can an expert review its methodology, assumptions, and data); *Frias v. Atlantic Richfield Co.*, 104 S.W.3d 925, 929–30 (Tex. App.—Houston [14th Dist.] 2003, no pet.) (holding that plaintiff’s expert did not support general causation because his affidavit referred to unspecified studies, did not indicate whether the studies had a certain time period for the exposure, did not address the confidence level of the studies, and did not attach the studies); *Green v. State*, 55 S.W.3d 633, 640 (Tex. App.—Tyler 2001, pet. ref’d) (holding that trial court properly struck an expert’s opinion when the expert did not identify literature that supported his opinion); *Forte v. State*, 935 S.W.2d 172, 177 (Tex. App.—Fort Worth 1996, pet. ref’d) (noting that although an expert claimed he relied upon a “very large body of literature,” he only mentioned one other purported expert in the field and failed to produce any of the literature upon which he allegedly relied (internal quotation marks omitted)).

416. *Schronk v. Laerdal Med. Corp.*, No. 10-12-00118-CV, 2013 WL 6570907, at \*1 (Tex. App.—Waco Dec. 12, 2013, pet. denied).

417. *Id.* at \*5.

418. *Id.* at \*6 (citing *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 556 (Tex. 1995), for the proposition that “an expert scientific opinion must be grounded, at the very least, on some demonstrable underlying scientific data or logical inferences therefrom”).

419. *Id.*

mentioned by the expert.<sup>420</sup> While *Schronk* involved a challenge to the trial court's decision to exclude expert testimony and to grant a summary judgment,<sup>421</sup> both *Minnesota Mining* and *Brookshire Bros.* involved a challenge to the legal sufficiency of the causation evidence to support the jury verdict.<sup>422</sup> All three, however, suggest that the proffering party bears the burden of including in the record articles relied on by the expert.

At least one Texas court of appeals has indicated that, while expert opinion testimony is *admissible* under the Rules of Evidence "without prior disclosure of the underlying facts or data,"<sup>423</sup> such testimony is not *competent* in the absence of the underlying facts or data because it is the basis of the expert's opinion, not the *ipse dixit* of the expert, that has evidentiary value.<sup>424</sup>

In contrast, in *BNSF Railway Co. v. Phillips*, the Fort Worth Court of Appeals rejected the defendant's contention that, because none of the epidemiological studies on which the plaintiff's expert had relied were admitted into evidence, there was no basis on which to determine their reliability.<sup>425</sup> The court stated that the defendant failed to identify any authority requiring the supporting studies to "be admitted into evidence; it is the trial court who determines reliability, not the jury."<sup>426</sup> One justice dissented from the two-justice majority opinion in *BNSF*. The dissent stated, "To the extent that [the plaintiff's] experts relied upon epidemiological studies to prove" causation, "they made no effort to show that the studies demonstrated a doubling of the risk that was statistically significant at the 95% confidence

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420. *Brookshire Bros. v. Smith*, 176 S.W.3d 30, 39 (Tex. App.—Houston [1st Dist.] 2004, pet. denied) ("As to any 'other peer review articles,' the only other article to which Dr. Friedman referred during his testimony was an article published in the *American Review of Respiratory Disease*. This article . . . is unrelated to causation.").

421. *Schronk*, 2013 WL 6570907, at \*3.

422. *Minn. Mining & Mfg. Co. v. Atterbury*, 978 S.W.2d 183, 186 (Tex. App.—Texarkana 1998, pet. denied); *Brookshire Bros.*, 176 S.W.3d at 33. In *Brookshire Bros.*, the Houston court disposed of the case on no-evidence-of-causation grounds, though the defendant also challenged the admissibility of the plaintiff's expert testimony on causation. *Id.* at 33, 39.

423. TEX. R. EVID. 705(a).

424. *Paradigm Oil, Inc. v. Retamco Operating, Inc.*, 242 S.W.3d 67, 72–73, 75 (Tex. App.—San Antonio 2007, pet. denied) (holding that landman's damages testimony was conclusory when landman testified that he determined, but did not identify in court, which leases had additional exploration on them and "fit the formula" for plaintiff to have an overriding royalty interest, and which leases plaintiff was entitled to have a "back in" or reversionary working interest once the wells reached payout status, and failed to provide the court with any of his calculations).

425. *BNSF Ry. Co. v. Phillips*, 434 S.W.3d 675, 688–89 (Tex. App.—Fort Worth 2014, pet. filed).

426. *Id.*

level,” as required by *Havner*.<sup>427</sup> “In the absence of that evidence,” the dissenting justice concluded, “their opinions are unreliable and, legally, no evidence.”<sup>428</sup>

Similarly, in *Pink v. Goodyear Tire & Rubber Co.*, the Beaumont Court of Appeals reversed a summary judgment in favor of Goodyear after concluding that the plaintiff’s expert evidence was not conclusory despite the absence of predicative materials in the record, with one justice dissenting.<sup>429</sup> The plaintiff’s expert, an oncologist, concluded that exposure to benzene at Goodyear’s tire plant caused the plaintiff’s renal cell carcinoma based on the expert’s review of the plaintiff’s medical records, witness testimony asserting use of benzene at the plant, the deposition of another physician, and “scientific literature.”<sup>430</sup> The two-justice majority held that the oncologist’s affidavit was not conclusory, even though it did not disclose the specific scientific literature the oncologist consulted or disclose the contents of the relied-upon literature, because the affidavit “implicitly” asserted that the scientific literature review supported the oncologist’s conclusion.<sup>431</sup> Citing Texas Rule of Evidence 705(a), the court indicated that reliance on unspecified scientific literature was permissible under Rule 705(a) in part because the trial court had not entered any “ruling requiring disclosure of the scientific literature or benzene exposure evidence on which the treating oncologist relied.”<sup>432</sup> The chief

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427. *Id.* at 709 (Meier, J., dissenting).

428. *Id.* (citing *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997)). The majority had declined to apply precedent from toxic tort cases to the plaintiff in *BNSF Railway* because the plaintiff brought his claim under the Federal Employers Liability Act, which has a lower standard for establishing causation. *See id.* at 689 (majority opinion). The dissenting justice noted that the Texas Supreme Court stated in *Merck & Co., Inc. v. Garza* that “*Havner*’s requirements necessarily apply to all epidemiological evidence.” *Id.* at 709 (Meier, J., dissenting) (quoting *Merck & Co. v. Garza*, 347 S.W.3d 256, 264 (Tex. 2011)).

429. *Pink v. Goodyear Tire & Rubber Co.*, 324 S.W.3d 290, 297–98, 303 (Tex. App.—Beaumont 2010, pet. dismiss’d).

430. *Id.* at 296.

431. *Id.* at 297–98.

432. *Id.* at 297. The court also held that the lack of a *Robinson* hearing record and the failure to obtain an explicit ruling was fatal to the expert challenge on appeal. *Id.* at 301–02. A ruling sustaining the defendant’s reliability “objections to the causation opinion is not implicit” in the trial court’s order granting summary judgment and did not preserve error because the trial court could have granted summary judgment on two other grounds urged in the trial court—no duty and no breach of a duty. *Id.* at 300. The court was also troubled about attempting to rule on reliability without a record of the hearing because two different standards of review are implicated in an expert challenge in the summary judgment context: abuse of discretion for an evidentiary objection based on lack of reliability and legal sufficiency for the summary judgment. *Id.* If the abuse of discretion standard is applied to the evidentiary issue,

justice disagreed, concluding in his dissent that the oncologist's affidavit was conclusory and therefore, could not be considered probative evidence.<sup>433</sup> The dissent reasoned that, as in the Texas Supreme Court's opinion in *Borg-Warner Corp. v. Flores*, even if there was evidence that benzene exposure can cause renal cell carcinoma at some exposure level, the plaintiff had failed to present evidence of what that exposure level is and whether the plaintiff had that level of exposure.<sup>434</sup>

In the view of the Authors of this Article, *Schronk, Minnesota Mining*, and *Brookshire Bros.* are more consistent with Texas Supreme Court authority reviewing expert evidence than *Pink* and *BNSF*. It is worth noting that the Texas Supreme Court denied the petitions for review in *Schronk, Minnesota Mining*, and *Brookshire Bros.* The Supreme Court has not had an opportunity to review *Pink* or *BNSF*. After Goodyear filed a

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this approach would reduce the summary judgment appellate review standard to an abuse of discretion standard whenever case-determinative *Robinson* objections, coupled with a no-evidence motion for summary judgment, are considered implicitly sustained by the granting of summary judgment. Whether or not the trial court abused its discretion in sustaining the *Robinson* objections would be determinative on appeal of whether the summary judgment must be reversed or affirmed.

*Id.*

Another problem is that *Robinson* hearings can include live testimony but summary judgment hearings cannot. *Id.* at 301. The court stated:

Considered with notice and opportunity-to-be-heard principles, these differences require that the two proceedings be separate under the circumstances of this case, and that we not consider [the defendant's] reliability objections as implicitly sustained by the trial court. . . . By conducting a separate *Robinson* hearing before considering a no-evidence motion for summary judgment, the trial court applies the process applicable to each hearing, provides the parties notice and an opportunity to present the best available evidence, and provides the appellate court with a full record for review. That process is required here. . . . The process missing from this appellate record, and necessary in this case, is a *Robinson* hearing. If the trial court decides the affidavit must be stricken because of unreliable foundational data, methodology, or technique, or for some other reason, the trial court may then decide whether to grant the no-evidence summary judgment, or "order a continuance to permit affidavits to be obtained or depositions to be taken or discovery to be had or may make such other order as is just." Without an express ruling that the treating oncologist's causation opinion is unreliable, however, the treating oncologist's affidavit remains part of the summary judgment proof and provides some evidence to defeat the no-evidence motion for summary judgment on causation.

*Id.* at 301–03 (citations omitted).

433. *Id.* at 303 (McKeithen, C.J., dissenting) ("Benzene exposure may or may not be a known cause of renal cell carcinoma, but Dr. Kanojia's affidavit neither states that benzene exposure is a known cause of renal cell carcinoma nor explains how Dr. Kanojia's training and experience enable him to express an opinion regarding whether benzene causes renal cell carcinoma.").

434. *Id.* at 304 (citing *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 771–72 (Tex. 2007)).

petition for review in *Pink*, the Court requested a response to the petition for review and later full briefing on the merits.<sup>435</sup> But the parties settled the case and dismissed the appeal before full briefing was completed.<sup>436</sup> *BNSF* is pending before the Texas Supreme Court.<sup>437</sup>

Reading *Arkoma Basin* in concert with *Pollock*, we conclude that the Texas Supreme Court is likely to treat the burden of placing predicative expert materials into the record much like it treated the preservation of error issue. Challenges to the soundness or trustworthiness of predicative material—such as an argument that a medical study was the product of a flawed methodology—must be raised before the trial court admits the expert opinion based on that material.<sup>438</sup> But challenges to the probativeness of predicative material—such as an argument that a medical study does not support the expert’s causation opinion because the study did not find sufficient correlation to indicate causation—can be raised postverdict even if the expert’s opinion is admitted into evidence without objection. Because predicative materials for expert opinions must be *both* trustworthy (i.e., reliable) *and* probative (i.e., tending to make the expert’s conclusion more likely to be true), proffering parties should always try to create a record of the materials that support their experts’ opinions. If an expert’s opinion is admitted into evidence without objection and there is no challenge to the predicative materials on which the expert relied, it is our position that the court must take the predicative materials in the record at face value—i.e., presume them to be trustworthy.<sup>439</sup> But if the predicative materials in the record do not support the expert’s conclusions, the expert’s opinion will not stand up on review, regardless of whether an objection was made. If the predicative materials are not in the record at all, they cannot be reviewed to determine whether they actually support the expert’s opinions, even if the materials are presumed to be trustworthy.

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435. The history of activity in this case can be found on the Supreme Court of Texas’s website at <http://www.search.txcourts.gov/Case.aspx?cn=10-0880> (last visited Sept. 19, 2014).

436. *See id.*

437. *See* TEXAS COURTS ONLINE, <http://www.search.txcourts.gov/Case.aspx?cn=02-11-00250-CV> (last visited Sept. 19, 2014). The court of appeals issued its first opinion in this appeal in August 2013. *Id.* The defendant filed motions for rehearing and reconsideration en banc. *See id.* In May 2014, the panel withdrew that opinion and issued a new opinion reaching the same result on rehearing, thus mooted the motion for reconsideration en banc. *Id.*

438. “Predicative Soundness” is discussed in the section on “Predicative Reliability” below. *See infra* notes 541–49 and accompanying text.

439. “Predicative Probativeness” is discussed in the section on “Predicative Reliability” below. *See infra* notes 550–59 and accompanying text.

The proffering party thus likely bears the burden of creating a record to support expert testimony, regardless of whether an objection was made.<sup>440</sup> But if the probative value of the predicate is evident on the face of the expert's testimony, the absence of the predicative materials from the record will not be fatal. This approach is consistent with both opinions. In *Arkoma Basin*, because the Court treated the numbers on which the damages expert relied as trustworthy, the expert's damages testimony was not devoid of support.<sup>441</sup> The probativeness of those numbers was evident from the expert's calculations, which were in the record from the expert's testimony and exhibits.<sup>442</sup> Thus, the expert's opinion was reliable. But in *Pollock*, the expert's testimony on causation was devoid of support even if the studies on which he relied were trustworthy because the studies did not support (i.e., were not probative of) a causal connection. Thus, the expert's opinion was unreliable regardless of whether the studies were in the record.

Finally, if the connection between the predicative material and the expert's conclusions is not facially evident—a “connective reliability” issue, discussed in detail below<sup>443</sup>—the offering party probably bears the burden of creating a record to support the connection in order to establish that the expert's conclusion has evidentiary weight, even in the absence of an objection.

In discussing the development of the record to support expert testimony, we must consider one last procedural difference between a legal-sufficiency review and a review of the admission or exclusion of evidence. In the context of a legal-sufficiency review, the Texas Supreme Court has instructed courts to review the “entire record” in analyzing the reliability of expert testimony.<sup>444</sup> This means two things with respect to including predicative expert materials in the record. First, supportive materials included in the record will be considered by the court and thus may add to the expert's reliability; supportive materials not included in the record offer no value beyond that

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440. For example, the Court's statement in *Havner* that “to survive legal sufficiency review” on causation, “a claimant must do more than simply introduce into evidence epidemiological studies that show a substantially elevated risk,” implies that the claimant must at least introduce such studies into evidence. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 720 (Tex. 1997).

441. *Arkoma Basin Exploration Co., Inc. v. FMF Assocs. 1990-A, Ltd*, 249 S.W.3d 380, 389–90 (Tex. 2008).

442. *Id.* at 389.

443. *See infra* Part III.D.

444. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009) (“[A] no-evidence review encompasses the entire record, including contrary evidence tending to show the expert opinion is incompetent or unreliable.”).

afforded to the expert's ability to rely on the materials, if any.<sup>445</sup> And if supportive predicative reliability materials are not included in the record but the opposing party includes in the record predicative material favoring a contrary conclusion, the expert's opinion may be deemed unreliable. For instance, the Waco court in *Schronk* rejected the expert's conclusion that the failure of the AED caused the death in part because the statistical data the expert referenced (but did not include in his report) was contradicted by an American Heart Association report that was included in the record.<sup>446</sup> Thus, regardless of whether an offering party must ensure that an expert's predicative materials are included in the record as part of the burden to establish reliability, the offering party should do so as a practical matter.

In developing a record, parties must be cognizant of the distinction between exhibits and testimony offered at trial and exhibits and testimony offered at a pretrial *Daubert* hearing. In *Exxon Corp. v. Makofski*, the dissenting justice would have concluded that a party waived its challenge to the reliability of the predicate for the opposing party's expert's causation opinion by failing to obtain a record from the pretrial hearing on the motions to exclude the expert's testimony.<sup>447</sup> In an opinion written by former Texas Supreme Court Justice Brister, then sitting on the Fourteenth Court of Appeals, the court rejected the waiver argument, noting that "[f]ollowing this argument to its logical conclusion, every time a pretrial motion to strike expert testimony is denied without a reporter's record, we must presume *any* jury verdict thereafter is valid (no matter how scientifically unsound)."<sup>448</sup> The court stated that a record of the pretrial hearing would be necessary to review a challenge to the trial court's decision to admit the expert evidence, but it was not necessary to a challenge to the legal sufficiency of the evidence to support the jury verdict.<sup>449</sup>

One other issue is whether the opposing party might want to offer the predicate materials relied on by the opposing expert. An opposing party might consider offering (at least into the record for appellate purposes) portions of the expert's materials if the materials do not in fact support the opinion. For example, in

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445. Courts of appeals routinely consider the contents of supportive materials introduced into evidence or filed with the expert's opinion or with *Daubert*-related filings.

446. *Schronk v. Laerdal Med. Corp.*, No. 10-12-00118-CV, 2013 WL 6570907, at \*6 (Tex. App.—Waco Dec. 12, 2013, pet. denied).

447. *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 197 (Tex. App.—Houston [14th Dist.] 2003, pet. denied) (Seymore, J., dissenting).

448. *Id.* at 180 (majority opinion).

449. *Id.* at 181–82.

*Makofski*, the expert relied on articles that did not reach the conclusion cited by the expert.<sup>450</sup> On the other hand, if the party offering the testimony has the burden to offer the predicate materials, the party might not want to include them in the record if the study does not directly and clearly contradict the expert's opinion.

Finally, different considerations come into play when an expert's predicative material is of a kind that is generally inadmissible, such as hearsay.<sup>451</sup> Under both Federal and Texas Rules of Evidence, an expert may rely on facts or data that are not themselves admissible into evidence as long as they are the kinds of facts or data on which experts in the field would reasonably rely.<sup>452</sup> Likewise, both the Federal and Texas Rules provide that when the underlying material would otherwise be inadmissible, the material may not be admitted into evidence if its prejudicial effect outweighs its probative value as explanation or support for the expert's opinion.<sup>453</sup> The Texas Rule further provides that such material must be excluded "if the danger that [it] will be used for a purpose other than as explanation or support for the expert's opinion outweighs [its] value as explanation or support" and requires the trial court to give a limiting instruction if so requested.<sup>454</sup>

The Texas Rules recognize a partial exception to the general prohibition on hearsay for learned treatises relied on by an expert witness.<sup>455</sup> Rule 803(18) states,

To the extent called to the attention of an expert witness upon cross-examination or relied upon by the expert in direct examination, statements contained in published treatises, periodicals, or pamphlets on a subject of history, medicine, or other science or art established as a reliable authority by the testimony or admission of the witness or

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450. *Id.* at 183–84.

451. The materials offered by the expert are hearsay if they are offered for the truth of the matters asserted in the material. But a party could offer the materials for a nonhearsay basis: to demonstrate the predicate for the opinion. In that situation, they are offered only to show what the expert relied on, not to prove the truth of the matters asserted. Thus, a trial judge might not admit the materials even for this limited purpose under Rules 403 and 705(d). TEX. R. EVID. 403, 705(d).

452. FED. R. EVID. 703; TEX. R. EVID. 703.

453. FED. R. EVID. 703; TEX. R. EVID. 705(d). While the Texas Rule requires "exclusion" of such evidence, the Federal Rule only prohibits disclosure of such evidence to the jury. FED. R. EVID. 703; TEX. R. EVID. 705(d).

454. TEX. R. EVID. 705(d). The Federal Rules have been read to similarly require a limiting instruction. *See, e.g.*, *Pineda v. Ford Motor Co.*, 520 F.3d 237, 247 n.14 (3d Cir. 2008); *see also* FED. R. EVID. 105.

455. TEX. R. EVID. 803(18).

by other expert testimony or by judicial notice. If admitted, the statements may be read into evidence but may not be received as exhibits.<sup>456</sup>

One Texas intermediate appellate court held the statements read into evidence pursuant to this Rule are afforded the same weight as live expert testimony and has considered them in reviewing reliability-based challenges to expert testimony despite their exclusion from the jury room.<sup>457</sup> Thus, proponents of expert opinions which rely on learned treatises should employ Rule 803's limited hearsay exception for learned treatises and have relevant portions read into evidence, even if the treatises cannot be treated as exhibits when the jury retires to deliberate.

Rule 803(18) highlights the distinction between admitting predicate materials and including statements from those materials in the record. That Rule prohibits the admission of learned treatises as an exhibit but permits an expert to read statements from them into the record. Practitioners who are concerned that offering extensive predicate material will detract from the merits of their presentation, but likewise are concerned that expert opinions may be deemed unreliable or conclusory in the absence of such materials, would be wise to include the key statements from those materials in the record before the conclusion of the expert's testimony.

5. *Commentary.* Courts in many jurisdictions have declined to require an adequate basis and explanation as a prerequisite to affording expert testimony evidentiary value, and even substantive complaints about the reliability of expert testimony cannot be raised for the first time in a legal-sufficiency challenge in most jurisdictions.<sup>458</sup> Permitting legal-sufficiency attacks

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456. *Id.*

457. *See, e.g.,* Mobil Oil Corp. v. Bailey, 187 S.W.3d 265, 280 (Tex. App.—Beaumont 2006, pet. denied) (“[E]vidence contained in a learned treatise is not inferior to live testimony by the author of the treatise or some other expert.” (quoting Loven v. State, 831 S.W.2d 387, 395 (Tex. App.—Amarillo 1992, no pet.))); *see also* Exxon Corp. v. Makofski, 116 S.W.3d 176, 183 (Tex. App.—Houston [14th Dist.] 2003, pet. denied) (“But while the rules of evidence withhold learned treatises from jurors, that does not mean they should be withheld entirely from the record. Without them, we are hard-pressed to conduct the kind of review *Havner* requires.”).

458. *See* Skydive Ariz., Inc. v. Quattrocchi, 673 F.3d 1105, 1113 (9th Cir. 2012) (“Failure to raise a *Daubert* challenge at trial causes a party to waive the right to raise objections to the substance of expert testimony post-trial.”); United States v. Gaskin, 364 F.3d 438, 460 n.8 (2d Cir. 2004) (holding that party could not complain on appeal that expert opinion lacked foundation because he stipulated to the admission of the opinion); United States v. Havvard, 260 F.3d 597, 601 (7th Cir. 2001) (rejecting argument that trial court erred in admitting conclusory expert testimony because “Rule 705 . . . allows experts to present naked opinions” and stating that “uncovering the basis for that opinion was a

based on the reliability of expert testimony, as Texas courts do, increases the burden on parties proffering expert testimony in several ways. First, it gives the opposing party a second bite at the apple. An opposing party who has waived some or all challenges to the admissibility of expert evidence may still be entitled to raise those challenges in a postverdict attack. With respect to reliability challenges the opposing party raised but did not prevail on at the *Daubert* hearing, the nonproffering party has an opportunity to further develop those challenges based on

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matter for cross-examination” (quoting *Mid-State Fertilizer Co. v. Exch. Nat’l Bank*, 877 F.2d 1333, 1339 (7th Cir.1989)); *Macsenti v. Becker*, 237 F.3d 1223, 1233–34 (10th Cir. 2001) (holding that defendant could not challenge the reliability and helpfulness of plaintiff’s expert testimony without having objected to the testimony when it was admitted at trial) *C.B. Fleet Co. v. SmithKline Beecham Consumer Healthcare, L.P.*, 131 F.3d 430, 437 (4th Cir. 1997) (rejecting party’s argument that it could challenge the sufficiency of expert testimony to support finding in the absence of an admissibility objection and stating that a *Daubert* review “cannot be done under the guise of a challenge to the substantive sufficiency of th[e] evidence”); *Cano v. Everest Minerals Corp.*, 362 F. Supp. 2d 814, 821 (W.D. Tex. 2005) (noting distinction between federal and Texas approaches when federal procedure governed admissibility of expert testimony but Texas state law governed substantive sufficiency of evidence review); *see also, e.g., Friedrich v. Fetterman & Assocs., P.A.*, 137 So. 3d 362, 366–67 (Fla. 2013) (reinstating trial court’s judgment in favor of defendant when plaintiff’s expert testified that defendant would have discovered defect in chair in reasonable inspection, even though expert testified that reasonable interval for inspection was every six months but failed to provide basis for concluding how long defect was present in chair such that jury could have concluded that defect would have existed at time of reasonable inspection); *Rosa v. Lawrence & Mem’l Hosp.*, 74 A.3d 534, 554, 556–57 (Conn. App. Ct. 2013) (holding that expert testimony was legally sufficient to support jury’s finding that defendant’s negligent provision of anesthesiological services caused plaintiff’s chronic foot pain when expert testified that he could not determine whether plaintiff’s nerve damage resulted from medical care or from plaintiff’s unrelated diabetes). *But see Stelwagon Mfg. Co. v. Tarmac Roofing Sys., Inc.*, 63 F.3d 1267, 1274–76 (3d Cir. 1995) (rejecting challenge to admissibility of expert evidence of damages but holding that expert testimony was not legally sufficient to support damages award because expert did not provide evidence that lost sales were caused by defendant’s price discrimination). When an expert does not opine directly on an issue, however, a party’s reliance on the expert’s testimony does not insulate the issue from legal-sufficiency attacks. *See Domingo ex rel. Domingo v. T.K.*, 289 F.3d 600, 607–08 (9th Cir. 2002) (holding that no evidence supported causation for plaintiff’s claim because “bits and pieces” of defense expert’s testimony were not sufficient when they were “[s]tray comments” taken out of context and experts did not testify to causation). The Eight Circuit has noted the legal insufficiency of speculative expert testimony when the testimony was improperly admitted. *See, e.g., Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039, 1057 (2000).

Courts outside of Texas have been more willing to hold that unreliable expert testimony is not legally sufficient to support a finding in the context of reviewing administrative decisions. *See City of Philadelphia v. Workers’ Comp. Appeal Bd. (Kriebel)*, 29 A.3d 762, 770 (Pa. 2011) (holding that expert testimony was legally insufficient to rebut statutory presumption that occupational disease was causally related to employment because it lacked an adequate factual foundation); *Eastwood v. Dep’t of Labor & Indus.*, 219 P.3d 711, 714, 717 (Wash. Ct. App. 2009) (holding that expert testimony was legally insufficient to support lower court’s finding of compensable aggravation in review of workers’ compensation claim denial).

what occurred at the *Daubert* hearing and at trial. Second, because a legal-sufficiency challenge takes place after the close of evidence, the proffering party can no longer respond to attacks with additional evidence to bolster perceived weaknesses in the expert's analysis.<sup>459</sup> Because of this, Texas's approach can permit disfavored litigation practices such as "laying behind the log," "ambush" techniques, and trial of cases on less than "the fullest knowledge of the facts and issues."<sup>460</sup> Third, as mentioned above, legal-sufficiency challenges garner the less deferential de-novo standard of review rather than the abuse-of-discretion standard applicable to admissibility decisions.<sup>461</sup>

Precluding legal-sufficiency challenges based on reliability, on the other hand, insulates expert evidence from an evidentiary review to which some other types of evidence are subjected. Specifically, courts in other jurisdictions presume that expert opinion evidence constitutes some evidence of the facts as to which the expert opines—otherwise, the trial court should not have admitted the testimony—without looking below the surface of the opinion. Other types of evidence generally do not enjoy the same presumption, even if admitted into evidence without objection. Nonexpert evidence may be legally insufficient to support a jury finding when, for example, (1) it does not support the factual finding under the circumstances of the case, even if it appears to support the finding on its face;<sup>462</sup> (2) it is equally consistent with the absence of the fact it is offered to prove;<sup>463</sup>

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459. See *Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 409 (Tex. 1998) ("Without requiring a timely objection to the reliability of the scientific evidence, the offering party is not given an opportunity to cure any defect that may exist, and will be subject to trial and appeal by ambush.").

460. See *City of San Antonio v. Pollock*, 284 S.W.3d 809, 816–17 (Tex. 2009) ("When a scientific opinion is not conclusory but the basis offered for it is unreliable, a party who objects may complain that the evidence is legally insufficient to support the judgment."); *Chapa v. Garcia*, 848 S.W.2d 667, 668 (Tex. 1992) (observing that the purpose of discovery is to afford parties "the fullest knowledge of the facts and issues prior to trial" (quoting *Axelsson, Inc. v. McIlhany*, 798 S.W.2d 550, 553 (Tex. 1990))).

461. See *supra* note 397 and accompanying text.

462. See, e.g., *Williams-Boldware v. Denton Cnty., Tex.*, 741 F.3d 635, 642 (5th Cir. 2014), *petition for cert. filed*, 82 U.S.L.W. 3724 (U.S. June 3, 2014) (No. 13-1450) (holding that evidence of single event of discriminatory conduct was legally insufficient to support finding of hostile work environment when conduct was reprimanded and there was no evidence of further misconduct); *Baker v. Dep't of Mental Health*, 408 S.W.3d 228, 238–39 (Mo. Ct. App. 2013) (holding evidence that two attorneys declined to take on plaintiff's case before she found representation was not legally sufficient evidence to support finding that there were limited qualified attorneys available to handle plaintiff's administrative case because the reasons the attorneys declined the case related to elements of case other than administrative issues).

463. See *Serv. Corp. Int'l v. Guerra*, 348 S.W.3d 221, 230 (Tex. 2011) ("Accordingly, the inferences were equal and the presence of the logo on the documents was legally insufficient to support a finding that Gaspard was employed by SCI International.").

(3) it tends to prove the existence of damages in some amount but cannot support the amount of damages found;<sup>464</sup> (4) it could create a question of fact if combined with other, additional evidence of the element for which it is offered, but it is not alone sufficient to create a question of fact;<sup>465</sup> or (5) the evidence is substantively defective.<sup>466</sup> There may be a well-founded justification for exempting expert evidence suffering these same flaws from evidentiary review, but courts in other jurisdictions generally have not articulated justifications or otherwise specifically addressed the issue. Immunizing expert opinion testimony from legal-sufficiency reviews that arise out of challenges to the predicate underlying the opinion is problematic because the reliability of the expert's predicate is the basis for admitting expert opinion testimony in the first place.<sup>467</sup> Lay opinion testimony, by contrast, is not admissible unless it satisfies the requirements of Rule 701; lay witnesses can testify *only* as to the predicate for the witness's opinions and conclusions—i.e., the facts of which the witness has personal knowledge.<sup>468</sup>

Professor Goode and his co-authors have criticized *Havner* and *Coastal Transport* as “mudd[ying] the distinction between admissibility and sufficiency.”<sup>469</sup> They suggest that the Texas Supreme Court's distinction between the two types of challenges “fails analytically, ignores the value of [the] timely-objection rule, and is inconsistent with Rule 705.”<sup>470</sup> More important, they argue, it ignores two benefits of the timely-objection rule: the rule deprives the trial and appellate courts of a fuller record that may be made in response to a trial objection and creates an

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464. See *Garcia v. Gomez*, 319 S.W.3d 638, 642–43 (Tex. 2010) (holding that there was no evidence of amount of damages found, but there was evidence that some damages were incurred).

465. See *T.O. Stanley Boot Co. v. Bank of El Paso*, 847 S.W.3d 218, 222 (Tex. 1992) (holding that evidence that promisor denied making promise may be considered in determining whether promisor did not intend to perform promise when promisor made promise, but denial of promise alone was no evidence of intent not to perform).

466. See *Hydroscience Techs., Inc. v. Hydroscience, Inc.*, 401 S.W.3d 783, 793 (Tex. App.—Dallas 2013, pet. denied) (“Substantive defects are never waived because the evidence is incompetent and cannot be considered under any circumstances.”).

467. See, e.g., FED. R. EVID. 701–06 (reliability of opinion testimony); TEX. R. EVID. 701–06 (reliability of opinion testimony).

468. See, e.g., FED. R. EVID. 601–15 (witness reliability), 701–06 (reliability of opinion testimony); TEX. R. EVID. 601–15 (witness reliability), 701–06 (reliability of opinion testimony).

469. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.1, at 7–8 (Supp. 2014).

470. *Id.* at 8 (footnote omitted). It fails analytically, according to them, because the distinction between the two types of reliability challenges “is inevitably going to prove difficult, if not impossible, to sustain.” *Id.*

unfairness.<sup>471</sup> According to Professor Goode and his co-authors, the proper approach on appeal when an expert opinion is unreliable but was not objected to in the trial court is not to reverse and render but to reverse and remand for a new trial.<sup>472</sup>

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471. *Id.* Professor Goode and his co-authors do not explain why a belated objection is proper for faulty assumptions. See *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499–500 (Tex. 1995) (holding expert’s testimony was no evidence when the “assumed facts var[ie]d materially from the actual, undisputed facts”). In private correspondence, Professor Goode has stated that he believes *Crye* is distinguishable.

The expert there said that his opinion that the defendant’s spray caused the plaintiff’s frostbite was based on two assumptions and that his opinion would be different if those assumptions were not true. The plaintiff then testified that those two assumptions were not true (and there was no evidence contravening the plaintiff’s testimony). In other words, on the face of the record, the expert’s testimony was “if X, the defendant’s spray caused the injury; if not X, the defendant’s spray did not cause the injury.” Since the uncontroverted record was that X did not exist, the expert’s testimony was actually that the defendant’s spray did not cause the injury. So it’s perfectly logical for a reviewing court to say there’s no evidence that the spray caused the injury—even if there had not been an objection to the expert’s testimony.

Letter from Steven Goode, Professor, Univ. of Tex. Sch. of Law, to Harvey Brown, Justice, First Court of Appeals (May 28, 2014) (on file with author).

While the objection may not be obvious when the testimony is admitted (because the evidence has not been admitted yet disproving the assumption), certainly a motion to strike at trial is available if the reason for requiring a trial objection is so a party may respond to the objection by presenting additional evidence.

472. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.1, at 19 (Supp. 2014) According to them, “[a] more logical approach would have been for the [Texas Supreme] Court [in *Pollock*] to have held the expert opinions inadmissible due to their unreliability. If inadmissible, they could not have been considered evidence of causation.” *Id.* They suggest that the proper analysis is found in *Moff v. State*, where the Court of Criminal Appeals held that a trial court objection is not required to preserve appellate review of the sufficiency of the evidence. *Id.* at 8 n.24.05; *Moff v. State*, 131 S.W.3d 485, 489 (Tex. Crim. App. 2004). If the appellant successfully complains that the trial court erred in admitting evidence, the error is reversible and requires a new trial. *Moff*, 131 S.W.3d at 489. The *Moff* Court explained that, although “a claim of trial court evidentiary error and a claim of insufficient evidence overlap,” they require separate analysis because “an appellate court must consider *all* evidence actually admitted at trial in its sufficiency review and give it whatever weight and probative value it could rationally convey to a jury.” *Id.* (footnote omitted). Thus, even if the evidence was improperly admitted, the evidence still must be considered in a sufficiency challenge. *Id.* at 489–90; see also *Powell v. State*, 194 S.W.3d 503, 507 (Tex. Crim. App. 2006) (“[A] reviewing court is permitted to consider all evidence in the trial-court record, whether admissible or inadmissible, when making a legal-sufficiency determination.”). Texas intermediate appellate courts have adopted a different rule for civil cases. See, e.g., *Walker v. Lampman*, No. 10-06-00096-CV, 2007 WL 2276195, at \*2 (Tex. App.—Waco Aug. 8, 2007, pet. denied) (mem. op.) (“[I]n civil cases, inadmissible evidence may not be considered in a sufficiency review.”); *N. Dall. Diagnostic Ctr. v. Dewberry*, 900 S.W.2d 90, 97 (Tex. App.—Dallas 1995, writ denied) (stating that it would not consider the only evidence of a specific fact because it was inadmissible); *Marshall v. Telecomms. Specialists, Inc.*, 806 S.W.2d 904, 907 (Tex. App.—Houston [1st Dist.] 1991, no writ) (refusing to consider inadmissible hearsay in determining sufficiency of evidence on appeal); *Cottle v. Knapper*, 571 S.W.2d 59, 62 (Tex. Civ. App.—Tyler 1978, no writ) (refusing to consider inadmissible testimony in determining sufficiency of evidence on appeal); *Texas Dep’t of Pub. Safety v. Nesmith*, 559 S.W.2d 443, 447 (Tex. Civ. App.—Corpus Christi 1977, no writ) (holding that incompetent evidence, although admitted at trial, should not be considered on appeal as having any probative value).

Professor Goode and his co-authors criticize *Whirlpool*<sup>473</sup> and *Pollock*<sup>474</sup> for similar reasons. They contend that these opinions “seem to conflict with Rule 705(a),”<sup>475</sup> which gives the proponent of expert testimony the discretion to offer the basis for an expert opinion during the direct examination “unless the court requires otherwise.”<sup>476</sup>

According to Professor Mueller, however, requiring an expert to provide a reliable basis for expert testimony is not inconsistent with Rule 705. Rule 705 “does not exempt expert testimony from the requirements of Rule 702 or permit decisions on admissibility to rest on credentials alone.”<sup>477</sup> It focuses “on *the manner of presenting* expert testimony to the factfinder, not on *any obligation to clear the admissibility hurdle*.”<sup>478</sup> With respect to

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Relying heavily on commentary by Professors Dix and Dawson, the *Moff* Court emphasized that the proper remedy is a new trial because the State may have put on other evidence if the trial court had properly excluded other evidence. *Moff*, 131 S.W.3d at 490. Professors Dix and Dawson explained:

This rule rests in large part upon what is perceived as the unfairness of barring further prosecution where the State has not had a fair opportunity to prove guilt.

A trial judge’s commission of trial error may lull the State into a false sense of security that may cause it to limit its presentation of evidence. Erroneous admission of hearsay evidence, for example, may cause the State to forego offering other evidence that would ultimately prove admissible.

*Id.* at 490 (quoting 43A GEORGE E. DIX & ROBERT O. DAWSON, TEXAS PRACTICE, CRIMINAL PRACTICE AND PROCEDURE § 43.531, at 742 (2d ed. 2001)). The Court concluded, “Both litigants and reviewing courts should be careful to distinguish claims of improperly admitted evidence (trial error) from legal insufficiency of all admitted evidence—even improperly admitted evidence.” *Id.*

473. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.1, at 7 (Supp. 2014) (stating that *Whirlpool* “undercut the abuse of discretion standard for review by erecting an independent standard for reviewing the reliability of expert testimony as part of a no-evidence review”). See *supra* notes 398–400 and accompanying text (discussing *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 637 (Tex. 2009)).

474. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.1, at 9 (Supp. 2014); see *supra* notes 322–26 and accompanying text (discussing *City of San Antonio v. Pollock*, 284 S.W.3d 809 (Tex. 2009)).

475. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 705.2, at 31 (Supp. 2014).

476. TEX. R. EVID. 705(a).

477. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:23, at 911.

478. *Id.* at 912. Professor Mueller contends that Rule 705 eliminates the need for a party to present the soundness of the expert’s opinion during direct examination. *Id.* at 910. The expert is only required to give a “shorthand-direct.” *Id.* at 908; see also BROWN & RONDON, *supra* note 35, at 732–33 (stating that under Rule 705(a) an expert may make an “abbreviated presentation” of an opinion without presenting any factual data and that the underlying data should only be required “when there is a special concern, such as the possibility that the opinion may be based on impermissible or unreliable data”). This Rule grants the proponent “more flexibility in presenting such testimony” and allows “the main point to be stated early.” 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:23, at 909. Thus,

Rule 705 in effect puts the burden on the opponent. The wisdom of this approach rests on the notion that the price of requiring the foundation to be laid first is simply too high, and obviously on the idea that the mechanism of cross is adequate to the task of exposing any flaws in the expert’s reasoning. . . . It is

having an opportunity to develop a full record, the U.S. Supreme Court has stated, “Since *Daubert*, . . . parties relying on expert evidence have had notice of the exacting standards of reliability such evidence must meet. It is implausible to suggest, post-*Daubert*, that parties will initially present less than their best expert evidence in the expectation of a second chance should their first try fail.”<sup>479</sup>

Certainly Professor Goode and his co-authors are correct that *Havner*, *Coastal Transport*, *Whirlpool*, and *Pollock* have changed the landscape of error preservation for expert challenges. And certainly there are good arguments as to the wisdom of this shift.

6. *Potential Procedural Solutions.* Unlike the rules governing the admissibility of expert evidence, the rules governing legal-sufficiency complaints were not designed for, and generally have not been specifically tailored to, the complexities of modern expert evidence. Legal-sufficiency complaints can be raised for the first time quite late in the trial proceedings—including after the judgment—and often are quite general. Thus, allowing no-evidence challenges to expert evidence can operate to deprive the proffering party of notice of the problem at a time when the proffering party might have been able to remedy it. When criticisms of expert evidence are raised and addressed in a *Daubert* hearing, for example, the proffering party is put on notice of the complaint and has an opportunity to put additional support for an expert’s opinions into the record, to elicit supplemental explanation from a testifying expert, or to demonstrate why the criticism is not well founded. When criticisms are raised for the first time after the close of the plaintiff’s evidence, the proffering party has limited, if any, means of taking such corrective actions.

Assuming Texas courts will continue to allow conclusory objections to be raised to expert testimony for the first time postverdict,<sup>480</sup> one possible procedural solution to mitigate this

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faith in the skill of trial counsel, the power of the cross, and the skepticism, common sense, and critical faculties of judges and juries, that underlie the conclusion that the exposure of weakness or fatal deficiencies in expert testimony may be left to the calling party’s opponent.

*Id.* § 7:22, at 906–07. Nevertheless, this path is “seldom taken.” *Id.* § 7:23, at 910.

479. *Weisgram v. Marley Co.*, 528 U.S. 440, 455 (2000) (citations omitted).

480. It is worth noting that this legal-sufficiency rule is not limited to expert testimony. *Natural Gas Pipeline Co. of Am. v. Justiss*, 397 S.W.3d 150, 156–57 (Tex. 2012) (observing that the Court held decades earlier that “the naked and unsupported opinion or conclusion of a witness does not constitute evidence of probative force and will not support a jury finding even when admitted without

rule's potential harshness in civil cases<sup>481</sup> would be to permit trial courts to grant a new trial and courts of appeals to remand for a new trial, when a defendant<sup>482</sup> prevails on a legal-sufficiency challenge based on defects in expert evidence not raised when, or before, the evidence was offered. This practice would be consistent with the rules of civil and appellate procedure authorizing new trials, which authorize trial courts to grant a new trial "for good cause"<sup>483</sup> and courts of appeals to remand for new trial when "the interest of justice" requires it.<sup>484</sup>

While a legal-sufficiency challenge does not have to be raised before evidence is admitted at trial, it does have to be raised in the trial court in order to be preserved for appeal—through a motion for instructed verdict, a motion for judgment notwithstanding the verdict (JNOV), an objection to the submission of the issue to the jury, a motion to disregard the jury's answer to a vital fact issue, or a motion for new trial.<sup>485</sup> If a defendant prevails on an expert-related, no-evidence challenge raised only in a motion for new trial, regardless of whether the defendant prevails in the trial court or on appeal, the remedy is a new trial, not a take-nothing judgment for the defendant.<sup>486</sup> But if a defendant prevails in the trial court on an expert-related, no-evidence challenge through one of the other four procedures, that defendant generally is entitled to a judgment in its favor on that claim. In the latter instance, the plaintiff could be permitted to file a motion for new trial attaching new evidence tending to cure the defect(s) in its expert evidence. Trial courts could be permitted to grant such motions if (1) the successful no-evidence challenge was based on one or more deficiencies in the expert evidence that the defendant had not raised when or before the

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objection" (quoting *Dall. Ry. & Terminal Co. v. Gossett*, 294 S.W.2d 377, 380–81 (Tex. 1956)).

481. The procedures suggested in this Article are limited to civil cases, given the scope of this Article.

482. We use the terms "plaintiff" and "defendant" here in accordance with the most common situation in which this issue arises, but we recognize that any party bearing the burden of proof on an issue could stand in the shoes of the party we identify here as a "plaintiff" and any opposing party could stand in the shoes of the party we identify as the "defendant."

483. See TEX. R. CIV. P. 320.

484. See TEX. R. APP. P. 43.3(b).

485. *Cecil v. Smith*, 804 S.W.2d 509, 510–11 (Tex. 1991).

486. *Werner v. Colwell*, 909 S.W.2d 866, 870 n.1 (Tex. 1995) (remanding for new trial rather than rendering judgment because, while there was no evidence to support the judgment, the complaining party had not requested rendition of judgment in the trial court); *Horrocks v. Tex. Dep't of Transp.*, 852 S.W.2d 498, 499 (Tex. 1993) (per curiam) (holding that court of appeals erred in rendering judgment on basis of no-evidence issue preserved only in motion for new trial).

evidence was offered; and (2) the plaintiff filed supplemental evidence sufficient to cure the newly raised deficiencies in its expert evidence.

Generally, trial courts could decide such motions under the existing procedures for motions for new trial, and courts of appeals could review trial courts' decisions under the same abuse of discretion standard generally applicable to motions for new trial,<sup>487</sup> except the "newly discovered evidence" standard would likely need to be more lenient. Currently, a party may seek a new trial on the basis of newly discovered evidence if the party demonstrates that "(1) the evidence has come to its knowledge since the trial, (2) its failure to discover the evidence sooner was not due to lack of diligence, (3) the evidence is not cumulative, and (4) the evidence is so material it would probably produce a different result if a new trial were granted."<sup>488</sup> A plaintiff could satisfy the third and fourth prongs by filing with the motion new evidence that supplemented or buttressed the plaintiff's expert evidence in a manner sufficient to convert it from "no evidence" to "some evidence," assuming the defendant was not entitled to judgment on some other, independent basis. But under this approach, the first and second requirements would need to be modified to permit the plaintiff to present evidence that was available to it at the time of trial but that was not necessary given the objections (or lack thereof) raised at that time. The first prong could be modified to permit not only evidence that has come to the plaintiff's knowledge since the trial, but also evidence responsive to objections to expert testimony that have come to the plaintiff's knowledge since the trial. The second prong could be satisfied not only by showing that the plaintiff was diligent in discovering evidence but also by showing that the plaintiff was diligent in responding to the defendant's objections to the expert evidence raised before or at trial. The motion for new trial in this context does more than give the trial court an opportunity to consider whether the plaintiff's supplemental evidence cures the deficiencies that render the expert evidence conclusory—it gives the plaintiff an opportunity to seek review of the trial court's decision on appeal and to do so on the basis of a record that contains all of the evidence the plaintiff could have submitted to the trial court if the defendant's complaints had been raised in a *Daubert* motion.

This approach addresses circumstances in which a trial court sustains a no-evidence attack, but not circumstances in which a

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487. *Waffle House, Inc. v. Williams*, 313 S.W.3d 796, 813 (Tex. 2010) (holding that a trial court's ruling on a motion for new trial is reviewed for an abuse of discretion).

488. *Id.*

trial court denies a no-evidence challenge but the court of appeals sustains it. In that instance, we suggest that the rules of appellate procedure could be amended to authorize a limited remand to the trial court when an appellate court holds, for the first time, that expert evidence is legally insufficient to support the judgment due to deficiencies in expert evidence that the defendant did not raise until after the close of the plaintiff's evidence.<sup>489</sup> The remand instructions to the trial court could afford the plaintiff a limited opportunity to move for new trial on the basis of new evidence tending to cure the deficiencies in its expert evidence. The trial court could then grant or deny the motion for new trial depending on whether the plaintiff had satisfied the four altered elements discussed above. If the trial court denied the motion for new trial, the trial court's new judgment would be appealable to the court of appeals, which would then review (under the abuse of discretion standard generally applicable to motions for new trial) only issues relating to the trial court's decision(s) on remand, before the whole case could be brought before the Texas Supreme Court in a petition for review. If the trial court granted the motion for new trial, such orders are now broadly subjected to mandamus review,<sup>490</sup> thus limiting the potential for a costly and time-consuming second trial when the trial court incorrectly determines that the new evidence provides a legally sufficient foundation for the expert's opinion.

One shortcoming of the remand approach is that if the plaintiff is permitted to buttress the reliability of its expert testimony for the first time on remand, it is advantaged by the appellate court's analysis of the issue—analysis the proffering party would not have in, say, a *Daubert* hearing. But the power to avoid providing that advantage to the proffering party rests in the hands of the opposing party, who may simply raise his objections before or when the expert evidence is offered at trial.

Finally, we note that Rule 703 permits an expert to rely on inadmissible facts or data in forming her opinion, as long as they are the kind of facts or data reasonably relied on by experts in the field,<sup>491</sup> and Rule 104(a) permits trial courts to consider

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489. *Cf.* *Humble Sand & Gravel, Inc. v. Gomez*, 146 S.W.3d 170, 195 (Tex. 2004) ("Because the parties have not focused on the issue we think is crucial, we conclude that the interests of justice would be best served by a new trial."); *Boyles v. Kerr*, 855 S.W.2d 593, 603 (Tex. 1993) ("We have broad discretion to remand for a new trial in the interest of justice where it appears that a party may have proceeded under the wrong legal theory.")

490. *E.g.*, *In re Whataburger Rests. LP*, 429 S.W.3d 597, 598 (Tex. 2014) (per curiam); *In re Toyota Motor Sales, U.S.A., Inc.*, 407 S.W.3d 746, 755–59 (Tex. 2013).

491. TEX. R. EVID. 703 ("The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by, reviewed by, or made

inadmissible evidence in ruling on expert challenges.<sup>492</sup> In light of these rules and the justifications for them, we suggest that parties proffering expert evidence should be permitted to put inadmissible evidence reasonably relied on by the expert before the court, even in the absence of an objection to admissibility. And courts should be permitted to consider inadmissible evidence reasonably relied on by experts when reviewing the legal sufficiency of expert evidence. Similarly, a party seeking a new trial under the standards discussed above should be permitted to file inadmissible evidence in support of the motion. In short, the rules should permit parties to offer for the trial and appellate courts' consideration all of the materials relied on by a testifying expert, as well as her report and deposition, for the limited purpose of showing the basis for the expert's opinion. When a party seeks relief from a court on the basis of such materials, the party should, of course, retain the burden of drawing the court's attention to the specific materials that support the relief requested.

We recognize that some Texas courts of appeals have indicated that inadmissible evidence generally may not be considered in a legal-sufficiency review.<sup>493</sup> But the Texas Supreme Court has not expressly adopted this rule, and whatever the validity of the rule outside the context of expert evidence, it cannot be strictly applied to legal-sufficiency challenges to the reliability of the basis for an expert's opinion—Rule 703 expressly permits an opinion to be based on inadmissible evidence by the rules of evidence.<sup>494</sup> The Texas

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known to the expert at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence.”). Rule 703 is discussed in detail in Part III.B. See *infra* notes 832–41 and accompanying text.

492. TEX. R. EVID. 104(a) (“Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b). In making its determination the court is not bound by the rules of evidence except those with respect to privileges.”).

493. See *supra* note 472.

494. TEX. R. EVID. 703. *Havner* makes clear that objected-to, inadmissible expert evidence cannot be considered in a legal-sufficiency review. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 711–12 (Tex. 1997) (“[T]o accept the expert’s opinion as some evidence ‘simply because he used the magic words’ would effectively remove the jurisdiction of the appellate courts to determine the legal sufficiency of the evidence in any case requiring expert testimony. . . . It could be argued that looking beyond the testimony to determine the reliability of scientific evidence is incompatible with our no evidence standard of review. If a reviewing court is to consider the evidence in the light most favorable to the verdict, the argument runs, a court should not look beyond the expert’s testimony to determine if it is reliable. But such an argument is too simplistic. It reduces the no evidence standard of review to a meaningless exercise of looking to see only what words appear in the transcript of the testimony, not whether there is in fact some evidence.”). But that does not mean that the inadmissible materials relied upon by the expert cannot be reviewed for a legal-sufficiency review. Indeed, *Havner* reviewed the articles cited by the plaintiffs’ experts. *Id.* at 724.

Supreme Court's legal-sufficiency reviews in expert-evidence cases seem to be in accord. The epidemiological and animal studies at issue in *Havner*, for example, would presumably have been inadmissible hearsay if offered independently of expert testimony.<sup>495</sup> Thus, under our proposal, those studies could be considered in a legal-sufficiency review.

Doubtless, these potential procedures add complications to the current procedure in civil cases, particularly the advent of a limited remand to consider a new trial. But they are attempts to develop a middle ground between the two extremes. There may be other, better, or equally workable solutions out there. We suggest only that a middle ground is worthy of consideration, in light of the unique nature of Texas's legal-sufficiency review of expert evidence. In our view, courts should explore—including through amendments to the rules of procedure—a less harsh means of dealing with such no-evidence challenges than automatically rendering judgment against a proffering party who was not put on notice of any issue by an objection and who perhaps could have, and would have, cured the objectionable aspect of its expert evidence if given the opportunity. An automatic remand for new trial, on the other hand, would create an unnecessary waste of judicial resources when the conclusory or speculative nature of expert evidence could not be cured. A procedural practice that affords proponents of expert testimony an opportunity to meet criticisms of the testimony after they are raised—including when the criticism is couched as a “no evidence” complaint and raised for the first time postverdict—is the most practical compromise between the two.

### *B. Predicative Reliability*<sup>496</sup>

Like juries and judges, scientists base their opinions on evidence. But juries and scientists draw from two decidedly different pools of evidence. The scientific approach invites consideration of all available information, including information that is incomplete, flawed, or of questionable reliability, with the scientist discerning what weight to afford each piece of information in light of any shortcomings.<sup>497</sup> A jury, by contrast,

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495. *Havner* and its legal-sufficiency analysis are discussed in detail at *supra* notes 252–71 and accompanying text. We discuss whether publications and other materials relied on by an expert are hearsay at *infra* note 451.

496. The 1999 article identifies this gate as “foundational reliability.” See Brown, *supra* note 1, at 811–12. Because courts have come to use the term “foundational” to refer collectively to the type of reliability discussed here as well as “methodological reliability” and “connective reliability,” we have renamed this gate “predicative reliability” for greater clarity.

497. See *infra* Part III.B.1.b (discussing this “weight of the evidence” approach).

may consider only the evidence admitted by the court—information that is narrowly tailored to the issues in the case, having been filtered by a myriad of rules and procedures designed to eliminate anything that is irrelevant, misleading, unreliable, or excessively prejudicial.<sup>498</sup>

One explanation for these inverse approaches can be found in the different roles of scientists and jurors. In the context of her own work, the scientist acts as both judge and jury, deciding what information to consider, what purposes to consider it for, how much weight to give it, and the ultimate import of all the information. This role reflects general perceptions of scientific research. The consumer of information in this context is an expert in the field who is well suited to evaluate the relative reliability and relevance of various pieces of information. The method of information processing used, the scientific method, is designed to neutralize passions and prejudices in the evaluation of information. And the peer-review process and the evolutionary nature of scientific research enable identification and correction of biases, design defects, or analytical flaws, on an ongoing basis.

In the courtroom, the judge acts as arbiter of what facts and opinions are appropriate for juror consumption, while jurors generally decide what weight to give the information and the ultimate import of conflicting information.<sup>499</sup> The juror's role reflects general perceptions of the courtroom. Jurors generally are not experts in the law, nor in the field about which an expert witness testifies. The law does not presume jurors are well suited to decipher the legally relevant from the legally irrelevant<sup>500</sup> or

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498. See, e.g., FED. R. EVID. 401–15 (relevance and prejudice); *id.* 601–15 (witness reliability); *id.* 701–06 (reliability of opinion testimony); *id.* 801–07 (hearsay); *id.* 901–1008 (reliability of nontestimonial evidence).

Legal scholars take different views as to the best unifying principle through which to view the rules of evidence. Some advocate a “jury control” principle, viewing the rules of evidence as designed to prevent juries from affording undue weight to particular kinds of evidence; others, a “best evidence” principle, viewing the rules as designed to prefer use of the best evidence available, permitting use of lesser evidence when the best evidence is unavailable; and still others, a “worst evidence” principle, viewing the rules as designed to prevent, deter, and expose perjury by witnesses. Compare Edward J. Imwinkelried, *The Worst Evidence Principle: The Best Hypothesis as to the Logical Structure of Evidence Law*, 46 U. MIAMI L. REV. 1069, 1072 (1992) (advocating the “worst evidence” principle and discussing the “jury control” principle), with Dale A. Nance, *The Best Evidence Principle*, 73 IOWA L. REV. 227, 293 (1988) (advocating the “best evidence” principle). The courts’ construction and application of Rule 702 could likewise be viewed through these paradigms. Fear of perjury by paid experts, in particular, seems to be a motivating factor in judicial review of expert evidence, if typically an unspoken one.

499. See, e.g., FED. R. EVID. 103.

500. FED. R. EVID. 401–02 (admissibility of relevant evidence).

the scientifically reliable from the scientifically unreliable,<sup>501</sup> nor does it presume they are dispassionate in their evaluation of information.<sup>502</sup> The informational predicate for a judgment generally reflects a snapshot in time—the legal community is not afforded an opportunity to reassess and modify the facts on which a judgment was based when new developments come to light.<sup>503</sup> And expert testimony in the courtroom is not subject to traditional peer review (although the predicative materials on which the expert relies may have been). The absence of these safeguards is exacerbated by the fact that experts providing scientific evidence in a courtroom are subject to greater bias provocations, particularly “adversarial bias,” than scientists in the field.<sup>504</sup>

Because of the differences in how evidence is used, a tension arises when an expert brings opinions based on such evidence to the courtroom. Under the old *Frye* test, this tension was resolved in deference to the judgment of the scientific community: an expert’s opinion was admissible if the theory underlying the

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501. FED. R. EVID. 702–03 (admissibility of expert witness testimony).

502. See, e.g., FED. R. EVID. 402 (requiring trial courts to filter out irrelevant evidence); *id.* 403 (requiring trial courts to filter out evidence that is relevant but more prejudicial than probative).

503. The Supreme Court observed in *Daubert*:

[T]here 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.

*Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 596–97 (1993).

504. See David E. Bernstein, *Expert Witnesses, Adversarial Bias, and the (Partial) Failure of the Daubert Revolution*, 93 IOWA L. REV. 451, 454 (2008) (describing the various kinds of adversarial biases that plague litigation experts); see also Bernstein, *supra* note 246, at 33 (“Critics [have] identified three distinct types of adversarial bias: (1) conscious bias, which occurs when an expert deliberately tailors evidence to support [an opinion favorable to the] client, (2) unconscious bias, which occurs when [an] expert does not intentionally mislead the court, but is influenced by psychological attachment to his ‘side’ [of the case], and (3) selection bias, which results from litigants choosing as their expert witnesses persons whose views are known to support [their position in the case].”). Bernstein has identified combatting adversarial bias as a principal purpose underlying Federal Rule of Evidence 702. *Id.* at 31.

opinion had achieved “general acceptance” in the expert’s field.<sup>505</sup> The barrier to entry was high,<sup>506</sup> but trial judges did not review the factual assumptions, data collections, studies, and opinions on which testifying experts relied in reaching their conclusion to ensure certain standards of reliability were satisfied, as they would if the evidence were offered in a judicial proceeding.<sup>507</sup> The modern evidentiary regime for expert testimony, ushered in by *Daubert* and its progeny,<sup>508</sup> shifted much of the “gatekeeping” responsibility from the scientific community at large to the trial judge.<sup>509</sup> Trial judges are required to independently assess the reliability of “each and every step” of the expert’s work: “the methodology, the facts underlying the expert’s opinion, the link between the facts and conclusion, et alia.”<sup>510</sup> Thus, while the facts or data on which a testifying expert relies in reaching an opinion are not subject to the stricter rules that govern judicial admissibility (e.g., an expert can rely on hearsay or other otherwise inadmissible information<sup>511</sup>) the expert’s opinion is subject to judicial review for reliability.<sup>512</sup>

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505. See *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923) (excluding an early version of polygraph testing because it had not yet gained acceptance among experts in the field). While the *Frye* approach deferred to existing scientific consensus, it did not mimic the “weight of the evidence” approach generally employed in the scientific community. See *infra* Part III.B.1.b.

506. The *Daubert* Court described the *Frye* test as an “austere standard” that “would be at odds with the ‘liberal thrust’ of the Federal Rules.” *Daubert*, 509 U.S. at 588–89 (quoting *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 169 (1988)).

507. See *Frye*, 293 F. at 1014.

508. See generally *Daubert*, 509 U.S. at 597.

509. See David L. Faigman, *The Daubert Revolution and the Birth of Modernity: Managing Scientific Evidence in the Age of Science*, 46 U.C. DAVIS L. REV. 893, 904 (2013) (“The *Daubert* test, in contrast to *Frye*, focuses courts’ attention on the methods and principles ostensibly supporting proffered expert opinion. Whether that opinion is based on good grounds, therefore, is a preliminary inquiry for the trial judge to determine.”).

510. *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 355 (5th Cir. 2007) (“[T]he expert’s testimony must be reliable at each and every step or else it is inadmissible. ‘The reliability analysis applies to all aspects of an expert’s testimony: the methodology, the facts underlying the expert’s opinion, the link between the facts and the conclusion . . . .’” (quoting *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir. 1999))); see also *United States v. Diaz*, 300 F.3d 66, 75 (1st Cir. 2002) (“Rule 702 encompasses an array of expert witness issues, including the qualifications of the witness, the relevance of the proffered testimony, the adequacy of the facts or data underlying an opinion, the scientific reliability of the witness’s methodology, and the reliability of the witness’s application of that methodology to the facts.”).

511. FED. R. EVID. 703.

512. See *ZF Meritor, LLC v. Eaton Corp.*, 696 F.3d 254, 291 (3d Cir. 2012) (“As we have made clear, ‘the reliability analysis [required by *Daubert*] applies to all aspects of an expert’s testimony: the methodology, the facts underlying the expert’s opinion, [and] the link between the facts and the conclusion.’” (quoting *Heller*, 167 F.3d at 155)), *cert. denied*, 133 S. Ct. 2025 (2013); *Knight*, 482 F.3d at 355; *Ruiz-Troche v. Pepsi Cola of P.R. Bottling Co.*, 161 F.3d 77, 81 (1st Cir. 1998) (stating that trial courts must “evaluate the data

Review of expert testimony can be viewed as a multilayered reliability analysis<sup>513</sup> that examines the reliability of the processes and reasoning by which an expert reached her opinions in the case and the reliability of the factual assumptions, data collections, studies, and opinions on which an expert relies in reaching her opinions.<sup>514</sup> This section focuses on the latter.<sup>515</sup> We refer to the assimilation of facts, assumptions, data collections, studies, and opinions on which an expert relies in reaching an opinion as the “predicate” for the opinion and the courts’ review of the reliability of that predicate as the “predicative-reliability gate.”<sup>516</sup> While the modern regime ostensibly offers a more liberal standard<sup>517</sup> for the admission of expert testimony—one that makes room in the courtroom for more experimental and “cutting edge” science and technologies<sup>518</sup>—parties proffering

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offered to support an expert’s bottom-line opinions to determine if that data provides adequate support to mark the expert’s testimony as reliable”); *see also In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1223, 1245 (E.D.N.Y. 1985), *aff’d*, 818 F.2d 187 (2d Cir. 1987) (“Rule 703 permits experts to rely upon hearsay. . . . Nevertheless, the court may not abdicate its independent responsibilities to decide if the bases meet minimum standards of reliability as a condition of admissibility. If the underlying data are so lacking in probative force and reliability that no reasonable expert could base an opinion on them, an opinion which rests entirely upon them must be excluded.” (citation omitted)).

513. *Tumlinson v. Advanced Micro Devices, Inc.*, 81 A.3d 1264, 1270 (Del. 2013) (applying *Daubert* and *Havner* in a case governed by Texas substantive law and Delaware procedural law).

514. *Id.*

515. *Brown*, *supra* note 1, at 812–13; *see also Ruiz-Troche*, 161 F.3d at 81 (stating that trial courts must “evaluate the data offered to support an expert’s bottom-line opinions to determine if that data provides adequate support to mark the expert’s testimony as reliable”). In *Havner*, the Texas Supreme Court stated,

The underlying data should be independently evaluated in determining if the opinion itself is reliable. . . . “If the underlying data are so lacking in probative force and reliability that no reasonable expert could base an opinion on them, an opinion which rests entirely upon them must be excluded.”

*Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997) (quoting *In re Agent Orange*, 611 F. Supp. at 1245).

516. *See supra* note 496.

517. The *Daubert* Court described the *Frye* “general acceptance” standard as “rigid” and “at odds with the ‘liberal thrust’ of the Federal Rules and their ‘general approach of relaxing the traditional barriers to opinion testimony,’” as well as with “the Rules’ permissive backdrop.” *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 588–89 (1993) (quoting *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 169 (1988)). By comparison, by the turn of the century, the Supreme Court was describing the standards of reliability applicable to expert evidence under *Daubert* as “exacting.” *Weisgram v. Marley Co.*, 528 U.S. 440, 442 (2000) (“Since *Daubert*, moreover, parties relying on expert evidence have had notice of the exacting standards of reliability such evidence must meet.”).

518. *See* 29 WRIGHT & GOLD, *supra* note 52, § 6266, at 266 n.13 (observing that courts have liberalized the Rules governing expert testimony to allow for testimony on cutting-edge technologies). Commentators and researchers have debated whether the test for admissibility of expert evidence under *Daubert* and its progeny is actually a more lenient standard than the

expert testimony face a burden that did not exist under the old regime: they must establish that the expert's opinion is "supported by an adequate foundation of relevant facts, data, or opinions" before the expert's opinion may be admitted.<sup>519</sup> "Where an expert's opinion is based on insufficient information, the analysis is unreliable."<sup>520</sup>

Over the last fifteen years, courts and parties have struggled with the parameters of this burden, and that struggle has resulted in disagreement among courts and commentators—especially in areas where the tension between the scientific approach to information consumption and the judicial approach to information consumption is greatest. This section addresses these issues and how they have been resolved, if they have been resolved, or how they may be resolved in the future. We begin with several overarching issues: (1) the different components of predicative reliability<sup>521</sup> and how these components relate to the unique double-ended approach to expert-reliability challenges in Texas (discussed in the preceding section<sup>522</sup>); and (2) the ongoing debate between the scientific "weight of the evidence" approach and the judicial "atomization" approach to evaluation of expert predicates.<sup>523</sup> Next, we address developments in the case law for assessing specific types of predicative material.<sup>524</sup> Finally, we discuss the issues specific to inadmissible predicates.<sup>525</sup>

Although we will note a number of unanswered questions and disagreements among different jurisdictions (and even among different courts in Texas), one thing remains clear: courts are required to "look beyond" an expert's averment that the data underlying her opinion is reliable and supports her conclusion; "[t]he underlying data should be independently evaluated in determining if the opinion itself is reliable."<sup>526</sup>

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*Frye* test. See, e.g., Andrew Jurs & Scott DeVito, *The Stricter Standard: An Empirical Assessment of Daubert's Effect on Civil Defendants*, 62 CATH. U. L. REV. 675, 679 (2013); Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL. PUB. POL'Y & L. 339, 346–47 (2002).

519. 2 GRAHAM, *supra* note 34, § 702.1, at 29 (4th ed. 1996).

520. Paz v. Brush Engineered Materials, Inc., 555 F.3d 383, 388 (5th Cir. 2009).

521. See *infra* Part III.B.1.a.

522. See *supra* Part III.A.

523. See *infra* Part III.B.1.b.

524. See *infra* Part III.B.2.

525. See *infra* Part III.B.3.

526. Richardson v. Richardson-Merrell, Inc., 857 F.2d 823, 829 (D.C. Cir. 1988); *In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1223, 1245 (E.D.N.Y. 1985), *aff'd*, 818 F.2d 187 (2d Cir. 1987); Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 713 (Tex. 1997) (citing *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 747–48 (3d Cir. 1994)); see also

Courts cannot rely on the *ipse dixit* of an expert witness alone.<sup>527</sup>

1. *Challenging Predicative Reliability.* In endeavoring to demonstrate that an expert's opinions are supported by a reliable predicate—i.e., “an adequate foundation of relevant facts, data, or opinions,”<sup>528</sup>—a proffering party must bear in mind a number of key considerations. First, the predicate must be adequate in two ways: it must be reliable in and of itself and it must actually support the opinions reached by the expert.<sup>529</sup> Second, in Texas courts, the adequacy of the predicate must be proved up in a manner that will withstand attack not only in a preadmission *Daubert* hearing but also in a postjudgment legal-sufficiency review.<sup>530</sup> Third, unlike the old *Frye* test, what is considered adequate support for an opinion in the scientific community may not be considered adequate support for an opinion in a courtroom.<sup>531</sup> We discuss each of these requirements below.

a. *Components of Predicative Reliability.* The predicative reliability requirement originates in the Supreme Court's recognition in *Daubert* that expert opinions must rest “on a reliable foundation.”<sup>532</sup> The Court expanded on this requirement in *Joiner*, affirming the trial court's decision to exclude expert testimony because the animal and epidemiological studies on which the experts relied did not provide sufficient support for the experts' conclusions that the plaintiff's exposure to PCBs caused his cancer.<sup>533</sup> Five months before the U.S. Supreme Court issued its opinion in *Joiner*, the Texas Supreme Court conducted a similar review in *Havner*, when it concluded that the epidemiological and animal studies on which the plaintiffs' experts relied did not provide adequate support for their conclusion that Bendectin caused the plaintiffs' daughter's birth

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Trepel v. Roadway Express, Inc., 194 F.3d 708, 721 (6th Cir. 1999) (“Although it is true that an expert may base an opinion on otherwise inadmissible evidence, the courts are constantly looking behind an expert's opinion to determine if the basis for that opinion is reliable and trustworthy.”).

527. Gen. Elec. Co. v. Joiner, 522 U.S. 136, 146 (1997); see also Kumho Tire Co. v. Carmichael, 526 U.S. 137, 157 (1999) (quoting *Joiner*, 522 U.S. at 146); Gammill v. Jack Williams Chevrolet, Inc., 972 S.W.2d 713, 726 (Tex. 1998) (quoting *Joiner*, 522 U.S. at 146).

528. 2 GRAHAM, *supra* note 34, § 702.1, at 29 (4th ed. 1996).

529. See *infra* Part III.B.1.

530. See *supra* Part III.A.1.

531. See *infra* Part III.B.2.a.

532. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 597 (1993).

533. Gen. Elec. Co. v. Joiner, 522 U.S. 136, 144–47 (1997).

defects.<sup>534</sup> Under *Havner*, “[i]f the foundational data underlying opinion testimony are unreliable, an expert will not be permitted to base an opinion on that data because any opinion drawn from that data is likewise unreliable.”<sup>535</sup> The *Havner* Court also instructed that the epidemiological studies on which the plaintiffs’ experts relied provided a reliable predicate for the experts’ opinions only if they were soundly designed and executed and actually supported the experts’ conclusions.<sup>536</sup>

The predicative reliability gate thus has two principal components: (1) the predicate itself must be reliable (which we call “predicative soundness”); and (2) the predicate must actually support the expert’s opinion (which we call “predicative probativeness”).<sup>537</sup> While the first prong relates to the quality of an expert’s predicate, the second prong relates to the probative value, if any, the predicate affords the expert’s opinion. The second prong is particularly important in Texas, where it is the basis<sup>538</sup> of an expert’s opinion, and not the expert’s qualifications or *ipse dixit*, that gives expert evidence probative value,<sup>539</sup> and where expert evidence lacking in probative value cannot support a judgment even if admitted without objection at trial.<sup>540</sup>

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534. Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 711, 730 (Tex. 1997).

535. *Id.* at 714.

536. *Id.* at 719–20.

537. Brown, *supra* note 1, at 812.

538. As used by the Texas Supreme Court, the term “basis” generally includes all components of reliability: the predicate for an expert’s opinion, the methodology the expert uses, and the reasoning the expert employs to extract opinions from the results, if any extraction is necessary. See *Elizondo v. Krist*, 415 S.W.3d 259, 265 (Tex. 2013) (using the term “basis” largely to refer to the expert’s inadequate reasoning from predicate to conclusion); *Burrow v. Arce*, 997 S.W.2d 229, 235–36 (Tex. 1999) (using the term to reference the expert’s failure to identify a factual predicate or to explain how he reached his opinion); *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 551 (Tex. 1995) (using the term to reference both the scientific studies on which an expert relied and the methodology on which the expert relied). Frequently when the Court refers to expert opinions as “conclusory” because they lack a “basis,” the reference is to the expert’s predicate, which is lacking either because the expert failed to identify facts, studies, or data supporting his opinion or because the facts, studies, or data the expert identified as supporting his opinion do not actually support the opinion—i.e., the absence of a probative predicate. See, e.g., *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009); *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 232 (Tex. 2004); *Burrow*, 997 S.W.2d at 235.

539. See *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*7 (Tex. Aug. 22, 2014) (“[T]he evidentiary value of expert testimony is derived from its basis, not from the mere fact that the expert has said it.”).

540. See *supra* Part III.A.; see also, e.g., *Pollock*, 284 S.W.3d at 816 (“[I]t is the basis of the witness’s opinion, and not the witness’s qualifications or his bare opinions alone, that can settle an issue as a matter of law; a claim will not stand or fall on the mere *ipse dixit* of a credentialed witness. . . . It is well settled that the naked and unsupported opinion or conclusion of a witness does not constitute evidence of probative force and will not support a jury finding even when admitted without objection.” (quoting *Coastal*

*i. Predicative Soundness.* When an expert bases his opinion on the scientific data, studies, or analysis of others, the reliability of the underlying material is vital to the reliability of the expert's conclusions—expert opinions predicated on untrustworthy information are themselves untrustworthy. “[W]hile an expert's data need not be admissible, the data cannot be derived from a manifestly unreliable source.”<sup>541</sup> Essentially, when an expert's analysis is based on the work of others, the underlying work is subject to the same tests for reliability as the expert's own work and conclusions.<sup>542</sup> Analysis of the first component of predicative reliability, predicative soundness, thus may mirror the kind of analysis that takes place at the methodological reliability and connective reliability gates except that, rather than examining the methodology, accuracy, and reasoning of a testifying expert's own analysis and opinions, the court must examine the methodology, accuracy, and reasoning employed by the experts on whose studies, articles, data collections, or conclusions the testifying expert relies.<sup>543</sup> Errors in

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*Transp. Co.*, 136 S.W.3d at 232, which in turn quotes *Burrow*, 997 S.W.2d at 235, and *Dallas Ry. & Terminal Co. v. Gossett*, 294 S.W.2d 377, 380 (1956)).

Not all jurisdictions require proponents of expert testimony to establish both the quality and the probativeness of their predicative information and materials. In 2012, the California Supreme Court rejected the argument that “a court should determine only whether the type of matter that an expert relies on in forming his or her opinion is the type of matter that an expert reasonably can rely on in forming an opinion, without regard to whether the matter relied on reasonably does support the particular opinion offered.” *Sargon Enters., Inc. v. Univ. of S. Cal.*, 288 P.3d 1237, 1251 (Cal. 2012) (quoting from, and adopting holding of, court of appeals' opinion in *In re Lockheed Litig. Cases*, 10 Cal. Rptr. 3d 34, 37 (Cal. Ct. App. 2004)). The California court relied on language in California's evidentiary statute indicating that the matter on which an expert relies must be not only the type of matter on which an expert can reasonably rely but the type of matter on which an expert can reasonably rely “in forming an opinion *upon the subject to which his testimony relates*,” and observed that an expert may be reasonable in relying on a particular matter to form an opinion on one subject but not another. *Id.* (quoting *In re Lockheed*, 10 Cal. Rptr. at 37).

541. *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.* 711 F.3d 1348, 1373 (Fed. Cir. 2013), *cert. denied*, 134 S. Ct. 900 (2014) (holding that expert could not rely on worldwide sales data from a document that the expert “assume[d]” had “found [the data] off the internet”); *Montgomery Cnty. v. Microvote Corp.*, 320 F.3d 440, 448 (3d Cir. 2003) (holding expert data unreliable when expert did not “seem to know where they were from or what the source of them were”).

542. *Brown*, *supra* note 1, at 807–08.

543. *See, e.g., Kilpatrick v. Breg, Inc.*, 613 F.3d 1329, 1337–38 (11th Cir. 2010). In *Kilpatrick*, the Eleventh Circuit upheld a district court's ruling that an expert could not rely on an article in the *American Journal of Sports Medicine* to support his conclusion that pain pumps that administered bupivacaine caused chondrolysis. *Id.* The article analyzed the medical records of 152 patients who had undergone arthroscopic shoulder surgeries, but only nineteen of the patients had pain pumps inserted, and of those nineteen, only ten developed chondrolysis in twelve shoulders. *Id.* at 1337. Neither the article nor the expert relying on it was able to explain whether such a small sample size

data collection, flawed protocols, and potential source bias, for example, can render the underlying data or studies incompetent to support expert testimony.<sup>544</sup>

The proffering party has the burden of establishing that the expert's opinion has a reliable foundation,<sup>545</sup> but once the proffering party meets the foundational requirements for admissibility, the "burden of exploring the facts and assumptions underlying the testimony of an expert witness" shifts to the opposing party for exploration in cross-examination.<sup>546</sup> As discussed below, courts have reached different conclusions on what, exactly, an offering party must do to meet this burden. Courts generally require more than an "expert's bald assurance of validity," seeking appropriate documentation and explanation as well.<sup>547</sup> In *In re Allied Chemical Corp.*, the Texas Supreme Court warned that "an expert's assurance that a study establishes causation does not make it so. Claimants must have an expert who can answer why a study is reliable."<sup>548</sup> Challenges to the soundness of an expert's predicative data or studies generally must be raised before the expert's opinions are admitted at trial, such as through a *Daubert* motion, or they are waived.<sup>549</sup>

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could produce statistically meaningful results under the circumstances; neither the article nor the expert accounted for other potential causes of chondrolysis; and neither the article nor the expert offered an explanation as to why the pain pumps caused chondrolysis in some patients but not others. *Id.* at 1337–38.

The *Kilpatrick* court also rejected the expert's reliance on (1) a case study of two individuals who developed chondrolysis because there was no analysis, only the reporting of the facts in the two cases; and (2) an editorial the expert co-authored in a scientific periodical because, as the expert recognized, it was "general in nature and d[id] not present any factual context that would allow the court to discern its relevance." *Id.* at 1339–40.

544. See, e.g., *Slaughter v. S. Talc Co.*, 919 F.2d 304, 307 (5th Cir. 1990) (concluding that sources upon which plaintiff's expert relied were so erroneous that expert's affidavits were "nothing more than bare conclusions derived from erroneous data").

545. *Wagner v. Hesston Corp.*, 450 F.3d 756, 758 (8th Cir. 2006); *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004); *Truck Ins. Exch. v. MagneTek, Inc.*, 360 F.3d 1206, 1210 (10th Cir. 2004); *Ruiz-Troche v. Pepsi Cola of P.R. Bottling Co.*, 161 F.3d 77, 85 (1st Cir. 1998).

546. *Stecyk v. Bell Helicopter Textron, Inc.*, 295 F.3d 408, 414 (3d Cir. 2002) (citing FED. R. EVID. 703, 705; *Ratliff v. Schiber Truck Co.*, 150 F.3d 949, 955 (8th Cir. 1998); *Toucet v. Mar. Overseas Corp.*, 991 F.2d 5, 10 (1st Cir. 1993)); see also FED. R. EVID. 705 ("Unless the court orders otherwise, an expert may state an opinion—and give the reasons for it—without first testifying to the underlying facts or data. But the expert may be required to disclose those facts or data on cross-examination.").

547. See *Daubert v. Merrell Dow Pharm., Inc. (Daubert II)*, 43 F.3d 1311, 1316–17 (9th Cir. 1995).

548. *In re Allied Chem. Corp.*, 227 S.W.3d 652, 656 (Tex. 2007).

549. See *supra* notes 267–69, 438 and accompanying text.

*ii. Predicative Probativeness.* The second component of predicative reliability, predicative probativeness, looks at whether an expert has identified a predicate for her opinion and if so, whether the identified predicate is, in fact, favorably probative of the expert's conclusions. An expert's predicate not only must be "sound science" but also must actually support the expert's conclusions. Thus, even when the study, data collection, and analysis on which a testifying expert relies are well designed and properly executed, they generally will not provide a reliable predicate for the testifying expert's conclusions if they reach different conclusions than the testifying expert,<sup>550</sup> determine that the data is insufficient to support a conclusion on the subject,<sup>551</sup> or have no logical bearing on the subject matter of the testimony.<sup>552</sup> And, of course, if an expert fails to identify any predicate for her opinion, she has offered no probative support for her opinion, only her *ipse dixit*, which will not suffice.<sup>553</sup> Finally,

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550. See *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 727 (Tex. 1997) (discussing *Richardson v. Richardson-Merrell, Inc.*, 649 F. Supp. 799, 802 (D.D.C. 1986), *aff'd*, 857 F.2d 823 (D.C. Cir. 1988) and its rejection of expert testimony in which expert relied on studies concluding that there was no statistically significant correlation between Bendectin and disease but "recalculated" epidemiological data to obtain statistically significant result).

551. See *Kilpatrick v. Breg, Inc.*, 613 F.3d 1329, 1338–39 (11th Cir. 2010). The *Kilpatrick* court upheld the lower court's ruling that the claimants' expert could not rely on an animal study involving rabbits when the study's authors expressly declined to extrapolate the study's findings to humans, noting the absence of data regarding "the human equivalent dosing of . . . bupivacaine in a rabbit shoulder model." *Id.* The court recognized that "a dose-response relationship is 'the single most important factor to consider in evaluating whether an alleged exposure caused a specific adverse effect.'" *Id.* at 1339 (quoting *McClain v. Metabolife Int'l, Inc.*, 401 F.3d 1233, 1242 (11th Cir. 2005), which in turn quotes David L. Eaton, *Scientific Judgment and Toxic Torts—A Primer in Toxicology for Judges and Lawyers*, 12 J.L. & POL'Y 5, 11 (2003)). In some circumstances, a testifying expert may be able to supply needed data missing from one source by reference to another source or his own work. But the testifying expert in *Kilpatrick* offered no explanation of the possible differences in dose-response relationships between humans and rabbits. *Id.*

552. See, e.g., *City of San Antonio v. Pollock*, 284 S.W.3d 809, 819 (Tex. 2009) (holding that expert offered no basis for his opinion that claimant was chronically exposed to benzene concentrations of 160 ppb when he relied exclusively on evidence of the benzene levels in a nearby, sealed monitoring well as opposed to evidence of benzene concentrations in the ambient air).

553. The Texas Supreme Court stated in *Pollock*,

[I]f no basis for the opinion is offered, or the basis offered provides no support, the opinion is merely a conclusory statement and cannot be considered probative evidence, regardless of whether there is no objection. "[A] claim will not stand or fall on the mere *ipse dixit* of a credentialed witness."

*Pollock*, 284 S.W.3d at 818 (quoting *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999)); see also *Romero v. KPH Consolidation, Inc.*, 166 S.W.3d 212, 223 (Tex. 2005) (holding that, to the extent expert's testimony could be read as opining that hospital should have suspended doctor despite lack of peer-review proceeding regarding doctor, expert offered

if an expert's opinion is based on facts or assumptions that are ultimately unsupported or disproved by the evidence, the expert lacks a probative predicate.<sup>554</sup>

Unlike predicative soundness, parties generally may raise objections based on the lack of a probative predicate in a legal-sufficiency challenge even if they failed to raise the objections before the expert's testimony was admitted at trial.<sup>555</sup> This is because when an expert offers no basis for her opinion, or when the basis she offers does not support her opinion, the opinion has no probative value, and is conclusory, cannot support a judgment even if admitted without objection.<sup>556</sup>

This component of predicative reliability can overlap other reliability gates—particularly, connective reliability.<sup>557</sup> For example, if an expert opines that substance X caused a plaintiff's disease but relies on a study that finds no association between substance X and the disease, the opinion lacks a basis and is conclusory; it fails at the predicative reliability gate.<sup>558</sup> But if the expert offers the same opinion and points to a study finding a strong association between substance X and the disease at dosages double the plaintiff's dosage, connective reliability is implicated: the study may provide a reliable predicate if the expert can bridge the "analytical gap" by demonstrating that the difference in dosage levels is not important to the causal connection.<sup>559</sup> If the expert fails to bridge the gap, the opinion lacks connective (and predicative) reliability. When predicative materials directly support an expert's opinions based on them, there is no gap and connective reliability does not come into play. Similarly, when the predicative materials do not provide any support for the expert's opinion, the two cannot be bridged together at all. But predicative materials may provide indirect

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no support for that opinion); *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470 (Tex. 2005) ("[The expert] eliminated the obvious possibility that fuel or vapors from the tank filler neck ignited only by saying so, offering no other basis for his opinion. Such a bare opinion was not enough."); In *Burrow*, the Court explained, "Credentials qualify a person to offer opinions, but they do not supply the basis for those opinions. The opinions must have a reasoned basis which the expert, because of his 'knowledge, skill, experience, training, or education,' is qualified to state." *Burrow*, 997 S.W.2d at 236 (quoting TEX. R. EVID. 702).

554. See, e.g., *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499 (Tex. 1995) ("When an expert's opinion is based on assumed facts that vary materially from the actual, undisputed facts, the opinion is without probative value and cannot support a verdict or judgment.").

555. See *supra* notes 355–91 and accompanying text.

556. *Pollock*, 284 S.W.3d at 818.

557. See *infra* Part III.D.

558. See *Pollock*, 284 S.W.3d at 818.

559. See *infra* Part III.D.

support for the expert's opinion that the expert can rely upon if she can demonstrate a sound link between the two. This is just one of many instances of interlocking between the reliability gates.

*b. Granulation v. Weight-of-the-Evidence.* One dichotomy that has arisen in reviewing the reliability of an expert opinion is between the "weight of the evidence" approach, in which a court considers all of the expert's predicative materials collectively to determine whether they provide a reliable basis for the expert's conclusion, and a more "granular" or "atomized" approach, in which a court considers each of the predicative materials on which the expert relies individually to determine whether it provides reliable support for the expert's conclusions.

The Supreme Court's connective reliability review in *Joiner* has been described as "strikingly atomized."<sup>560</sup> The Court reviewed the reliability of each of the experts' underlying materials on an individual basis. First, the Court rejected the experts' reliance on animal studies performed on infant mice injected with massive doses of PCBs as too "far-removed" from the plaintiff's environmental exposure to significantly smaller doses as an adult human.<sup>561</sup> Then the Court reviewed and rejected, one-by-one, the experts' reliance on four epidemiological studies.<sup>562</sup> The Court's ultimate conclusion—that the studies "were not sufficient, whether individually or in combination, to support [the experts'] conclusions"<sup>563</sup>—leaves room for a more holistic approach, but rightly or wrongly, the *Joiner* opinion largely has been construed as endorsing a granulated review of predicative expert materials.<sup>564</sup>

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560. Jennifer L. Mnookin, *Atomism, Holism, and the Judicial Assessment of Evidence*, 60 UCLA L. REV. 1524, 1572 (2013).

561. Gen. Elec. Co. v. Joiner, 522 U.S. 136, 144 (1997).

562. *Id.* at 145–46.

563. *Id.* at 146–47. Although *Joiner* had argued that the supporting evidence was sufficient under a "weight of the evidence" approach, the *Joiner* majority did not expressly approve or reject that approach.

564. Unlike the majority, Justice Stevens directly addressed the "weight of the evidence" approach advocated by *Joiner*'s experts:

Joiner's experts used a "weight of the evidence" methodology to assess whether Joiner's exposure to transformer fluids promoted his lung cancer. They did not suggest that any one study provided adequate support for their conclusions, but instead relied on all the studies taken together (along with their interviews of Joiner and their review of his medical records). . . .

It is not intrinsically "unscientific" for experienced professionals to arrive at a conclusion by weighing all available scientific evidence—this is not the sort of "junk science" with which *Daubert* was concerned. . . . And using this methodology, it would seem that an expert could reasonably have concluded that

The Texas Supreme Court's approach in *Havner* was similarly granular.<sup>565</sup> The Court examined each of the epidemiological studies relied on by the plaintiffs' experts to determine whether it offered reliable support for the experts' causation opinions.<sup>566</sup> The Court then did the same for each of the animal studies relied on.<sup>567</sup> The Court conducted a similar study-by-study review to determine whether there was a reliable basis for expert opinions on causation in *Pollock*<sup>568</sup> and *Merck*.<sup>569</sup> Additionally, by adopting a bright-line test for epidemiological evidence (doubling of the risk and a statistically significant confidence level), the *Havner* court precluded the possibility that epidemiological evidence below that line—i.e., evidence that does not, alone, support causation—might nevertheless provide sufficient support for an expert opinion on causation if combined with enough other, similar evidence to reach a critical mass.<sup>570</sup> In *Merck*, the plaintiffs argued that “the totality of the evidence”

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the study of workers at an Italian capacitor plant, coupled with data from Monsanto's study and other studies, raises an inference that PCB's promote lung cancer.

*Id.* at 152–54 (Stephens, J., concurring in part and dissenting in part) (footnote omitted).

565. Merrell Dow Pharm., Inc. v. Havner, 953 S.W.2d 706, 724–26 (Tex. 1997).

566. *Id.*

567. *Id.* at 728–30.

568. City of San Antonio v. Pollock, 284 S.W.3d 809, 819–20 (Tex. 2009).

569. Merck & Co. v. Garza, 347 S.W.3d 256, 266–67 (Tex. 2011).

570. See *Havner*, 953 S.W.2d at 719–20, 724–30.

The RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 28 cmt. c (2010) adopts the view that a bright-line rule like that adopted in *Havner* is undesirable. The comment to the Restatement states:

Some courts [have] tried to develop bright-line rules based on science for adequate proof of factual causation. The high-water mark for this overreliance on scientific thresholds occurred in the Bendectin litigation when one court announced a blanket rule that a plaintiff could not make out a sufficient case without statistically significant epidemiologic evidence.

These courts may be relying on a view that “science” presents an “objective” method of establishing that, in all cases, reasonable minds cannot differ on the issue of factual causation. Such a view is incorrect. First, scientific standards for the sufficiency of evidence to establish a proposition may be inappropriate for the law, which itself must decide the minimum amount of evidence permitting a reasonable (and, therefore, permissible) inference, as opposed to speculation that is not permitted. Second, scientists report that an evaluation of data and scientific evidence to determine whether an inference of causation is appropriate requires judgment and interpretation. Scientists are subject to their own value judgments and preexisting biases that may affect their view of a body of evidence. There are instances in which although one scientist or group of scientists comes to one conclusion about factual causation, they recognize that another group that comes to a contrary conclusion might still be “reasonable.”

*Id.* (citation omitted). The comment concludes that courts “should be cautious about adopting specific ‘scientific’ principles, taken out of context, to formulate bright-line legal rules or conclude that reasonable minds cannot differ about factual causation.” *Id.*

supported their expert's causation opinion.<sup>571</sup> The Court stated, "The totality of the evidence cannot prove general causation if it does not meet the standards for scientific reliability established by *Havner*. A plaintiff cannot prove causation by presenting different types of unreliable evidence."<sup>572</sup>

The authors of the relevant chapter of the Federal Judicial Center's (FJC) Reference Manual on Scientific Evidence, on the other hand, favor a more holistic approach. They observe that "many of the most well-respected and prestigious scientific bodies . . . consider all the relevant available scientific evidence, taken as a whole, to determine which conclusion or hypothesis regarding causal claim is best supported by the body of evidence."<sup>573</sup> The approach described by the FJC is often referred to as the "weight of the evidence" approach<sup>574</sup> and is, as the FJC notes, generally accepted in the scientific community.<sup>575</sup> Under this approach, scientists do not disregard studies that fail to implement sound protocols, exhibit high error rates, or employ flawed methodology; instead, they consider all available information, using the strengths and weaknesses of any given study to determine what weight to give it in the global assessment.<sup>576</sup> The FJC's endorsement of this approach to expert reliability analysis is a change from earlier editions of the FJC,<sup>577</sup>

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571. *Merck*, 347 S.W.3d at 267.

572. *Id.* at 268.

573. Margaret A. Berger, *The Admissibility of Expert Testimony*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 11, 20 (3d ed. 2011).

574. See *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 16 (1st Cir. 2011) (discussing a testifying expert's "weight of the evidence" methodology for reaching his opinion); *Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 197–98 (5th Cir. 1996) (questioning the "weight of the evidence" approach).

575. See Berger, *supra* note 573, at 20; see also Thomas O. McGarity & Sidney A. Shapiro, *Regulatory Science in Rulemaking and Tort: Unifying the Weight of the Evidence Approach*, 3 WAKE FOREST J.L. & POL'Y 65, 78 (2013).

576. See McGarity & Shapiro, *supra* note 575, at 78–79.

577. The second edition of the Federal Reference Manual relied more heavily on *Joiner*, recognizing certain problems with the "weight of the evidence" approach. See Margaret A. Berger, *The Supreme Court's Trilogy on the Admissibility of Expert Testimony*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 9, 14–15, 32–34 (2d ed. 2000). It noted, for example, "Combining studies across fields is even more controversial than pooling the results of epidemiological studies in a meta-analysis, a statistical technique that some find unreliable when used in connection with observational studies." *Id.* at 33. And,

not all would agree with Justice Stevens' assumption that whatever is relied upon in assessing risk is automatically relevant in proving causation in a court of law. Proof of risk and proof of causation entail somewhat different questions because risk assessment frequently calls for a cost-benefit analysis. . . . [R]isk assessors may pay heed to any evidence that points to a need for caution, rather than assess the likelihood that a causal relationship in a specific case is more likely than not.

*Id.*

and some commentators have criticized the change.<sup>578</sup> Other commentators have embraced the “holistic” approach.<sup>579</sup>

The FJC chapter’s principal rationale for endorsing the weight of the evidence approach is that it is the approach embraced by the scientific community.<sup>580</sup> After all, it makes sense to presume that the optimal measure of scientific validity is the one used by scientists themselves. And this is consistent with one goal of expert evidentiary standards: to ensure that expert evidence offered in court is of the same caliber as that employed by experts outside the courtroom.<sup>581</sup> On the other hand, as discussed above, expert opinions in the courtroom are subject to limitations and biases that do not threaten the reliability of an expert’s professional work.<sup>582</sup> Particularly relevant here, experts in the courtroom are subject to inherent biases not generally present in their professional work, and while the scientific community can adjust its assessment of an issue on an ongoing basis as new data and research are added to an expanding universe of information, the court must determine whether a specific subset of data and research has reached a critical mass sufficient to provide a reliable basis for a snapshot assessment of an issue that cannot later be adjusted based on new or additional information.<sup>583</sup>

In 2011, the First Circuit endorsed the more holistic approach to predicative review in *Milward v. Acuity Specialty Products Group, Inc.*,<sup>584</sup> in which a plaintiff alleged that his exposure to benzene-containing products manufactured by the defendants was the cause of his rare type of leukemia, Acute

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578. See, e.g., Eric Lasker, *Manning the Daubert Gate: A Defense Primer in Response to Milward v. Acuity Specialty Products*, 79 DEF. COUNS. J. 128, 131 (2012) (“While a trial court can . . . review individual lines of scientific evidence to determine whether they meet this admissibility threshold, there is no way for a court to so evaluate the ‘weight of the evidence’ approach followed by the Milwards’ expert. An ‘inference to the best explanation’ cannot be tested, it cannot be falsified, and it cannot be validated against known or potential rates of error.”); James F. Rogers, James Shelson & Jessalyn H. Zeigler, *Changes in the Reference Manual on Scientific Evidence (Third Edition)*, 80 DEF. COUNS. J. 287, 293–94 (2013).

579. See, e.g., Mnookin, *supra* note 560, at 1576 (“[H]olism is the more intellectually legitimate perspective for the assessment of expert evidence.”).

580. See Berger, *supra* note 573, at 20.

581. See, e.g., *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 499 (Tex. 2001) (stating that courts must ensure that an expert opinion “comports with applicable professional standards outside the courtroom and that it will have a reliable basis in the knowledge and experience of the discipline”).

582. See *supra* Part III.B.

583. See *supra* Part III.B.

584. *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 17–19 (1st Cir. 2011).

Promyelocytic Leukemia (APL).<sup>585</sup> The appeal was taken from a bifurcated trial. Therefore, only the plaintiff's expert evidence on general causation (i.e., whether benzene was capable of causing APL) was at issue; specific causation (i.e., whether benzene caused the plaintiff's APL) was not at issue.<sup>586</sup> The plaintiff's expert had applied a "weight of the evidence" methodology to conclude that benzene was capable of causing APL.<sup>587</sup> The *Milward* court described the "weight of the evidence" approach as "a mode of logical reasoning often described as 'inference to the best explanation,' in which the conclusion is not guaranteed by the premises."<sup>588</sup> "In this mode of reasoning," the court acknowledged, "the use of scientific judgment is necessary"; there is "no algorithm" for determining "whether an association truly reflects a causal relationship or is spurious"; and "scientists may come to different judgments about whether such an inference is appropriate."<sup>589</sup> The court concluded that "[t]he fact that the role of judgment in the weight of the evidence approach is more readily apparent than it is in other methodologies does not mean that the approach is any less scientific."<sup>590</sup>

Of course, the dispute among legal practitioners and commentators is not over whether experts should apply a "weight of the evidence" approach to their scientific analysis outside the courtroom—it is a common and widely accepted scientific practice.<sup>591</sup> The dispute is over whether courts should admit an expert opinion based on the cumulative weight of the evidence when none of the individual pieces of evidence provides legally probative support for the expert's opinion. The *Milward* court did more than just hold that testifying experts can rely on a "weight of the evidence" methodology in their analysis; it held that the district court erred by

treat[ing] the separate evidentiary components of [the expert's] analysis atomistically, as though his ultimate opinion was *independently* supported by each. . . . The district court erred in reasoning that because no one line of evidence supported a reliable inference of causation, an

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585. *Id.* at 13.

586. *Id.* The distinction between "general causation" and "specific causation," and the import of these two causation elements on expert causation opinions in toxic tort cases is discussed at *infra* notes 604–07 and accompanying text.

587. *Milward*, 639 F.3d at 19–20.

588. *Id.* at 17 (citing *Bitler v. A.O. Smith Corp.*, 391 F.3d 1114, 1124 n.5 (10th Cir. 2004)).

589. *Id.* at 18.

590. *Id.*

591. *Id.* at 17–18; *see also* *Berger*, *supra* note 573, at 20.

inference of causation based on the totality of the evidence was unreliable.<sup>592</sup>

Thus, many commentators have viewed *Milward* as a significant shift in the law.<sup>593</sup> Not surprisingly, these commentators have taken a variety of sometimes diametrically opposed views on the wisdom of the *Milward* court's approach to evidentiary review of expert evidence.<sup>594</sup>

It is important to note, however, that the *Milward* court did not adopt an across-the-board rule as to the admissibility of expert testimony applying a "weight of the evidence" methodology; instead the court reiterated the general rules that "admissibility must turn on the particular facts of the case" and that the ultimate inquiry is whether the expert "applied the methodology with 'the same level of intellectual rigor' that he uses in his scientific practice."<sup>595</sup>

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

593. See, e.g., Bernstein, *supra* note 246, at 53; McGarity & Shapiro, *supra* note 575, at 95; Mnookin, *supra* note 560, at 1581 n.185; Joseph Sanders, *Milward v. Acuity Specialty Products Group: Constructing and Deconstructing Science and Law in Judicial Opinions*, 3 WAKE FOREST J.L. & POLY 141, 142 (2013); Andrew S. Lipton, *Tips from the Daubert Playbook, Part 1: Prepare to Get Your Epidemiologist's Testimony Admitted*, TRIAL, Mar. 2012, at 34, 36–38. Bernstein stated that *Milward* "ignored Rule 702, disregarded the Supreme Court's opinion in *Joiner*, relied on obsolete precedents, misunderstood the underlying rationale for exclusionary rules for expert testimony, misapplied basic scientific concepts, and credulously endorsed 'weight of the evidence' as a valid scientific methodology." Bernstein, *supra* note 246, at 29.

594. Compare Bernstein, *supra* note 246, at 53 (describing *Milward* as "[t]he most notorious opinion rebelling against the post-*Daubert* admissibility rules for expert testimony"), with Lipton, *supra* note 593, at 35 (describing the *Milward* court as "recogniz[ing] Rule 702's liberal intent").

To date, only one state court has relied on *Milward*. See *Harris v. CSX Transp., Inc.*, 753 S.E.2d 275, 289 (W. Va. 2013). The Supreme Court of Appeals of West Virginia cited *Milward* extensively in holding that a trial court overstepped its gatekeeper function in excluding all of the plaintiff's causation experts. See *id.* at 289, 301–02, 306. But while the court sanctioned the experts' reliance on a "weight of the evidence" approach in reaching his conclusion, the court did not expressly apply a "weight of the evidence" approach (or any approach) to review the studies and data on which the expert relied in reaching his conclusion. See *id.* at 296–97. The Eighth Circuit has cited to *Milward*, but not to the part of the opinion that endorses a "weight of the evidence" review. See *Kuhn v. Wyeth, Inc.*, 686 F.3d 618, 625 (8th Cir. 2012).

595. *Milward*, 639 F.3d at 19 (quoting *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999)). Applying this test, the court determined that the following five categories of evidence relied on by the plaintiff's expert provided a "scientifically sound and methodologically reliable foundation." *Id.* at 20. The five categories of predicative evidence included: (1) "the near-consensus among governmental agencies, experts, and active researchers in the field that benzene can cause [Acute Myeloid Leukemia (AML)]," the classification of leukemia that includes APL; (2) evidence that all types of AML derive from the same origin—genetically damaged pluripotent stem cells—from which the expert concluded that all AMLs, including APL, have a common etiology; (3) "toxicology studies establishing that metabolites of benzene cause significant chromosomal damage at the stem cell level in the bone marrow—the type of damage that is known to cause APL and

2. *Developments in Specific Categories of Predicates.* As with the other reliability gates, the analysis of whether an expert's opinion is founded on an adequate predicate necessarily differs from one context to the next.<sup>596</sup> Rule 702 lists three broad categories of expert testimony: scientific knowledge, technical knowledge, or other specialized knowledge.<sup>597</sup> The inquiry into whether an expert has provided an adequate predicate for her opinion is determined on a case-by-case basis.<sup>598</sup> But within Rule 702's three categories of "knowledge," certain types of predicates appear over and over in recent case law. As a result, certain recurring themes and baselines have developed in the jurisprudence for assessing specific types of expert predicates within these categories of expertise. It is important to note that while some predicative data, studies, facts, or assumptions may be inherently unreliable because they are inherently unsound or lacking in quality, much predicative material is reliable for some purposes but not others.<sup>599</sup>

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other types of AML"; (4) two sets of studies indicating that benzene metabolites act as catalytic inhibitors of a cellular enzyme, "topo II," that "is essential for the maintenance of proper chromosome structure and segregation," which the expert relied on as evidencing "a known biological mechanism by which exposure to benzene could cause APL"; and (5) a small set of epidemiological studies showing "an increased risk factor for APL, which although not statistically significant was consistent with causality, and provided no grounds for concluding otherwise." *Id.* at 18–20. As these categories of evidence demonstrate, much of the analysis of the reliability of the expert's conclusion depended not on predicative reliability but on connective reliability—i.e., whether the expert had demonstrated a reliable basis for extrapolating from evidence relating to causation of AMLs generally to reach a conclusion on causation of APL specifically and whether the expert had demonstrated a reliable basis for extrapolating from evidence relating to inhibition of topo II and the chromosomal translocation seen in APL. See *infra* Part III.D., for a thorough discussion of connective reliability. A principal difference between the district court's analysis (which led to exclusion of the expert testimony) and the circuit court's analysis (which led to admission of the testimony) was that the circuit court determined that the expert adequately bridged these gaps and the district court reached the opposite conclusion. *Milward*, 639 F.3d at 20–23. If the circuit court had agreed with the district court that the expert could not reliably extrapolate from evidence relating to AMLs generally and topo II inhibition, it is not clear whether the circuit court would have admitted expert testimony supported only by that evidence and epidemiological evidence that "concededly lack[ed] statistical significance." *Id.* at 25.

596. See, e.g., Daniel J. Capra, *The Daubert Puzzle*, 32 GA. L. REV. 699, 781 (1998) (arguing that "a flexible, expertise-dependent analysis of reliability" should be utilized).

597. FED. R. EVID. 702; TEX. R. EVID. 702; see also *Kumho*, 526 U.S. at 141 (explaining that the gatekeeping obligation, established in *Daubert* and imposed on trial judges, of ensuring that scientific testimony is reliable applies equally to scientific, technical, and other specialized knowledge without any relevant distinction). The *Kumho* Court went on to say that *Daubert* only mentioned scientific knowledge because that was the specific category of knowledge at issue. See *id.*

598. See, e.g., Gen. Elec. Co. v. Joiner, 552 U.S. 136, 143–47 (1997).

599. See, e.g., Robert M. Lloyd, *Proving Lost Profits After Daubert: Five Questions Every Court Should Ask Before Admitting Expert Testimony*, 41 U. RICH. L. REV. 379, 392

*a. Scientific Predicates.* Expert evidence based on “scientific” knowledge<sup>600</sup> is perhaps the quintessential expert evidence. It is perhaps most often used to establish the element of causation in tort cases, particularly in toxic tort cases.<sup>601</sup> The trilogy of U.S. Supreme Court cases that form the basis for judicial screening of expert testimony—*Daubert*, *Joiner*, and *Kumho*—all address expert opinions on causation in tort cases.<sup>602</sup> *Daubert* and *Joiner* were both toxic tort cases.<sup>603</sup> As the body of case law in this area has developed, so has the science. Courts are increasingly sophisticated in their analysis of scientific evidence, particularly in the area of toxic torts, where specific causation issues recur in multiple cases across multiple jurisdictions. In this section, we examine certain types of predicative material that experts commonly rely on in litigation involving scientific expert evidence.

*i. Specific v. General Causation.* Before delving into this area of law, it is important to distinguish between two types of causation evidence in toxic tort cases. In these cases, courts generally require a claimant to prove through scientific expert evidence that the toxic substance at issue is capable of causing the type of injury suffered by the claimant (general causation) and that the toxic substance at issue actually caused the claimant’s injury (specific causation).<sup>604</sup> Courts generally examine whether a toxic tort claimant has provided adequate evidence of general causation before reaching the issue of specific causation.<sup>605</sup> When science has not yet developed direct evidence

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(2007) (“Outside of litigation, experts often use data of questionable reliability for one purpose when they would not think of using it for another.”). An example Lloyd provides is “that when CPAs attach their names to financial statements, they give one of three distinct levels of assurance that the statements are accurate.” *Id.* at 392–93. Thus, in reviewing the reliability of lost profit calculations, courts should consider the particular type of financial statement utilized by the expert and other circumstances relevant to the statement. *Id.* at 394. “If the financial statements were prepared for tax purposes,” for example, “there was probably an incentive to understate profits.” *Id.* “If they were prepared to persuade investors to invest in the enterprise or lenders to lend to it, there may have been the opposite incentive.” *Id.*

600. FED. R. EVID. 702; TEX. R. EVID. 702.

601. See, e.g., *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 717 (Tex. 1997).

602. See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 582–84, 589 (1993); *Joiner*, 522 U.S. at 138–43; *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141–47 (1999).

603. See *Daubert*, 509 U.S. at 580; *Joiner*, 522 U.S. at 137.

604. See, e.g., *Pluck v. BP Oil Pipeline Co.*, 640 F.3d 671, 676–77 (6th Cir. 2011) (“In a toxic-tort case, as here, the plaintiff must establish both general and specific causation through proof that the toxic substance is capable of causing, and did cause, the plaintiff’s alleged injury.”).

605. See, e.g., *Johnson v. Arkema, Inc.*, 685 F.3d 452, 469 (5th Cir. 2012); *Best v. Lowe’s Home Ctrs., Inc.*, 563 F.3d 171, 178, 181 (6th Cir. 1999).

that a particular substance causes a particular injury, experts in toxic tort cases often rely on epidemiological studies and animal studies as indirect evidence of general causation.<sup>606</sup> Evidence of specific causation in a toxic tort case is typically more direct. Once general causation is established, a claimant's treating physician, or another physician who has reviewed the claimant's medical records, often will opine that the claimant's injury was caused by his exposure to the toxic chemical based on a "differential diagnosis" technique.<sup>607</sup>

*ii. Epidemiological Studies.* Epidemiology is the "basic science of disease prevention."<sup>608</sup> Epidemiology endeavors to identify environmental (and, more recently, genetic) risk factors for disease and to offer insights into the mechanisms involved in the origin of different diseases, as a first step in developing approaches to prevention.<sup>609</sup> Epidemiological investigation of disease pathogenesis (the mechanism that causes a disease) can be divided into two steps: first, a statistical analysis of collected data to determine if a scientifically valid association exists between an agent and a disease; second, if a valid association exists, a determination of what conclusions (including conclusions about causation) can be derived from the data.<sup>610</sup> In the first step, associations are assessed in terms of several important considerations including: the relative risk, the confidence interval, and the quality of information.<sup>611</sup> Relative risk measures how much more likely a person exposed to a particular substance is to contract a particular disease than is an unexposed person.<sup>612</sup> "A confidence interval provides both the relative risk (or other risk measure) found in the study and a range (interval) within which the risk likely would fall if the study were repeated numerous times."<sup>613</sup> Finally, the quality of a

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606. See, e.g., *Daubert*, 509 U.S. at 582–83 (noting that "[n]o study had found Bendectin to be a human teratogen"; therefore, the plaintiffs' experts relied, in part, on "animal studies that found a link between Bendectin and malformations").

607. See, e.g., *Johnson*, 685 F.3d at 469; *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 18 (1st Cir. 2011); *Goebel v. Denver & Rio Grande W.R.R.*, 346 F.3d 987, 999 (10th Cir. 2003). The differential diagnosis technique is discussed under "methodology," below. See *infra* Part III.C.2.j.

608. LEON GORDIS, *EPIDEMIOLOGY* vii (4th ed. 2009).

609. *Id.* at 3–6.

610. Frank C. Woodside, III & Allison G. Davis, *The Bradford Hill Criteria: The Forgotten Predicate*, 35 T. JEFFERSON L. REV. 103, 107–08 (2013) (citing DAVID E. LILIENTHAL & PAUL D. STOLLEY, *FOUNDATIONS OF EPIDEMIOLOGY* 12 (3d ed. 1994)).

611. *Id.* at 109–11.

612. *Id.* at 109–10.

613. Michael D. Green, D. Michal Freedman & Leon Gordis, *Reference Guide on Epidemiology*, in *REFERENCE MANUAL ON SCIENTIFIC EVIDENCE* 573 (3d ed. 2011); see also

particular epidemiological study depends on its limitations, including the potential for selection bias, information bias, misclassification bias, confounding, or sampling error.<sup>614</sup>

Epidemiological studies fall into one of two categories: observational studies and experimental studies.<sup>615</sup> In the first category, researchers “observe” a group of individuals who have been exposed to an agent and compare them with another group of individuals who have not been exposed.<sup>616</sup> In experimental studies, by contrast, individuals in exposed and control groups are chosen at random and the epidemiologist controls the conditions under which the study is conducted.<sup>617</sup> Because they are controlled and prospective, randomized clinical trials are more reliable than observational studies.<sup>618</sup> They are sometimes referred to as the “gold standard.”<sup>619</sup>

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*id.* at 580 (“A confidence interval is a range of possible values calculated from the results of a study. If a 95% confidence interval is specified, the range encompasses the results we would expect 95% of the time if samples for new studies were repeatedly drawn from the same population. Thus, the width of the interval reflects random error. The narrower the confidence interval, the more statistically stable the results of the study. . . . [T]he confidence interval reveals the likely range of risk estimates consistent with random error.”); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 723 (Tex. 1997) (“A confidence interval shows a ‘range of values within which the results of a study sample would be likely to fall if the study were repeated numerous times.’” (quoting Linda A. Bailey, Leon Gordis & Michael Green, *Reference Guide on Epidemiology*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 173 (1994))).

614. Woodside & Davis, *supra* note 610, at 110–11 & n.36.

615. Observational epidemiological studies include four major types of study design: (1) cohort studies; (2) case-control studies; (3) cross-sectional studies; and (4) ecological studies. Green, Freedman & Gordis, *supra* note 613, at 549, 556–57. Cohort studies and case-control studies are the most common observational study designs. *Id.* at 556. The primary difference between these designs is in how the two groups in the study are comprised. *Id.* at 557. Cohort studies measure association by comparing the incidence of disease in an exposed group and an unexposed (control) group. *Id.* Case-control studies measure association by comparing the frequency of exposure in a group with the disease and a (control) group without the disease. *Id.*

616. *Id.* at 555–56.

617. *Id.* at 556; *Merck & Co. v. Garza*, 347 S.W.3d 256, 263 (Tex. 2011) (citing *LILIENTHAL & STOLLEY*, *supra* note 610, at 151).

618. *Merck*, 347 S.W.3d at 263; *see also* Green, Freedman & Gordis, *supra* note 613, at 555.

619. Green, Freedman & Gordis, *supra* note 613, at 555; *see also* *Khun v. Wyeth, Inc.*, 686 F.3d 618, 622–23 (8th Cir. 2012); *In re Celexa & Lexapro Prods. Liab. Litig.*, 927 F. Supp. 2d 758, 768 (E.D. Mo. 2013); *In re Neurontin Mktg. & Sales Practices Litig.*, No. 04-CV-10739-PBS, 2011 WL 3852254, at \*34 (D. Mass. Aug. 31, 2011), *aff'd*, 712 F.3d 21 (1st Cir. 2013); *Deutsch v. Novartis Pharm. Corp.*, 768 F. Supp. 2d 420, 430 (E.D.N.Y. 2011); *In re Avandia Mktg., Sales Practices & Prods. Liab. Litig.*, No. 1871, 2011 WL 13576, at \*2 (E.D. Pa. Jan. 4, 2011); *United States v. Harkonen*, No. C 08-00164 MHP, 2010 WL 2985257, at \*3 (N.D. Cal. July 27, 2010); *Tucker v. SmithKline Beecham Corp.*, 701 F. Supp. 2d 1040, 1060 (S.D. Ind. 2010); *In re Neurontin Mktg., Sales Practices, & Prods. Liab. Litig.*, 612 F. Supp. 2d 116, 125 (D. Mass. 2009); *In re Viagra Prods. Liab. Litig.*, 572 F. Supp. 2d 1071, 1078 (D. Minn. 2008); *Ranes v. Adams Labs., Inc.*, 778 N.W.2d 677, 692 (Iowa 2010).

In courtrooms, epidemiological evidence is commonly used to support conclusions about general causation, especially when more direct evidence of causation is not available.<sup>620</sup> Although epidemiological evidence is widely accepted as the type of evidence that can provide a sound predicate for expert determinations of general causation,<sup>621</sup> and is sometimes identified as the best type of (indirect) evidence for that purpose,<sup>622</sup> the adequacy of the particular epidemiological evidence relied on to establish general causation in a particular case is the subject of much litigation. Frequently, individual epidemiological studies find an association in the first step of the process but are not able to make determinations of causation based on that association alone.<sup>623</sup> Courts are careful to observe that, although evidence of association can tend to show causation, association and causation are not legally equivalent.<sup>624</sup> Courts have been particularly critical of epidemiological studies when there are other plausible causes that are not discounted and the connection between exposure and the disease is merely temporal.<sup>625</sup> With respect to the latter, courts have invoked the logical fallacy of *post hoc ergo propter hoc*, observing that causation cannot be presumed merely because the disease or its symptoms follow the exposure.<sup>626</sup>

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620. Green, Freedman & Gordis, *supra* note 613, at 551–52.

621. *Id.* at 551 n.2 (listing authorities).

622. See *Norris v. Baxter Healthcare Corp.*, 397 F.3d 878, 882 (10th Cir. 2005) (“[E]pidemiology is the best evidence of general causation in a toxic tort case.”); *Brock v. Merrell Dow Pharm., Inc.*, 874 F.2d 307, 311 (5th Cir. 1989) (“[T]he most useful and conclusive type of evidence in a case such as this is epidemiological studies.”), *modified*, 884 F.2d 166 (5th Cir. 1989) (per curiam); see also David E. Bernstein, *The Admissibility of Scientific Evidence After Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 15 CARDOZO L. REV. 2139, 2166 (1994) (“Epidemiological data is by far the best evidence that can be presented on the issue of whether a substance causes human health effects, because epidemiological data is based on statistical studies of human populations.”).

623. See, e.g., *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 715 (Tex. 1997).

624. *Berry v. CSX Transp., Inc.*, 709 So. 2d 552, 558 (Fla. Dist. Ct. App. 1998); *King v. Burlington N. Santa Fe Ry. Co.*, 762 N.W.2d 24, 35–36 (Neb. 2009); *Fraser v. 301–52 Townhouse Corp.*, 870 N.Y.S.2d 266, 268 (N.Y. App. Div. 2008); *Havner*, 953 S.W.2d at 727; Green, Freedman & Gordis, *supra* note 613, at 552.

625. See *Hendrix ex rel. G.P. v. Evenflo Co.*, 609 F.3d 1183, 1197 (11th Cir. 2010); *Huss v. Gayden*, 571 F.3d 442, 458–59 (5th Cir. 2009); *Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1211 (10th Cir. 2002); *Glastetter v. Novartis Pharm. Corp.*, 252 F.3d 986, 989–90 (8th Cir. 2001).

626. See *Hendrix*, 609 F.3d at 1197 (referencing the *post hoc ergo propter hoc* fallacy in stating that “[c]ase studies and clinical experience, used alone and not merely to bolster other evidence, are also insufficient to show general causation”); *Huss*, 571 F.3d at 458–59 (invoking the fallacy when rejecting reliance on a case control study showing a correlation between Terbutaline therapy and cardiomyopathy); see also *Jelinek v. Casas*, 328 S.W.3d 526, 533–34 (Tex. 2010) (stating that “[c]are must be taken to avoid the *post hoc ergo propter hoc* fallacy, that is, finding an earlier event caused a later event merely because it

The issue in *Daubert* was the admissibility of the expert opinion testimony that the drug Bendectin caused certain birth defects.<sup>627</sup> After rejecting *Frye*'s "general acceptance" test in favor of Rule 702's relevancy and reliability requirements,<sup>628</sup> the *Daubert* Court remanded the case for application of the new framework for determining the admissibility of expert evidence.<sup>629</sup> On remand, the *Daubert II* court excluded opinion testimony that Bendectin caused the birth defects from experts relying on three categories of predicates: epidemiological studies, animal studies, and the chemical structure of Bendectin, as compared to that of other drugs suspected of causing birth defects.<sup>630</sup> With regard to the epidemiological studies, the *Daubert II* court held that, for an epidemiological study to show causation under a preponderance of the evidence standard, it would have to demonstrate a relative risk of at least 2.0—i.e., that birth defects were twice as likely among mothers who took Bendectin than mothers who did not.<sup>631</sup> "A relative risk of less than two," according to the court, "tends to *disprove* legal causation."<sup>632</sup>

The Texas Supreme Court reached the same conclusion in *Havner*, another Bendectin birth defect case.<sup>633</sup> The *Havner* Court held that "properly designed and executed epidemiological studies may be part of the evidence supporting causation in a toxic tort case"<sup>634</sup> but placed several limitations on when an expert may rely on epidemiological studies to support causation testimony in Texas. First, the studies themselves must have been conducted using "sound methodology."<sup>635</sup> The *Havner* Court instructed Texas courts to examine the design and execution of

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occurred first," and holding that testimony of family members about claimant's suffering after treatment was not reliable evidence that treatment caused suffering).

627. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 582–85 (1993).

628. *Id.* at 589–92.

629. *Id.* at 598.

630. *Daubert II*, 43 F.3d 1311, 1317–19 (9th Cir. 1995).

631. *Id.* at 1320–21. The court stated,

California tort law requires plaintiffs to show not merely that Bendectin increased the likelihood of injury, but that it more likely than not caused *their* injuries. In terms of statistical proof, this means that plaintiffs must establish not just that their mothers' ingestion of Bendectin increased somewhat the likelihood of birth defects, but that it more than doubled it—only then can it be said that Bendectin is more likely than not the source of their injury.

*Id.* at 1320 (citation omitted).

632. *Id.* at 1321.

633. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 708 (Tex. 1997).

634. *Id.* at 717.

635. *Id.* at 718–19.

the epidemiological studies, especially for bias.<sup>636</sup> Second, the Court held that the studies must demonstrate relative risk of more than 2.0—i.e., more than a “doubling of the risk”—which the Court linked to the “more likely than not” standard of proof applicable to causation.<sup>637</sup> The Court cautioned that a relative risk of more than 2.0 was not “a litmus test,” and that even a high relative risk does not necessarily prove a causal relationship.<sup>638</sup> The Court expressly declined to decide “whether epidemiological evidence with a relative risk of less than 2.0, coupled with other credible and reliable evidence, may be legally sufficient to support causation.”<sup>639</sup> Finally, the Court noted the particular importance of replication in epidemiology,<sup>640</sup> and stated that “an isolated study finding statistically significant association between Bendectin and [the birth] defects would not be legally sufficient evidence of causation.”<sup>641</sup>

*Havner’s* conclusion must be considered in context. The epidemiological evidence in *Havner* was limited to observational epidemiological studies—rather than experimental studies, which are more reliable<sup>642</sup>—that demonstrated low relative risks and wide, nonstatistically significant confidence intervals.<sup>643</sup> The epidemiological studies were not bolstered by other reliable evidence.<sup>644</sup> And the claimant presented no independent scientific evidence of specific causation.<sup>645</sup> Thus, when the Texas Supreme

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636. See *id.* at 718–19 & n.2 (referring to the nine criteria set forth in Austin Bradford Hill, *The Environment and Disease: Association or Causation?*, 58 PROC. ROYAL SOC’Y MED. 295, 295–99 (1965)).

637. *Id.* at 717.

638. *Id.* at 718 (observing that studies had demonstrated an association between getting breast implants and reduced breast cancer rates, but “[t]his does not necessarily mean that breast implants caused the reduced rate of breast cancer”).

639. *Id.* at 719.

640. See *id.* at 727. The replication at issue here is actual replication of positive associations in different populations, not replication in the sense of whether a particular scientific method is capable of being repeated and thus tested; cf. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593 (1993) (observing that a “key question” in determining the reliability of expert testimony is whether the theory or technique “can be (and has been) tested”).

641. *Havner*, 953 S.W.2d at 727. For a thorough discussion of *Havner*, see Brown, *supra* note 1, at 798–800, 813–14, 819–20, 838–48.

642. As noted above, because they are controlled and prospective, randomized clinical trials are more reliable than observational studies. *Merck & Co. v. Garza*, 347 S.W.3d 256, 263 (Tex. 2011).

643. *Havner*, 953 S.W.2d at 723.

644. *Id.* at 728–30. The plaintiffs’ expert did rely on other evidence, specifically in vivo and in vitro animal studies. See *id.* But the Court found that evidence unreliable because, like the animal studies in *Daubert*, they were not adequately tied to the development of birth defects in humans—i.e., they lacked connective reliability. *Id.* at 729–30; see *infra* Part III.D.

645. *Havner*, 953 S.W.2d at 714–15; see also *Merrell Dow Pharm., Inc. v. Havner*, 907 S.W.2d 535, 548 (Tex. App.—Corpus Christi 1994), *rev’d*, 953 S.W.2d 706 (Tex. 1997).

Court issued *Havner*, it was not clear that the Court's pronouncements would apply to all epidemiological evidence in toxic tort cases across the board.

In *Merck & Co. v. Garza*, the plaintiffs argued that *Havner's* requirement of at least two epidemiological studies demonstrating at least a "doubling of the risk" did not apply to clinical trials or, if the requirement did apply to clinical trials, it was not a bright-line rule.<sup>646</sup> The Texas Supreme Court rejected these arguments and "reiterate[d] that when parties attempt to prove general causation using epidemiological evidence, a threshold requirement of reliability is that the evidence demonstrate a statistically significant doubling of the risk."<sup>647</sup> With respect to the difference between observational and experimental epidemiological studies, the Court stated:

[W]hile the controlled, experimental, and prospective nature of clinical trials undoubtedly makes them more reliable than retroactive, observational studies, both must show a statistically significant doubling of the risk in order to be some evidence that a drug more likely than not caused a particular injury. The superior way in which a study is conducted does not justify taking its conclusion to be anything other than what it is.<sup>648</sup>

On this basis, the Court concluded that the requirements identified in *Havner* "necessarily apply to all epidemiological evidence."<sup>649</sup>

Although the *Merck* Court decided the case on the basis of general causation without reaching the plaintiffs' specific causation evidence, the plaintiffs in that case presented separate evidence of specific causation.<sup>650</sup> The Court could have distinguished *Havner* on this basis, because the plaintiffs in *Havner* relied exclusively on epidemiological evidence and animal

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646. *Merck*, 347 S.W.3d at 262.

647. *Id.* at 265. The Texas Supreme Court has, on the other hand, recognized that epidemiological studies are not always necessary to establish causation. *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 772 (Tex. 2007) ("While such studies are not necessary to prove causation, we have recognized that 'properly designed and executed epidemiological studies may be part of the evidence supporting causation in a toxic tort case,' and 'the requirement of more than a doubling of the risk strikes a balance between the needs of our legal system and the limits of science.'" (quoting *Havner*, 953 S.W.2d at 717-18)).

648. *Merck*, 347 S.W.3d at 263-64.

649. *Id.* at 264.

650. *See Merck & Co. v. Garza*, 277 S.W.3d 430, 437 (Tex. App.—San Antonio 2008) (concluding that the differential diagnosis testimony of Dr. Simonini adequately eliminated other potential causes for Garza's heart attack), *rev'd*, 347 S.W.3d 256 (Tex. 2011).

studies to establish both specific and general causation.<sup>651</sup> Several jurisdictions have held the 2.0+ minimum for epidemiological evidence applies only when the expert relies on epidemiological evidence to prove specific causation, not when the expert relies on it to prove general causation. In *In re Bextra and Celebrex Marketing Sales Practices and Product Liability Litigation*, the district court for the Northern District of California distinguished *Daubert II* (on which the *Havner* Court relied in adopting the “doubling of the risk” standard<sup>652</sup>) on this basis, stating that a relative risk of greater than 2.0 is necessary for epidemiological studies to be probative of *specific* causation but the same analysis does not apply when epidemiological evidence is relied on only to show *general* causation.<sup>653</sup> The district court for the Central District of California reached the same conclusion in *In re Silicone Gel Breast Implants Products Liability Litigation*,<sup>654</sup> as have several other federal district courts.<sup>655</sup> The Superior Court of Delaware likewise distinguished between general and specific causation, indicating that requiring a relative risk of 2.0 “makes sense” in the context of specific causation, in which the plaintiff must show that the substance in question “more likely than not” caused the injury in question.<sup>656</sup> But when epidemiological evidence “is offered to support general causation, whether the exposure could cause harm at all, a less stringent standard is, by definition, weaker but potentially probative.”<sup>657</sup>

But in *Merck*, the Texas Supreme Court applied the “doubling of the risk” requirement for epidemiological evidence without regard to whether there was separate, reliable evidence

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651. See *Merrell Dow Pharm., Inc. v. Havner*, 907 S.W.2d 535, 551–57 (Tex. App.—Corpus Christi 1994) (discussing each of the plaintiffs’ experts and their testimony individually), *rev’d*, 953 S.W.2d 706 (Tex. 1997); see also *BIC Pen Corp. v. Carter*, 346 S.W.3d 533, 545 (Tex. 2011) (discussing *Havner*’s “doubling of the risk” requirement in terms of specific causation); *Havner*, 907 S.W.2d at 565 (Seerden, C.J., dissenting) (noting that only one expert testified as to specific causation; that expert relied on the same evidence as the other experts did for general causation and provided no basis for his elimination of other potential causes).

652. *Havner*, 953 S.W.2d at 716.

653. *In re Bextra & Celebrex Mktg. Sales Practices & Prod. Liab. Litig.*, 524 F. Supp. 2d 1166, 1172–73 (N.D. Cal. 2007).

654. *In re Silicone Gel Breasts Implants Prods. Liab. Litig.*, 318 F. Supp. 2d 879, 893 (C.D. Cal. 2004).

655. See, e.g., *In re Viagra Prods. Liab. Litig.*, 572 F. Supp. 2d 1071, 1081 (D. Minn. 2008) (distinguishing specific and general causation with respect to the 2.0 relative risk requirement for epidemiological studies).

656. *Tumlinson v. Advanced Micro Devices, Inc.*, No. 08C-07-106 FSS, 2013 WL 7084888, at \*6 (Del. Super. Ct. Oct. 15, 2013), *aff’d*, 81 A.3d 1264 (Del. 2013).

657. *Id.*

of specific causation.<sup>658</sup> And since *Merck*, the Court has continued to state the *Havner* requirements as absolutes for epidemiological evidence.<sup>659</sup> Even under *Borg-Warner Corp. v. Flores* and *Bostic v. Georgia-Pacific Corp.*, in which the Court lightened, to some degree, the burden of proving causation in multi-defendant asbestos-related suits, the Texas Supreme Court strictly adhered to the *Havner* standards for epidemiological evidence.<sup>660</sup> In light of the Texas Supreme Court's unequivocal statements in *Merck*, epidemiological evidence demonstrating a relative risk of less than 2.0 is probably not admissible to show either specific or general causation in Texas courts.<sup>661</sup>

A number of other jurisdictions have also indicated that a showing of a relative risk of at least 2.0 is necessary for epidemiological evidence to support an expert opinion on causation.<sup>662</sup> But other courts have shied away from, or expressly rejected, a bright-line numerical threshold.<sup>663</sup> Academics in the scientific community have contended that there are a number of deficiencies inherent in the adoption of this kind of bright-line rule.<sup>664</sup>

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658. *Merck & Co. v. Garza*, 347 S.W.3d 256, 265 (Tex. 2011).

659. *Bostic v. Ga.-Pac. Corp.*, No. 10-0775, 2014 WL 3797159, at \*11 (Tex. July 11, 2014).

660. *Id.*; *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 771–72 (Tex. 2007). As discussed below, *Bostic* both lightened and made heavier the plaintiff's burden. *See infra* notes 683–712 and accompanying text.

661. *Merck*, 347 S.W.3d at 265; *see also Bostic*, 2014 WL 3797159, at \*4.

662. *Allison v. McGhan Med. Corp.*, 184 F.3d 1300, 1315 n.16 (11th Cir. 1999); *Daubert II*, 43 F.3d 1311, 1320 (9th Cir. 1995); *DeLuca v. Merrell Dow Pharm., Inc.*, 911 F.2d 941, 958 (3d Cir. 1990); *Pozefsky v. Baxter Healthcare Corp.*, No. 92CV0314LEKRS, 2001 WL 967608, at \*3 (N.D.N.Y. Aug. 16, 2001); *Siharath v. Sandoz Pharm. Corp.*, 131 F. Supp. 2d 1347, 1356 (N.D. Ga. 2001), *aff'd sub nom. Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194 (11th Cir. 2002); *In re Breast Implant Litig.*, 11 F. Supp. 2d 1217, 1225–26 (D. Colo. 1998); *Hall v. Baxter Healthcare Corp.*, 947 F. Supp. 1387, 1403 (D. Or. 1996); *Sanderson v. Int'l Flavors & Fragrances, Inc.*, 950 F. Supp. 981, 1000 (C.D. Cal. 1996); *Manko v. United States*, 636 F. Supp. 1419, 1434 (W.D. Mo. 1986), *aff'd in relevant part*, 830 F.2d 831 (8th Cir. 1987); *Marder v. G.D. Searle & Co.*, 630 F. Supp. 1087, 1092 (D. Md. 1986), *aff'd sub nom. Wheelahan v. G.D. Searle & Co.*, 814 F.2d 655 (4th Cir. 1987) (per curiam); *In re Agent Orange Prod. Liab. Litig.*, 597 F. Supp. 740, 785 (E.D.N.Y. 1984), *aff'd*, 818 F.2d 145 (2d Cir. 1987); *Nonnon v. City of New York*, 932 N.Y.S.2d 428, 438 (N.Y. App. Div. 2011); *Estate of George v. Vt. League of Cities & Towns*, 993 A.2d 367, 377 (Vt. 2010).

663. *In re Joint E. & S. Dist. Asbestos Litig.*, 52 F.3d 1124, 1134 (2d Cir. 1995); *Pritchard v. Dow Agro Scis.*, 705 F. Supp. 2d 471, 486 (W.D. Pa. 2010), *aff'd*, 430 F. App'x 102 (3d Cir. 2011); *Miller v. Pfizer, Inc.*, 196 F. Supp. 2d 1062, 1079 (D. Kan. 2002), *aff'd*, 356 F.3d 1326 (10th Cir. 2004); *King v. Burlington N. Santa Fe Ry. Co.*, 762 N.W.2d 24, 46 (Neb. 2009); *Caterinicchio v. Pittsburgh Corning Corp.*, 605 A.2d 1092, 1094 (N.J. 1992); *McDaniel v. CSX Transp., Inc.*, 955 S.W.2d 257, 264 (Tenn. 1997).

664. *See, e.g., Sander Greenland, Relation of Probability of Causation to Relative Risk and Doubling Dose: A Methodological Error That Has Become a Social Problem*, 89 AM. J. PUB. HEALTH 1166, 1166–69 (1999) (summarizing two principal criticisms:

It is important to note that the rationale for adopting a “doubling of the risk” requirement is typically predicated on a preponderance-of-the-evidence or more-likely-than-not burden of proof.<sup>665</sup> When a different burden of proof applies, or when burdens are shifted away from the claimant, these rationales may lack force.<sup>666</sup> Texas courts of appeals have reached differing results, for example, with respect to whether *Havner* requires the exclusion of epidemiological studies that do not show a “doubling of the risk” in FELA cases,<sup>667</sup> in which the standard of proof for causation is significantly lower: the claimant need only show that the employer’s negligence “played a part—no matter how small—in bringing about the [claimant’s] injury.”<sup>668</sup>

It is also important to distinguish the “doubling of the risk” standard from a “doubling dose” standard advocated in some cases. In *In re Hanford Nuclear Reservation Litigation*, the Ninth Circuit rejected an argument that, under *Daubert II*, parties claiming that exposure to radiation had caused their illnesses had to “demonstrate that they had been exposed to a specific dose of radiation that statistically ‘doubled their risk’ of harm” to establish general causation.<sup>669</sup> The court observed that this argument blurred the lines between general and specific causation,<sup>670</sup> noting: “It is critical to stress that the plaintiffs in *Daubert II* had no scientific evidence that Bendectin was capable of causing birth defects (generic causation), and therefore were

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(1) “when exposure accelerates the time of disease occurrence, the standard epidemiologic estimates of probability of causation will tend to underestimate that probability”; and (2) “the exposure dose at which the probability of causation exceeds 50% (the point at which exposure causation is more likely than not) may fall well below the ‘doubling dose’ (the dose at which the incidence of disease is doubled)”.

665. See *Daubert II*, 43 F.3d 1311, 1320–21 (9th Cir. 1995); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 728 (Tex. 1997).

666. See *City of Littleton v. Indus. Claim Appeals Office of State*, No. 10CA1494, 2012 WL 5360912, at \*3–6 (Colo. App. Nov. 1, 2012) (en banc), *cert. granted sub nom.* *City of Littleton v. Indus. Claim Appeals Office*, No. 12SC871, 2013 WL 5630244 (Colo. Oct. 15, 2013).

667. See *Mo. Pac. R.R. Co. v. Navarro*, 90 S.W.3d 747, 759–60 (Tex. App.—San Antonio 2002, no pet.) (Lopez, J., concurring) (urging Texas courts to “embrace the distinction” between the different standards of proof for causation in state tort claims and FELA claims in this respect). Compare *id.* at 758 (majority opinion) (applying *Havner*’s “doubling of the risk factor” test to epidemiological studies of causal relationship between diesel exhaust and multiple myeloma), with *BNSF Ry. Co. v. Phillips*, 434 S.W.3d 675, 694, 709 (Tex. App.—Fort Worth 2014, pet. filed) (admitting causation testimony in a nontoxic tort case based in part on epidemiological studies despite dissent’s observation that claimant “made no effort to show that the studies demonstrated a doubling of the risk that was statistically significant at the 95% confidence level”).

668. *CSX Transp., Inc. v. McBride*, 131 S. Ct. 2630, 2644 (2011) (stating causation standard for FELA cases).

669. *In re Hanford Nuclear Reservation Litig.*, 292 F.3d 1124, 1130 (9th Cir. 2002).

670. *Id.* at 1134–35.

required to produce epidemiological studies to prove that Bendectin more likely than not caused their own particularized injuries (individual causation).<sup>671</sup> In *Hanford Nuclear*, by contrast, general causation was not truly questioned, and the issue was one of specific causation.<sup>672</sup> The court concluded that in that context it was error for the district court to require evidence that the claimants were exposed to a “doubling dose” of radiation without regard to individual risk factors such as heredity.<sup>673</sup>

It is not clear whether the Ninth Circuit’s distinction between “doubling of the risk” and “doubling dose” is viable under Texas law.<sup>674</sup> It is equally true in Texas that evidence of specific causation must account for the relevant characteristics of the claimant in the case, such as medical history and genetic disposition.<sup>675</sup> This would mean that once a claimant proffers reliable evidence of general causation, he must demonstrate that the substance at issue more likely than not caused his injury in light of actual circumstances, not that he was exposed to the dosage necessary to double the risk of injury under some generic set of circumstances.<sup>676</sup> And *Havner* reached largely the same result as *Daubert II*, under largely the same circumstances—the experts relied on the disputed epidemiological evidence to support conclusions on both general and specific causation.<sup>677</sup> Thus, the Texas Supreme Court could distinguish *Havner* in the same way that the Ninth Circuit distinguished *Daubert II*. But, as noted above, the Texas Supreme Court applied the *Havner* standard in *Merck* without distinction, even though the plaintiffs in *Merck* presented separate evidence of specific causation.<sup>678</sup>

In a 2011 workplace radiation case, the Fifth Circuit relied on the standards for expert causation evidence articulated in *Havner*, concluding that the plaintiffs’ evidence failed as a matter of law because their expert did not rule out potential causes of their injuries other than radiation.<sup>679</sup> Justice Dennis, who wrote

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671. *Id.* at 1136–37.

672. Claimants in the case alleged that their illness was caused by radiation emitted by a local nuclear power plant. *Id.* at 1137. The court stated that it had “been recognized by scientific and legal authority” that “[r]adiation is capable of causing a broad range of illnesses.” *Id.*

673. *Id.*; see also *Cano v. Everest Minerals Corp.*, 362 F. Supp. 2d 814, 823 (W.D. Tex. 2005).

674. See *Hanford Nuclear*, 292 F.3d at 1130.

675. See, e.g., *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 219–20 (Tex. 2010).

676. Cf. *Hanford Nuclear*, 292 F.3d at 1130.

677. See *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714–15 (Tex. 1997).

678. *Merck & Co. v. Garza*, 347 S.W.3d 256, 264 (Tex. 2011); *Merck & Co. v. Garza*, 277 S.W.3d 430, 437 (Tex. App.—San Antonio 2008), *rev’d*, 347 S.W.3d 256 (Tex. 2011).

679. *Cotroneo v. Shaw Env’t & Infrastructure, Inc.*, 639 F.3d 186, 193 (5th Cir. 2011).

the court's majority opinion and also wrote separately, concurred in the court's conclusion on this issue but disagreed with the court "basing its decision on rules of decision derived from [*Havner*]." <sup>680</sup> Citing *Hanford Nuclear*, he stated, "That was a Bendectin case in which the applicable rules of general or generic causation and individual or specific causation are different from those which should be applied in the instant nuclear radiation case." <sup>681</sup> At least one federal district court in Texas has followed *Hanford Nuclear* and applied its distinction between "doubling of the risk" and "doubling dose." <sup>682</sup>

The Texas Supreme Court addressed the standards for epidemiological evidence again in 2014. The principal issue in *Bostic* <sup>683</sup> was whether and how the Court's 2007 decision in *Flores*, <sup>684</sup> a multi-defendant asbestosis case, applied in a multi-defendant mesothelioma case. In *Flores*, the plaintiff alleged that he had suffered from asbestosis caused by exposure to various defendants' asbestos-containing products, including Borg-Warner's. <sup>685</sup> In the Texas Supreme Court, Borg-Warner argued that, with respect to its products, the plaintiff had not offered evidence of proximate causation, <sup>686</sup> which requires evidence of cause-in-fact—i.e., that the defendant's act or omission be a substantial factor in bringing about the plaintiff's injury (substantial factor causation), without which the injury would not have occurred (but-for causation). <sup>687</sup> Without using the phrase "but-for causation," <sup>688</sup> the Court held that a plaintiff in an

680. *Id.* at 200 & n.1 (Dennis, J., concurring in part and dissenting in part).

681. *Id.* at 200 n.1 (citing *Hanford Nuclear*, 292 F.3d at 1133–37).

682. *See* *Cano v. Everest Minerals Corp.*, 362 F. Supp. 2d 814, 823–24 (W.D. Tex. 2005).

683. *Bostic v. Ga.-Pac. Corp.*, No. 10-0775, 2014 WL 3797159, at \*1 (Tex. July 11, 2014).

684. *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 768 (Tex. 2007).

685. *Id.* at 766.

686. Under Texas law, proximate cause has two elements: cause-in-fact and foreseeability. *Rodriguez-Escobar v. Goss*, 392 S.W.3d 109, 113 (Tex. 2013). Cause-in-fact has two elements of its own: substantial factor and but-for causation. *Id.*

687. Brief for Petitioner at 13–22, *Flores*, 232 S.W.3d 765 (No. 05-0189), available at [www.supreme.courts.state.tx.us](http://www.supreme.courts.state.tx.us) (under "Electronic Briefs" for 2005 cases).

688. The Court did, however, endorse the Restatement's formulation of "legal cause." *Flores*, 232 S.W.3d at 769–70 (citing RESTATEMENT (SECOND) OF TORTS § 431 (1965)). In comment *a*, the Restatement states,

The word "substantial" is used to denote the fact that the defendant's conduct has such an effect in producing the harm as to lead reasonable men to regard it as a cause, using that word in the popular sense, in which there always lurks the idea of responsibility, rather than in the so-called "philosophic sense," which includes every one of the great number of events without which any happening would not have occurred.

RESTATEMENT (SECOND) OF TORTS § 431 cmt. a (1965). The *Flores* Court parroted this statement, quoting a 1991 Texas Supreme Court opinion that, in turn, quoted this

asbestos action must submit evidence that a defendant's product (and not merely any asbestos-containing product) was a substantial factor in bringing about the plaintiff's injury. The Court stated that this substantial factor standard of causation includes the "*Lohrmann* test" of "frequency, regularity, and proximity"<sup>689</sup> but also requires something more.<sup>690</sup> This evidentiary burden is not subject to "mathematical precision," but it does require "[d]efendant-specific evidence relating to the approximate dose to which the plaintiff was exposed, coupled with evidence that the dose was a substantial factor in causing the asbestos-related disease."<sup>691</sup>

The *Bostic* Court shed additional light on *Flores*'s substantial factor standard of causation, holding that it (1) applies to mesothelioma cases as well as asbestosis cases;<sup>692</sup> (2) *does not* require a plaintiff to present defendant-specific evidence of but-for causation;<sup>693</sup> and (3) *does* require a plaintiff to, in the

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language from the Restatement. *Flores*, 232 S.W.3d at 770 (quoting *Lear Siegler, Inc. v. Perez*, 819 S.W.2d 470, 472 (Tex. 1991)). The "without which any happening would not have occurred" language incorporates the idea of but-for causation. *Flores* thus might have been read as preserving the but-for causation requirement.

689. See *Lohrmann v. Pittsburgh Corning Corp.*, 782 F.2d 1156, 1162–63 (4th Cir. 1986).

690. *Flores*, 232 S.W.3d at 772 ("[P]roof of mere frequency, regularity, and proximity is necessary but not sufficient, as it provides none of the quantitative information necessary to support causation under Texas law."). It is not enough to prove "that the plaintiff was exposed to 'some' respirable fibers traceable to the defendant." *Bostic v. Ga.-Pac. Corp.*, No. 10-0775, 2014 WL 3797159, at \*1 (Tex. July 11, 2014). (describing *Flores*). The Court in *Flores* also noted that "while some respirable fibers may be released upon grinding some brake pads, the sparse record here contains no evidence of the approximate quantum of Borg-Warner fibers to which Flores was exposed, and whether this sufficiently contributed to the aggregate dose of asbestos Flores inhaled, such that it could be considered a substantial factor in causing his asbestosis." *Flores*, 232 S.W.3d at 772.

691. *Id.* at 773.

692. *Bostic*, 2014 WL 3797159, at \*5. The Court had a six-member majority on this holding, including the five justices who joined the majority opinion in its entirety and the one concurring justice.

693. *Id.* at \*6 ("[W]e follow *Flores* and conclude that in products liability cases where the plaintiff was exposed to multiple sources of asbestos, substantial factor causation is the appropriate basic standard of causation without including as a separate requirement that the plaintiff meet a strict but for causation test."). The Court had the same six-member majority on this holding. In support of this holding, the Court observed,

Due to the nature of the disease process, which can occur over decades and involve multiple sources of exposure, establishing which fibers from which defendant actually caused the disease is not always humanly possible. Even if the exposure from a particular defendant was by itself sufficient to cause the disease, in multiple-exposure cases the plaintiff may find it impossible to show that he would not have become ill but for the exposure from that defendant.

*Id.*

The *Bostic* Court indicated that this outcome was dictated by *Flores*, stating that "[t]he absence of but for language in *Flores* was not inadvertent." *Id.* at \*7. But as noted above, *Flores* did quote the "without which" language from the Restatement, *supra*

absence of “direct proof of causation,” present evidence that “the plaintiff’s exposure to the defendant’s product more than doubled his risk of contracting the disease,” which “must be shown through reliable expert testimony that is based on epidemiological studies or similarly reliable scientific testimony”—i.e., the plaintiff must show that his exposure to each defendant’s products was at or above the level of exposure at which his epidemiological evidence showed an above-2.0 relative risk under *Havner*.<sup>694</sup> The Court stated that a defendant-specific showing of a more-than-doubling-of-the-risk is necessary but not alone sufficient to establish substantial factor causation.<sup>695</sup> Under this standard, “the dose must be

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note 688, and in fact, the *Bostic* Court quoted this language from *Flores* at the outset of the opinion. *Id.* at \*1. Regardless, the *Bostic* Court rejected any but-for requirement in multi-exposure, asbestos-related toxic tort actions, and surmised that the Restatement’s authors would agree: “[W]e do not think the Restatements, in their attempts to synthesize many decades of tort law, would require the plaintiffs to meet a strict but for causation test in a case like today’s case.” *Id.* at \*8.

The Restatement (Third) of Torts: Physical & Emotional Harm reformulates the causation standard. As noted above, the Restatement (Second) of Torts requires “legal cause,” which it defines to include both the substantial factor and but-for causation elements. RESTATEMENT (SECOND) OF TORTS § 431(a), (b), cmt. a. The Restatement (Third) separates these two causal elements into “factual cause,” which is but-for causation, *see* RESTATEMENT (THIRD) OF TORTS: PHYSICAL & EMOTIONAL HARM § 26 (2005) (“Conduct is the factual cause of harm when the harm would not have occurred absent the conduct.”), and the “scope of liability (proximate cause),” which is somewhat similar to Texas’s foreseeability element of causation, *see id.* § 29 (“An actor’s liability is limited to harms that result from the risks that made the actor’s conduct tortious.”). Unlike its predecessor, the Restatement (Third) includes two sections that expressly address the application of the but-for causation requirement in the context of harms caused by multiple actors. First, under section 27, when multiple acts occur, each of which would have been a but-for cause of the harm individually, each act is considered a factual cause. *Id.* § 27 (“multiple sufficient causes”). A common example of this scenario is when two defendants fatally shot the plaintiff at the same time. Each defendant could argue that his own shot was not a but-for cause of the plaintiff’s death because the other shot would have killed the plaintiff. Section 27 treats both defendants as the but-for cause of the plaintiff’s death. Second, under section 28(b), when a plaintiff proves that multiple actors engaged in tortious conduct, one or more of which caused the plaintiff’s injury, if the plaintiff cannot reasonably be expected to prove which actor or actors caused the harm, the burden of proof shifts to the defendants. *Id.* § 28(b). The comments indicate that section 28(b) was drafted with toxic tort cases in mind. *See id.* § 28 cmt. c. The U.S. Supreme Court recently cited the Restatement (Third) when refusing to strictly require proof of but-for causation under a federal statute authorizing restitution for crime victims upon a showing of proximate cause. *Paroline v. United States*, 134 S. Ct. 1710, 1723–29 (2014).

694. *Bostic*, 2014 WL 3797159, at \*11. The Court had a five-member majority on this holding, made up of the five justices who joined the majority opinion in its entirety.

695. *Id.* at \*12 (“[W]hen evidence is introduced of exposure from other defendants or other sources, proof of more than a doubling of the risk may not suffice to establish substantial factor causation.”). The Court offered this example:

Suppose a plaintiff shows that his exposure to a defendant’s product more than doubled his chances of contracting a disease, but the evidence at trial also established that another source of the toxin increased the chances by a factor of 10,000. In this circumstance, a trier of fact or a court reviewing the sufficiency of

quantified but need not be established with mathematical precision[.]”<sup>696</sup>

Applying these standard’s to the Bostics’ case—brought against Georgia-Pacific and 39 other manufacturers of asbestos-containing products—the Court held that there was no evidence that Timothy Bostic’s exposure to Georgia-Pacific’s products more than doubled the risk of mesothelioma.<sup>697</sup> Bostic, who was forty at the time of his death, had been exposed to multiple sources of asbestos throughout his life.<sup>698</sup> There was evidence that he was exposed to Georgia-Pacific’s asbestos-containing joint compound while he was a minor, from occasional remodeling projects that he worked on with his father and from exposure to his father’s clothing after his father performed various projects.<sup>699</sup> Georgia-Pacific stopped manufacturing the asbestos-containing joint compound when Bostic was fifteen.<sup>700</sup> The Bostics’ experts testified that “each and every exposure” to asbestos was a cause of Bostic’s mesothelioma, and did not attempt to quantify Bostic’s exposure to any one defendant’s products. The Bostics’ specific causation expert “made no attempt to measure Bostic’s actual aggregate dose assignable to Georgia-Pacific or any other source.”<sup>701</sup> The Court held that “[p]roof of substantial factor causation requires some quantification of the dose resulting from Bostic’s exposure to Georgia-Pacific’s products,” and the Bostics’ claim against Georgia-Pacific failed because they did not offer any dose-quantifying evidence.<sup>702</sup>

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the evidence should be allowed to conclude that the defendant’s product was not a substantial factor in causing the disease.

*Id.*

696. *Id.* at \*14.

697. *Id.* at \*14–15.

698. *Id.*

699. *Id.* at \*14.

700. *Id.*

701. *Id.* at \*15.

702. *Id.* at \*16–18. The Court looked at the epidemiological studies underlying the Bostics’ experts’ testimony and concluded that none of them supported an association between the disease and the kind of occasional exposure to asbestos to which Bostic testified with respect to Georgia-Pacific’s products. To the contrary, they examined consistent, occupational exposure. *See id.*

One Justice concurred in the *Bostic* judgment, agreeing that Bostic’s causation evidence was legally insufficient but disagreeing with the legal standard adopted by the majority. *Id.* at \*19–20. The concurring Justice noted that the Bostics “offered epidemiological studies of occupational exposure that were extrapolated to purportedly measure risk from occasional exposure,” such as Timothy Bostic’s exposure to Georgia-Pacific’s products, but they “never substantiated those extrapolations, yielding an analytical gap in [their] proof of causation.” *Id.* at \*20.

Three justices disagreed.<sup>703</sup> The dissent argued that causation in a multi-defendant toxic tort case involved three inquiries—general causation, specific causation, and substantial factor causation—and that the majority “improperly applie[d] *Havner* to answer all three questions.”<sup>704</sup> By doing so, the dissent asserted, the Court “effectively render[ed] *Havner* the exclusive measure of proof in toxic tort cases,” in direct conflict with *Havner*’s “affirmation that a plaintiff is always free to prove his case by ‘direct, scientifically reliable proof of causation.’”<sup>705</sup> The dissent concluded that the Bostics had put forth such “direct, scientifically reliable proof” of both specific and general causation (i.e., that asbestos can cause mesothelioma and that asbestos did in fact cause Timothy Bostic’s mesothelioma) and thus should not have to satisfy *Havner* to prove substantial factor causation (i.e., that asbestos from Georgia-Pacific’s product was a substantial cause of his mesothelioma).<sup>706</sup> The dissenting justices generally agreed with the majority that the determination of whether a particular defendant’s product was a substantial cause of a plaintiff’s disease should be based on evidence relating to the plaintiff’s aggregate exposure relative to the plaintiff’s exposure to the particular defendant’s products.<sup>707</sup> But they disagreed with the majority’s conclusion that the Bostics had failed to offer any dose-quantifying evidence, relying on evidence of “the approximate quantum of time Timothy was exposed to” Georgia-Pacific’s product.<sup>708</sup>

Regardless of whether the majority or the dissent in *Bostic* has the better argument as to whether the Bostics presented

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703. *Id.* at \*25–37 (Lehrman, J., joined by Boyd, J. and Devine, J., dissenting).

704. *Id.* at \*28. The majority disagreed, stating the “substantial factor” is not a separate causation requirement but, instead, “describe[s] the level of proof required to establish specific causation, which is always an element of the plaintiff’s case.” *Id.* at \*12.

705. *Id.* at \*28 (Lehrman, J., joined by Boyd, J. and Devine, J., dissenting). The majority agreed that if a plaintiff could establish that his exposure to a particular toxin is the only possible cause of his disease and that the defendant’s product is the only possible source of his exposure, “this proof might amount to direct proof of causation” such that the alternative means of proving causation through epidemiological studies might be unnecessary. *Id.* at \*13. But it did not agree that the Bostics had presented any direct proof that Georgia-Pacific’s product caused Timothy Bostic’s mesothelioma or that the testimony estimating the period of time over which Timothy was exposed to Georgia-Pacific’s product on some number of occasions amounted to evidence of how much exposure occurred during that period of time. *Id.* at \*17–18.

706. *Id.* at \*36.

707. *Id.* at \*36. “Timothy worked with his father throughout his childhood on residential construction projects. When he was only a boy, Timothy mixed dry joint compound, sanded it on the walls “[a]s far up as he could reach,” and swept the dust generated by sanding. Expert witnesses consistently maintained that exposure to asbestos during childhood can be particularly detrimental.” *Id.*

708. *Id.*

adequate “direct” evidence of causation, the dissent presents a strong argument that *Havner*’s doubling-of-the-risk requirement does not apply to defendant-specific causation evidence. Georgia-Pacific did not dispute that asbestos causes mesothelioma, nor did it truly challenge the contention that Bostic’s exposure to asbestos had caused his mesothelioma.<sup>709</sup> The principal dispute in the case was whether Georgia-Pacific’s asbestos-containing products caused Bostic’s mesothelioma, as opposed to the products of other manufacturers (some of whom had settled with the Bostics), to which Bostic may have had greater exposure.<sup>710</sup> The Court might have reached the same result in the case without extending the *Havner* requirements to defendant-specific exposure levels (as opposed to aggregate exposure levels) by relying on the considerations espoused in *Flores*: the *Lohrmann* “frequency, regularity, and proximity” test plus the Restatement (Second) of Torts’ substantial factor requirement.<sup>711</sup> As the dissent noted, by applying *Havner* to defendant-specific exposure levels, *Bostic* prevents a plaintiff from recovering from any defendant if he was exposed to asbestos from multiple products in small amounts, none of which alone more the doubled his risk of mesothelioma, but which collectively caused the mesothelioma.<sup>712</sup> An alternative approach would be to consider how “substantial” the plaintiff’s exposure to an individual defendant’s products is relative to his total exposure, which could include exposure to the products of manufacturers with which the plaintiff already settled.

Finally, although most of the jurisprudence on epidemiological evidence focuses on the probativeness of the studies (i.e., whether they actually tend to prove a causal relationship), courts have also rejected epidemiological evidence based on the soundness of the studies (i.e., when they do not bear

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709. *Id.* at \*1.

710. *Id.* at \*14–16.

711. *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 769–70 (Tex. 2007); *Lohrmann v. Pittsburgh Corning Corp.*, 782 F.2d 1156 1162–63 (4th Cir. 1986).

712. *Bostic*, 2014 WL 3797159, at \*30, \*37. Essentially, the majority opinion in *Bostic* effectuates the Restatement (Third)’s “multiple sufficient causes” exception to the but-for-causation requirement, at least for multi-defendant, asbestos-disease cases. *See infra* note 794. But this does not account for a scenario in which a disease is caused by exposure to multiple defendants’ products, none of which alone doubled the plaintiff’s relative risk but all of which combined to cause the plaintiff’s disease. A plaintiff who could conclusively prove that his mesothelioma was caused by exposure to asbestos in 200 defendants’ products might nevertheless be unable to recover against any defendant (at least in reliance on epidemiological evidence) because his aggregate exposure was significant but his exposure to each individual defendant’s products was minimal. The Restatement (Third) addresses this scenario, to some degree, with its burden-shifting rule. *See* RESTATEMENT (THIRD) OF TORTS, *supra* note 570, at §§ 27, 28.

the necessary indicia of reliability under *Daubert/Havner*) regardless of whether the study's results support the expert's conclusion.<sup>713</sup> In *Wells v. SmithKline Beecham Corp.*, the Fifth Circuit applied the *Daubert* factors to an observational epidemiological study on which the claimant's expert relied, the "Weintraub Poster study," and found that the study did not pass muster.<sup>714</sup> The claimant in the case alleged the drug Requip had caused his compulsive gambling.<sup>715</sup> The Weintraub Poster study found an association between a particular category of drug (dopamine agonists) and increased impulse behavior, including gambling.<sup>716</sup> The court observed that the study "pass[ed] none of the applicable *Daubert* tests": it had never been published or peer reviewed,<sup>717</sup> the results had not been replicated,<sup>718</sup> and the study's findings had not been "generally accepted" within the relevant scientific community.<sup>719</sup>

Several courts, including the Texas Supreme Court, have stated that epidemiological studies are not the only permissible means by which a toxic tort claimant can prove general causation.<sup>720</sup> But a substantial body of epidemiological evidence challenging causation cannot be ignored.<sup>721</sup> When relevant

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713. See, e.g., *Wells v. SmithKline Beecham Corp.*, 601 F.3d 375, 379–81 (5th Cir. 2010). After noting that epidemiological studies relied on by a testifying expert must be soundly designed and executed, the *Havner* Court went on to review not the reliability of the study's protocols but whether the results of the study had any meaningful bearing on causation, even assuming they were reliably produced. See *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 719–20 (Tex. 1997). Here, courts are not examining the methodology employed by the expert himself, but rather, the methodology employed by the scientists who conducted the epidemiological study. The Court has said that a testifying expert cannot rely on scientific studies if the scientists who conducted them did not employ reasonably sound practices or demonstrated unreasonable bias. See *id.* at 719.

714. *Wells*, 601 F.3d at 380. The Weintraub Poster study was a case-controlled observational study. See *id.* Echoing its statement in *Knight v. Kirby Inland Marine Inc.*, the court stated, "Although, '[c]ase-control studies are not per se inadmissible evidence on general causation,' this court has frowned on causation conclusions bereft of statistically significant epidemiological support." *Id.* (footnote omitted) (quoting *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 352 (5th Cir. 2007)) (holding that expert could not reliably extrapolate from a case-control study involving different workers, exposed to a different type of chemicals, for a different length of time).

715. *Id.* at 377.

716. *Id.* at 380.

717. *Id.*

718. *Id.* at 380 & n.29.

719. *Id.* at 380–81.

720. *Norris v. Baxter Healthcare Corp.* 397 F.3d 878, 882 (10th Cir. 2005); *Benedi v. McNeil-P.P.C., Inc.*, 66 F.3d 1378, 1384 (4th Cir. 1995); *Vassallo v. Baxter Healthcare Corp.*, 696 N.E.2d 909, 918 (Mass. 1998); *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 772 (Tex. 2007) (stating that epidemiological "studies are not necessary to prove causation").

721. *Norris*, 397 F.3d at 882; see also *Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 197 (5th Cir. 1996) (finding it significant that "numerous reputable epidemiological studies covering in total thousands of workers" indicated that there was no causation).

epidemiological evidence exists, the absence of such evidence in the record may be fatal when general causation is contested in a toxic tort case; but when epidemiological evidence is sparse or nonexistent, perhaps due to the rarity of the disease, the absence of statistically significant epidemiological evidence generally is not a “crucial flaw,” as long as there is other reliable evidence of causation.<sup>722</sup> Sometimes there is reliable, but not legally conclusive, epidemiological evidence to support conflicting conclusions about causation. Resolution of the conflict is an issue for the jury as long as there is reliable evidence on both sides of the issue, even if the evidence on one side is stronger than the evidence on the other side.<sup>723</sup>

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722. See, e.g., *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 24 (1st Cir. 2011); see also *Taber v. Roush*, 316 S.W.3d 139, 152–53 (Tex. App.—Houston [14th Dist.] 2010, no pet.) (responding to defendant’s criticism of plaintiff’s expert’s reliance on only prospective studies to support opinion on causation by observing that “[t]he dearth of prospective testing in support of the natural forces of labor theory is explained by ethical considerations that preclude a prospective study”).

723. See, e.g., *Khun v. Wyeth, Inc.*, 686 F.3d 618, 622–23 (8th Cir. 2012); *Taber*, 316 S.W.3d at 148–53 (holding in case that “centered on a battle of the experts” that challenges to caliber of expert’s predicative materials went to the weight of the expert evidence, not its admissibility). In *Khun v. Wyeth*, Wyeth relied on an experimental epidemiological study, the “WHI study,” as evidence that the drug Prempro had not caused the claimants’ breast cancer. *Khun*, 686 F.3d at 622. The WHI study of hormone therapy drugs comprised of estrogen and progestin, like Prempro, found that breast cancer rates were lower in women using the drug than women using the placebo during the first two years of use, approximately equal during the third year, and higher in the fourth and subsequent years. *Id.* at 626. Because the two claimants in *Khun* had used the drug for three years and less than two years, respectively, the WHI study did not support the expert’s conclusion that Prempro had caused the claimants’ breast cancer. *Id.* at 621–23. Instead, the claimants’ causation expert relied on three observational epidemiological studies to conclude that Prempro caused the claimants’ cancer. *Id.* at 628. The first study observed “a significant increase in risk for . . . breast cancer at 2 to 3 years of use” among 67,754 American women. *Id.* The second study involved more than one million women in England, more than 20,000 of whom took a hormone therapy drug with a formulation similar to Prempro, but the women reported their duration of use only at the time they enrolled in the study. *Id.* at 629. The study showed “elevated” relative risk of breast cancer among women who reported using the drug for less than a year at the time of enrollment and that “[t]he breast cancers were diagnosed on average 1.2 years after recruitment.” *Id.* The claimants’ expert testified that by adding the average 1.2 years from enrollment to diagnosis, the study could be said to show an elevated risk in less than 2.2 years of use. *Id.* at 629–30. The third study involved more than 50,000 French women. *Id.* at 630. The expert recognized that this approach would result in some “misclassifications” but that because of the “very large numbers” in the study, “small amounts of misclassifications don’t really make a lot of difference.” *Id.*

The court recognized that most French women use a different formulation than Prempro and that the study did not distinguish between different formulations of hormone therapy. *Id.* The study showed an increased risk of breast cancer among women taking hormone therapy for less than two years when the women began taking the hormone therapy shortly after the onset of menopause. *Id.* The claimants’ expert noted that the WHI study’s participants were more than ten years past the onset of menopause. *Id.* at 623. Wyeth argued that the WHI study was a randomized control study, “the ‘gold standard’ of epidemiological studies,” that disproved the contention that short term use of

*iii. Animal Studies.* Epidemiological studies are often considered the first tier for indirect proof of causation in the toxic tort context.<sup>724</sup> When epidemiological studies are unavailable or inconclusive, experts may turn to animal studies. Under the first component of predicative reliability, animal studies are subject to the same standards of internal integrity and validity applicable to epidemiological studies and all expert evidence generally—they must be properly designed and executed such that they could be reasonably relied upon by experts in the relevant field of expertise.<sup>725</sup> The second component of predicative reliability—whether the animal studies actually provide reliable support for the expert’s causation conclusion—is typically less about significance and meaning of the studies in and of themselves and more about the significance of the studies in relation to humans and the facts of the case.<sup>726</sup> For this reason, animal studies are primarily decided under the rubric of the connective reliability gate.<sup>727</sup> The question is whether the expert can adequately connect the results of the animal studies to the circumstances of the case, including bridging the anatomical differences between humans and the kinds of animals used in the studies.

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Prempro could cause breast cancer and that the claimants’ causation expert, who had relied on the WHI study in previous cases, had failed to adequately refute the study’s findings. *Id.* at 622–23. Wyeth argued that the claimants’ expert had “cherry picked” the three observational studies on which he relied from “a wealth of studies” showing no increased risk of breast cancer from short term use. *Id.* at 633. The MDL magistrate judge agreed and excluded the expert’s testimony. *Id.* at 626. The Eight Circuit disagreed. *Id.* at 627. The court stated that the claimants did not bear the burden of disproving the WHI study’s finding that short term use of Prempro does not increase the risk of breast cancer; as long as their expert “arrived at his contrary opinion in a scientifically sound and methodological fashion,” the issue was one of conflicting evidence for the jury to resolve. *Id.* at 626. The court likewise recognized the imperfections in the observational studies on which the claimants’ expert relied, but concluded that they “were sufficient to support his opinion that short term use of Prempro increases the risk of breast cancer.” *Id.* at 632. The court indicated that the limitations of the studies on which the expert relied went to the weight to be afforded the expert’s testimony by the jury, and that the “wealth” of observational studies Wyeth identified as reaching an opposite conclusion was likewise an issue of conflicting evidence, not admissibility. *Id.* at 632–33.

724. See Green, Freedman & Gordis, *supra* note 613, at 551 n.2, 555–56, 608–10 (“Epidemiologic studies have been well received by courts deciding cases involving toxic substances.”).

725. See generally FED. R. EVID. 703; *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595, 597 (1993).

726. See, e.g., *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144–45 (1997); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 728–29 (Tex. 1997); see also *Johnson v. Arkema, Inc.*, 685 F.3d 452, 463 (5th Cir. 2012) (quoting *Allen v. Pa. Eng’g Corp.*, 102 F.3d 194, 197 (5th Cir. 1996) for the proposition that animal studies have “very limited usefulness” in proving toxicity and “must be carefully qualified in order to have explanatory potential for human beings”).

727. Connective reliability is discussed below. See *infra* Part III.D.

One court of appeals has relied on *Havner* to state broadly that “[a]nimal studies, standing alone, are generally held to be inadequate to prove causation in humans absent other confirming epidemiological data.”<sup>728</sup> *Havner* is subject to differing constructions. It can be read to hold only that, when an expert relies on epidemiological evidence as a predicate for a causation opinion in a toxic tort case, the epidemiological evidence does not provide adequate support for the expert’s opinion unless it includes at least two studies demonstrating at least a “doubling of the risk”; or it can be read to hold when an expert offers a causation opinion in a toxic tort case, the predicate for the opinion must include at least two epidemiological studies demonstrating at least a “doubling of the risk”—no other predicate will suffice. The second construction of *Havner* would preclude an expert from ever reaching a causation opinion in a toxic tort case based on animal studies alone. This construction was advanced in a case recently decided by the Texas Supreme Court.<sup>729</sup> The Court’s opinion in *Bostic* establishes that epidemiological evidence is not an absolute requirement for proof of causation in a toxic tort: the plaintiff may choose instead to provide “direct, scientifically reliable proof of causation.”<sup>730</sup> *Havner* “offers an alternative method of establishing causation” when such direct proof is not available.<sup>731</sup>

While *Bostic* answers the question of whether *Havner*-satisfying epidemiological evidence is an absolute requirement for causation in toxic tort cases, it does not answer the question of whether animal studies could ever be sufficient in the absence of such epidemiological studies. *Bostic* recognized an exception for “direct” causation evidence, but animal studies, like epidemiological studies, are “indirect” causation evidence. Whatever the outcome in Texas, the U.S. Supreme Court’s rejection of the expert’s reliance on animal studies in *Joiner* is probably not so broad. The *Joiner* Court expressly noted that “whether animal studies can ever be a proper foundation for an expert’s opinion” was not the issue in the case.<sup>732</sup> Instead, the

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728. *Alza Corp. v. Thompson*, No. 13-07-00090-CV, 2010 WL 1254610, at \*18 (Tex. App.—Corpus Christi Apr. 1, 2010, no pet.) (mem. op.) (citing *Havner*, 953 S.W.2d at 729).

729. See Georgia-Pacific Corp.’s Brief on the Merits at 15–16, 30–33, *Bostic v. Ga.-Pac. Corp.*, No. 10-0775, 2014 WL 3797159 (Tex. July 11, 2014). The briefing in this case is available on the Texas Supreme Court’s website, [www.supreme.courts.state.tx.us/ebriefs/ebriefs.asp](http://www.supreme.courts.state.tx.us/ebriefs/ebriefs.asp), under the briefing for the 2010 cases (last visited Sept. 19, 2014).

730. *Bostic*, 2014 WL 3797159, at \*9 (quoting *Merrell Dow Pharm., Inc. v. Hanver*, 953 S.W.2d 706, 715 (Tex. 1997)).

731. *Id.*

732. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144 (1997).

Court focused on the analytical gap between the circumstances of the animal studies and the circumstances of the case (animal v. human, high concentration v. low concentration), and the expert's failure to bridge that gap (i.e., connective reliability).<sup>733</sup>

*iv. Published Literature.* Whether an expert's theory has been published and subjected to peer review is one of the factors identified in *Daubert* for evaluating the reliability of an expert's testimony.<sup>734</sup> Not coincidentally, reliance on published literature is common among scientific experts,<sup>735</sup> and published literature is generally viewed as a particularly reliable predicate for expert opinions.<sup>736</sup> But testimony may be reliable in the absence of published literature supporting the testimony.<sup>737</sup> A party offering scientific opinion testimony that is not supported by any published, peer-reviewed literature should explain the absence of such literature—for example, the issue may be too unusual to justify publication or too new for literature to have reached the publication stage.<sup>738</sup>

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733. *Id.* at 144–45.

734. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593 (1993). This is discussed in detail under “methodological reliability.” See *infra* Part III.C.

735. *Daubert's* factors can apply to nonscientific expert testimony, and nonscientific experts often rely on published literature as well. This predicate is discussed here simply because it is most common in the context of scientific expert testimony.

736. See, e.g., *Neiberger v. Fed Ex Ground Package Sys., Inc.*, 566 F.3d 1184, 1190–91 (10th Cir. 2009) (holding that district court did not err in admitting defense expert attributing cause of nonunion in spine to smoking where expert relied on several peer-reviewed articles in medical journal, his physical examination, and eliminated other causes); *Tex. Mut. Ins. Co. v. Lerma*, 143 S.W.3d 172, 176–78 (Tex. App.—San Antonio 2004, pet. denied) (holding in wrongful death claim that physician's causation opinion was unreliable when physician admitted he knew of no scientific literature indicating a person could get tetanus more than twenty-one days after being injured and did not exclude other plausible causes of injury).

737. See, e.g., *Primiano v. Cook*, 598 F.3d 558, 565, 567 (9th Cir. 2010) (“Peer reviewed scientific literature may be unavailable because the issue may be too particular, new, or of insufficiently broad interest, to be in the literature” or when medical phenomenon was so unusual that “the specialists who publish articles do not see it in their practices.”); *Clausen v. M/V New Carissa*, 339 F.3d 1049, 1060–61 (9th Cir. 2003) (holding that expert's general causation opinion that identifies “low-level toxic effects of oil as a possible cause of the oyster mortality without supporting peer-reviewed literature specific to that subject” was sufficiently reliable because he relied “upon a variety of [other] objective, verifiable evidence” (quoting *Kennedy v. Collagen Corp.*, 161 F.3d 1226, 1228 (9th Cir. 1998))); *Pipitone v. Biomatrix, Inc.*, 288 F.3d 239, 246 (5th Cir. 2002) (holding that lack of literature did not undermine expert's opinion and explaining “there is no evidence that anyone has ever contracted a salmonella infection from an injection of any kind into the knee” and therefore “it is difficult to see why a scientist would study this phenomenon”).

738. See, e.g., *Primiano* 598 F.3d at 567; *White v. Ford Motor Co.*, 312 F.3d 998, 1008 (9th Cir. 2002) (holding that trial judge did not err in admitting expert opinion on design of parking brake and that “scientific bolstering as published articles in reference journals was not required, because there is no reason to suppose that this detail of parking brake manufacture was of general interest to the scientific community and would generate a peer-reviewed literature”), *amended and reh'g denied*, 335 F.3d 833 (9th Cir. 2003).

It is insufficient for an expert to simply cite literature and claim it supports his opinion. Courts meticulously examine the content<sup>739</sup> and depth of the literature cited by an expert.<sup>740</sup> A mere citation or passing reference to literature is insufficient;<sup>741</sup> the expert should explain how that literature supports the opinion.<sup>742</sup> Articles that are “self-limiting” may not support a reliability finding.<sup>743</sup> One federal court stated that an expert who relies on a published article by another author to provide a reliable basis for an opinion must demonstrate that the expert has properly interpreted the article.<sup>744</sup> An expert “cannot use” an article that expressly refuses to reach a conclusion to support that very conclusion.<sup>745</sup> Cited literature that does not support an expert’s opinion is of no aid,<sup>746</sup> nor is literature with its own flaws.<sup>747</sup> One

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739. *Wiggs v. All Saints Health Sys.*, 124 S.W.3d 407, 412–13 (Tex. App.—Fort Worth 2003, pet. denied) (stating that the only two medical articles reviewed by expert did not reach the same causation conclusion as expert).

740. *Doe v. Ortho-Clinical Diagnostics, Inc.*, 440 F. Supp. 2d 465, 472–75 (M.D.N.C. 2006) (noting a literature review may support general causation if “performed appropriately” but, despite “his collective review of a motley assortment of diverse literature,” it did not support his opinion because “the disconnected literature he presents does not add up” to his conclusion); *Lugo v. N.Y. City Health & Hosps. Corp.*, 929 N.Y.S.2d 264, 279 (N.Y. App. Div. 2011) (stating court should examine “whether a reasonable quantum of legitimate support exists in the literature of the expert’s views”); *Wiggs*, 124 S.W.3d at 413 (noting expert reviewed only two medical articles, not a broad spectrum of the medical literature); cf. *McDowell v. Brown*, 392 F.3d 1283, 1298 (11th Cir. 2004) (“[A] court should meticulously focus on the expert’s principles and methodology.”); *Miller v. Pfizer, Inc.*, 356 F.3d 1326, 1335 (10th Cir. 2004) (affirming exclusion of expert testimony over objection that the trial court was too nitpicky: “What the Millers call nit-picking, we would call being thorough” because *Daubert’s* analysis “is extensive, requiring the district court to carefully and meticulously review the proffered scientific evidence”).

741. *Brown v. Ill. Cent. R.R. Co.*, 705 F.3d 531, 536 (5th Cir. 2013); *United States v. Montgomery*, 635 F.3d 1074, 1090–91 (8th Cir. 2011) (finding no error in exclusion of expert testimony that defendant’s PET scan test results revealed abnormalities consistent with pseudocystosis because testimony did “not meet Rule 702’s reliability requirement”; it was “at most a working hypothesis, not admissible scientific ‘knowledge’” where expert made only passing reference to study that purportedly supported opinion and opposing expert rebutted applicability of the study (quoting *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 670 (6th Cir. 2010))).

742. *Praytor v. Ford Motor Co.*, 97 S.W.3d 237, 244 (Tex. App.—Houston [14th Dist.] 2002, no pet.) (stating that expert’s claimed reliance on medical literature in his diagnosis was inadequate because expert failed “to explain what literature he read or whether the literature consists of peer-reviewed studies”).

743. *McClain v. Metabolife Int’l, Inc.*, 401 F.3d 1233, 1247 (11th Cir. 2005).

744. *Metabolife Int’l, Inc. v. Wornick*, 264 F.3d 832, 844 (9th Cir. 2001).

745. *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 185–86 (Tex. App.—Houston [14th Dist.] 2003, pet. denied).

746. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997); *Makofski*, 116 S.W.3d at 185–86.

747. See *Davis v. Aetrex Worldwide, Inc.*, 392 S.W.3d 213, 217 (Tex. App.—Amarillo 2012, no pet.) (holding podiatrist’s testimony that black diabetic shoes caused purchaser’s blisters was unreliable due to analytical gap when expert had no knowledge of relevant facts surrounding incident and reliance on article was misplaced because article had “a number of analytical gaps as applicable to this case”).

federal court also examined whether an expert adequately addressed literature that reached an opposite conclusion.<sup>748</sup> When literature is deeply divided on an issue, experts from both sides must rely on a degree of interpretation of the literature and there is no evidence that the literature for one side has flaws not present in the other side's literature, "[c]ourts are not equipped to" weigh "the relative persuasive power" of the competing studies.<sup>749</sup>

*v. Material Safety Data Sheets and Safety Standards.*

Experts sometimes rely on federal regulations (particularly from the EPA, FDA, or OSHA), warnings provided by governmental or private entities, and material safety data sheets (MSDS) to infer a causal relationship between a particular substance and a particular illness or injury. Some courts have, for example, concluded that information from a chemical's MSDS can, in some cases, provide an adequate predicate for identifying a chemical as a potential cause, particularly when combined with other support.<sup>750</sup> But like federal regulations and health warnings, an MSDS is not designed to establish causation. Courts have generally allowed MSDSs and other types of formalized health warnings to serve as a predicate for expert opinions on causation only when the MSDS provide sufficient factual information to support the expert's analysis.<sup>751</sup>

David Bernstein has observed that the considerations that govern a governmental agency's adoption of a safety standard differ in material ways from the considerations that govern the law's imposition of liability.<sup>752</sup>

[W]here government agencies are charged with proactively protecting the public health from potential toxic threats, agencies often have no choice but to rely on scientists' best guesses in the face of scientific uncertainty. But such best guesses are not admissible in toxic tort cases, where the law demands *reliable* expert testimony regarding causation.<sup>753</sup>

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748. *Cooper v. Smith & Nephew, Inc.*, 259 F.3d 194, 200, 203 (4th Cir. 2001) (stating physician's causation opinion was unreliable and "wholly conclusory" because his methodology differed from that in his own medical practice and he "did not identify specifically how he ruled out . . . other potential causes of" plaintiff's condition; it was insufficient to simply assert that he found two articles on another potential cause "unpersuasive").

749. *Taber v. Roush*, 316 S.W.3d 139, 153–56 (Tex. App.—Houston [14th Dist.] 2010, no pet.).

750. *See, e.g., Best v. Lowe's Home Ctrs., Inc.*, 563 F.3d 171, 180–81 (6th Cir. 2009).

751. *Compare id.*, with *Moore v. Ashland Chem. Inc.*, 151 F.3d 269, 278 (5th Cir. 1998).

752. Bernstein, *supra* note 246, at 60.

753. *Id.* Bernstein also indicates that adversarial bias in expert testimony is an important consideration for distinguishing standards for regulatory determinations from standards for legal determinations based on expert testimony. *See id.* at 60–61.

A Texas court of appeals echoed these sentiments in *Makofski*, rejecting the use of the EPA's "lower standards" because "differences in costs and benefits make false positives acceptable in some situations but unacceptable in others."<sup>754</sup> The court observed that "it may be appropriate for the EPA to protect people from chemical exposure on weak evidence that it will cause any harm, but that does not make it equally appropriate to impose a judgment of several million dollars on weak evidence that a defendant caused any harm."<sup>755</sup> In *Moore v. Ashland Chemical, Inc.*, the Fifth Circuit affirmed the exclusion of differential diagnosis testimony when the physician ruled in a particular chemical as a potential cause of the claimant's RADS based on a statement in the chemical's MSDS that overexposure to the chemical could cause injury to the lungs depending on the concentration and duration of exposure.<sup>756</sup> Because the risk identified in the MSDS depended on the concentration and duration of exposure but the MSDS did not identify the degree of concentration or level of exposure necessary to give rise to the risk, the expert could not rule in the chemical as a potential cause of RADS based on the MSDS alone.<sup>757</sup> A Texas court of appeals relied on *Moore* to reach the same conclusion in *Brookshire Bros., Inc. v. Smith*, when an expert opined that a commercial cleaner caused the plaintiff's RADS based in part on the cleaner's MSDS and warning labels.<sup>758</sup> The court stated that "neither the MSDS nor the warning labels, standing alone, provide the type of specific, detailed showing of scientific reliability required to accord evidentiary value to an expert's opinion."<sup>759</sup> The court further noted that "[t]here was no evidence produced at trial that discussed the scientific foundation used in formulating the conclusions contained in either the MSDS or the warning labels."<sup>760</sup>

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754. *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 187–88 (Tex. App.—Houston [14th Dist.] 2003, pet. denied). See *infra* notes 1373–76 and accompanying text for a discussion of "false positives" and "false negatives" and the roles they can play in risk-benefit analyses.

755. *Makofski*, 116 S.W.3d at 188.

756. See *Moore*, 151 F.3d at 278–79.

757. *Id.* at 278.

758. See *Brookshire Bros. v. Smith*, 176 S.W.3d 30, 38 (Tex. App.—Houston [1st Dist.] 2004, pet. denied). The Dallas Court of Appeals relied on *Moore* to reject claimants' attempt to rely on an MSDS as evidence that an insecticide used by the city caused their injuries, in the absence of any expert testimony. *City of Dallas v. Furgason*, No. 05-06-00875-CV, 2007 WL 2703134, at \*2 (Tex. App.—Dallas Sept. 18, 2007, no pet.) (mem. op.).

759. *Brookshire Bros.*, 176 S.W.3d at 38.

760. *Id.*

Similarly, in *Johnson v. Arkema*, the Fifth Circuit stated that an MSDS is not “per se reliable support for an expert’s opinion,”<sup>761</sup> nor are exposure level standards imposed by OSHA and the National Institute for Occupational Safety and Health.<sup>762</sup>

In *Coastal Tankships, U.S.A., Inc. v. Anderson*, a Texas appellate court held, en banc, that the trial court had abused its discretion in allowing the plaintiff’s medical expert to testify that exposure to the chemical naphtha caused the plaintiff’s pneumonia based on the plaintiff’s medical records, the MSDS for naphtha, and lay testimony that the plaintiff was healthy before inhaling the naphtha fumes but became ill soon afterward.<sup>763</sup> The court observed that “no expert established that [the treating physician’s] diagnostic records, the naphtha MSDS, or any other nonexpert evidence on which [the testifying expert] now relies met the appropriate *Daubert/Robinson/Jordan* inquiry as to general causation,” and this was “fatal to [the expert’s] claims.”<sup>764</sup>

But ten years after *Coastal Tankships*, a panel from the same court allowed a chemist to rely on information in a chemical’s MSDS in reaching his conclusion that the chemical caused a fire in *Control Solutions, Inc. v. Gharda USA, Inc.*<sup>765</sup> In *Control Solutions*, the expert was a forensic chemist and chemical fire expert who did not rely exclusively or even primarily on the MSDS to support a causation conclusion; instead, he relied on the MSDS as supplying data about the chemical (particularly the temperature at which it would thermally decompose) that he used as a basis for further research.<sup>766</sup>

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761. See *Johnson v. Arkema, Inc.*, 685 F.3d 452, 464–65 (5th Cir. 2012) (stating that permissible exposure levels set by OSHA “are not necessarily reliable in all toxic tort cases. It may be appropriate first to consult the underlying basis for their proscriptions before an expert’s reliance on them can pass *Daubert* muster”).

762. *Id.* at 465 (stating that a court may refrain from treating a defendant’s material safety data sheets as “per se reliable support for an expert’s opinion” and require “scientific evidence justifying the relevant statements found within the MSDS”).

763. *Coastal Tankships, U.S.A., Inc. v. Anderson*, 87 S.W.3d 591, 597, 611 (Tex. App.—Houston [1st Dist.] 2002, pet. denied).

764. *Id.* at 611 (footnote omitted). Justice Brister, then sitting on the First Court of Appeals, further stated in his concurrence that the MSDS

states only that overexposure to naphtha can cause (among many other problems) inflammation of the lungs. Because it does not mention [the kind of pneumonia suffered by the plaintiff], it provides no information about relative risk, required exposure level, or time of onset. This is not enough to prove causation.

*Id.* at 618 (Brister, J., concurring) (footnote omitted).

765. *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 157–58 (Tex. App.—Houston [1st Dist.] 2012, pet. filed).

766. *Id.* at 154–55.

Similarly, in *Best v. Lowes Home Centers, Inc.*, the Sixth Circuit Court of Appeals held that a physician could properly rule in EZ Aqua as a potential cause of the claimant's anosmia based in part on the EZ Aqua's MSDS statement that it is "irritating to the mucous membrane and upper respiratory tract" and "[m]ay be harmful if inhaled," but also based on the physician's experience and knowledge of anosmia and its causal relationship to chlorine derivatives like that contained in EZ Aqua.<sup>767</sup> The *Best* court relied on a Second Circuit Court of Appeals case, *McCullock v. H.B. Fuller Co.*, in which the claimant had developed throat polyps after exposure to hot glue fumes.<sup>768</sup> The *McCullock* court permitted physician testimony that the hot glue fumes had caused the polyps when the physician relied on the MSDS, as well as "pathological studies," the patient's medical history, and the expert's experience and training.<sup>769</sup> Similarly, in *Westberry v. Gislaved Gummi AB*, the court allowed a physician to rely on a statement in the MSDS for talc that inhalation of talc dust "in high concentrations irritates mucous membranes" to "rule in" talc as a potential cause of the claimant's sinus condition when there was evidence that the claimant was exposed to "very high levels of airborne talc throughout his workday."<sup>770</sup>

In sum, an expert generally may rely on an MSDS to provide factual information about a particular chemical. The expert may then apply her own methodology and analysis to reach a conclusion on causation based, in whole or in part, on those facts. But an MSDS is not designed for the purpose of establishing causation. When an expert attempts to rely on an MSDS not for discrete data but to supply a conclusion on causation, the MSDS must stand up to the same standards applicable to any expert opinion on causation; i.e., the proffering party must demonstrate the predicative, methodological, and connective reliability of the analysis that led to the conclusion in the MSDS regarding causation.

In some cases, experts have attempted to rely on federal health and safety regulations and standards as a predicate for ruling in potential causes of a claimant's injury or illness in differential diagnosis testimony. Courts have admitted expert testimony predicated on federal regulations or safety standards

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767. *Best v. Lowe's Home Ctrs., Inc.*, 563 F.3d 171, 178–80 (6th Cir. 2009).

768. *Id.* at 181 (citing *McCullock v. H.B. Fuller Co.*, 61 F.3d 1038, 1040–41 (2d Cir. 1995)).

769. *McCullock*, 61 F.3d. at 1041, 1044.

770. *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 264 (4th Cir. 1999).

set by federal health- or safety-related agencies as part of a larger body of scientific literature demonstrating that “it is generally accepted in the medical community” that exposure to a particular substance can cause a particular illness.<sup>771</sup> But like an MSDS, health and safety regulations and standards are not designed for the purpose of establishing a causal connection between a substance and a disease. They thus generally are not, alone, a sufficient predicate for an expert’s opinion on general causation. In *Pluck v. BP Oil Pipeline Co.*, the testifying physician “ruled in” the claimant’s exposure to benzene as a potential cause of her Parkinson’s disease based on an EPA safety regulation stating that the maximum permissible contaminant level for benzene in drinking water is five ppb.<sup>772</sup> But the physician was unable to determine the claimant’s level of exposure and did not have a basis for concluding that she was ever exposed to benzene at a level equal to or in excess of five ppb.<sup>773</sup> The court held that evidence that benzene was unsafe in certain dosages did not provide a reliable basis for “ruling in” benzene as a potential cause of the claimant’s injury when there was no basis for concluding that the claimant was exposed to the unsafe dosage.<sup>774</sup>

The fatal defect in both *Moore* and *Pluck* was the absence of necessary “dosage” data—either the data necessary to determine at what dosage a substance poses a particular danger or data necessary to determine whether the claimant was exposed to the dosage at which the substance poses the danger.<sup>775</sup> This has been a recurring theme in recent toxic tort cases.<sup>776</sup> Claimants in such

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771. See *Amorgianos v. Nat’l R.R. Passenger*, 137 F. Supp. 2d 147, 181–82 (E.D.N.Y. 2001), *aff’d*, 303 F.3d 256 (2d Cir. 2002) (admitting expert testimony on general causation when medical experts relied on articles, texts, and OSHA standards to support their opinions that xylene exposure caused plaintiff’s eye irritation and acute intoxication); see also *Curtis v. M&S Petroleum, Inc.*, 174 F.3d 661, 669–70 (5th Cir. 1999) (holding medical expert “provided generous support for his general causation theory” including MSDS for benzene, OSHA standards for benzene, “the toxicological profile for benzene, which was published by the U.S. Department of Health and Human Services, the Public Health Service, Agency for Toxic Substance and Disease Registry,” and “the strong temporal connection between the refinery workers’ exposure to benzene and the onset of their symptoms”).

772. *Pluck v. BP Oil Pipeline Co.*, 640 F.3d 671, 679 (6th Cir. 2011); see also 40 C.F.R. § 141.61(a)(2) (2004).

773. *Pluck*, 640 F.3d at 679.

774. *Id.* at 679–80.

775. *Moore v. Ashland Chem. Inc.*, 151 F.3d 269, 278 (5th Cir. 1998); *Pluck*, 640 F.3d at 679.

776. See *Mitchell v. Gencorp Inc.*, 165 F.3d 778, 781 (10th Cir. 1999) (“[P]laintiff must demonstrate ‘the levels of exposure that are hazardous to human beings generally as well as the plaintiff’s actual level of exposure.’” (quoting *Wright v. Willamette Indus., Inc.*, 91 F.3d 1105, 1106 (8th Cir. 1996))); *Allen v. Pa. Eng’g Corp.*, 102 F.3d 194, 199 (5th

cases should endeavor to prove that either (1) the substance in question is capable of causing the type of injury he suffered at any dosage; or (2) the substance in question is capable of causing the type of injury he suffered at a particular dosage and his exposure met or exceeded that dosage. But precise exposure data is not always essential to differential diagnosis testimony.<sup>777</sup> In *Westberry*, for example, evidence of “very high levels” of exposure to airborne talc, including testimony that talc settling from the air around the claimant’s workspace onto the floor was “so thick one could see footprints in it,” was sufficient when supplied with evidence that “high concentrations” could cause the kind of injury suffered by the claimant.<sup>778</sup>

But even if exposure data is included in a federal safety standard, the standard will not supply an adequate predicate for “ruling in” a potential cause if it is not adequately tied to the applicable legal standards for causation. In *Glastetter v. Novartis Pharmaceuticals*, the Eighth Circuit Court of Appeals upheld the exclusion of a claimant’s medical experts on the ground that they lacked a reliable basis for ruling in the drug in question, Parlodel, as potential cause of the claimant’s ICH.<sup>779</sup> Among the predicates on which the claimant’s experts relied was the FDA’s 1994 rescission of its earlier approval of Parlodel as a treatment for postpartum lactation, for which purpose the claimant had used Parlodel.<sup>780</sup> After evaluating the available medical literature, the FDA had “concluded that Parlodel might cause seizures or strokes in women already susceptible to disease” and “decided that ‘the potential risks

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Cir. 1996) (“Scientific knowledge of the harmful level of exposure to a chemical, plus knowledge that the plaintiff was exposed to such quantities, are minimal facts necessary to sustain the plaintiffs’ burden in a toxic tort case.”).

777. See *Hardyman v. Norfolk & W. Ry. Co.*, 243 F.3d 255, 265 (6th Cir. 2001) (“[I]t makes little sense to require a plaintiff to establish a dose/response relationship or threshold level in a situation where there has been no scientific study conducted specifically on railroad brakemen and where the dose/response relationship or threshold level will always vary from individual to individual. Such a requirement essentially would foreclose plaintiffs from recovering for CTS against negligent employers unless their particular job has been the subject of a national, epidemiological study on CTS.”); *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 264 (4th Cir. 1999) (“[W]hile precise information concerning the exposure necessary to cause specific harm to humans and exact details pertaining to the plaintiff’s exposure are beneficial, such evidence is not always available, or necessary, to demonstrate that a substance is toxic to humans given substantial exposure and need not invariably provide the basis for an expert’s opinion on causation.”); *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 157 (3d Cir. 1999) (“[E]ven absent hard evidence of the level of exposure to the chemical in question, a medical expert could offer an opinion that the chemical caused plaintiff’s illness.”).

778. *Westberry*, 178 F.3d at 264.

779. *Glastetter v. Novartis Pharm. Corp.*, 252 F.3d 986, 989 (8th Cir. 2001).

780. *Id.* at 991.

associated with the use of bromocriptine for the prevention of physiological lactation outweigh its limited benefits and bromocriptine is no longer shown to be safe for use in preventing physiological lactation.”<sup>781</sup> The court observed that such balancing was “irrelevant” to the issue of whether the claimant’s experts properly “ruled in” Parlodel as a potential cause and that the FDA’s decision to remove Parlodel from the market rested “upon a lesser showing of harm to the public than the preponderance-of-the-evidence or more-likely-than-not standards used to assess tort liability.”<sup>782</sup> On this basis, the court concluded that the FDA’s action was not an adequate predicate for the experts’ decision to “rule in” Parlodel as a potential cause of ICHs.<sup>783</sup>

*vi. Another Expert’s Opinion.* When parties offer multiple experts to opine on different issues, it is not necessary that each expert’s opinion stands or falls on its own. Experts are permitted to predicate their opinions on the opinions and findings offered by other experts in the case.<sup>784</sup> The danger in this approach is that if the underlying expert’s opinion is excluded or deemed to constitute no evidence, the dependent expert opinion will likely also be excluded or deemed no evidence, unless the expert has provided other, independently sufficient support for his opinion.<sup>785</sup> Additionally, an expert may not merely “parrot” the opinion of another expert; each expert must be giving his own opinion.<sup>786</sup>

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781. *Id.* (quoting 59 Fed. Reg. 43351 (Aug. 23, 1994)).

782. *Id.*

783. *Id.* at 992.

784. *See, e.g.,* Rio Grande Reg’l Hosp. v. Ayala, No. 13-11-00686-CV, 2012 WL 3637368, at \*22–23 (Tex. App.—Corpus Christi Aug. 24, 2012, pet. denied) (mem. op.) (rejecting contention that physician’s opinion was conclusory because he “accept[ed] the express opinions of [two other experts for the plaintiff] regarding the breaches in standard of care” without specifying why he accepted those opinions or identifying the opinions he accepted more specifically); Southland Lloyds Ins. Co. v. Cantu, 399 S.W.3d 558, 566 (Tex. App.—San Antonio 2011, pet. denied) (relying on federal authority); Anderson v. Gonzalez, 315 S.W.3d 582, 587 (Tex. App.—Eastland 2010, no pet.) (“An expert may rely on the opinions of other individuals who have rendered reports or diagnoses.” (citing Kelly v. Rendon, 255 S.W.3d 665, 676 (Tex. App.—Houston [14th Dist.] 2008, no pet.), and Cresthaven Nursing Residence v. Freeman, 134 S.W.3d 214, 234 (Tex. App.—Amarillo 2003, no pet.)); Collini v. Pustejovsky, 280 S.W.3d 456, 466 (Tex. App.—Fort Worth 2009, no pet.) (“Courts have held that in addressing causation, a reporting physician may rely on the opinions of other individuals who have rendered reports or diagnoses.” (also citing Kelly and Cresthaven Nursing Residence)).

785. *See, e.g.,* Martinez v. City of San Antonio, 40 S.W.3d 587, 592–94 (Tex. App.—San Antonio 2001, pet. denied).

786. *See Southland Lloyds*, 399 S.W.3d at 566–67 (discussing federal case law on this issue).

b. *Factual Predicates.* Texas Rule of Evidence 703 permits experts to base their opinions on facts perceived by them, reviewed by them, or made known to them.<sup>787</sup> The Texas Supreme Court has instructed that “[w]hen expert testimony is involved, courts are to rigorously examine the validity of the facts and assumptions on which the testimony is based.”<sup>788</sup> When an expert’s opinion is predicated on a particular set of facts or assumptions, the facts on which the expert relies need not be undisputed;<sup>789</sup> to the contrary, opposing parties may present competing experts who reach differing opinions based in whole or in part on conflicting sets of facts.<sup>790</sup> But an expert’s opinion is unreliable if it is founded on facts or assumptions that are contrary to the proven or undisputed facts in the case.<sup>791</sup> And

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787. TEX. R. EVID. 703 (“The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by, reviewed by, or made known to the expert at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence.”). As with any other permissible predicate for scientific testimony, expert testimony based on facts or data authorized by this Rule must still pass the methodological and connective reliability gates. In *Robinson*, for example, the dissent noted that the expert had relied on “first-hand knowledge gained by personal observation and investigation of the potential causes of the damage to the Robinsons’ pecan trees”—a source of information authorized by Rule 703 and generally considered a sufficient basis for the rendition of an expert opinion. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 560 (Tex. 1995) (Cornyn, J., joined by Hightower, Gammage, and Spector, JJ., dissenting). Nevertheless, the majority concluded that the trial court did not err in excluding the expert’s testimony because this methodology—observation of the damaged tree—was not, under the circumstances, a reliable means of determining which of the several potential causes was responsible for the damage to the pecan trees. *Id.* at 559.

788. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 637 (Tex. 2009).

789. *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*10 (Tex. Aug. 22, 2014) (noting that, if there is conflicting evidence on a fact on which expert testimony relies, it is the province of the jury to decide which evidence to credit).

790. *See, e.g., City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1044 (9th Cir. 2014) (holding that courts should not exclude expert opinions “merely because they are impeachable” (quoting *Alaska Rent-A-Car, Inc. v. Avis Budget Grp., Inc.*, 738 F.3d 960, 969 (9th Cir. 2013))); *Micro Chem., Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1392 (Fed. Cir. 2003) (“When, as here, the parties’ experts rely on conflicting sets of facts, it is not the role of the trial court to evaluate the correctness of facts underlying one expert’s testimony.”). The Advisory Committee’s note to Rule 702 states,

When facts are in dispute, experts sometimes reach different conclusions based on competing versions of the facts. The emphasis in the amendment on “sufficient facts or data” is not intended to authorize a trial court to exclude an expert’s testimony on the ground that the court believes one version of the facts and not the other.

FED. R. EVID. 702 advisory committee’s note.

791. This rule has been applied both in Texas and federal courts. *See, e.g., Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 242 (1993) (“When an expert opinion is not supported by sufficient facts to validate it in the eyes of the law, or when indisputable record facts contradict or otherwise render the opinion unreasonable, it

ultimately, the jury cannot credit an expert opinion if it is premised on facts that are not supported by the evidence.<sup>792</sup> A party need not “prove up every inconsequential assumption on which their expert relies,” but “if the record contains no evidence supporting an expert’s material factual assumption, or if such assumptions are contrary to conclusively proven facts, opinion testimony founded on these assumptions is not competent evidence.”<sup>793</sup>

When an expert’s opinion is unreliable because it is based on assumed facts that vary from the actual facts or because it is based on facts that do not support the conclusion reached, Texas courts treat the testimony as not only unreliable but also conclusory.<sup>794</sup> Thus, expert testimony that is admissible under the standards discussed in the paragraph above—i.e., testimony

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cannot support a jury’s verdict.”); *Bogosian v. Mercedes-Benz of N. Am., Inc.*, 104 F.3d 472, 479–80 (1st Cir. 1997) (upholding exclusion of testimony from the plaintiff’s mechanical engineer because testimony rested on assumption that was contrary to the plaintiff’s own testimony about the facts of the accident); *Whirlpool*, 298 S.W.3d at 637 (“An expert’s opinion might be unreliable, for example, if it is based on assumed facts that vary from the actual facts . . . .”); *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499 (Tex. 1995) (“When an expert’s opinion is based on assumed facts that vary materially from the actual, undisputed facts, the opinion is without probative value and cannot support a verdict or judgment.”).

792. See *Hous. Unlimited*, 2014 WL 4116810, at \*11; see also *Williams v. Illinois*, 132 S. Ct. 2221, 2241 (2012) (“[I]f the prosecution cannot muster any independent admissible evidence to prove the foundational facts that are essential to the relevance of the expert’s testimony, then the expert’s testimony cannot be given any weight by the trier of fact.”). As discussed in Part III.B.3 below, an expert may rely on certain inadmissible evidence—frequently, inadmissible hearsay. See *infra* Part III.B.3. But, as the U.S. Supreme Court has noted, when such evidence is relied on by a testifying expert, “trial judges may and, under most circumstances, must, instruct the jury that out-of-court statements cannot be accepted for their truth, and that an expert’s opinion is only as good as the independent evidence that establishes its underlying premises.” *Williams*, 132 S. Ct. at 2241.

793. *Hous. Unlimited*, 2014 WL 4116810, at \*10–11.

794. *Id.* at \*8 (holding that expert damages testimony was legally insufficient to support a judgment when, among other things, the facts she relied on to calculate diminution in market value did “not *actually* support her opinion”); *Whirlpool*, 298 S.W.3d at 637; see also *Burroughs Wellcome Co.*, 907 S.W.2d at 499 (“When an expert’s opinion is based on assumed facts that vary materially from the actual, undisputed facts, the opinion is without probative value and cannot support a verdict or judgment.”); *Capital Metro. Transp. Auth./Cent. of Tenn. Ry. & Navigation Co. v. Cent. of Tenn. Ry. & Navigation Co.*, 114 S.W.3d 573, 578 (Tex. App.—Austin 2003, pet. denied) (“Capital Metro argues that, because it is not challenging the reliability of the methodology of the expert, it was not required to make a *Robinson/Havner* challenge below in order to assert a no-evidence challenge on appeal. We agree. An attack on an expert opinion on the basis that it is premised on unsupported assumptions, speculation, and surmise does not constitute an attack on the reliability of the methodology of the expert. Therefore, a *Robinson/Havner* challenge is not required.”); *Rayon v. Energy Specialties, Inc.*, 121 S.W.3d 7, 20–21 (Tex. App.—Fort Worth 2002, no pet.) (“An expert’s affidavit that is based on assumed facts that vary from the actual undisputed facts has no probative force. . . . Because Heldenbrand’s theory was based upon two assumptions that were later conclusively disproved . . . Heldenbrand’s affidavit and report have no probative force.”).

that is premised on a set of facts that the proffering party intends to prove at trial—may nevertheless ultimately amount to “no evidence” because the proffering party fails to offer any proof of those facts or because the opposing party conclusively disproves those facts. In a legal-sufficiency review, “if an expert’s opinion is based on certain assumptions about the facts, [the appellate court] cannot disregard evidence showing those assumptions were unfounded.”<sup>795</sup>

Typically, federal courts have likewise treated expert opinion testimony as unreliable when the opinion is based on assumptions that do not conform to the facts of the case or that are ultimately unsubstantiated by the evidence.<sup>796</sup> When an expert’s testimony is based upon assumptions, federal courts require the expert to show “the reasonableness and validity of [his] assumptions.”<sup>797</sup> Some arguments about the reasonableness of assumptions, however, “go to the weight, not the admissibility, of the testimony.”<sup>798</sup>

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795. *City of Keller v. Wilson*, 168 S.W.3d 802, 813 (Tex. 2005).

796. *See, e.g., Moore v. Int’l Paint, L.L.C.*, 547 F. App’x 513, 515–17 (5th Cir. 2013) (affirming exclusion of expert testimony in which expert assumed that plaintiff’s work with defendant’s product took place indoors and in an unventilated room, when there was no evidence to support those assumptions); *Boucher v. U.S. Suzuki Motor Corp.*, 73 F.3d 18, 21–22 (2d Cir. 1996) (excluding expert’s testimony on lost future earnings because it was too speculative); *Tyger Constr. Co. v. Pensacola Constr. Co.*, 29 F.3d 137, 142 (4th Cir. 1994) (excluding testimony about increased costs based upon unsubstantiated assumptions); *Joy v. Bell Helicopter Textron, Inc.*, 999 F.2d 549, 569 (D.C. Cir. 1993); *Advent Sys. Ltd. v. Unisys Corp.*, 925 F.2d 670, 681–82 (3d Cir. 1991) (holding expert’s testimony concerning lost profits was inadmissible because it was based upon false assumptions); *Randolph v. Laeisz*, 896 F.2d 964, 968 (5th Cir. 1990) (stating that assumption that market conditions are constantly improving was unsubstantiated); *Hernandez v. M/V Rajaan*, 841 F.2d 582, 587 (5th Cir. 1988); *In re Air Crash Disaster at New Orleans, La.*, 795 F.2d 1230, 1234–35 (5th Cir. 1986); *Shu-Tao Lin v. McDonnell Douglas Corp.*, 742 F.2d 45, 52 (2d Cir. 1984) (rejecting use of psychiatric costs in valuing lost nurture, care, and guidance of children and stating that unfounded assumptions do not make damage calculation any more accurate); *Am. Bearing Co. v. Litton Indus., Inc.*, 729 F.2d 943, 947–48 (3d Cir. 1984) (rejecting expert’s calculated damages because they were based upon figures that included assumptions about bearings that were outside of the market); *Gumbs v. Int’l Harvester, Inc.*, 718 F.2d 88, 98 (3d Cir. 1983). *But see, e.g., Norton v. Caremark, Inc.*, 20 F.3d 330, 340 (8th Cir. 1994) (upholding admission of CPA’s lost pay calculations because assumptions, even if flawed, were not “so ‘fundamentally unsupported’ that they ‘offered no assistance to the jury’” (quoting *Loudermill v. Dow Chem. Co.*, 863 F.2d 566, 570 (8th Cir. 1988))); *Andrade Garcia v. Columbia Med. Ctr. of Sherman*, 996 F. Supp. 617, 622–23 (E.D. Tex. 1998) (allowing economist to testify concerning future lost earnings of plaintiff because his findings were based on “reliable foundation” and utilized “principles and methods . . . [that] have a sound and reliable basis in the knowledge and experience of the discipline at issue—here, economics”).

797. *Adams v. Ind. Bell Tel. Co.*, 2 F. Supp. 2d 1077, 1099 (S.D. Ind. 1998), *aff’d in part, rev’d in part sub nom. Adams v. Ameritech Servs., Inc.*, 231 F.3d 414 (7th Cir. 2000).

798. *Tyler v. Bethlehem Steel Corp.*, 958 F.2d 1176, 1188 (2d Cir. 1992) (noting that expert testimony “may be based on firsthand observation of the witness, on facts or data presented at the trial, or on facts and data presented before the trial”).

As long as there is conflicting evidence, the correctness of the facts underlying expert testimony is an issue for the jury, and the trial court's gatekeeping function is not intended to usurp that role.<sup>799</sup> In *Scott's Marina at Lake Grapevine Ltd. v. Brown*, a Texas court of appeals permitted a plaintiff's expert to opine that the plaintiff's illness was caused by his exposure to sewage containing human feces while on the job.<sup>800</sup> The employer-defendant contested the admissibility of the causation evidence on the ground that it was expressly based on the assumption that the sewage that the plaintiff was exposed to at work contained feces.<sup>801</sup> The defendant pointed to considerable evidence that, if true, precluded the possibility that feces was present in the sewage.<sup>802</sup> But the plaintiff had presented *some* evidence to the contrary.<sup>803</sup> Thus, the court concluded "because [the plaintiff's expert] acknowledged this assumption and because the validity of this assumption relied on the jury's determination of fact, the validity of [the expert's] assumption goes to the weight to be ascribed to the evidence rather than its admissibility."<sup>804</sup>

Similarly, in *Rehabilitative Care Systems of America v. Davis*, the plaintiff's treating physician testified that the plaintiff's torn rotator cuff was caused by an incident with an exercise machine the plaintiff was using during rehabilitative physical therapy after surgery on the plaintiff's shoulder, rather than by the event that caused the plaintiff's original shoulder injury.<sup>805</sup> The court of appeals rejected the defendant's challenges to the reliability of the physician's testimony based on the fact that the physician was not present at the time of the accident

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799. See *LMC Complete Auto., Inc. v. Burke*, 229 S.W.3d 469, 478 (Tex. App.—Houston [1st Dist.] 2007, pet. denied) ("The weakness of facts in support of an expert's opinion generally goes to the weight of the testimony rather than the admissibility."); see also *Micro Chem., Inc. v. Lextron Inc.*, 317 F.3d 1387, 1392 (Fed. Cir. 2003) ("When, as here, the parties' experts rely on conflicting sets of facts, it is not the role of the trial court to evaluate the correctness of facts underlying one expert's testimony."); *Koch v. Sports Health Home Care Corp.*, No. 94-1346, 1995 WL 290409, at \*10 (4th Cir. May 15, 1995) (per curiam) ("The jury must be aware of the facts on which an expert opinion is based, because it is within the province of the jury to determine whether the facts relied upon by the expert are true or not." (citations omitted)).

800. *Scott's Marina at Lake Grapevine Ltd. v. Brown*, 365 S.W.3d 146, 155 (Tex. App.—Amarillo 2012, pet. denied).

801. *Id.*

802. *Id.* at 151–52.

803. *Id.* at 152–53.

804. *Id.* at 155.

805. *Rehabilitative Care Sys. of Am. v. Davis*, 43 S.W.3d 649, 654 (Tex. App.—Texarkana 2001), *pet. denied*, 73 S.W.3d 233 (Tex. 2002) (disapproving court of appeals' statement that expert testimony was not required to prove the standard of care but denying the petition because expert testimony was offered to prove the standard of care).

and had no basis for determining whether the plaintiff was telling him the truth about what happened.<sup>806</sup> The court noted that if the physician had “observed the incident itself, he would be a fact witness rather than an expert witness.”<sup>807</sup> The physician was permitted to testify that, if the incident happened as the plaintiff had described it, it was a reasonable medical probability that the incident caused the plaintiff’s injury.<sup>808</sup>

When expert evidence is based on an unsupported factual assumption, Texas courts have generally declined to exclude the evidence or treat it as conclusory if the assumption is not material to the expert’s ultimate conclusion.<sup>809</sup> Only “material” assumptions must be substantiated.<sup>810</sup> Likewise, an expert’s lack of knowledge about, or incorrect statement of, facts that are ancillary to her opinion generally will not render the opinion unreliable. In *Wellogix v. Accenture*, the Fifth Circuit upheld the admission of testimony from a software programming expert who testified incorrectly about two facts relevant to the subject matter of his testimony.<sup>811</sup> The defendant had argued that the district court erred in admitting the expert’s opinion—testimony that the claimant’s source code constituted a trade secret—because the expert discredited himself by: (1) opining that the claimant’s design specification was “an incredibly valuable trade secret” and “would not be known publicly,” when in fact the design specifications were available on the claimant’s public website; and (2) comparing the claimant’s source code to the wrong software, which the district court described as “a rudimentary mistake.”<sup>812</sup> These two facts were not, however, vital to the

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806. *Id.* at 663.

807. *Id.*

808. *Id.*

809. *See* *Lamont v. Vaquillas Energy Lopeno, LLP*, 421 S.W.3d 198, 225 (Tex. App.—San Antonio 2013, pet. filed) (“Hite acknowledged that his model assumed another operator would not have drilled on the Lopeno Prospect gas reservoir if [defendants] had not done so. As such, [plaintiffs’] wells on the Worley lease would have drained the gas reservoir without interruption. However, this assumption is irrelevant because Hite presented objective data regarding his calculation of the amount of gas drilled by [defendants], the market value of gas, the amount of gas in the reservoir, and uncontroverted evidence that [defendants] depleted the reservoir.”); *Marvelli v. Alston*, 100 S.W.3d 460, 475–76 (Tex. App.—Fort Worth 2003, pet. denied) (rejecting complaint that expert’s opinion was based on incorrect assumption about manner in which physician placed lenses because expert “consistently maintained that, regardless of whether they were placed vertically or where Dr. Marvelli testified he rotated them, the haptics should have been placed horizontally at 3:00 and 9:00 o’clock”).

810. *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*10–11 (Tex. Aug. 22, 2014).

811. *Wellogix, Inc. v. Accenture, L.L.P.*, 716 F.3d 867, 881–82 (5th Cir. 2013).

812. *Id.* at 882.

expert's opinion in the case and the defendant had the opportunity use the expert's mistakes to discredit his testimony before the jury.<sup>813</sup>

On the other hand, when the assumption is material to the expert's ultimate conclusion, a court may treat the expert's opinion as "no evidence" even when the assumption could be construed to undermine the expert's opinion only in part or to some degree. For example, in *Total Clean, LLC v. Cox Smith Matthews Inc.*, a court of appeals held that the trial court did not err in granting summary judgment on a plaintiff's claim for lost profits when the plaintiff's damages expert, at the plaintiff's request, based his calculation on the incorrect assumption that the plaintiff-company, a truck washing operation, had been operating successfully for eighteen months.<sup>814</sup> The expert relied on this assumption to decrease the applicable discount rate from 30% to 20%, which in turn drastically increased the plaintiff's projected lost profits.<sup>815</sup> But the expert conceded that the assumption was untrue and that he had relied on the assumption, as well as performance numbers provided by the plaintiff rather than those derived from comparable businesses, in making his calculations at the plaintiff's request.<sup>816</sup> Instead of treating the testimony as evidence of some lesser amount of damages, the court concluded that the expert's opinion was "unreliable and ha[d] no probative value."<sup>817</sup>

Similarly, another Texas court of appeals reversed a lost profits award and rendered a take-nothing judgment when the only evidence of lost profits was expert testimony predicated on unfounded assumptions.<sup>818</sup> The defendant did not dispute the validity of the expert's methodology, but argued that the expert's "assumptions were based on mere speculation and surmise rather than on the facts of the case."<sup>819</sup> The appellate court agreed, noting that the company had lost money in every year since the plaintiff took over its management.<sup>820</sup> The expert had

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813. *Id.*; see also *Wellogix, Inc. v. Accenture, LLP*, 823 F. Supp. 2d 555, 576–77 (S.D. Tex. 2011) (noting expert compared claimant's source code to correct and incorrect software, which were related), *aff'd*, 716 F.3d 867 (5th Cir. 2013).

814. *Total Clean, LLC v. Cox Smith Matthews Inc.*, 330 S.W.3d 657, 664–65 (Tex. App.—San Antonio 2010, pet. denied).

815. *Id.*

816. *Id.*

817. *Id.* at 664.

818. *Capital Metro. Transp. Auth./Cent. of Tenn. Ry. & Navigation Co. v. Cent. of Tenn. Ry. & Navigation Co.*, 114 S.W.3d 573, 582 (Tex. App.—Austin 2003, pet. denied).

819. *Id.* at 580.

820. *Id.* at 581–82.

concluded that the company would have made profits in the future based on future performance (and extensions) of a contract that the plaintiff was accused of breaching,<sup>821</sup> citing *Pace Corp. v. Jackson*<sup>822</sup> for the proposition that “recovery of lost profits is allowed where a business is established on the strength of a contract but is discontinued because of its breach.”<sup>823</sup> The court of appeals held that the plaintiff could not rely on that principle because its business was not established on the basis of the contract on which the expert relied; to the contrary, the business had been in operation (operating at a loss) for years.<sup>824</sup> As in *Total Clean*, the *Capital Metro* court criticized the expert for basing his calculations on a number of performance assumptions, at the plaintiff’s instruction, without independently investigating and confirming the numbers.<sup>825</sup>

Measuring lost profits, however, is an “inherently speculative undertaking.”<sup>826</sup> In making such measurements, an expert may rely on assumptions that are reasonable and consistent with the facts of the case. In *Toshiba Machine Co. v. SPM Flow Control, Inc.*, for example, an appellate court concluded that an expert’s lost profits opinion was reliable even though the expert did not determine all of the details of potential sales.<sup>827</sup> For example, one component of the expert’s lost profits calculation was based on profits lost from (due to the other party’s fault) quoting prices that were too high or delivery times that were too long to suit the company’s customers, but the expert admitted he did not determine what price or delivery time would have induced the party’s customers to buy from it.<sup>828</sup> The expert had personally contacted customers to determine the cause of their cancellations and calculated the resulting lost profits based on the company’s existing margin data.<sup>829</sup> The other components of the expert’s lost profits opinion were likewise based on the company’s existing production rates, shop rates (which the expert had determined to be industry standard and independently examined to ensure accuracy), sales history, and

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821. *Id.* at 579–80.

822. *Pace Corp. v. Jackson*, 284 S.W.2d 340, 348 (Tex. 1955).

823. *Capital Metro.*, 114 S.W.3d at 582.

824. *Id.*

825. *Id.* at 581–82.

826. *Pena v. Ludwig*, 766 S.W.2d 298, 301 (Tex. App.—Waco 1989, no writ).

827. *Toshiba Mach. Co. v. SPM Flow Control, Inc.*, 180 S.W.3d 761, 779 (Tex. App.—Fort Worth 2002), *pet. granted, cause remanded* (Mar. 31, 2006).

828. *Id.* 778–79.

829. *Id.* at 778.

profit margin.<sup>830</sup> The court noted that the company had been profitable for years and stated that the expert's calculations were reliably based on "proven products" and "existing customers."<sup>831</sup>

Rule 703 permits experts to draw inferences from the factual record in the case,<sup>832</sup> but the Texas Supreme Court has constrained expert inferences in much the same way it has constrained expert opinions generally: an expert cannot merely draw possible inferences from the facts and state a conclusion; instead, the expert must provide the jury with the basis for his inferences.<sup>833</sup> Thus, in *Jelinek v. Casas*, the Court said,

When the only evidence of a vital fact is circumstantial, the expert cannot merely draw possible inferences from the evidence and state that "in medical probability" the injury was caused by the defendant's negligence. The expert must explain why the inferences drawn are medically preferable to competing inferences that are equally consistent with the known facts. Thus, when the facts support several possible conclusions, only some of which establish that the defendant's negligence caused the plaintiff's injury, the expert must explain to the fact finder why those conclusions are superior based on verifiable medical evidence, not simply the expert's opinion.<sup>834</sup>

When facts give rise to equal inferences—i.e., when they are consistent with the opinion formed by the expert but also equally consistent with an opposing conclusion—they will not provide an adequate basis for the expert's opinion. In *Wal-Mart Stores, Inc. v. Merrell*,<sup>835</sup> discussed above,<sup>836</sup> a key fault in the plaintiffs' expert's theory about what caused a home fire was that the factual evidence on which the expert relied to support his theory was equally consistent with the defendant's expert's alternative theory about what caused the fire.<sup>837</sup>

Finally, while experts may draw inferences from the facts of the case,<sup>838</sup> the general rule that "an inference may not be based upon another inference"<sup>839</sup> applies to expert evidence—experts

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830. *Id.*

831. *Id.* at 778–79.

832. TEX. R. EVID. 703.

833. *See Jelinek v. Casas*, 328 S.W.3d 526, 536 (Tex. 2010).

834. *Id.*

835. *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837 (Tex. 2010).

836. *See supra* notes 365–73 and accompanying text.

837. *Wal-Mart Stores, Inc.*, 313 S.W.3d at 839.

838. TEX. R. EVID. 703.

839. *Marathon Corp. v. Pitzner*, 106 S.W.3d 724, 725, 729 (Tex. 2003) (per curiam) (holding expert opinions piled "inference on inference" and did not constitute legally-sufficient evidence); *Skepek v. Mynatt*, 8 S.W.3d 377, 383 (Tex. App.—El Paso 1999, pet. denied) (quoting *Briones v. Levine's Dep't Store, Inc.*, 446 S.W.2d 7, 10 (Tex. 1969)).

may not “pil[e] inference upon inference.”<sup>840</sup> Nor may courts supply inferences on an expert’s behalf in order to fill material gaps in the expert’s testimony.<sup>841</sup>

*c. Technical and Experiential Predicates.* Rule 702 contemplates more than just “scientific” expert testimony; it also expressly permits “technical” or “other specialized” expert testimony based on the expert’s “knowledge, skill, experience, training, or education.”<sup>842</sup> Indeed, in some situations, an expert’s “experience, knowledge, and training are the critical inquiry” in measuring the reliability of an expert’s opinion.<sup>843</sup>

*i. Experiential Predicates Generally.* “Experience alone may provide a sufficient basis for an expert’s testimony in some cases, but it cannot do so in every case.”<sup>844</sup> The Advisory Committee’s notes to Rule 702 similarly observe that, experience may “provide a sufficient foundation for expert testimony. . . . In certain fields, experience is the predominant, if not sole, basis for a great deal of reliable expert testimony.”<sup>845</sup> On the other hand, “[i]n science, experience usually is where the process begins, not ends.”<sup>846</sup>

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840. *Merck & Co. v. Ernst*, 296 S.W.3d 81, 99–100 (Tex. App.—Houston [14th Dist.] 2009, pet. denied) (quoting *Entex, A Div. of Noram Energy v. Gonzalez*, 94 S.W.3d 1, 8 (Tex. App.—Houston [14th Dist.] 2002, pet. denied) (“The epidemiological evidence supports the conclusion that Vioxx use at a certain dose and duration is associated with an increased risk of thrombotic cardiovascular events. The experts’ speculation that a clot ‘could have’ existed, but ‘could have’ dissolved, been dislodged, or fragmented gives rise to nothing more than conjecture. Facts from which an inference may properly be drawn must be established by direct evidence, not by other inferences.”); *Rayon v. Energy Specialties, Inc.*, 121 S.W.3d 7, 21 (Tex. App.—Fort Worth 2002, no pet.) (“Finally, Richard Taylor’s ‘expert’ opinions about insulation causing the fire rely on a series of multiple inferences that are equal to no-evidence.”).

841. *See Jernigan v. Langley*, 195 S.W.3d 91, 94 (Tex. 2006) (rejecting the court of appeals’ analysis which “indulge[d] multiple inferences that are simply unsupported by the scant [expert] reports”).

842. FED. R. EVID. 702; TEX. R. EVID. 702.

843. *In re Commitment of Bohannon*, 388 S.W.3d 296, 306 (Tex. 2012); *see also Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999) (observing that in some cases, the reliability inquiry will focus upon the expert’s experience); *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 905 (Tex. 2004) (“In some situations, the witness’s skill and experience alone may provide a sufficient basis for the expert’s opinion.”).

844. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998).

845. FED. R. EVID. 702 advisory committee’s note (listing as examples the opinion of a handwriting expert and a design engineer’s testimony when the expert’s opinions “are based on facts, a reasonable investigation, and traditional technical/mechanical expertise, and he provides a reasonable link between the information and procedures he uses and the conclusions he reaches” (quoting *Tassin v. Sears, Roebuck & Co.*, 946 F. Supp. 1241, 1248 (M.D. La. 1996))).

846. 1 FAIGMAN ET AL., *supra* note 246, § 1:25, at 75 (“Experience provides insights useful for generating hypotheses that can be tested more systematically and more rigorously. It might be, for instance, that clinical experience indicates a relationship between silicone implants and autoimmune disorders. But the scientific arsenal contains a battery of weapons that can be brought to bear on this question . . .”).

The U.S. and Texas Supreme Courts both agree that an expert's experience may provide a reliable basis for an expert's opinion.<sup>847</sup> Other courts have also agreed that experience can provide a reliable basis for an expert's opinion in some situations.<sup>848</sup> As the Fifth Circuit has stated, some expert opinions can be reliable "based mainly on his personal observations, professional experience, education and training."<sup>849</sup>

But that does not mean that courts blindly accept the mantra of experience as a means of escaping the reliability inquiry. In *Kumho*, the U.S. Supreme Court held that the requirements of *Daubert* and its progeny are not limited to scientific expert testimony; they also apply to technical, nonscientific expert testimony.<sup>850</sup> The Texas Supreme Court reached the same conclusion a year earlier, holding in *Gammill* that an expert may base his opinion on his own experience, training, and skill, but the proffering party must still establish the reliability of the expert's basis.<sup>851</sup> The Texas Supreme Court

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847. *Kumho*, 526 U.S. at 156 ("[N]o one denies that an expert might draw a conclusion from a set of observations based on extensive and specialized experience."); *id.* at 150 (stating that when evaluating specialized or technical expert opinion testimony, "the relevant reliability concerns may focus upon personal knowledge or experience"); *Gammill, Inc.*, 972 S.W.2d at 726 ("Experience alone may provide a sufficient basis for an expert's testimony in some cases, but it cannot do so in every case.")

848. *See, e.g., Schneider ex rel. Estate of Schneider v. Fried*, 320 F.3d 396, 407 (3d Cir. 2003) (stating that "the degree to which the expert testifying is qualified" implicates the testimony's reliability (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 742 (3d Cir. 1994))); *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 160 (Tex. App.—Houston [1st Dist.] 2012) ("[T]he correct approach to determining the reliability of expert testimony is to evaluate the qualifications and reliability of each particular expert's testimony . . ."); *Alon USA, LP v. State*, 222 S.W.3d 19, 35 (Tex. App.—Austin 2005, pet. denied) (concluding that expert's opinion was "reliable considering his qualifications"); *Coca-Cola Co. v. Harmar Bottling Co.*, 111 S.W.3d 287, 299–301 (Tex. App.—Texarkana 2003) (holding that plaintiff economist's testimony was sufficiently reliable when expert relied on data provided by defendant, used the product market definition adopted by the Bureau of Economics of the Federal Trade Commission, economist was experienced in antitrust matters, and methodology was used by other antitrust economics experts and rejecting contention that opinion had to be capable of scientific testing to be reliable), *rev'd on other grounds*, 218 S.W.3d 671 (Tex. 2006); *Reliable Consultants, Inc. v. Jaquez*, 25 S.W.3d 336, 346 (Tex. App.—Austin 2000, pet. denied); *BROWN & RONDON*, *supra* note 35, at 702 (discussing that for nonscientific evidence, reliability should consider both the witness's experience and the *Robinson* factors "or some variation of them").

849. *Dart v. Kitchens Bros. Mfg.*, 253 F. App'x 395, 397 (5th Cir. 2007) (quoting *Pipitone v. Biomatrix, Inc.*, 288 F.3d 239, 247 (5th Cir. 2002)); *Pipitone*, 288 F.3d at 247 (explaining that reliability requires an examination "of these bases when determining whether the testimony should be admitted").

850. *Kumho*, 526 U.S. at 148–49.

851. *Gammill*, 972 S.W.2d at 722–26. Many legal commentators have viewed this expansion of the applicability of Rule 702 as one of the most significant differences between the modern expert evidence regime and the old *Frye* regime. *See, e.g., Bernstein, supra* note 246, at 49 ("It is difficult to overstate the significance of [*Kumho*] ruling.").

held that an expert's experience does not excuse the expert from identifying a valid predicate for his opinion or, as discussed below,<sup>852</sup> from adequately connecting his opinions to that predicate and to the facts of the case. The Court emphasized this point in *Whirlpool*:

Witnesses offered as experts in an area or subject will invariably have experience in that field. If courts merely accept "experience" as a substitute for proof that an expert's opinions are reliable and then only examine the testimony for analytical gaps in the expert's logic and opinions, an expert can effectively insulate his or her conclusions from meaningful review by filling gaps in the testimony with almost any type of data or subjective opinions.<sup>853</sup>

Thus, "while an expert's overwhelming qualifications may bear on the reliability of his proffered testimony, they are by no means a guarantor of reliability."<sup>854</sup> A very qualified expert may "still offer unreliable testimony."<sup>855</sup> Strong qualifications do not save an otherwise unreliable opinion.<sup>856</sup> Otherwise, the reliability

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Although Texas adopted a *Kumho*-like approach even before the Supreme Court issued *Kumho*, some other states have declined to expand the application of their evidentiary rules in the same way. *See, e.g.*, *Marron v. Stromstad*, 123 P.3d 992, 1004–07 (Alaska 2005).

852. *See infra* Part III.D.

853. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 639 (Tex. 2009).

854. *Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1341 (11th Cir. 2003).

855. *Id.* at 1342; *see also Merck & Co. v. Garza*, 347 S.W.3d 256, 262 (Tex. 2011) ("[C]ourts must look beyond the bare opinions of qualified experts and independently evaluate the foundational data underlying an expert's opinion in order to determine whether the expert's opinion is reliable."); *Whirlpool*, 298 S.W.3d at 639 (observing that rarely will a court be able to base its reliability determination only on the experience of a qualified expert, to the exclusion of the *Robinson* factors); *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629, 631 (Tex. 2002) ("Exxon does not challenge [the expert's] qualifications. Accordingly, we must determine whether his testimony is relevant and reliable . . . ."; holding that trial court erred in admitting expert's testimony).

856. *Lewis v. CITGO Petroleum Corp.*, 561 F.3d 698, 705 (7th Cir. 2009) ("A supremely qualified expert cannot waltz into the courtroom and render opinions unless those opinions are based upon some recognized scientific method." (quoting *Clark v. Takata Corp.*, 192 F.3d 750, 759 n.5 (7th Cir. 1999))); *McDowell v. Brown*, 392 F.3d 1283, 1298 (11th Cir. 2004) (same); *Chapman v. Maytag Corp.*, 297 F.3d 682, 686–88 (7th Cir. 2002); *Goebel v. Denver & Rio Grande W.R.R.*, 215 F.3d 1083, 1088 (10th Cir. 2000) ("It is axiomatic that an expert, no matter how good his credentials, is not permitted to speculate."); *Merck & Co.*, 347 S.W.3d at 262 ("[C]ourts must look beyond the bare opinions of qualified experts and independently evaluate the foundational data underlying an expert's opinion in order to determine whether the expert's opinion is reliable."); *City of San Antonio v. Pollock*, 284 S.W.3d 809, 818 (Tex. 2009) ("[A] claim will not stand or fall on the mere *ipse dixit* of a credentialed witness." (alteration in original) (quoting *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999))); *Burrow*, 997 S.W.2d at 235 (noting that "it is the basis of the [expert] witness's opinion, and not the witness's qualifications" that determine reliability); *Gammill*, 972 S.W.2d at 726 ("A more experienced expert may offer unreliable opinions, and a lesser experienced expert's opinions may have solid footing.").

inquiry disappears into the qualifications inquiry.<sup>857</sup> Similarly, a court may not rely on a comparison of the relative strength of the parties' qualifications to determine that an expert's opinion is unreliable.<sup>858</sup> In short, an expert's extensive education, training, and experience may buttress the reliability of an expert's opinion,<sup>859</sup> but qualifications, no matter how great, cannot relieve the court of its separate obligation to ensure that each expert opinion satisfies the predicative, methodological, and connective reliability gates.<sup>860</sup> The witness's qualifications as an expert must not be conflated with the reliability of the expert's theory or technique.

A number of commentators and courts have listed qualifications as one of the *Daubert* factors.<sup>861</sup> Courts sometimes focus on experience alone as the sole criterion for measuring reliability.<sup>862</sup> The Court of Criminal Appeals in *Nenno v. State* concluded that in fields other than the hard sciences, such as the social sciences, factors like an expert's education, training, and experience are more appropriate factors in assessing reliability than the scientific method.<sup>863</sup> Under *Nenno*, courts reviewing the reliability of an expert's opinion in fields within the soft sciences

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857. *United States v. Frazier*, 387 F.3d 1244, 1261 (11th Cir. 2004) ("If admissibility could be established merely by the *ipse dixit* of an admittedly qualified expert, the reliability prong would be, for all practical purposes, subsumed by the qualification prong.").

858. *Feliciano-Hill v. Principi*, 439 F.3d 18, 25 (1st Cir. 2006) (stating could not exclude expert on ground that opinion disagrees with a more qualified expert).

859. *See, e.g., Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 501 (Tex. 2001) ("Pleunneke's experience, coupled with his thorough testimony about the methodology he employed, demonstrate that the opinions he drew from the underlying data are reliable.").

860. *See, e.g., id.* at 499 ("In *Robinson*, we identified six nonexclusive factors to determine whether an expert's testimony is reliable and thus admissible. But in *Gammill* we recognized that the *Robinson* factors may not apply to certain testimony. In those instances, there still must be some basis for the opinion offered to show its reliability, and, ultimately, the trial court must determine how to assess reliability. If an expert relies upon unreliable foundational data, any opinion drawn from that data is likewise unreliable. Further, an expert's testimony is unreliable even when the underlying data is sound if the expert's methodology is flawed." (citations omitted)).

861. *See, e.g.,* FED. R. EVID. 702 advisory committee's note; *Kelly v. State*, 824 S.W.2d 568, 573 (Tex. Crim. App. 1992); 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 56.

862. *See, e.g., SR Int'l Bus. Ins. Co. v. World Trade Ctr. Props., LLC*, 467 F.3d 107, 133–34 (2d Cir. 2006) (holding expert testimony concerning insurance industry customs and practices admissible and any gaps or inconsistencies in testimony went to opinion's weight); *Marvelli v. Alston*, 100 S.W.3d 460, 479 (Tex. App.—Fort Worth 2003, pet. denied) (relying in part on expert's experience for finding reliability); *GTE Mobilnet of S. Tex. Ltd. P'ship v. Pascouet*, 61 S.W.3d 599, 614 (Tex. App.—Houston [14th Dist.] 2001, pet. denied) (same).

863. *Nenno v. State*, 970 S.W.2d 549, 561 (Tex. Crim. App. 1998), *overruled on other grounds by State v. Terrazas*, 4 S.W.3d 720, 727 (Tex. Crim. App. 1999).

should consider whether: (1) the field of expertise is a legitimate one; (2) the subject matter of the expert's testimony is within the scope of that field; and (3) the expert's testimony properly relies upon the principles involved in that field of study.<sup>864</sup> The Texas Supreme Court has not adopted the *Nenno* approach, but two intermediate courts have.<sup>865</sup> If experience is properly analyzed, and the reliability inquiry is treated as a flexible one in which multiple interlocking gates are potentially at issue, we believe it is unnecessary to use a separate test for nonscientific evidence.

When the predicate for an expert's opinion is the expert's own experience, that experience must be sufficiently reliable to support the opinion.<sup>866</sup> And, as with other predicates, courts will not simply take the expert's word for it in determining whether the expert's experience is, in fact, a reliable basis for her conclusion.<sup>867</sup> An expert cannot globally claim that his opinion is based on his education or experience.<sup>868</sup> The expert must provide some estimate of his experience.<sup>869</sup> Courts may be particularly

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864. *Id.*

865. *Taylor v. Tex. Dep't of Protective & Regulatory Servs.*, 160 S.W.3d 641, 650–51 (Tex. App.—Austin 2005, pet. denied) (applying in parental termination case); *In re A.J.L.*, 136 S.W.3d 293, 295, 298 (Tex. App.—Fort Worth 2004, no pet.) (same); *In re G.B.*, No. 07–01–0210–CV, 2003 WL 22327191, at \*2 (Tex. App.—Amarillo Oct. 10, 2003, no pet.) (same); *see also In re J.B.*, 93 S.W.3d 609, 629–31 (Tex. App.—Waco 2002, pet. denied) (Gray, J., dissenting) (same). *Taylor* and *A.J.L.* both cited Justice Gray's dissenting opinion as a holding of the court.

866. *See, e.g., Bartosh v. Gulf Health Care Ctr.-Galveston*, 178 S.W.3d 434, 442–43 (Tex. App.—Houston [14th Dist.] 2005, no pet.) (holding that physician's opinion that ant bites contributed to resident's death was not supported by adequate foundation because physician had "only slight experience regarding fire ant bites and no experience" with complications from such bites); *State Farm Lloyds v. Mireles*, 63 S.W.3d 491, 499 (Tex. App.—San Antonio 2001, no pet.) ("Certainly, if he is primarily depending on his experience to support his opinion, he would have to have seen it more than once.").

867. *See, e.g., Samuels v. Holland Am. Line-USA Inc.*, 656 F.3d 948, 952–53 (9th Cir. 2011) (holding expert opinion that water at particular port was known to be extremely dangerous throughout the cruise line industry was inadmissible when expert did not provide any materials from the cruise line industry, contact other comparable cruise lines about issue, and had not done any research; his "quick internet research" and "few telephone calls" were an insufficient basis for his opinion).

868. GEORGE E. DIX ET AL., MCCORMICK ON EVIDENCE § 13, at 38, 40 (Kenneth S. Broun ed., 7th ed. 2014) (when the expert is making a descriptive claim based on her experience, "the trial judge should demand a foundation establishing that on a significant number of occasions, the witness or other members of her specialty have had experiences similar to the incident in question").

869. *See Reach Music Publ'g, Inc. v. Warner Chappell Music, Inc.*, 988 F. Supp. 2d 395, 399, 404–05 (S.D.N.Y. 2013) (holding attorney provided reliable testimony concerning music publishing industry's custom and practice based on his extensive experience, and attorney provided "an explanation of how that experience is a sufficient basis for his opinion and that it was reliably applied to generate this opinion"); 1 FAIGMAN ET AL., *supra* note 246, § 1:26, at 80 ("Mere assertions of 'years of experience' should never be sufficient support for expert opinions. At the very least, courts should inquire into the nature and extent of the asserted experience.").

demanding in requiring a sufficient quantity of experience when the expert's experience is contrary to that of published literature or industry standards.<sup>870</sup> On the other hand, experience can be combined with literature to serve as the predicate for an expert opinion.<sup>871</sup>

When expert opinion testimony is based primarily on the expert's own personal experience, the extent of experience necessary depends in large part on the nature of the fact or principle that the expert seeks to establish. Thus, a beekeeper may opine that bumblebees always take off into the wind if she has observed "enough bees" taking off in "various circumstances" to "show a pattern."<sup>872</sup> But only a few observations of bees taking off likely will not support an opinion that bees "always" take off into the wind.<sup>873</sup> Conversely, only a few observations of bees taking off likely will support an opinion that bees "can" take off into the wind.<sup>874</sup> Generally, an expert can reliably rely on experience that demonstrates a level of consistency or predictability that is necessary to support the opinion. This requirement typically is not satisfied by a "random experience" or an "isolated case."<sup>875</sup> And courts frequently demand disclosure of the specifics of an expert's predicative experiences; vague recollections may be deemed insufficient to support the expert's opinion.<sup>876</sup>

But extensive "experience can suffice to validate a proposition even when the experience cannot be precisely

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870. See *Brown v. Ill. Cent. R.R. Co.*, 705 F.3d 531, 535–37 & n.11 (5th Cir. 2013) (holding no error in excluding expert opinion that crossing was ultrahazardous that was "transparently subjective" where expert did not rely on any guidelines or publications but instead on his "education and experience" and unidentified industry "standards, customs and practices" and admitted that crossing's visibility complied with Department of Transportation standard).

871. See *Escoto v. Estate of Ambriz*, 200 S.W.3d 716, 727 (Tex. App.—Corpus Christi 2006) (holding trial court did not abuse discretion in rejecting reliability challenge to expert opinion that fatigue from working graveyard shift caused automobile accident because of extensive experience studying fatigue, review of literature on fatigue in workplace, group studies, and analysis of facts), *rev'd on other grounds sub nom.* *Nabors Drilling, U.S.A., Inc. v. Escoto*, 288 S.W.3d 401 (Tex. 2009).

872. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998) (discussing the bumblebee analogy borrowed from *Berry v. City of Detroit*, 25 F.3d 1342, 1349–50 (6th Cir. 1994)).

873. *Cf. id.*

874. *Cf. id.*

875. *Minn. Mining & Mfg. Co. v. Atterbury*, 978 S.W.2d 183, 200–01 (Tex. App.—Texarkana 1998, pet. denied) (applying *Havner's* standards for evidence of causation, which were in turn taken from federal regulations promulgated by the FDA for clinical investigations of the safety and effectiveness of drugs).

876. See, e.g., *Watkins v. Telsmith, Inc.*, 121 F.3d 984, 992 (5th Cir. 1997).

quantified.”<sup>877</sup> Courts could look to a number of facts to determine the sufficiency of the quantity of experience. The publication *Daubert* factor may have some potential applicability for determining the sufficiency of an expert’s experience. An expert who has published his experience has given some objective criteria outside the litigation context of the experience and has subjected that experience to comparison by other experts. However, experts may have vast experience without publishing an article describing their experience.

To evaluate the sufficiency of the experience, courts should require an expert to identify examples of her experience because the reliability inquiry does not blindly accept an expert’s claim of predicate data without inquiry.<sup>878</sup> Thus, an expert’s declaration that a term has an industry meaning or that a practice is standard is insufficient; the expert needs to present some support for the declaration.<sup>879</sup> “If the witness is relying solely or primarily on experience, then the witness must explain how that experience leads to the conclusion reached, why that experience is a sufficient basis for the opinion, and how that experience is reliably applied to the facts.”<sup>880</sup> “It is not enough for the expert to explain that he or she is resting the opinion on his or her education or experience.”<sup>881</sup> “The trial court’s gatekeeping function requires more than simply ‘taking the expert’s word for

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877. Edward J. Imwinkelried, *The Meaning of “Appropriate Validation” in Daubert v. Merrell Dow Pharmaceuticals, Inc., Interpreted in Light of the Broader Rationalist Tradition, Not the Narrow Scientific Tradition*, 30 FLA. ST. U. L. REV. 735, 747 (2003) (footnote omitted).

878. This is similar to the *Havner* principle that an expert’s bald assurances of validity are insufficient to establish reliability and that the underlying data should be independently evaluated in determining if the opinion itself is reliable. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 712–13 (Tex. 1997); *cf.* *Bartosh v. Gulf Health Care Ctr.-Galveston*, 178 S.W.3d 434, 442–43 (Tex. App.—Houston [14th Dist.] 2005, no pet.) (holding that physician’s opinion that ant bites contributed to resident’s death was not supported by adequate foundation because physician had “only slight experience regarding fire ant bites and no experience” with complications from such bites).

879. *See* *Samuels v. Holland Am. Line-USA Inc.*, 656 F.3d 948, 952–53 (9th Cir. 2011) (holding expert opinion that water at particular port was known to be extremely dangerous throughout the cruise line industry was inadmissible when expert did not provide any materials from cruise line industry, contact other comparable cruise lines about issue, and had not done any research; his “quick internet search” and “few telephone calls” were an insufficient basis for his opinion).

880. FED. R. EVID. 702 advisory committee’s note.

881. Edward J. Imwinkelried, *Serendipitous Timing: The Coincidental Emergence of the New Brain Science and the Advent of an Epistemological Approach to Determining the Admissibility of Expert Testimony*, 62 MERCER L. REV. 959, 975 (2011); *see, e.g.,* *Praytor v. Ford Motor Co.*, 97 S.W.3d 237, 244 (Tex. App.—Houston [14th Dist.] 2002, no pet.) (stating that physician’s experience treating two similar patients “does not qualify as a scientific study that meets the statistical requirements of *Havner* or that can be tested or reviewed by [his] peers”).

it.”<sup>882</sup> A court may be particularly skeptical of an expert’s claim of experience when that experience is unique and contradicted by the well-established experience of other experts.<sup>883</sup>

Professor Imwinkelried identifies the difficulties of blind reliance on experience without analysis of its validity for reaching an inferential claim through an illustration:

Arson investigators rely on certain clues such as concrete “spalling” and char depth to determine the point of origin of a fire. These clues are plausible and widely accepted by fire department arson investigators. The difficulty, though, is that there have been few “full-scale burns” of buildings to verify that such factors accurately identify the starting place of a fire. To make matters worse, “[n]othing in the natural world ‘tests’ an arson investigator’s expertise. If an arson investigator is wrong, nothing runs aground or burns down.” These clues are in widespread use, but there is little objective evidence that their use yields accurate results. Without any effort to detect error and evaluate the results of the use of the technique, the analysts might simply be repeating the same mistakes over and over again.<sup>884</sup>

“While the relevant factors for determining reliability will vary from expertise to expertise,” the Advisory Committee’s notes state that Rule 702

rejects the premise that an expert’s testimony should be treated more permissively simply because it is outside the realm of science. An opinion from an expert who is not a scientist should receive the same degree of scrutiny for reliability as an opinion from an expert who purports to be a scientist.<sup>885</sup>

Professor Imwinkelried gives a helpful illustration demonstrating the need to establish an adequate amount of experience for experience-based expert testimony:

Suppose, for instance, that in a contract lawsuit, there is a dispute over the meaning of a term in the written agreement. To support her interpretation of the term, the plaintiff calls an experienced member of the industry as an expert witness. The witness proposes to testify that within the industry, there is a trade custom or usage as to the meaning of that term. The expert’s specific theory is that

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882. FED. R. EVID. 702 advisory committee’s note.

883. *State Farm Lloyds v. Mireles*, 63 S.W.3d 491, 499 (Tex. App.—San Antonio 2001, no pet.) (holding experience insufficient to reach opinion and noting that expert stood “alone among foundation experts in his opinion and theories”).

884. Imwinkelried, *supra* note 877, at 762 (citations omitted).

885. FED. R. EVID. 702 advisory committee’s note.

the usage exists within the industry. So long as the witness testifies that he or she has been a member of the industry for a certain period of time and has encountered that usage of the term on several occasions by industry members, the foundation ought to be deemed adequate. Standing alone, that experience suffices.<sup>886</sup>

In this illustration, the proponent of the expert testimony wants the witness to “merely recite or summarize experience as to fact A.”<sup>887</sup> In these situations, the testimony is descriptive and should be permitted provided “the witness has had a large number of similar experiences as to fact A.”<sup>888</sup>

In other situations, “the proponent contemplates inviting the expert to draw an inference from the witness’s experience. The expert evaluates the experience and draws a further inference as to fact B.”<sup>889</sup> An example would be when a physician describes her experience performing a particular procedure and then draws an inference regarding the standard of care for a reasonably prudent physician. The physician’s experience alone is insufficient to make a logical inferential determination that her practice is the same as the standard of care, that requires evidence of what other physicians do or do not do under the same or similar circumstances. When experience is used as the basis for a medical causation opinion, the expert is also making an inferential determination based on that experience. In that situation, “[o]ne or a few isolated anecdotes should not suffice.”<sup>890</sup> Instead, courts should first “insist[] upon a showing of ‘many instances’—a definite pattern of consistent outcomes—before they [are] willing to infer a relationship or connection.”<sup>891</sup> Additionally, courts “should demand proof of the results” of the expert’s experience.<sup>892</sup>

In each of these situations, experience is not operating as a factor supporting the reliability of an expert’s methodology. Rather, the expert’s experience is operating as a basis for the opinion, by providing data gathered through the expert’s personal experience, by using the expert’s experience as a methodology for analyzing the data in the case, or both. And as discussed below, experience can also function as the connection

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886. Imwinkelried, *supra* note 877, at 752 (footnotes omitted).

887. *Id.* at 753.

888. *Id.* at 756 (footnote omitted).

889. *See id.* at 753.

890. *Id.* at 761.

891. *Id.*

892. *Id.*

or link between an expert's methodology or predicate data to the expert's conclusion when an expert must extrapolate from either of those two bases to reach her conclusion.<sup>893</sup> At least one legal authority has observed that what we refer to in this Article as "connective reliability" plays a particularly important role in assessing experience-based opinions.<sup>894</sup>

*ii. Attorneys' Experiential Predicates.* Special rules apply to an attorney's expert testimony about the reasonableness and necessity of attorney's fees. In *Garcia v. Gomez*, a health care liability claim in which shifting of attorney's fees was mandated by the Texas Medical Liability Act,<sup>895</sup> the Texas Supreme Court held that "[a]n attorney's testimony about the reasonableness of his or her own fees is not like other expert witness testimony."<sup>896</sup> "Although rooted in the attorney's experience and expertise, it also consists of the attorney's personal knowledge about the underlying work and its particular value to the client."<sup>897</sup> The Court held that such testimony "is not objectionable as merely conclusory because the opposing party, or that party's attorney, likewise has some knowledge of the time and effort involved and if the matter is truly in dispute, may effectively question the attorney regarding the reasonableness of his fee."<sup>898</sup> The Court noted that the opposing party in *Garcia* did not cross-examine the witness or present any contrary evidence on the issue of

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893. See *infra* notes 1671–77 and accompanying text (discussing *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486 (Tex. 2001)); *infra* notes 1701–20 and accompanying text (discussing *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79 (Tex. App.—Houston [1st Dist.] 2009, no pet.)).

894. See 29 WRIGHT & GOLD, *supra* note 52, § 6266, at 88 (Supp. 2014) ("Expert testimony regarding scientific matters is reliable if the expert's theories were derived through the so-called scientific method. This includes the use of testing, appropriate standards and controls, and acceptable error rates. These Daubert factors focus on the reliability of the expert's methods rather than the validity of the expert's conclusions. In the non-scientific context, the reliability of an expert's methodology will be determined by common sense, logic, and practices common to or accepted in the area of expertise in question.").

895. See TEX. CIV. PRAC. & REM. CODE ANN. § 74.351(b) (West 2011) (mandating that if an expert report has not been served within the period specified by Subsection (a) regarding a defendant physician or health care provider, the court, on the motion of the affected physician or health care provider, shall enter an order that awards reasonable attorney's fees to the affected physician or health care provider).

896. *Garcia v. Gomez*, 319 S.W.3d 638, 641 (Tex. 2010).

897. *Id.* In this sense, the Court compared the testimony to a property owner's testimony about the value of her property under the "Property Owner Rule." *Id.*; see *infra* notes 1007–10 and accompanying text (discussing the "Property Owner Rule"). But the Court has since then imposed stricter expert-testimony requirements on such property owner testimony. See *infra* text accompanying note 1009 (observing that property owners must now support the valuation of their property with a sufficient predicate).

898. *Garcia*, 319 S.W.3d at 641.

attorney's fees.<sup>899</sup> Thus, the Court held that the attorney's testimony, in which the attorney summarily asserted that certain dollar amounts represented the reasonable and necessary attorney's fees that were usual and customary for a case of the same nature as the case before the jury, constituted "some evidence" (but not conclusive evidence) of reasonable and necessary attorney's fees.<sup>900</sup> In the wake of *Garcia*, courts have sanctioned attorney's fees testimony that, like the testimony in *Garcia*, consisted of little (if anything) more than the attorney's bald assertions that her fees were reasonable and necessary.<sup>901</sup>

But two years later, the Court distinguished *Garcia* from cases involving the lodestar method of proving attorney's fees.<sup>902</sup> In *El Apple I, Ltd. v. Olivas*, the Court held that attorney opinion testimony on the reasonableness of his fees, which would have been sufficient under *Garcia*, did not provide an adequate predicate to support an opinion on the reasonableness and necessity of attorney's fees under the lodestar method.<sup>903</sup> In lodestar cases, a more substantial predicate is necessary: "[A] trial court should obtain sufficient information to make a meaningful evaluation of the application for attorney's fees," including "meaningful review of the hours claimed" and excluding charges for "duplicative, excessive, or inadequately documented work."<sup>904</sup> The Court did not state a bright-line rule that billing records or their equivalent are always required to substantiate an expert opinion on reasonable attorney's fees under the lodestar method, but it at least implied that such documentation will ordinarily be necessary.<sup>905</sup>

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899. *Id.*

900. *Id.*

901. *See, e.g.,* Sundance Minerals, L.P. v. Moore, 354 S.W.3d 507, 514–15 (Tex. App.—Fort Worth 2011, pet. denied); Giron v. Baylor Univ. Med. Ctr., No. 05-09-00825-CV, 2011 WL 149981, at \*6 (Tex. App.—Dallas Jan. 19, 2011, pet. denied) (mem. op.).

902. *El Apple I, Ltd. v. Olivas*, 370 S.W.3d 757, 762 (Tex. 2012) ("Unlike *Garcia*, the question [here] is not whether the trial court erred in failing to make an award of fees required by statute, but rather whether the court properly applied the lodestar method in determining contested attorney's fees.>").

903. *Id.* at 764.

904. *Id.* at 762.

905. *Id.* at 762–63 ("While Texas courts have not routinely required billing records or other documentary evidence to substantiate a claim for attorney's fees, the requirement has merit in contested cases under the lodestar approach. . . . [The] proof should include the basic facts underlying the lodestar, which are: (1) the nature of the work, (2) who performed the services and their rate, (3) approximately when the services were performed, and (4) the number of hours worked. An attorney could, of course, testify to these details, but in all but the simplest cases, the attorney would probably have to refer to some type of record or documentation to provide this information. Thus, when there is an expectation that the lodestar method will be used to calculate fees, attorneys should document their time much as they would for their own clients, that is, contemporaneous

The Texas Supreme Court again addressed the sufficiency of expert testimony predicated on an attorney's experience and personal knowledge in 2013, this time outside the context of reasonable and necessary attorney's fees.<sup>906</sup> In *Elizondo v. Krist*, the Elizondos sued their former attorneys, alleging that the attorneys had settled their personal injury claims against BP Amoco Chemical Company for less than the claims were worth.<sup>907</sup> The Elizondos' underlying claims against BP arose out of an explosion at BP's Texas City refinery that gave rise to approximately 4,000 claims against BP, all of which BP settled.<sup>908</sup> The Elizondos attempted to demonstrate damages for their malpractice claim through the affidavit of an attorney-expert who had represented a number of other claimants against BP in these settlements.<sup>909</sup> The expert identified ten factors that BP had considered in determining the settlement value of claims like the Elizondos' and concluded that the Elizondos' former attorneys had breached the standard of care by settling the Elizondos' claims against BP for \$50,000, which he described as "basically . . . nuisance value," because he placed the actual settlement value of the claims between two and three million dollars.<sup>910</sup> The expert predicated his opinion on the facts of the case, his "experience in the BP litigation," his "knowledge of general settlement values," and "the criteria and protocol relied upon to establish general settlement values in the BP litigation."<sup>911</sup> Essentially, the expert used BP's ten settlement-evaluation criteria to compare the Elizondos' claims to other claims BP settled after the refinery explosion and determined that the Elizondos' claims were settled for much less than other comparable claims.<sup>912</sup> The Court held that the expert testimony was conclusory under a connective reliability analysis,<sup>913</sup> but the Court specifically approved of the attorney's use of other settlements as factual predicates for his opinion on the value of the Elizondos' underlying claims:

Under Evidence Rule 703, experts may base their testimony on facts or data that are "of a type reasonably relied upon

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billing records or other documentation recorded reasonably close to the time when the work is performed.").

906. *Elizondo v. Krist*, 415 S.W.3d 259 (Tex. 2013).

907. *Id.* at 261.

908. *Id.* at 260.

909. *Id.* at 262.

910. *Id.* at 262–63.

911. *Id.* at 262.

912. *Id.* at 263.

913. *Id.* at 266; *see infra* Part III.D.

by experts in the particular field in forming opinions or inferences upon the subject.” That test is met when, in a mass tort litigation involving thousands of similar claimants and arising out of the same event, the expert measures the “true” settlement value of a particular case by persuasively comparing all the circumstances of the case to the settlements obtained in other cases with similar circumstances arising from the event.<sup>914</sup>

Thus, for opinions given by attorneys, as well as for opinions given by physicians, reliability will often focus on the expert’s experience with the particular question at issue.<sup>915</sup> To that extent, the reliability of the expert’s opinion overlaps with the expert’s qualifications. But sometimes both experience and predicative data are available, and in those cases, a court may wish to consider both. For example, an attorney may testify that a billing rate is “standard” or “reasonable” in a community for an attorney with a certain level of experience.<sup>916</sup> The attorney’s testimony is not reliable “if the attorney only knows the hourly rate charged by the attorneys handling the dispute and by the expert’s colleagues in his or her own law firm.”<sup>917</sup> But he may know the fees charged by other attorneys. And the expert-attorney may have data available on attorney’s billing rates from the Texas Lawyer. There may also be a question of connective reliability—the expert may not have any experience with the particular type of case and may have to extrapolate from other cases or may have billing rate data from one area of the state but not from the county of the lawsuit. Finally, although the conclusory nature of an attorney’s opinion on the reasonableness of attorney’s fees should, in theory, depend solely on the proffered opinion and support for it, whether the sufficiency of the evidence on fees was contested at trial and the degree to which the opinion testimony was challenged by the opposing party seem to play a

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914. *Elizondo*, 415 S.W.3d at 263 (quoting TEX. R. EVID. 703) (“In this case, it is undisputed that BP, a large, solvent corporation, made the decision to settle every case arising from the plant explosion. Here, where the same defendant settled thousands of cases, and indeed made the business decision to settle all cases and not try any to a verdict, we see no reason why an expert cannot base his opinion of malpractice damages on a comparison of what similarly situated plaintiffs obtained from the same defendant. This data is perhaps the best evidence of the real-world settlement value of the case.”).

915. *See, e.g., id.* at 262; *Garcia v. Gomez*, 319 S.W.3d 638, 641 (Tex. 2010) (holding that attorney’s experience and expertise alone may be sufficient predicate for expert opinion on reasonableness of her fees in health care liability claims); *JCPenney Life Ins. Co. v. Baker*, 33 S.W.3d 417, 428 (Tex. App.—Fort Worth 2000, no pet.) (holding that physician’s causation opinion that death resulted from automobile accident was reliable because opinion was based on physician’s experience with condition and observations).

916. *Brown*, *supra* note 1, at 833.

917. *Id.*

meaningful role in the degree of scrutiny applied by appellate courts.

Finally, whether offered by an attorney or another type of expert, an opinion based on an erroneous interpretation of a contract<sup>918</sup> or the law<sup>919</sup> is not reliable.<sup>920</sup>

*iii. Engineering Technical Predicates.* Engineering experts often rely on technical predicates to demonstrate a manufacturing or design defect (or the absence thereof) in products liability cases or to demonstrate that such a defect caused a plaintiff's injury. The principles of mathematics and physics on which such experts base their opinions (methodological reliability) are sometimes well established and unquestioned;<sup>921</sup> in those cases, challenges to the expert testimony are frequently based on the data the expert plugged into the equation (predicative reliability), the assumptions on which the equation was based (predicative reliability), or the "fit" between the factual predicate of the expert's opinion and the actual facts of the case (connective reliability).<sup>922</sup> Although the first and third focuses overlap, our focus in this section is on opinion testimony lacking a factual predicate—i.e., when the data the expert plugged into the calculations or the assumptions on which the calculations were based are unsupported by, or inconsistent with, the evidence in the case.

In *Whirlpool*, for example, the plaintiffs relied exclusively on the testimony of an electrical engineer to prove a design defect.<sup>923</sup>

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918. Cent. Appraisal Dist. of Taylor Cnty. v. W. AH 406, Ltd., 372 S.W.3d 672, 690 (Tex. App.—Eastland 2012, pet. denied).

919. Exxon Pipeline Co. v. Zwahr, 88 S.W.3d 623, 629–31 (Tex. 2002) (holding that expert failed to apply proper methods of damages for eminent domain claim and therefore, was not relevant because it was not sufficiently tied to facts of case); Greenberg Traurig of N.Y., P.C. v. Moody, 161 S.W.3d 56, 98, 100 (Tex. App.—Houston [14th Dist.] 2004, no pet.) (concluding that expert testimony interpreting Texas disciplinary rules was incorrect and improperly admitted); Yzaguirre v. KCS Res., Inc., 47 S.W.3d 532, 544 (Tex. App.—Dallas 2000) (holding that expert testimony that relied on improper definition of market value was properly not admitted), *aff'd*, 53 S.W.3d 368 (Tex. 2001).

920. This is particularly important when considering expert testimony on the law, which attorney-experts often offer in legal malpractice or breach of fiduciary duty cases. We discuss legal expert testimony in detail below. *See infra* notes 1458–67 and accompanying text.

921. Other times, however, engineering experts' methodologies are challenged. For example, when the expert failed to conduct any physical testing or support theoretical calculations and models. *See infra* note 1247 and accompanying text (stating that courts often rely on the absence of testing in concluding that an expert's testimony is unreliable).

922. *See supra* Part III.B.2 (discussing the relevancy and importance of factual predicates of an expert's opinion and cases where an expert's opinion relies on false facts or assumptions).

923. Whirlpool Corp. v. Camacho, 298 S.W.3d 631, 634 (Tex. 2009).

The engineer testified that the fire in the plaintiffs' home started when lint particles in their Whirlpool-manufactured clothes dryer ignited the clothes in the dryer.<sup>924</sup> The expert presented a detailed process by which the fire could have started in the dryer: the dryer's corrugated tube allowed lint to hang up on the inside of the tube and clog it; the clogged tube caused lint to back up into the blower housing assembly, from which excessive amounts of it escaped by being blown through a gasket-like seal between the lint chute and the blower housing (the "lint chute seal"), and into the dryer cabinet; the lint was then forced through the lint chute seal, became airborne, and was drawn into the heater box; some airborne lint particles then passed through the heater box, were ignited as they passed by the heater element, and traveled vertically to the inlet grill; there, the lint particles either entered the drum or came into contact with and ignited other lint that had become attached to the inlet grill, and then the newly-ignited lint entered the rotating drum; once the ignited lint was in the dryer drum, it landed in the drying, tumbling clothes, and smoldered there through the remainder of the drying and cool-down cycles and the period of time after the dryer shut off; when one of the plaintiffs opened the dryer door, oxygen entered the drum and the increased oxygen level allowed the smoldering lint and clothes to burst into flames.<sup>925</sup>

But the Texas Supreme Court held that the expert's testimony was "conclusory" and "not entitled to probative weight" because of the inadequacy of the predicate on which his opinion rested.<sup>926</sup> First, while a clogged lint tube might cause the kind of back up the engineer described, there was no basis for concluding that the plaintiffs' lint tube was clogged.<sup>927</sup> The tube had been destroyed in the fire, so the engineer examined the transport tube from an "exemplar" dryer.<sup>928</sup> But the "exemplar" dryer was used under different conditions and in a different manner.<sup>929</sup> Importantly, the "exemplar" dryer had not been properly vented, and the engineer could not provide any basis for concluding that a lint transport tube would become clogged if properly vented, as the plaintiffs' had been.<sup>930</sup> And there was evidence that the

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924. *Id.* at 635.

925. *Id.* at 635–36.

926. *Id.* at 643 (citing *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009)).

927. *Id.* at 640.

928. *Id.*

929. *Id.*

930. *Id.* Notably, the "analytical gap" between the circumstances of the exemplar dryer and the circumstances of the plaintiff's dryer left the expert with no predicate for his opinion that the dryer's transport tube became clogged. *See id.* at 639–40.

plaintiffs' dryer had been serviced before the fire, at which time the dryer's cabinet had been vacuumed out.<sup>931</sup> Second, the engineer relied on certain lint-ignition tests to conclude that lint in the plaintiffs' dryer could have ignited in the heater box and then passed through the inlet grill to ignite clothes in the dryer.<sup>932</sup> But the tests involved dryers that were designed differently than the plaintiffs' dryer—particularly in that they did not have an inlet grill separating the heating element from the clothing.<sup>933</sup> Whirlpool presented evidence that the inlet grill would have prevented lint particles large enough to ignite clothing from passing through.<sup>934</sup> The engineer did not explain how the smaller particles that could have passed through the inlet grill in the plaintiffs' dryer could have ignited clothing.<sup>935</sup> Because it was based on the unsupported assumptions that the lint transport tube was clogged and that large lint particles could have passed through the dryer's inlet grill, the expert testimony in *Whirlpool* lacked predicative reliability (as well as connective reliability, as discussed below).<sup>936</sup>

*iv. Accident Reconstruction Technical Predicates.*

Accident reconstructionists also often rely on physics and mathematical predicates, as well as their experience, for their opinions about how an accident came to pass. The Texas Supreme Court provided a useful comparison of expert testimony in product liability cases in *TXI Transportation*, discussing two of the Court's prior cases involving accident reconstruction expert testimony as exemplars of when such testimony is reliable and when it is not.<sup>937</sup> In both cases, the principal issue was whether

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931. *Id.*

932. *Id.* at 640–41.

933. *Id.* at 641.

934. *Id.*

935. *Id.* Here again, the plaintiffs' expert lacked any predicate for his assumption (that lint ignited clothing in the dryer) because the only predicate that the expert had (the lint-ignition tests) lacked connective reliability—i.e., the expert failed to explain why the “gap” between dryers with inlet grill and dryers without an inlet grill was not material to his theory of the fire. *See id.* The Court agreed with the plaintiffs that “[t]esting is not always required to support an expert’s opinion,” but the Court qualified that standard by stating that when testing is possible, the lack of such testing “is one factor that points toward a determination that an expert opinion is unreliable.” *Id.* at 642. The Court also criticized the expert’s opinion on methodological reliability grounds and connective reliability grounds. *See id.* at 642–43; *infra* notes 1259–66, 1646–56 and accompanying text (discussing *Whirlpool*).

936. Connective reliability is discussed in detail later in this article. *See infra* Part III.D.

937. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239–40 (Tex. 2010) (comparing *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 40–41 (Tex. 2007) with *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 906 (Tex. 2004)).

the failure of a defective mechanical part was the cause of the accident or was caused by the accident, but the Court found the expert testimony reliable in one case (*Ledesma*) and unreliable in the other (*Ramirez*).<sup>938</sup>

In *Ledesma*, the expert, a metallurgical and mechanical engineer, opined that a u-bolt on the plaintiff's truck became under-torqued on the rear leaf spring and axle assembly causing the axle assembly to come apart, which in turn caused the drive shaft to separate from the transmission such that the plaintiff lost control of the truck.<sup>939</sup> In *Ramirez*, the expert, an accident reconstructionist, opined that a bearing defect in the left rear wheel assembly of the plaintiff's car caused the left rear wheel to become detached from the car's axle, which in turn caused the plaintiff to lose control of the car.<sup>940</sup> The difference between the two exemplars of expert evidence was that the expert in *Ledesma* "supported his theory with observations and measurements from the physical evidence and the manufacturer's own specifications" and "pointed to other physical evidence to support his theory regarding the u-bolt's failure as the triggering event for the accident."<sup>941</sup> The expert in *Ramirez*, by comparison, "proposed the 'laws of physics' explained his assumption, but did not connect his theory to any physical evidence in the case or to any tests or calculations prepared to substantiate his theory"; to the contrary, the expert could not logically reconcile certain facts about the accident site with his theory of how the accident happened.<sup>942</sup> The Court concluded that the expert opinion testimony offered in *TXI Transportation*, like that in *Ledesma*, was "neither conclusory nor subjective" because the expert's "observations, measurements, and calculations were tied to the physical evidence in the case which likewise provided support for his conclusions and theory."<sup>943</sup>

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938. *TXI Transp.*, 306 S.W.3d at 239–40; *Ledesma*, 242 S.W.3d at 40–41; *Ramirez*, 159 S.W.3d at 906.

939. *Ledesma*, 242 S.W.3d at 37–38.

940. *Ramirez*, 159 S.W.3d at 902, 904.

941. *TXI Transp.*, 306 S.W.3d at 239 (citing *Ledesma*, 242 S.W.3d at 37–38).

942. *Id.* (citing *Ramirez*, 159 S.W.3d at 904–06).

943. *Id.* at 240. The flaw in the expert evidence in *Ramirez* could be viewed as a lack of predicative reliability—the expert had no basis for concluding that the left rear wheel became detached before the accident. See *Ramirez*, 159 S.W.3d at 904–06. But it is better viewed as a lack of connective reliability because there was evidence in the case from which a hypothesis could be made on the issue—most notably, the location of the wheel at the accident scene. See *id.* The problem for the plaintiff was that this evidence was contrary to, rather than supportive of, the expert's theory of the accident; his theory of the accident simply did not fit the facts of the case. See *id.*; see also *infra* notes 1616–32 (discussing connective reliability in *Ramirez*).

While *TXI Transportation* and *Ledesma* indicate that expert opinions about how an accident came to pass must be tied to the physical evidence in the case, Texas courts have not required that the connection be perfect or the best available. In *Lincoln v. Clark Freight Lines, Inc.*, the court of appeals rejected a challenge to accident reconstruction testimony from an experienced deputy on the ground that the deputy had determined the hardness of the vehicle's tire rubber (for purposes of determining the coefficient of friction) by "eyeballing the tires" rather than using a Durometer.<sup>944</sup> The court determined that the expert could rely on his "years of experience testing the coefficient of friction with 'similar tires' . . . [which] supplied scientific proof that the [test car's] drag coefficient would be similar to that of the [plaintiff's car]."<sup>945</sup> The court concluded that the trial court did not err in finding that the expert's testimony was not based on merely subjective belief or unsupported speculation.<sup>946</sup>

*v. Damages Technical and Experiential Predicates.* Like engineering experts, damages experts often rely on technical predicates to calculate damages—frequently, principles of finance and mathematics that are well established and unquestioned.<sup>947</sup> Thus, in this category of expert testimony too, challenges are sometimes based on the data the expert plugged into the equation or the assumptions on which the equation was based (predicative reliability).<sup>948</sup>

Federal courts have afforded damages experts some leeway in determining what data to use in damages calculations. For example, in *Manpower, Inc. v. Insurance Co. of Pennsylvania*, the Seventh Circuit overturned a district court's exclusion of an expert's opinion of the plaintiff's business interruption losses, calculated using a growth rate extrapolation methodology.<sup>949</sup> The expert's methodology was sound and was not the subject of the

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944. *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79, 85, 89, 91 (Tex. App.—Houston [1st Dist.] 2009, no pet.).

945. *Id.* at 89–90.

946. *Id.* at 91.

947. *See, e.g.*, *Guadalupe-Blanco River Auth. v. Kraft*, 77 S.W.3d 805, 808 (Tex. 2002) (acknowledging the use of comparable sales to be an approved methodology to value the fair market value of property); *Koko Motel, Inc. v. Mayo*, 91 S.W.3d 41, 51 (Tex. App.—Amarillo 2000, pet. denied).

948. *See Manpower, Inc. v. Ins. Co. of Pa.*, 732 F.3d 796, 801 (7th Cir. 2013) (stating that the district court accepted the methodology as sound but excluded the testimony because of the data used).

949. *Id.* at 808, 810. The plaintiff's claim against its insurer was for recovery under the plaintiff's "difference in conditions" policy after the collapse of the plaintiff's office building. *Id.* at 799.

district court's concern.<sup>950</sup> Instead, the issue was whether the data points used by the expert in his calculations were sufficiently reliable.<sup>951</sup> The Seventh Circuit said that “[t]he reliability of data and assumptions used in applying a methodology is tested by the adversarial process and determined by the jury; the court’s role is generally limited to assessing the reliability of the methodology—the framework—of the expert’s analysis.”<sup>952</sup> The court clarified that an expert may not rely on data “that has no quantitative or qualitative connection to the methodology employed,”<sup>953</sup> but rather, must rely on the “kinds of facts or data on which experts in the field would reasonably rely.”<sup>954</sup>

Because Texas courts are not limited to pre-admission review of reliability and may also test reliability posttrial through a legal-sufficiency challenge, the data underlying an expert’s damages opinion is subject to scrutiny in light of the facts developed at trial.<sup>955</sup> Consistent with the Seventh Circuit’s caution that foundational data for an expert opinion cannot be quantitatively or qualitatively disconnected from the facts of the case, Texas courts have rejected damages opinions based on an acceptable methodology when the predicative data used in the calculations lacks sufficient similarity or comparability to the facts of the case.<sup>956</sup> For example, in *Guadalupe-Blanco River Authority v. Kraft*, the Texas Supreme Court held that a trial court erred in admitting the testimony of a damages expert who opined on the value of land based on the “judicially accepted sales

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950. *Id.* at 806–07.

951. *Id.*

952. *Id.* at 808.

953. *Id.*

954. *Id.* at 809 (quoting FED. R. EVID. 703) (internal quotation marks omitted).

955. *See supra* Part III.A (stating that Texas appellate courts can overturn a verdict on legal-sufficiency-of-the-evidence grounds when an expert’s opinion lacks connective reliability, even if the opinion was admitted without objection).

956. This is particularly true when an expert relies on the comparable sales methodology to determine market value. Texas courts have observed that the sales data on which the expert relies for comparison must have similar characteristics to the property at issue. *See City of Harlingen v. Estate of Sharboneau*, 48 S.W.3d 177, 182 (Tex. 2001) (“Comparable sales must be voluntary, and should take place near in time to the condemnation, occur in the vicinity of the condemned property, and involve land with similar characteristics.”); *see also Williams v. State*, 406 S.W.3d 273, 285 (Tex. App.—San Antonio 2013, pet. denied) (“Comparable sales are generally admissible unless it appears that reasonable minds cannot differ from the conclusion that the evidence of the other sales lack probative force because of their dissimilarity to the condemned property.”); *Collin Cnty. v. Hixon Family P’ship*, 365 S.W.3d 860, 870 (Tex. App.—Dallas 2012, pet. denied) (discussing the test of similarity); *LaSalle Pipeline, LP v. Donnell Lands, L.P.*, 336 S.W.3d 306, 316 (Tex. App.—San Antonio 2010, pet. denied) (stating that comparable sales do not have to be in the immediate vicinity of the subject land, so long as they meet the test of similarity).

comparison method for land valuation.”<sup>957</sup> The Court stated that, under *Havner*, it was required to “independently evaluate[]” the expert’s predicative data to ensure reliability.<sup>958</sup> The Court reviewed the sales on which the expert relied in making his comparison and determined that they were not comparable to the property at issue.<sup>959</sup> Because a comparison sales approach methodology requires comparison to comparable properties, and the expert had not relied on any comparable properties, the expert’s testimony lacked any probative predicate and was not reliable.<sup>960</sup>

Similarly, in *Royce Homes, L.P. v. Humphrey*, the Beaumont Court of Appeals held that a trial court erred by admitting opinion testimony from a real estate appraiser regarding diminution in the market value of the plaintiff’s home as a result of flooding.<sup>961</sup> The expert testified that “flood stigma” had caused a 20% decline in the plaintiff’s home value, which the expert testified would continue to affect the home’s value even after the cause of the flooding was fixed.<sup>962</sup> With regard to the predicate for his opinion, the expert testified that he had dealt with over one hundred properties that had incurred flood damage, but in reaching the 20% figure, he conceded that he did not use other flooded properties as a comparison; nor did he identify any data supporting his calculation or any properties that he claimed suffered similar flood damage.<sup>963</sup> Instead, he testified that his opinion was based on “much conversation, particularly, over the years with realtors that sell these properties” and on his experience in selling flooded properties and nonflooded properties, though he had nothing “in writing” to show a comparison.<sup>964</sup> The court of appeals concluded that broad assertions of general experience were not a sufficient predicate for the expert’s damages opinion.<sup>965</sup>

Most recently, in *Houston Unlimited*, the Texas Supreme Court rejected expert testimony that contaminated property suffered a diminution in value that remained after the contamination subsided due to the “stigma” of having been

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957. *Guadalupe-Blanco River Auth. v. Kraft*, 77 S.W.3d 805, 807–08 (Tex. 2002).

958. *Id.* at 808 (quoting *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997)).

959. *Id.*

960. *Id.* at 808–09.

961. *Royce Homes, L.P. v. Humphrey*, 244 S.W.3d 570, 577–79 (Tex. App.—Beaumont 2008, pet. denied).

962. *Id.* at 575, 578.

963. *Id.* at 578.

964. *Id.*

965. *Id.* at 578–79.

contaminated.<sup>966</sup> The Court did not reach the issue of whether “stigma” damages could ever be recovered for a temporary injury to land because it held that the expert’s testimony was legally insufficient to support the judgment even if such damages were available.<sup>967</sup> The Court noted deficiencies in both the expert’s methodology and the predicate for her opinion. Her factual predicate was defective because (1) she equated both an original listing price and a verbal offer as establishing “market values,” when neither satisfies the legal definition of “market value”;<sup>968</sup> (2) she relied on a “sweetheart” deal as establishing “market value” when the law requires an arm’s-length transaction;<sup>969</sup> and (3) she derived the plaintiff’s “stigma” damages from the “stigma” damage suffered by two other contaminated and remediated properties without ever attempting to show that the diminutions in value allegedly suffered by the two other properties were attributable to “stigma” rather than other market factors.<sup>970</sup>

Damages opinions cannot be based on facts or data that the applicable legal and professional standards bar from consideration. For example, damages opinions in oil and gas cases cannot violate the value-to-the-taker rule or the projected-enhancement rule.<sup>971</sup> As another example, in condemnation cases, business income generally cannot be considered in determining the market value of real property.<sup>972</sup>

Additionally, when damages opinions are based on incorrect legal principles or constructions, the expert’s opinion may be left without a valid predicate. For example, when an expert’s valuation of property was significantly impacted by the expert’s incorrect interpretation of the parties’ “lockbox” agreement, the Eastland Court of Appeals held that “[b]ecause the foundational data underlying [the expert’s] opinions is unreliable, the value

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966. Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch, No. 13-0084, 2014 WL 4116810, at \*5 (Tex. Aug. 22, 2014).

967. *Id.* at \*8.

968. *Id.* at \*9 (observing that “market value” is what a willing buyer under no compulsion to buy will pay and a willing seller under no compulsion to sell will accept, while a list price reflects only what a willing seller will accept and an unaccepted offer reflects only what a willing buyer will pay).

969. *Id.* at \*9–10.

970. *Id.* at \*11–12.

971. *See, e.g.*, Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC, 386 S.W.3d 256, 262 (Tex. 2012) (holding that damages expert’s opinion violated value-to-the-taker rule and therefore, required remand); Exxon Pipeline Co. v. Zwahr, 88 S.W.3d 623, 627–29 (Tex. 2002) (citing City of Fort Worth v. Corbin, 504 S.W.2d 828, 830 (Tex. 1974)) (stating that project-enhancement rule prevents fact finder from taking into account the enhancement of the property’s value due to taking itself in determining market value).

972. State v. Cent. Expressway Sign Assocs., 302 S.W.3d 866, 871 (Tex. 2009).

opinions that he drew from that data are likewise unreliable, and his testimony is legally no evidence to support the jury's verdict."<sup>973</sup> In determining land value, the law permits experts to predicate their value calculations on the land's highest and best use, and that may include a purpose for which the land is not currently being used.<sup>974</sup>

When a party seeks to recover remedial damages—often measured by the cost of repair—the party must establish that the damages sought are reasonable and necessary.<sup>975</sup> If the cost of repair is established exclusively through expert testimony, then the expert must opine not only as to what repairs would cost, but that those costs are reasonable and must support those opinions with an adequate predicate.<sup>976</sup> In *McGinty v. Hennen*, the jury found that a homebuilder's negligence caused mold in the plaintiff's home, that the home was worth \$262,885 less than it otherwise would have been, and that the cost to remove the mold and repair the home would be \$651,230.<sup>977</sup> The trial court entered judgment for the plaintiff awarding the \$651,230 repair costs.<sup>978</sup> The Supreme Court of Texas held that the testimony of the plaintiff's expert, a local contractor, constituted no evidence of the reasonable and necessary cost of repairs because the expert did not opine or otherwise address, directly or indirectly, whether the repair costs estimated were reasonable.<sup>979</sup> The Court stated that while a detailed explanation of how cost estimates are reached will, in some instances, "reveal factors that were

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973. Cent. Appraisal Dist. of Taylor Cnty. v. W. AH 406, Ltd., 372 S.W.3d 672, 689 (Tex. App.—Eastland 2012, pet. denied).

974. In *State v. Petropoulos*, the defendant objected to expert testimony regarding the value of land if the land was used as a car wash and lube facility, arguing that the testimony was speculative because the plaintiffs had not been approached by buyers seeking to acquire the land for that use. *State v. Petropoulos*, 346 S.W.3d 525, 529 (Tex. 2011). The Texas Supreme Court disagreed, observing that the appraisal expert had described the practice in the appraisal profession of conducting a feasibility analysis to determine an appropriate highest and best use, had adhered to that practice considering four key factors, and had determined a value estimate for the property under various possible uses, selecting what he considered the property's highest and best use. *Id.*

975. *McGinty v. Hennen*, 372 S.W.3d 625, 627 (Tex. 2012) (per curiam) (citing *Mustang Pipeline Co. v. Driver Pipeline Co.*, 134 S.W.3d 195, 200 (Tex. 2004) (per curiam)).

976. *Id.* at 627–28.

977. *Id.* at 626.

978. *Id.*

979. *Id.* at 627–28. The expert testified that he had estimated costs of repair using a program called "Exactimate," which he asserted was "used widely in the insurance industry." *Id.* at 627. He testified that the program had a price guide for Houston, Texas, which he compared with prices in Corpus Christi, Texas and determined to be "within a percent or two difference." *Id.* He also testified that he had checked the pricing and that "some of the other costs came from subcontractors or historical data or jobs." *Id.*

considered to ensure the reasonableness of the ultimate price,” the testimony offered in the case did not.<sup>980</sup>

Expert opinions on lost profits and future earnings<sup>981</sup> can be particularly difficult to substantiate because they necessarily entail some degree of speculation. With respect to lost profits, Texas appellate courts have approved a variety of different methodologies for estimating a business’s unrealized future profits.<sup>982</sup> But even when the expert uses a reliable methodology, the expert’s opinion can be challenged based on the reliability of the foundational data to which the methodology is applied.<sup>983</sup> “At a minimum, opinions or estimates of lost profits must be based upon objective facts, figures, or data from which the amount of lost profits may be ascertained.”<sup>984</sup> Thus, the Dallas Court of Appeals held that expert testimony on lost profits was unreliable and “constituted no evidence” when the expert’s opinion was “based on assumed facts about available leases and on unsupported, verbal information about lease rates.”<sup>985</sup> The court stated that “the lease rates for the leases that [the expert] assumed [the plaintiff] would enter into, and [the plaintiff’s] lost profits based on those purportedly lost leases were not based on

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980. *Id.* at 628.

981. With respect to future earnings, several Texas courts of appeals have held evidence relating to a plaintiff’s immigration status may be relevant to determine the plaintiff’s future earnings if the earnings forecasts assume continued employment in the United States when the plaintiff is subject to immediate deportation. *See Republic Waste Servs., Ltd. v. Martinez*, 335 S.W.3d 401, 407–08 (Tex. App.—Houston [1st Dist.] 2011, no pet.) (affirming trial court’s exclusion of immigration status because its probative value was slight and was outweighed by danger of unfair prejudice); *ABC Rendering of San Antonio, Inc. v. Covarrubias*, No. 15085, 1972 WL 268822, at \*6 (Tex. Civ. App.—San Antonio Nov. 22, 1972, no writ); *see also* Benny Agosto, Jr., Lupe Salinas & Eloisa Morales Arteaga, “*But Your Honor, He’s an Illegal!*”—*Ruled Inadmissible and Prejudicial: Can the Undocumented Worker’s Alien Status Be Introduced at Trial?*,” 17 TEX. HISP. J.L. & POL’Y 27, 41–45 (2011) (discussing Texas cases dealing with the concerns of admitting evidence regarding a party’s immigration status).

982. *See, e.g., ERI Consulting Eng’rs, Inc. v. Swinnea*, 318 S.W.3d 867, 877 (Tex. 2010) (“Contrasting revenue from a time period immediately before the period at issue is an established method of proving revenue for a lost profit damages calculation.”); *White v. Sw. Bell Tel. Co.*, 651 S.W.2d 260, 262 (Tex. 1983) (citing *Atomic Fuel Extraction Corp. v. Slick*, 386 S.W.2d 180, 188 (Tex. Civ. App.—San Antonio 1964, writ ref’d n.r.e.)) (“Where there is an established business, pre-existing profits may be used to evidence the amount of loss with reasonable certainty.”); *DaimlerChrysler Motors Co. v. Manuel*, 362 S.W.3d 160, 190–91 (Tex. App.—Fort Worth 2012, no pet.) (noting approval of “yardstick” and “before and after” methods for determining lost profits).

983. *See DaimlerChrysler Motors*, 362 S.W.3d at 191 (“The underlying data should be independently evaluated in determining if the opinion itself is reliable.” (quoting *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997))).

984. *Id.* at 191 (citing *Springs Window Fashions Div., Inc. v. Blind Maker, Inc.*, 184 S.W.3d 840, 884–85 (Tex. App.—Austin 2006, pet. granted, judgment vacated w.r.m.)).

985. *Wells Fargo Bank Nw., N.A. v. RPK Capital XVI, L.L.C.*, 360 S.W.3d 691, 712 (Tex. App.—Dallas 2012, no pet.).

objective facts, figures, or data.”<sup>986</sup> The San Antonio Court of Appeals reached the same conclusion when an expert’s lost profits opinion was based on the false assumption that the business had been operating successfully for eighteen months, an assumption that reduced the applicable discount rate for profit projections.<sup>987</sup> Similarly, that court found an accountant’s damage calculations concerning lost funding for future years constituted improper speculation because no evidence supported the expert’s assumption of the number of years for renewal.<sup>988</sup> And the Houston First Court of Appeals rendered a take-nothing judgment against a plaintiff after determining that the plaintiff’s expert evidence on lost profits was based on assumptions that the plaintiff provided to the expert and that the expert had not taken any measures to independently verify those assumptions.<sup>989</sup> Courts in some other jurisdictions have reached similar results.<sup>990</sup>

One emerging theme in expert testimony on lost profits is the distinction between expert calculations that are unsound—and therefore no evidence—and those that are sound but not necessarily the optimal or exclusive means for calculating damages—and therefore subject to attack through cross-examination and counter evidence. For example, future profit testimony that wholly fails to take into account risks inherent in the relevant activity is unsound—and therefore no evidence.<sup>991</sup> In *Wyndham International, Inc. v. ACE American Insurance Co.*, the Dallas Court of Appeals affirmed the exclusion of expert

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986. *Id.*

987. *Total Clean, LLC v. Cox Smith Matthews Inc.*, 330 S.W.3d 657, 664 (Tex. App.—San Antonio 2010, pet. denied).

988. *United Way of San Antonio, Inc. v. Helping Hands Lifeline Found., Inc.*, 949 S.W.2d 707, 712 (Tex. App.—San Antonio 1997, writ denied) (comparing the unsupported expectation of renewal of funding with the “mere hope for success of an untried enterprise” (quoting *Tex. Instruments, Inc. v. Teletron Energy Mgmt., Inc.*, 877 S.W.2d 276, 280 (Tex. 1994))).

989. *Glattly v. Air Start Components, Inc.*, 332 S.W.3d 620, 633, 636 (Tex. App.—Houston [1st Dist.] 2010, pet. denied).

990. *See, e.g., Sargon Enters., Inc. v. Univ. of S. Cal.*, 288 P.3d 1237, 1255 (Cal. 2012) (holding that trial court properly excluded expert’s lost-profits opinion because expert based lost-profits estimates on unsubstantiated assumption that claimant’s market share “would have increased spectacularly over time to levels far above anything it had ever reached”); *Beverly Hills Concepts v. Schatz & Schatz*, 717 A.2d 724, 736 (Conn. 1998) (holding that trial court abused its discretion in awarding lost profits because the plaintiff’s expert assumed that plaintiff corporation would be able to sell fitness franchises with a rate of success similar to its previous sales of fitness equipment).

991. *See Ramco Oil & Gas Ltd. v. Anglo-Dutch (Tenge) L.L.C.*, 207 S.W.3d 801, 822 (Tex. App.—Houston [14th Dist.] 2006, pet. denied) (holding that expert opinion on lost profits that failed to quantify risk that wells would not produce at early stage of development—as necessary to expert’s damages model—was speculative).

testimony on lost profits at a hotel resulting from the 9/11 terrorist attacks because the court determined that the expert lacked a reliable foundation.<sup>992</sup> The expert calculated the hotel's lost profits by extrapolating from the hotel's monthly forecasts of room revenues, and comparing the resulting forecast to actual room revenues.<sup>993</sup> The court noted that the expert failed to account for other factors affecting room revenues, such as the economic downturn, and for rebookings that would have offset 9/11 cancellations.<sup>994</sup> As a result, the expert's opinion was "not based upon a reliable foundation" and was "little more than speculation."<sup>995</sup> But when there are multiple, industry-accepted means for accounting for a risk, future profit testimony that uses one means may be some evidence of future profits even if another means is arguably more accurate.<sup>996</sup>

In *DaimlerChrysler Motors Co., LLC v. Manuel*, the Fort Worth Court of Appeals held that a plaintiff's economist could rely on the defendant's own sales forecasts as a predicate for calculating the plaintiff's lost profit.<sup>997</sup> At trial, the defendant argued that the projections were "not reliable" and should not have been relied on by the economist in calculating lost profit damages.<sup>998</sup> The court held that the defendant's own witness had established the reliability of the projections, testifying that the document was commonly used in the industry, represented the "best number" available, and was supported by extensive market research.<sup>999</sup> This case offers a reminder that a party challenging the predicative data of expert testimony may have difficulty when the expert uses that party's own data.

And in *Rogers v. Alexander*, the Dallas Court of Appeals held that an accountant's opinion on the value of the company was reliable when the accountant explained why he used a particular

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992. *Wyndham Int'l, Inc. v. ACE Am. Ins. Co.*, 186 S.W.3d 682, 687–89 (Tex. App.—Dallas 2006, no pet.).

993. *Id.* at 687.

994. *Id.* at 688.

995. *Id.* at 689.

996. *Cf. Arkoma Basin Exploration Co. v. FMF Assocs. 1990-A, Ltd.*, 249 S.W.3d 380, 389 (Tex. 2008) (rejecting argument that expert testimony on oil well reserves was unreliable due to expert's failure to discount estimates by a capitalization rate when expert's opinion was based on eight-year "payouts" calculation that employed different manner of accounting for risk).

997. *DaimlerChrysler Motors Co. v. Manuel*, 362 S.W.3d 160, 191–92 (Tex. App.—Fort Worth 2012, no pet.). Before the plaintiff had opened the car dealership at issue, the defendant had prepared for the plaintiff a document that projected net profits for the dealership's first year of operation. *Id.*

998. *Id.* at 192.

999. *Id.*

multiplier to calculate the company's value, what was common in the industry, and what factors he considered.<sup>1000</sup>

*vi. Safety Experts' Predicates.* The admissibility of testimony from "safety" experts is often decided under other gates. For example, testimony from "safety" experts is not admissible if it is not helpful to the jury because the subject matter of the testimony is within the common knowledge and experience of average jurors.<sup>1001</sup> But opinion testimony of this nature can also be excluded based on the inadequacy of the expert's predicate for forming an opinion.<sup>1002</sup> For example, the Fourteenth Court of Appeals upheld the exclusion of testimony from a workplace safety expert in a case involving an alleged on-the-job injury at a hospital that occurred when the employee was pushing a large food cart.<sup>1003</sup> The expert opined that the hospital was negligent in its selection of patient food carts, but the expert had not personally observed the carts, did not know their size or weight, and did not know how much weight they would carry.<sup>1004</sup> He also opined that the hospital failed to adequately train its employees on how to safely operate the patient food carts, but he had no information concerning the training the injured worker or co-workers had received.<sup>1005</sup> The court excluded all of this testimony.<sup>1006</sup>

*vii. Property Owners' Experiential Predicates.* Under the property owner rule, a property owner is qualified to testify to the value of her property even if she would not be qualified to testify about the value of similar property belonging to someone else.<sup>1007</sup> The Texas Supreme Court recently held that when a property owner testifies to the value of his property, his opinion

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1000. *Rogers v. Alexander*, 244 S.W.3d 370, 386–87 (Tex. App.—Dallas 2007, pet. denied).

1001. *See supra* Part II.A (discussing *K-Mart Corp. v. Honeycutt*, 24 S.W.3d 357, 360–61 (Tex. 2000) and *Dietz v. Hill Country Rests., Inc.*, 398 S.W.3d 761, 764–65 (Tex. App.—San Antonio 2011, no pet.)).

1002. *See, e.g.*, *Goss v. Kellogg Brown & Root Inc.*, 232 S.W.3d 816, 818–19 (Tex. App.—Houston [14th Dist.] 2007, pet. denied); *Moore v. Mem'l Hermann Hosp. Sys., Inc.*, 140 S.W.3d 870, 876 (Tex. App.—Houston [14th Dist.] 2004, no pet.) (affirming trial court's exclusion of plaintiff's workplace safety expert because expert did not have a reasonable basis for opinions); *Taylor v. Am. Fabritech, Inc.*, 132 S.W.3d 613, 619–20 (Tex. App.—Houston [14th Dist.] 2004, pet. denied) (considering whether reliable foundation existed for expert's opinion on construction safety).

1003. *Moore*, 140 S.W.3d at 876.

1004. *Id.*

1005. *Id.*

1006. *Id.*

1007. *Porrás v. Craig*, 675 S.W.2d 503, 504 (Tex. 1984).

on value is functionally equivalent to expert testimony and thus, subject to the same reliability standards applicable to other experts (though not the same qualification standards).<sup>1008</sup> Thus, a property owner must support her opinion about the value of her property with a sufficient predicate, such as “[e]vidence of price paid, nearby sales, tax valuations, appraisals, online resources, and any other relevant factors.”<sup>1009</sup> Like any other expert, the property owner’s testimony can be based on inadmissible hearsay under appropriate circumstances.<sup>1010</sup>

3. *Inadmissible Predicates.*<sup>1011</sup> Rule 703 of the Texas Rules of Evidence allows an expert to rely on otherwise inadmissible hearsay or other evidence *only if* the underlying facts or data are “of a type reasonably relied upon by experts in the particular field.”<sup>1012</sup> Thus, the text of Rule 703 requires the expert to satisfy two requirements to form an opinion based on inadmissible evidence. First, the facts or data relied upon by the expert must be the type relied upon by experts in the field. Second, the expert’s reliance must be reasonable.<sup>1013</sup> “It is not sufficient for the court simply to ascertain that other experts do in fact rely on that type of data.”<sup>1014</sup> Upon timely request, the judge must make a preliminary determination of whether these criteria are satisfied.<sup>1015</sup> One purpose of this rule is “to relieve parties of the

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1008. *Natural Gas Pipeline Co. of Am. v. Justiss*, 397 S.W.3d 150, 155, 159 (Tex. 2012) (“[O]pinion testimony concerning [damages to land] is subject to the same requirements as any other opinion evidence, with one exception: the owner of the property can testify to its market value, even if he could not qualify to testify about the value of like property belonging to someone else.” (quoting *Porras*, 675 S.W.2d at 504)). The Court noted that the “property owner rule” is based on the assumption that a property owner is familiar with his property and its value even if he is not familiar with property values generally. *Id.* at 157.

1009. *Id.* at 159.

1010. *Id.* at 157–58. The circumstances under which an expert can rely on hearsay or other inadmissible evidence are discussed in the next section.

1011. Rules 703 and 705 were discussed as the seventh gate for expert testimony in the 1999 Eight Gates article. Brown, *supra* note 1, at 875–89. It is more accurate to describe the inquiries under this gate as part of the predicative reliability gate. Thus, we have concluded that there are seven, not eight, gates.

1012. TEX. R. EVID. 703.

1013. *United States v. Corey*, 207 F.3d 84, 99 (1st Cir. 2000) (Torruella, C.J., dissenting); *see also*; 5 GRAHAM, *supra* note 34, § 703:1, at 538–43 (stating that the proponent must demonstrate “both that such items are of the type customarily relied upon by experts in the field and that such items are sufficiently trustworthy to make such reliance reasonable”); 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 856 (stating that Rule 703 requires a dual inquiry of reliance and adequacy).

1014. 4 WEINSTEIN & BERGER, *supra* note 27, § 703.04[2], at 703-10.1 to 703-11.

1015. *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 748–49 (3d Cir. 1994) (“[I]t is the judge who makes the determination of reasonable reliance, and that for the judge to make the factual determination under Rule 104(a) that an expert is basing his or her opinion on

burden of authenticating all the materials on which the experts have reasonably relied.”<sup>1016</sup> This “dual standard” creates

some internal tension, since it refers to both adequacy and the practice of experts, and in theory experts might rest opinions on inadequate bases. Not surprisingly, some decisions emphasize that courts must decide independently whether the underlying information satisfies the reasonable reliance standard while others suggest that courts play a deferential role in deciding only whether experts in the field rely on such information.<sup>1017</sup>

The first requirement—customary reliance in the field—is insufficient by itself because, while courts “should give weight to the collective judgment of others in the field,” that judgment is not determinative.<sup>1018</sup> Under the second requirement, the proponent of the evidence must demonstrate the reasonableness of such reliance in the instant case—reliance on certain types of evidence may be reasonable in some circumstances but not others. A court is not required to accept an expert’s assurance that experts in the field reasonably rely on inadmissible information.<sup>1019</sup> As explained by the First Circuit, Rule 703 requires a trial judge to “act as an independent ‘gatekeeper’ to ensure that there is sufficient, credible evidence that experts do rely on the specified types of sources in formulating their opinions.”<sup>1020</sup> An expert’s blind reliance on documents provided by a party is not reasonable.<sup>1021</sup> The reasonableness of the

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a type of data *reasonably* relied upon by experts, the judge must conduct an independent evaluation into reasonableness. . . . [W]hen a trial judge analyzes whether an expert’s data is of a type reasonably relied on by experts in the field, he or she should assess whether there are good grounds to rely on this data to draw the conclusion reached by the expert. Whether experts in the field rely on this type of data will simply continue to be a part of the judge’s analysis.”); *see also* *Factory Mut. Ins. Co. v. Alon USA L.P.*, 705 F.3d 518, 526 (5th Cir. 2013) (stating that district court was “best placed to evaluate whether” expert reasonably relied on depreciation estimates of former employees); *In re TMI Litig.*, 193 F.3d 613, 697 (3d Cir. 1999) (“The key inquiry is reasonable reliance and that inquiry dictates that the ‘trial judge must conduct an independent evaluation into reasonableness.’” (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d at 748)), *amended by* 199 F.3d 158 (3d Cir. 2000).

1016. 4 WEINSTEIN & BERGER, *supra* note 27, § 703.04[3], at 703-13.

1017. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 857.

1018. *Id.*

1019. *See* *United States v. Corey*, 207 F.3d 84, 84–89 (1st Cir. 2000).

1020. *Id.*; *cf.* *Montgomery Cnty. v. Microvote Corp.*, 320 F.3d 440, 448 (3d Cir. 2003) (summarizing Rule 703 as requiring an assessment of “whether there are good grounds to rely on this data to draw the conclusion reached by the expert,” and if not, “the opinion resting on that data must be excluded” (quoting *In re TMI Litig.*, 193 F.3d at 697)).

1021. *Montgomery Cnty.*, 320 F.3d at 448–49 (holding that district court did not abuse discretion in excluding expert testimony on whether certain voting systems satisfied standard of the Federal Election Commission when expert relied on document prepared

reliance inquiry overlaps with the reliability inquiry under *Daubert* and its progeny.<sup>1022</sup>

Although it is the burden of the proponent of the evidence to demonstrate its admissibility, the objecting party should attempt to demonstrate that experts in the field do not rely on this particular type of evidence or that the expert's reliance on the particular evidence is not reasonable under the circumstances of the case, even if reliance on the same type of evidence might be reasonable and customary in the field under other circumstances.<sup>1023</sup> Failure to do so will support the trial court's exercise of its discretion to permit the expert to rely on the evidence.<sup>1024</sup> If the court finds that the only data considered by an expert is inadmissible evidence that is not reasonably relied upon by experts in the field, the court must strike the resulting opinion.<sup>1025</sup> If the underlying facts are sufficiently reliable but are normally inadmissible, such as hearsay, a balancing test under Rule 705(d) determines whether the jury will hear the inadmissible evidence. A trial court is not required to conduct a 705(d) balancing test on the record.<sup>1026</sup>

*a. Rule 703.* The Texas Supreme Court has cited Rule 703 only once in the past fifteen years.<sup>1027</sup> In *Elizondo v. Krist*,

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by party but "did not know what the document was, who created it, or how it was created" and therefore, no reasonable expert could rely on it).

1022. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 860; *see also In re TMI Litig.*, 193 F.3d at 697 ("Rule 703's reliability standard is similar to Rule 702's reliability requirement, i.e., 'there must be good grounds on which to find the data reliable.'" (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 748 (3d Cir. 1994))); *Leonard v. State*, 385 S.W.3d 570, 582 (Tex. Crim. App. 2012) ("Rule 703 is not a conduit for admitting opinions based on 'scientific, technical, or other specialized knowledge' that would not meet Rule 702's reliability requirement. If the methodology or data underlying an expert's opinion would not survive the scrutiny of a Rule 702 reliability analysis, Rule 703 does not render the opinion admissible." (footnote omitted)).

1023. FED. R. EVID. 703; *see Ward v. Dixie Nat. Life Ins. Co.*, 595 F.3d 164, 182 (4th Cir. 2010) (stating that because defendants did not attempt to contradict expert's testimony regarding whether experts normally rely on the information, district court did not abuse discretion).

1024. *Ward*, 595 F.3d at 182 (holding trial court did not abuse discretion in permitting damages expert to base opinion on six spreadsheets when the expert testified the spreadsheets were of the type experts in the field "normally rely" on to reach an opinion and objecting party "did not present any evidence to contradict that testimony").

1025. *In re TMI Litig.*, 193 F.3d at 697 ("If the data underlying the expert's opinion are so unreliable that no reasonable expert could base an opinion on them, the opinion resting on that data must be excluded." (citing *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d at 748)).

1026. *Davis v. State*, 268 S.W.3d 683, 701 (Tex. App.—Fort Worth 2008, pet. ref'd).

1027. *See* TEX. R. EVID. 703 ("The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by, reviewed by, or made known to the expert at or before the hearing. If of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts

the Court quoted Rule 703 in its discussion of how an expert in a legal malpractice case-within-a-case claim can determine “the real-world settlement value” of claims in a mass tort litigation.<sup>1028</sup> The Court held that the rule is satisfied

when, in a mass tort litigation involving thousands of similar claimants and arising out of the same event, the expert measures the “true” settlement value of a particular case by persuasively comparing all the circumstances of the case to the settlements obtained in other cases with similar circumstances arising from the event.<sup>1029</sup>

The Court of Criminal Appeals has also addressed Rule 703 once in a majority, published opinion in the past fifteen years. In *Leonard v. State*, the Court held that the trial court erred in failing to exclude the inadmissible and unreliable evidence relied on by the expert.<sup>1030</sup> The appeal arose from a trial court’s decision to revoke community supervision that was ordered after a defendant entered into a plea bargain.<sup>1031</sup> The terms of the community supervision required the defendant to successfully complete a sex-offender treatment program and honestly

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or data need not be admissible in evidence.”). The federal rule is similar but not identical. See FED. R. EVID. 703 (“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 Advisory Committee’s notes to the federal rule draw a distinction between Rule 702 and Rule 703:

There has been some confusion over the relationship between Rules 702 and 703. The amendment makes clear that the sufficiency of the basis of an expert’s testimony is to be decided under Rule 702. Rule 702 sets forth the overarching requirement of reliability, and an analysis of the sufficiency of the expert’s basis cannot be divorced from the ultimate reliability of the expert’s opinion. In contrast, the “reasonable reliance” requirement of Rule 703 is a relatively narrow inquiry. When an expert relies on inadmissible information, Rule 703 requires the trial court to determine whether that information is of a type reasonably relied on by other experts in the field. If so, the expert can rely on the information in reaching an opinion. However, the question whether the expert is relying on a *sufficient* basis of information—whether admissible information or not—is governed by the requirements of Rule 702.

FED. R. EVID. 702 advisory committee’s note.

1028. *Elizondo v. Krist*, 415 S.W.3d 259, 263 (Tex. 2013).

1029. *Id.* at 263. For a discussion of the facts and other holdings in *Elizondo*, see *supra* notes 288, 906–14 and accompanying text, and *infra* notes 1657–69, 1695, 1698 and accompanying text.

1030. *Leonard v. State*, 385 S.W.3d 570, 583 (Tex. Crim. App. 2012) (asserting that Rule 703 “does not allow an expert to present opinion testimony based on scientifically unreliable facts or data”).

1031. *Id.* at 572.

complete polygraph examinations.<sup>1032</sup> A psychotherapist testified not only to the defendant's discharge from the program, but also that the reason for his discharge was his failed polygraph examinations.<sup>1033</sup> The Court held that the trial court erred in admitting the psychotherapist's testimony concerning the otherwise inadmissible evidence—the failure of polygraph examinations—that formed the basis for his opinion that the defendant was dishonest, which in turn was the reason for his discharge from a sex-offender program.<sup>1034</sup> The expert testified that experts in his field customarily rely on polygraph results to form opinions about a sex offender's treatment.<sup>1035</sup>

The Court stated that polygraph results are unreliable and inadmissible and ruled that this cannot be evaded by Rule 703.<sup>1036</sup> Under Rule 703, an expert can rely on inadmissible evidence only when it is reasonable to do so: "The use of [the word] 'reasonably' rather than 'customarily' or 'regularly' implies that judicial oversight was intended."<sup>1037</sup> The Court held that admitting this otherwise inadmissible evidence "stretches Rule 703 beyond its limits."<sup>1038</sup> To allow an expert to rely on evidence that is not only inadmissible but also unreliable

cannot be reasonable. . . . Rule 703 is not a conduit for admitting opinions based on "scientific, technical, or other specialized knowledge" that would not meet Rule 702's reliability requirement. If the methodology or data underlying an expert's opinion would not survive the scrutiny of a Rule 702 reliability analysis, Rule 703 does not render the opinion admissible.<sup>1039</sup>

The Court concluded, "Rule 703 does not allow an expert to present opinion testimony based on scientifically unreliable facts or data."<sup>1040</sup>

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1032. *Id.*

1033. *Id.* at 573.

1034. *Id.* at 573, 583.

1035. *Id.* at 586.

1036. *Id.* at 580–82 (noting that the Court has consistently held that polygraph tests are unreliable, and concluding that if an opinion would not satisfy Rule 702's reliability requirement Rule 703 cannot be used to argue admissibility of that opinion).

1037. *Id.* at 582 (quoting 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 703.3, at 49).

1038. *Id.* at 582.

1039. *Id.* (footnote omitted).

1040. *Id.* at 583. One federal court has stated that even if the information relied upon by the expert is not reliable, it might still be admissible under Rule 703. *United States v. 87.98 Acres of Land More or Less in the Cnty. of Merced*, 530 F.3d 899, 904–05 (9th Cir. 2008). Professor Graham criticizes this holding. *See* 5 GRAHAM, *supra* note 34, § 703:1, at 551–52 n.14.

Texas courts of appeals have addressed Rule 703 on numerous occasions in the past fifteen years.<sup>1041</sup> Under Rule 703, “an expert may base an opinion solely on inadmissible hearsay” provided the other requirements of the rule are satisfied.<sup>1042</sup> Reliance on inadmissible information requires more than simply reviewing the information.<sup>1043</sup> The Texas intermediate appellate courts have found that a healthcare provider may reasonably rely on hearsay (and disclose the hearsay to the factfinder). For example, a treating physician may reasonably rely on a patient’s history in determining the cause of an injury.<sup>1044</sup> A physician may also rely on a nurse’s report<sup>1045</sup> and on a radiologist’s report, subject to a Rule 403 objection.<sup>1046</sup> Similarly, an assistant medical examiner may opine on the cause of death based on police and investigative reports that contain hearsay because such investigations are the type of data reasonably relied upon by medical examiners.<sup>1047</sup> But one court has held that a physician may rely on the opinions of other health care providers who have diagnosed a patient only if the physician is qualified for the specific diagnosis in question or provides information on the expertise of the relied-upon physicians.<sup>1048</sup>

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1041. See, e.g., *Wood v. State*, 299 S.W.3d 200, 212 (Tex. App.—Austin 2009, pet. ref’d) (asserting that expert may base an opinion solely on inadmissible hearsay); *LMC Complete Auto., Inc. v. Burke*, 229 S.W.3d 469, 478 (Tex. App.—Houston [1st Dist.] 2007, pet. denied) (concluding that doctor testifying on causation may rely on medical history patient presented to the doctor); *Stam v. Mack*, 984 S.W.2d 747, 750 (Tex. App.—Texarkana 1999, no pet.) (concluding that Rule 703 “allow[s] a testifying expert to relate on direct examination the reasonably reliable facts and data on which he relied in forming his opinion”).

1042. *Wood*, 299 S.W.3d at 212.

1043. *United Servs. Auto. Ass’n v. Gordon*, 103 S.W.3d 436, 442 (Tex. App.—San Antonio 2002, no pet.) (stating that expert report reviewed but not relied on by second expert was not admissible under Rule 705).

1044. *LMC Complete Auto., Inc.*, 229 S.W.3d at 479; see also *Walker v. Soo Line R.R. Co.*, 208 F.3d 581, 586 (7th Cir. 2000) (concluding psychiatrist could rely on histories reported by plaintiff and his girlfriend as a reliable methodology to determine plaintiff’s pre-incident IQ because “[m]edical professionals reasonably may be expected to rely on self-reported patient histories”). The expert in *LMC Complete Automotive* testified that it is common for experts to rely on patient history. *LMC Complete Auto., Inc.*, 229 S.W.3d at 479. As *Leonard* states, Rule 703 requires the reliance to be reasonable, not merely customary. *Leonard*, 385 S.W.3d at 582.

1045. *Kelly v. Rendon*, 255 S.W.3d 665, 676 (Tex. App.—Houston [14th Dist.] 2008, no pet.).

1046. *Stam*, 984 S.W.2d at 750 (holding pediatrician could testify to nontreating radiologist’s opinion because Rules 703 and 705 “allow a testifying expert to relate on direct examination the reasonably reliable facts and data on which he relied in forming his opinion, subject to an objection under TEX. R. EVID. 403 that the probative value of such facts and data is outweighed by the risk of undue prejudice”).

1047. *Tex. Workers’ Comp. Comm’n v. Wausau Underwriters Ins.*, 127 S.W.3d 50, 57 (Tex. App.—Houston [1st Dist.] 2003, pet. denied).

1048. *Collini v. Pustejovsky*, 280 S.W.3d 456, 466 (Tex. App.—Fort Worth 2009, no pet.) (finding doctor was not qualified because he did not adequately demonstrate his

Outside the context of medical opinions, Texas intermediate appellate courts have reached the same conclusion. For example, a psychiatrist may reasonably rely on information from a spouse, co-workers, or family members in determining amphetamine use.<sup>1049</sup> A company's vice president of finance, who was also an accountant, could testify to lost profits based in part on conversations with former customers under Rule 703 because the court could not "think of a more appropriate method to determine why sales were lost than to ask the customer."<sup>1050</sup> One Texas intermediate court and numerous federal circuit courts have recognized that in some circumstances experts may reasonably rely on technical data, test results, and reports from others in forming an opinion,<sup>1051</sup> but not always.<sup>1052</sup> And police officers are

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qualifications, or that he relied on opinions of qualified physicians for his report); *cf.* *Crowe v. Marchand*, 506 F.3d 13, 17–18 (1st Cir. 2007) (concluding physician could rely on reports of x-ray and MRI "instead of reading the films himself"); *Cresthaven Nursing Residence v. Freeman*, 134 S.W.3d 214, 234 (Tex. App.—Amarillo 2003, no pet.) (holding that testifying physician properly relied, in part, on opinions of other doctors in establishing causation, but physician must first demonstrate his own qualifications on specific condition).

1049. *Loram Maint. of Way, Inc. v. Ianni*, 141 S.W.3d 722, 731–32 (Tex. App.—El Paso 2004) (noting that psychiatrist testified that although laypersons may lack the expertise to opine on whether individual is using amphetamines, "laypersons are able to make the kind of observations" that psychiatrists can rely on), *rev'd on other grounds*, 210 S.W.3d 593 (Tex. 2006).

1050. *Toshiba Mach. Co., Am. v. SPM Flow Control, Inc.*, 180 S.W.3d 761, 779 (Tex. App.—Fort Worth 2005, pet. granted, judgment vacated w.r.m.).

1051. *Cooper Tire & Rubber Co. v. Mendez*, 155 S.W.3d 382, 397 (Tex. App.—El Paso 2004) (finding hearsay technical report relied on by expert was admissible as support for expert opinion), *rev'd on other grounds*, 204 S.W.3d 797 (Tex. 2006); *N.L.A. v. Holder*, 744 F.3d 425, 440 (7th Cir. 2014) (asserting expert-researcher "could certainly assess the reliability of other researchers' reports and rely on them in the ordinary course of his work"); *United States v. Luna*, 649 F.3d 91, 105 (1st Cir. 2011) (holding that experts are permitted under Rule 703 to rely on technical manuals and information from manufacturers in forming opinions regarding location of manufacturing of ammunition); *Chavez v. Carranza*, 559 F.3d 486, 497 (6th Cir. 2009) (finding that expert could reasonably rely upon interviews, commission reports, documentary research, and field research to form opinions); *Monsanto Co. v. David*, 516 F.3d 1009, 1015 (Fed. Cir. 2008) ("[R]eliance on scientific test results prepared by others may constitute the type of evidence that is reasonably relied upon by experts for purposes of Rule of Evidence 703."); *United States v. Carter*, 270 F.3d 731, 735 (8th Cir. 2001) ("[T]he information stamped on the handgun showing the place of manufacture is data of a type reasonably relied upon by firearms experts."); *Gussack Realty Co. v. Xerox Corp.*, 224 F.3d 85, 94–95 (2d Cir. 2000) (rejecting argument that plaintiffs' experts' opinions were inadmissible because experts failed to conduct their own tests and relied only on data provided by defendant's experts and a governmental agency because "[t]he expert need not have conducted her own tests" and could rely on facts or data made known to the expert under Rule 703); *United States v. Gardner*, 211 F.3d 1049, 1054 (7th Cir. 2000) (holding fire investigator's "reliance on reports, photographs, and third-party observations, which may not have been admissible into evidence, served as a reliable basis for his testimony because these materials are facts or data 'of a type reasonably relied upon by experts' in the field of fire cause and origin").

1052. *Warger v. Shauers*, 721 F.3d 606, 612–13 (8th Cir. 2013), *cert. granted*, 134 S. Ct. 1491 (2014) (holding that when expert relied on unreliable report as sole basis for

often permitted to rely on eyewitness statements and information gained in their investigations.<sup>1053</sup>

The Fifth Circuit held, in one case, that an appraiser could testify regarding an industrial plant's remaining life at the time of its explosion as part of the damages calculation and to account for the plant's depreciation, even though his opinion was based exclusively on hearsay.<sup>1054</sup> The expert could not inspect the destroyed plant to determine the depreciation; instead, he met with various employees who, after he educated them regarding depreciation methods, estimated the plant's remaining life.<sup>1055</sup> The expert stated the estimates were reliable and adopted their data for his calculation.<sup>1056</sup> The Fifth Circuit noted that the expert testified that "estimates of others constitute the sort of information reasonably relied upon by appraisers approaching valuation questions."<sup>1057</sup> Additionally, the expert "did more than just repeat information gleaned from external sources," including demonstrating his familiarity with the appraisal of similar plants.<sup>1058</sup> Finally, the

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opinion, opinion also had to be struck); *Junk v. Terminix Int'l Co.*, 628 F.3d 439, 449–50 (8th Cir. 2010) (holding that trial court did not err in excluding EPA report relied on by expert because report was not reliable, and its probative value did not substantially outweigh its prejudicial effect, when report was brief summary of research rather than scholarly publication and jury might have been misled into believing it reported EPA's findings).

1053. *United States v. Steed*, 548 F.3d 961, 975–76 (11th Cir. 2008) (holding that trial court did not err in permitting police officer to testify based on conversations with other law enforcement officers over course of his career, his history of participation in unrelated searches and arrests of criminal suspects, and published literature because expert witness may base opinion on inadmissible hearsay provided sources are reasonably reliable and his "testimony regarding drug trafficking, criminal indicators, and commercial trucking industry was all based on his personal training and experience, not on conversations with non-testifying individuals," but cautioning that Rule 703 does not open door to all otherwise inadmissible evidence); *United States v. Mulder*, 273 F.3d 91, 102 (2d Cir. 2001) (interpreting Rule 703 to permit police officer to rely "largely on the statements of detectives he supervised, victim contractors, and informants to form his opinions"); *Sphere Drake Ins. PLC v. Trisko*, 226 F.3d 951, 955 (8th Cir. 2000) (concluding police detective could testify about hearsay statements of third parties because he "normally relied on" such statements in his work and trial court instructed hearsay statements were not admitted for their truth, but rather only to inform jury of factual basis of expert opinion); *cf. Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79, 92 (Tex. App.—Houston [1st Dist.] 2009, no pet.) (finding expert testimony sufficiency reliable based in part on conversations with two eyewitnesses but not addressing whether reliance on such statements was reasonable).

1054. *Factory Mut. Ins. Co. v. Alon USA L.P.*, 705 F.3d 518, 525–26 (5th Cir. 2013) (noting that there was very little room for investigation since the original plant was destroyed and scrapped after an explosion, thus appraiser consulted one of the few resources he had and noting that estimates of plant employees are data reasonably relied on by appraisers).

1055. *Id.* at 524.

1056. *Id.*

1057. *Id.* at 525.

1058. *Id.*

court observed that the expert's investigation had to "be viewed in light of what was feasible"; given the destruction of the plant, he "consulted one of the few sources of information available."<sup>1059</sup>

While most of the cases involve otherwise inadmissible hearsay, Rule 703 also permits an expert to rely on other inadmissible evidence.<sup>1060</sup> For example, subsequent remedial measures are not admissible under Rule 407.<sup>1061</sup> Nevertheless, the Second Circuit concluded that an expert could rely on such evidence in forming an opinion.<sup>1062</sup> The court made it clear, however, that the issue of whether the expert could rely on this data was distinct from whether the data was admissible.<sup>1063</sup> The parties, in contrast, had conflated these two separate issues.<sup>1064</sup> Rule 703 is clear that the underlying basis for an expert opinion "does not need to be admissible evidence in order for" the opinion itself to be admissible.<sup>1065</sup>

The Rule's only requirement is that the data be "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject." We find that it is reasonable for an engineer to rely upon a warning and alternative safety instruction subsequently issued by a manufacturer in forming an opinion that an earlier service manual fails to provide adequate instructions and warnings to automobile technicians.<sup>1066</sup>

On the other hand, Professor Mueller has suggested that expert testimony should not always be permitted to rely on inadmissible information when there are "strong reasons of extrinsic policy serving interests independent of the factfinding process."<sup>1067</sup> Under that rationale, experts arguably

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1059. *Id.*

1060. FED. R. EVID. 703 ("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.")

1061. FED. R. EVID. 407 ("When measures are taken that would have made an earlier injury or harm less likely to occur, evidence of the subsequent measures is not admissible to prove: negligence; culpable conduct; a defect in a product or its design; or a need for a warning or instruction.")

1062. *Pineda v. Ford Motor Co.*, 520 F.3d 237, 246–47 (3d Cir. 2008) (permitting expert to rely on subsequent remedial measures in forming opinion that warning defect existed in earlier manual, and rejecting argument that Rule 407 required excluding the subsequent warning as a basis for his opinion).

1063. *Id.*

1064. *Id.* at 246.

1065. *Id.* at 247.

1066. *Id.*

1067. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 863 (citing cases, as examples, required reports and privileged information).

should not be permitted to rely on subsequent remedial measures.<sup>1068</sup>

*b. Rule 705(d).* The issue of whether the expert should be able to recount the inadmissible evidence is a separate issue from whether the expert may rely on the evidence.<sup>1069</sup> Rule 703 may permit an expert to rely on inadmissible information to form an opinion and yet prohibit the expert from reiterating the inadmissible information in direct testimony.<sup>1070</sup> If the expert is permitted to disclose the otherwise inadmissible information, “Rule 703 operates as the equivalent of” an exception to the applicable evidence rule.<sup>1071</sup> Texas Rule 705(d) sets forth a balancing test for determining when to permit the expert to disclose the underlying data.<sup>1072</sup> A trial court must balance the probative value of the inadmissible data to explain or support the reasonableness of the expert’s opinion against either (1) the danger that the jury may use this inadmissible evidence as substantive evidence or for some other purpose; or (2) the unfairly prejudicial effect of this inadmissible evidence.<sup>1073</sup> Unlike the permissive balancing test in Rule 403, Rule 705(d) is mandatory.<sup>1074</sup> Also the balancing test in Rule 705(d) differs from Rule 403; it mandates exclusion when the danger of an improper purpose or unfairly prejudicial effect merely outweighs its probative value.

The federal balancing test, which is part of the 2000 amendments to Rule 703, tips the scale in favor of excluding the basis for the expert opinion when the facts or data would otherwise be inadmissible: “[T]he 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

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1068. Professor Graham states that allowing an expert to rely on subsequent remedial measures, settlement offers, inadmissible character evidence, criminal convictions, and information inadmissible under Rule 403 may thwart the policies of these rules. 5 GRAHAM, *supra* note 34, § 703:1, at 563–65.

1069. See FED. R. EVID. 703 (allowing experts to rely on inadmissible facts or data in forming an opinion “[i]f experts in the particular field would reasonably rely on those kinds of facts or data,” but allowing disclosure of such facts and data to the jury “only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect”).

1070. See *id.*

1071. 5 GRAHAM, *supra* note 34, § 703:1, at 563.

1072. See TEX. R. EVID. 705(d).

1073. *Id.*

1074. Rule 403 provides that the court “*may* exclude relevant evidence if its probative value is substantially outweighed by a danger . . . of unfair prejudice.” FED. R. EVID. 403 (emphasis added).

prejudicial effect.”<sup>1075</sup> Under the federal rule, the presumption is that otherwise inadmissible evidence “will be kept out unless the court determines that any potential prejudice is *substantially outweighed* by the probative value.”<sup>1076</sup> The Advisory Committee identifies an example: disclosure might be appropriate when the proponent wishes “to ‘remove the sting’ from the opponent’s anticipated attack, and thereby prevent the jury from drawing an unfair negative inference.”<sup>1077</sup>

The Texas Supreme Court did not address Rule 705(d) during the past fifteen years, but the Court of Criminal Appeals has twice and each time determined that the trial court did not err in declining to permit the expert to discuss the inadmissible evidence.<sup>1078</sup> Quoting an earlier concurring opinion, the Court of Criminal Appeals in *Valle v. State* observed that when a trial court admits otherwise inadmissible evidence under Rule 705(d), a great danger exists that “the jury will consider the facts and data as substantive evidence rather than as merely constituting the underlying basis for the expert’s opinion.”<sup>1079</sup> Allowing the defendant’s mitigation expert to explain that he relied on inadmissible hearsay in the form of a videotaped interview of the defendant’s mother concerning his stepfather’s abuse created this danger. The Court also said that the expert did not need evidence of the interview itself for a legitimate purpose, which supported the trial court’s determination.<sup>1080</sup>

In *Resendiz v. State*, the trial court also did not abuse its discretion in refusing to permit an expert to present otherwise inadmissible information—photographs the expert relied on in

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1075. FED. R. EVID. 703.

1076. *Turner v. Burlington N. Santa Fe R.R.*, 338 F.3d 1058, 1062 (9th Cir. 2003). The court quoted from a committee note in support of its conclusion: “The amendment provides a presumption against disclosure to the jury of information used as the basis of an expert’s opinion and not admissible for any substantive purpose, when that information is offered by the proponent of the expert.” *Id.* (quoting 4 WEINSTEIN & BERGER, *supra* note 27, § 703.05[2], at 703-24 (quoting FED. R. EVID. 703 advisory committee’s note (relaying the committee notes verbatim))); *see also* *Pineda v. Ford Motor Co.*, 520 F.3d 237, 247 n.14 (3d Cir. 2008) (“[T]he Rule’s balancing test clearly establishes a presumption against disclosure to the jury of otherwise inadmissible evidence.”).

1077. FED. R. EVID. 703 advisory committee’s note.

1078. *Valle v. State*, 109 S.W.3d 500, 505–06 (Tex. Crim. App. 2003) (“Allowing the defense to present appellant’s mother’s statements to the jury would have entailed a danger that the jury would consider those statements as substantive evidence.”); *Resendiz v. State*, 112 S.W.3d 541, 544–46 (Tex. Crim. App. 2003) (finding trial court did not err when it did not allow inadmissible photographs “[b]ecause the danger that the photographs would confuse or mislead the jury outweighs their probative value”).

1079. *Valle*, 109 S.W.3d at 505–06 (quoting *Cole v. State*, 839 S.W.2d 798, 815 (Tex. Crim. App. 1990) (Maloney, J., concurring)).

1080. *Id.* at 503, 505–06.

support of his opinion that the defendant was insane when he committed the capital murder in question.<sup>1081</sup> The trial court permitted the expert to describe the photographs but expressed concern that the photographs might be used for a purpose other than assessing the basis for the expert's opinion.<sup>1082</sup> The Court of Criminal Appeals noted that the trial court conducted the balancing test for inadmissible evidence under Rule 705(d) and also relied on Rule 403.<sup>1083</sup>

The Texas intermediate appellate courts have also addressed when otherwise inadmissible evidence that forms the basis for an expert opinion is admissible.<sup>1084</sup> Under Rule 705, an expert in "certain limited circumstances . . . may disclose the facts and data underlying his opinion even if they are inadmissible as evidence."<sup>1085</sup>

But Rule 705(d)'s balancing test sometimes requires exclusion of some, or all, of the basis for the expert's opinion. For example, the Fort Worth Court of Appeals affirmed a trial court's refusal to allow a defendant to cross-examine a police detective regarding the defendant's statements to the detective.<sup>1086</sup> The court of appeals observed that there was a danger that the "statements would be used for a purpose—that is, as substantive evidence—other than as an explanation or support for" the detective's opinion.<sup>1087</sup> Additionally, the defendant admitted that the value of the statement was "as substantive evidence" of his own self-defense claim.<sup>1088</sup>

Parties may try to use Rule 705(d) to present expert opinions from an expert who for various reasons does not testify at trial or from a nondesignated, nontestifying expert through a testifying expert who relied on the second expert.<sup>1089</sup> One federal court prohibited an expert from recounting the opinions of another expert who did not, and was not expected to, testify during the

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1081. *Resendiz*, 112 S.W.3d at 544–46.

1082. *Id.* at 544–45.

1083. *Id.* at 545.

1084. *See Wood v. State*, 299 S.W.3d 200, 212–13 (Tex. App.—Austin 2009, pet. ref'd) (permitting an expert to testify to his own opinions despite those opinions being based on testimonial hearsay).

1085. *Id.* at 212.

1086. *Davis v. State*, 268 S.W.3d 683, 700, 702 (Tex. App.—Fort Worth 2008, pet. ref'd).

1087. *Id.* at 702.

1088. *Id.*

1089. *E.g.*, *Mike's Train House, Inc. v. Lionel, L.L.C.*, 472 F.3d 398, 409 (6th Cir. 2006); *Ferrara & DiMercurio v. St. Paul Mercury Ins. Co.*, 240 F.3d 1, 8–9 (1st Cir. 2001) (allowing a second expert to rely on another, nontestifying expert because the nontestifying expert passed away during the trial proceedings).

trial.<sup>1090</sup> Another permitted such testimony when the other expert died before trial and the two experts' investigations overlapped.<sup>1091</sup> But the San Antonio Court of Appeals held that a trial court did not abuse its discretion in permitting an independent insurance adjuster to rely on, and inform the jury about, another expert's inadmissible report identifying the cost of repairs necessitated by a hailstorm.<sup>1092</sup> The adjuster-expert explained the nontestifying expert's methodology, testified that he used the same methodology for estimating repair costs in his practice, and stated that his investigation would have been the same as the nontestifying expert had he been retained on that issue.<sup>1093</sup> The testifying expert, therefore, did not merely parrot the other expert's opinion,<sup>1094</sup> distinguishing this case from numerous cases holding that "[an expert] cannot simply be a conduit for the opinion of an unproduced expert."<sup>1095</sup>

Federal cases and commentators continue to agree that an expert may not act "as a conduit by presenting an opinion that is not his own opinion but that of someone else."<sup>1096</sup> Thus, the entirety of an expert's testimony "cannot be the mere repetition of 'the out-of-court statements of others.'"<sup>1097</sup>

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1090. *Mike's Train House, Inc.*, 472 F.3d at 409 (holding that expert should not be permitted to recount to factfinder conclusions of another expert who was not present at trial). *But see* *United States v. Brown*, 299 F.3d 1252, 1256–57 (11th Cir. 2002) (permitting police officer to testify regarding another officer's opinion); 5 GRAHAM, *supra* note 34, § 703:1, at 556 n.17 (describing *Brown* as "a very questionable decision").

1091. *Ferrara & DiMercurio*, 240 F.3d at 9 (ruling that a fire investigator could reasonably rely on a deceased investigator's report because "a cause-and-origin expert . . . could be expected to examine the report of another expert . . . as well as the fire department's report in the course of forming his own opinion derived from a variety of sources").

1092. *Southland Lloyds Ins. Co. v. Cantu*, 399 S.W.3d 558, 563–64, 566–67 (Tex. App.—San Antonio 2011, no pet.) (stating that the expert "was permitted to testify as to relevant matters about which he had personal knowledge").

1093. *Id.* at 563–64.

1094. *Id.* at 567.

1095. *Id.* at 566 (quoting *Malletier v. Dooney & Bourke, Inc.*, 525 F. Supp. 2d 558, 664 (S.D.N.Y. 2007)).

1096. *See, e.g.*, 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 864–65; *see also* *Marvel Characters, Inc. v. Kirby*, 726 F.3d 119, 136 (2d Cir. 2013) (stating that while Rule 703 permits experts some leeway with respect to explaining otherwise inadmissible hearsay, "a party cannot call an expert simply as a conduit for introducing hearsay under the guise that the testifying expert used the hearsay as the basis of his testimony." The appropriate way to adduce factual details of specific past events is, where possible, through persons who witnessed those events" and holding that trial court therefore did not abuse discretion in declining to admit evidence (quoting *Malletier*, 525 F. Supp. 2d at 666)); *United States v. Mejia*, 545 F.3d 179, 197 (2d Cir. 2008) (asserting expert may not be used as conduit to transmit inadmissible information to jury).

1097. *United States v. Luna*, 649 F.3d 91, 105 (1st Cir. 2011) (quoting *United States v. Cormier*, 468 F.3d 63, 73 (1st Cir. 2006)).

Rule 703 “was not intended to abolish the hearsay rule and to allow a witness, under the guise of giving expert testimony, to in effect become the mouthpiece of the witnesses on whose statements or opinions the expert purports to base his opinion.” The rule “was never intended to allow oblique evasions of the hearsay rule.”<sup>1098</sup>

The expert also should be prohibited from testifying “that others agree with him as a means of vouching for or reinforcing any opinion of his own that he presents, at least in relation to central or contested matters.”<sup>1099</sup>

Instead, the expert is permitted to testify to the underlying data only in the context of explaining (1) the expert’s opinion that was formed as a result of the expert’s training and experience; and (2) the basis for the opinion.<sup>1100</sup> Otherwise, the expert is simply repeating the inadmissible hearsay without the jury understanding its limited purpose, a practice that allows the offering party to circumvent the rules of evidence.<sup>1101</sup> In one Second Circuit case, the court observed that some of the expert’s testimony “involved merely repeating information he had read or heard” rather than tying it to an opinion.<sup>1102</sup> The court explained:

When asked how he learned particular facts, [the expert witness] did not explain how he had pieced together bits of information from different sources and reached a studied conclusion that he then gave to the jury. Instead, he testified that he had read an article, or had talked to gang members in custody (including, on at least one occasion, a gang member arrested as part of this investigation), or listened to a recording (evidence that could have been played to the jury in its original form, notwithstanding that some informants may have been identified in the process). This testimony strongly suggests that [the witness] was acting not as an expert but instead as a case agent . . . .<sup>1103</sup>

The expert’s testimony therefore violated Rule 703.<sup>1104</sup>

Professor Mueller observes that the distinction of when the expert is merely describing the basis for an opinion and when the expert is acting as a conduit for presenting otherwise

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1098. *Factory Mut. Ins. Co. v. Alon USA L.P.*, 705 F.3d 518, 524 (5th Cir. 2013) (citations omitted) (quoting *Loeffel Steel Prods., Inc. v. Delta Brands, Inc.*, 387 F. Supp. 2d 794, 808 (N.D. Ill. 2005)).

1099. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 864–65.

1100. *Id.*

1101. *Id.*

1102. *United States v. Mejia*, 545 F.3d 179, 197 (2d Cir. 2008).

1103. *Id.* at 197–98.

1104. *Id.* at 198.

inadmissible information is “sometimes hard to draw,” particularly when the inadmissible information is a major basis for the expert’s opinion.<sup>1105</sup> To make the distinction “calls for considered judgment that there is enough of the expert’s own independent appraisal in what he proposes to say to make his testimony useful and reliable by the force or weight of his own authority.”<sup>1106</sup> Thus, a court must attempt to distinguish whether the expert’s primary purpose for providing this particular support for an opinion is to disclose his reliance on others or merely to “repeat[] what others say.”<sup>1107</sup> In any event, an expert should not be able to prove the inadmissible information unless the expert adds “special insights of his own.”<sup>1108</sup>

Professor Goode goes even farther than Professor Mueller; he states, “[I]t is often simply impossible to disentangle the explanatory value of the otherwise inadmissible hearsay from its substantive use.”<sup>1109</sup> Professor Goode cites as illustrative of this problem the trial court’s decision to allow a medical examiner to read several affidavits relied on to conclude that the victim died as a result of homicidal violence.<sup>1110</sup> After cross-examination questioned the veracity of the affidavits and the expert testified on redirect that the statements “were the kinds of statements that you would typically rely upon in your job as a medical examiner in arriving at a conclusion in terms of cause of death,” the State was permitted to read the affidavits.<sup>1111</sup> The court held that the defense had opened the door for the jury to review the affidavits and “there was no great danger that the affidavits would be used for a purpose other than as explanation or support for the expert’s opinion.”<sup>1112</sup> The affidavits included statements that the defendant wished he could “get rid of” his wife, the victim did not like going to the pond (where her body was found), the defendant said it would be cheaper to kill a woman than to divorce her, he was controlling, the victim would not wander into the woods and was a strong swimmer, the victim stated that the defendant was capable of great violence when under the influence of alcohol, and double hearsay from the defendant’s

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1105. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:16, at 865.

1106. *Id.*

1107. *Id.*

1108. *Id.*

1109. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 705.3, at 31 (Supp. 2014).

1110. *Id.* (discussing the trial court’s ruling as described in *Moulton v. State*, 360 S.W.3d 540, 564–65 (Tex. App.—Texarkana 2011), *rev’d on other grounds*, 395 S.W.3d 804 (Tex. Crim. App. 2013)).

1111. *Moulton*, 360 S.W.3d at 564.

1112. *Id.* at 565.

daughter that she believed her father killed her mom.<sup>1113</sup> The court of appeals held that the trial court did not abuse its discretion.<sup>1114</sup>

Professor Goode comments,

[T]his otherwise inadmissible hearsay can be said to have a legitimate nonhearsay purpose. . . . Nevertheless, the extent to which this material really explains or supports the medical examiner's opinion is almost entirely dependent on whether the otherwise inadmissible hearsay is true. If these hearsay statements were true, the medical examiner's opinion that the victim's death was a homicide is strengthened; if they were false, it is undermined.<sup>1115</sup>

Recognizing these types of dangers, the Second Circuit carefully distinguished between allowing a police officer to rely on hearsay to form an opinion and allowing the officer to regurgitate the hearsay to the jury.<sup>1116</sup> The court held that a police officer could rely on hearsay statements made by gang members during custodial and noncustodial interviews, statements made by other law enforcement officers, intercepted telephone conversations, and printed and online materials because law enforcement officers "routinely and reasonably rely upon hearsay in reaching their conclusions."<sup>1117</sup> But the admissibility of the opinion does not mean the expert may "transmit hearsay to the jury."<sup>1118</sup>

The court did not use the federal balancing test. Instead, the court examined whether the expert formed an opinion by applying his experience or a reliable methodology to the inadmissible hearsay.<sup>1119</sup> If the expert does not apply his experience or a reliable methodology to the otherwise inadmissible data, the expert is simply parroting impermissible hearsay evidence, thereby "allow[ing] [a party] 'to circumvent the rules prohibiting hearsay.'"<sup>1120</sup> The Second Circuit ruled that the district court had abused its discretion in allowing testimony from one of the government's expert witnesses regarding gang structure and operations because the

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1113. *Id.* at 547–48.

1114. *Id.* at 566.

1115. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 705.3, at 32 (Supp. 2014).

1116. *United States v. Mejia*, 545 F.3d 179, 197–98 (2d Cir. 2008) (finding expert testimony to violate Rule 703 when the expert "did not analyze his source materials so much as repeat their contents").

1117. *Id.* at 197 (quoting *United States v. Dukagjini*, 326 F.3d 45, 57 (2d Cir. 2003)).

1118. *Id.*

1119. *Id.*

1120. *Id.* (quoting *Dukagjini*, 326 F.3d at 69).

expert “did not analyze his source materials so much as repeat their contents.”<sup>1121</sup>

The Ninth Circuit affirmed the exclusion of an expert’s opinion that a fire was intentionally created by pouring gasoline into the soil when the sole basis for the opinion was a lab report, which was “otherwise inadmissible hearsay evidence in the absence of foundation testimony by the [testing] laboratory.”<sup>1122</sup> “The prejudice that would result from admission of this evidence was substantial, whereas its probative value was minimal.”<sup>1123</sup> Therefore, the trial court did not abuse its discretion in refusing to permit the expert’s testimony.<sup>1124</sup> Unfortunately, the court conflated two separate inquiries under the Federal rule; the court correctly observed that Rule 703 “requires a court to ask two questions when evaluating otherwise inadmissible evidence”: first, “whether the facts are of a type reasonably relied on by experts in the particular field,” and second, “whether the probative value of the underlying data substantially outweighs its prejudicial effect.”<sup>1125</sup> But the answers to those two questions do not both examine the admissibility of the expert’s opinion; only the first question addresses admissibility of the opinion.<sup>1126</sup> The second question addresses not admissibility of the opinion but the admissibility of the basis for the opinion.<sup>1127</sup> Even if the basis is excludable under the balancing test, the opinion is nevertheless admissible unless the first question is answered negatively (or there were other defects in forming the opinion).

The Seventh Circuit addressed the not-infrequent issue of an expert who relies on his assistants in developing his opinions. The court explained that an expert may rely on the assistants without the assistants testifying but the “[a]nalysis becomes more complicated if the assistants . . . exercise professional judgment that is beyond the expert’s ken.”<sup>1128</sup> A well-credentialed scientist “is not permitted to be the mouthpiece of a scientist in a different specialty.”<sup>1129</sup>

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1121. *Id.* at 198.

1122. *Turner v. Burlington N. Santa Fe R.R.*, 338 F.3d 1058, 1062 (9th Cir. 2003).

1123. *Id.*

1124. *Id.*

1125. *Id.* at 1061 (quoting *Bauman v. Centex Corp.*, 611 F.2d 1115, 1120 (5th Cir. 1980)).

1126. *See* 4 WEINSTEIN & BERGER, *supra* note 27, § 703.03, at 703-7 (observing that there are “two separate issues: first, may the expert use the underlying data to form an opinion, and second, may the expert disclose the data to the jury”).

1127. *See id.*

1128. *Dura Auto. Sys. of Ind., Inc. v. CTS Corp.*, 285 F.3d 609, 612, 614 (7th Cir. 2002).

1129. *Id.* at 614.

The First Circuit held in a medical malpractice case that a trial court did not err in overruling a defendant-surgeon's hearsay objection to expert testimony regarding findings in published literature, and thereby permitted the expert to evade the limitations on the use of authoritative literature set forth in Rule 803(18).<sup>1130</sup> The expert was asked whether he was familiar with the literature about scarring caused by a second surgery.<sup>1131</sup> He identified literature by another physician but stated that he was testifying not from that literature but from his "own collective knowledge, including other sources, independent research, and experience."<sup>1132</sup> He then explained that the research supported his opinion about the increased scarring.<sup>1133</sup>

The appellants argued that the "hearsay did not . . . fall within the 'learned treatise' exception of Rule 803(18) because no foundation was laid to establish the reliability of [the literature]."<sup>1134</sup> They further argued that "Rule 803(18) permits only the reading of the text of a learned treatise, not an oral summary thereof."<sup>1135</sup> The court held that that the expert was not summarizing literature but rather was describing, based on his own expertise, "the current state of medical research on the subject of scarring. While it may be that [the] expert opinion was formed, in part, on the basis of the published works of . . . other researchers, scholarly literature is information reasonably relied upon by medical experts."<sup>1136</sup> The court's analysis, unfortunately, addresses only the first prong of Rule 703's dual standard—whether scholarly literature is the type of information reasonably relied on by experts, and ignores the second prong—whether it is reasonable for the expert to rely on the literature. To answer this second inquiry, the court should have examined whether reliance on the particular article was reasonable before it permitted the expert to buttress his own research and experience with reference to research of others.<sup>1137</sup> But in another case, the court

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1130. *Ramirez v. Debs-Elias*, 407 F.3d 444, 446, 449–50 (1st Cir. 2005). For a similar analysis, see *In re Japanese Elec. Prods. Antitrust Litig.*, 723 F.2d 238, 282 (3d Cir. 1983) (stating that when expert opinions are based on scholarly article, "the article itself need not be admissible" under Rule 803(18) to be relied on by the expert and thus court erred in excluding opinion), *rev'd on other grounds sub nom. Matsushita Elec. Indus. Co., v. Zenith Radio Corp.*, 475 U.S. 574 (1986), and *abrogated by Pfeiffer v. Marion Ctr. Area Sch. Dist., Bd. of Sch. Dirs. for Marion Ctr. Area Sch. Dist.*, 917 F.2d 779 (3d Cir. 1990).

1131. *Ramirez*, 407 F.3d at 447.

1132. *Id.*

1133. *Id.*

1134. *Id.* at 449.

1135. *Id.*

1136. *Id.* (footnote omitted).

1137. *Junk v. Terminix Int'l Co.*, 628 F.3d 439, 449 (8th Cir. 2010) (stating that Rule

used the balancing test to hold that an EPA report was not admissible.<sup>1138</sup>

*c. Limiting Instructions Under Rule 705(d).* If the court elects to permit an expert to explain the otherwise inadmissible basis for his opinion, Rule 705(d) of the Texas Rules of Evidence requires the trial court to give a limiting instruction upon request.<sup>1139</sup> A limiting instruction is necessary because the “[f]acts, data, or opinions reasonably relied upon by an expert witness are *not* thereof substantive evidence; reasonably relied on facts, data or opinions constitute substantive evidence only if otherwise admitted in evidence.”<sup>1140</sup>

The Corpus Christi Court of Appeals suggested the following instruction when an expert relies on otherwise inadmissible evidence:

An expert may testify in terms of opinion or inference. The expert may disclose the underlying facts or data relied upon to formulate that opinion or inference. When the underlying facts or data are disclosed, they may be considered by you to aid you in determining (if it does so) the weight, if any, to be given the testimony of the expert at trial and his credibility; but such underlying facts or data, if any, shall not be considered as tending to establish the alleged guilt of the defendant in this case.<sup>1141</sup>

In a case arising from an order of commitment of a person found to be a sexually violent predator, the Beaumont Court of Appeals relied heavily on the trial court’s limiting instruction in holding that the trial court did not abuse its discretion when it allowed two experts to disclose that they based their opinion, that the defendant suffered from a behavioral abnormality that made him likely to engage in a predatory act of sexual violence, in part on details about his prior sexual offenses.<sup>1142</sup> The details

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803(8)(C) does not provide an exception to the hearsay rule when “the sources of information or other circumstances indicate a lack of trustworthiness”).

1138. *Id.* at 449–50 (8th Cir. 2010) (holding that trial court did not err in excluding EPA report relied on by expert because report was not reliable and its probative value did not substantially outweigh its prejudicial effect when report was a brief summary of research rather than a scholarly publication and jury might have been misled into believing it reported EPA’s findings).

1139. *Brennan v. Reinhart Institutional Foods*, 211 F.3d 449, 451 (8th Cir. 2000) (“[It] is helpful when trial courts instruct juries as to the limited applicability of the hearsay evidence by informing the jury that the hearsay is inadmissible as substantive evidence to prove the truth of the fact asserted.”).

1140. 5 GRAHAM, *supra* note 34, § 703:1, at 559.

1141. *Depena v. State*, 148 S.W.3d 461, 470 n.10 (Tex. App.—Corpus Christi 2004, no pet.).

1142. *In re Commitment of Tesson*, 413 S.W.3d 514, 519–21 (Tex. App.—Beaumont 2013, pet. denied).

of the prior offenses were contained in various hearsay records reviewed by the experts.<sup>1143</sup> The trial court instructed the jury on the definition of hearsay and that the experts were relying on hearsay.<sup>1144</sup> The trial court further explained that this hearsay “was presented to show you the basis of the experts’ opinion and to afford you the opportunity to decide the weight and the credibility to be given to the expert[s]’ opinion but not as primary evidence for you to consider as being truthful.”<sup>1145</sup> When the hearsay was admitted a second time as a basis for an expert opinion, the judge informed the jury that he was overruling the hearsay objection so the jurors could have the information to assess “the basis upon which his opinion is founded. And you can decide as you see fit about whether to consider his opinion valid or not and how much weight should be given to it. But the hearsay portion is not primary evidence for you to consider.”<sup>1146</sup> The court of appeals held that “the trial court could have reasonably concluded that the disclosure of the data at issue would be helpful to the jury because the disclosure of the data would allow the jury to understand how the State’s experts had formed their respective opinions.”<sup>1147</sup> And because of its limiting instructions, “the trial court’s decision to admit the evidence at issue was not unfairly prejudicial.”<sup>1148</sup>

Federal Rule 705 eliminates the need for a party to present the soundness of the expert’s opinion during direct examination.<sup>1149</sup> The expert is only required to give a “shorthand-direct.”<sup>1150</sup> This rule grants the proponent “more flexibility in presenting such testimony” and allows “the main point to be stated early.”<sup>1151</sup> Thus,

Rule 705 in effect puts the burden on the opponent. The wisdom of this approach rests on the notion that the price of

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1143. *Id.* at 519.

1144. *Id.*

1145. *Id.*

1146. *Id.* at 520.

1147. *Id.*

1148. *Id.* at 521; *see also In re Commitment of Young*, 410 S.W.3d 542, 557–58 (Tex. App.—Beaumont 2013, no pet.) (holding that trial court in sexually violent predatory case did not abuse discretion in allowing expert to explain otherwise inadmissible evidence as support for opinion in light of limiting instruction).

1149. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:22, at 906.

1150. *Id.*; *see also BROWN & RONDON*, *supra* note 35, at 732–33 (stating that under Rule 705(a) an expert may make an “abbreviated presentation” of an opinion without presenting any factual data and that underlying data should only be required “when there is a special concern, such as the possibility that the opinion may be based on impermissible or unreliable data”).

1151. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:23, at 909.

requiring the foundation to be laid first is simply too high, and obviously on the idea that the mechanism of cross is adequate to the task of exposing any flaws in the expert's reasoning. . . . It is faith in the skill of trial counsel, the power of the cross, and the skepticism, common sense, and critical faculties of judges and juries, that underlie the conclusion that the exposure of weakness or fatal deficiencies in expert testimony may be left to the calling party's opponent.<sup>1152</sup>

Nevertheless, this path is "seldom taken."<sup>1153</sup> One reason is that "Rule 705 does not exempt expert testimony from the requirements of Rule 702 or permit decisions on admissibility to rest on credentials alone."<sup>1154</sup> Rule 705 focuses "on *the manner of presenting* expert testimony to the factfinder, not on *any obligation to clear the admissibility hurdle*."<sup>1155</sup> If the expert never presents support for an opinion, the opinion may be stricken.<sup>1156</sup>

4. *Conclusion.* An expert opinion must be "supported by an adequate foundation of relevant facts, data, or opinions,"<sup>1157</sup> and courts must "independently evaluate" this predicate to ensure that it is reliable.<sup>1158</sup> When the predicate for expert testimony is 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.'"<sup>1159</sup> Ultimately, "[i]f the foundational data underlying opinion testimony are unreliable, an expert will not be permitted to base an opinion on that data because any opinion drawn from that data is likewise unreliable."<sup>1160</sup> This is true even if the expert is well qualified,

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1152. *Id.* § 7:22, at 906–07.

1153. *Id.* § 7:23, at 910.

1154. *Id.* at 911.

1155. *Id.* at 912.

1156. *Id.*

1157. 2 GRAHAM, *supra* note 34, § 702.1, at 29 (4th ed. 1996).

1158. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997) (citing *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 747–48 (3d Cir. 1994); *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823, 829 (D.C. Cir. 1988); *In re Agent Orange Liab. Litig.*, 611 F. Supp. 1223, 1245 (E.D.N.Y. 1985), *aff'd*, 818 F.2d 187 (2d Cir. 1987)); *see also Trepel v. Roadway Express, Inc.*, 194 F.3d 708, 721 (6th Cir. 1999) ("Although it is true that an expert may base an opinion on otherwise inadmissible evidence, the courts are constantly looking behind an expert's opinion to determine if the basis for that opinion is reliable and trustworthy.").

1159. *ZF Meritor, LLC v. Eaton Corp.*, 696 F.3d 254, 294 (3d Cir. 2012) (quoting *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149 (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592 (1993))), *cert. denied*, 133 S. Ct. 2025 (2013).

1160. *Merck & Co. v. Garza*, 347 S.W.3d 256, 262–63 (Tex. 2011) (quoting *Havner*, 953 S.W.2d at 714).

employs a reliable methodology, and provides a well-reasoned connection between his opinion and the basis for it. In other words, like a math problem, an expert can employ the right formula and correctly perform the math, but he will not get the right answer if he plugs the wrong numbers into the formula. Thus, courts must examine the facts, data, studies, and assumptions underlying the expert's opinion—i.e., the predicate for the expert's opinion—to assess the reliability of the expert's conclusions.<sup>1161</sup> Absent a sound predicate, expert opinion testimony is unreliable, and in Texas, the absence of any predicate, or reliance on a predicate that does not offer any support for an expert's opinion, renders the opinion conclusory and therefore, “no evidence.”<sup>1162</sup> In other words, “bare conclusions and assertions unsupported by facts of record, expert opinions based on facts merely assumed and not proved, or facts different from those proved, and scientific testimony without any reliable basis,” are not only inadmissible, but also are not probative and cannot support a judgment even if admitted without objection.<sup>1163</sup> Predicative reliability is thus a necessary foundation for reliable expert testimony.

### C. *Methodological Reliability*<sup>1164</sup>

The methodological reliability gate is based on three key cases—one decided by the U.S. Supreme Court and two decided by the Texas Supreme Court. Under the U.S. Supreme Court's opinion in *Daubert*<sup>1165</sup> and the Texas Supreme Court's opinions in *Robinson*<sup>1166</sup> and *Havner*,<sup>1167</sup> when an expert's methodology is not reliable, the resulting opinion and testimony is not “knowledge” and is inadmissible.<sup>1168</sup> *Daubert* refers to this reliability test as the

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1161. See, e.g., *Hous. Unlimited Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*7–14 (Tex. Aug. 22, 2014); *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 642 (Tex. 2009); *Havner*, 953 S.W.2d at 713.

1162. *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499 (Tex. 1995) (stating the expert's opinion was “no evidence” of an injury because it was based on facts that “var[ie]d materially from the actual, undisputed facts”); see also *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (citing *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 231–32 (Tex. 2004)) (“[T]estimony that is conclusory or speculative is not relevant evidence.”).

1163. *Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 420–21 (Tex. 1998).

1164. For additional discussion of this issue, see Brown, *supra* note 1, at 778–804.

1165. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 584 (1993).

1166. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 556 (Tex. 1995).

1167. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714, 720–29 (Tex. 1997).

1168. *Robinson*, 923 S.W.2d at 556; Brown, *supra* note 1, at 747. The reliability requirement applies to all types of expert evidence. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149 (1999) (stating Rule 702's reliability requirement applies to all matters);

“evidentiary reliability” test.<sup>1169</sup> Because this gate focuses primarily on the reliability of the expert’s *methodology*, we call this gate the methodological reliability gate.<sup>1170</sup> This gate examines whether “the testimony is the product of reliable principles and methods.”<sup>1171</sup>

1. *Overview of Pre-2000 Cases.* In *Daubert*, the Supreme Court rejected *Frye*<sup>1172</sup> as well as “the let-it-all-in standard in favor of a new reliability standard.”<sup>1173</sup> The Court made four “general observations” of factors to be examined under that reliability standard:<sup>1174</sup>

1. Whether the theory “can be (and has been) tested.”<sup>1175</sup>
2. Whether the theory has been “subjected to peer review and publication.”<sup>1176</sup>
3. What the “known or potential rate of error” is for any tests or techniques, and whether there are standards or controls for the technique’s operations.<sup>1177</sup>
4. Whether the theory is generally accepted in the relevant scientific community.<sup>1178</sup>

None of the factors, however, are definitive.<sup>1179</sup>

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*Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998) (“All expert testimony should be shown to be reliable before it is admitted.”); *Nenno v. State*, 970 S.W.2d 549, 560 (Tex. Crim. App. 1998) (stating Rule 702 applies to nonscientific, as well as scientific, evidence).

1169. *Daubert*, 509 U.S. at 590 n.9.

1170. *Brown*, *supra* note 1, at 748, 778–804.

1171. FED. R. EVID. 702; *see Havner*, 953 S.W.2d at 714 (explaining that the opinion is unreliable when an expert uses a “flawed methodology”).

1172. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923). Professor Faigman and his co-authors helpfully contrast *Daubert* and *Frye*:

*Frye* inquires into the general acceptance of a proposition among a community thought to understand the matter; *Daubert* inquires directly into a proposition’s scientific foundation. . . . [T]hese two questions usually will lead to the same result. That which has a strong scientific foundation usually will be generally accepted; that which has a weak scientific foundation usually will not be widely accepted. In those situations, both standards will admit or both will exclude. But sometimes the two will diverge. When asserted knowledge is sound but not generally accepted, *Daubert* permits its admission while *Frye* does not. . . . When asserted knowledge has not been shown to be sound, but nevertheless has gained general acceptance in the field, then *Daubert* excludes even though *Frye* would admit. . . . Put most simply, *Daubert* sets a higher threshold for admissibility in some circumstances and a lower threshold under other circumstances.

1 FAIGMAN ET AL., *supra* note 246, § 1:15, at 49–51.

1173. *Bernstein*, *supra* note 246, at 41.

1174. *Daubert*, 509 U.S. at 593–94.

1175. *Id.*

1176. *Id.*

1177. *Id.* at 594.

1178. *Id.* at 594 (citations omitted).

1179. *Id.* at 593.

This type of “methodological definition” based on Rule 702’s reference to “scientific . . . knowledge” was suggested by several amicus briefs submitted by scientists and scientific organizations.<sup>1180</sup> *Daubert* “posed an essentially epistemological question: How can an investigator use Newtonian scientific methodology to come to know whether a hypothesis about a phenomenon is true?”<sup>1181</sup> Under this test, “[t]he decisive question is whether the proponent has demonstrated that the expert’s theory or technique has been empirically validated, that is, whether it is supported by adequate, methodologically sound empirical data.”<sup>1182</sup> These factors are to ensure that scientific techniques and research “comport[] with the dictates of good science.”<sup>1183</sup>

Despite its identification of these factors, the Supreme Court stressed that the inquiry envisioned by Rule 702 is a “flexible” one.<sup>1184</sup> On remand, the Ninth Circuit added another factor for assessing reliability: whether the technique was derived through independent research or was developed for litigation purposes.<sup>1185</sup> The Ninth Circuit noted the expert’s bald assurances that the opinions are based on sound scientific techniques was insufficient; the expert had to offer some objective, independent validation of that methodology.<sup>1186</sup>

The Texas Supreme Court followed the lead of *Daubert* and adopted a reliability test for scientific expert testimony in *E.I. du*

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1180. Imwinkelried, *supra* note 881, at 962.

1181. *Id.* at 974.

1182. *Id.* at 962–63.

1183. *Id.* (quoting *Daubert II*, 43 F.3d 1311, 1317 (9th Cir. 1995)). In *Daubert*, the Court focused on whether the expert opinion reflected “scientific knowledge” and examined expert opinions “derived by the scientific method” and whether their work product amounted to “good science.” *Daubert*, 509 U.S. at 593. For example, the testing factor was specifically tied to scientific knowledge: courts must determine “whether a theory or technique is scientific knowledge that will assist the trier of fact [by determining] whether it can be (and has been) tested.” *Id.* at 593. Rate of error applies in examining “a particular scientific technique.” *Id.* at 594. General acceptance examined acceptance within the “relevant scientific community.” *Id.* *Daubert II* explained that *Daubert* instructs courts “to determine whether the analysis undergirding the experts’ testimony falls within the range of accepted standards governing how scientists conduct their research and reach their conclusions.” *Daubert II*, 43 F.3d at 1317.

1184. *Daubert*, 509 U.S. at 594.

1185. *See Daubert II*, 43 F.3d at 1317. The court explained:

That an expert testifies for money does not necessarily cast doubt on the reliability of his testimony, as few experts appear in court merely as an eleemosynary gesture. But in determining whether proposed expert testimony amounts to good science, we may not ignore the fact that a scientist’s normal workplace is the lab or the field, not the courtroom or the lawyer’s office.

*Id.*

1186. *Id.* at 1316.

*Pont de Nemours & Co. v. Robinson*.<sup>1187</sup> A horticulturalist testified that a fungicide was contaminated with an herbicide and that the application of the contaminated fungicide damaged the Robinsons' pecan trees.<sup>1188</sup> The methodology he used to reach this opinion included visual inspections and "comparative symptomology."<sup>1189</sup> He did not conduct any soil or tissue testing or test the fungicide.<sup>1190</sup>

The Court announced a general rule that expert testimony must be "based upon a reliable foundation."<sup>1191</sup> Trial judges act as gatekeepers who have a "heightened responsibility to ensure that expert testimony shows some indicia of reliability."<sup>1192</sup> For evidence involving scientific techniques or principles, the evidence must be "grounded 'in the methods and procedures of science.'"<sup>1193</sup> The Court adopted six factors that a trial court "may consider" for determining reliability under Rule 702 but stressed that the factors are both flexible and nonexhaustive.<sup>1194</sup> These factors include all four of those identified in *Daubert*, the additional factor identified by the Ninth Circuit upon remand in *Daubert II*, and the extent to which the technique relies upon the subjective interpretation of the expert (which we will refer to as the *Daubert* or *Robinson* factors).<sup>1195</sup> The Court added one absolute requirement for reliability: an expert testifying on causation must take reasonable steps to exclude other plausible causes of the damages in question, a process best described as differential etiology.<sup>1196</sup>

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1187. E.I. du Point de Nemours & Co. v. Robinson, 923 S.W.2d 549 (Tex. 1995).

1188. *Id.* at 551.

1189. *Id.* The Court described comparative symptomology as comparing the Robinsons' pecan trees symptoms with common symptoms of other plants treated with the same fungicide under dissimilar growing conditions. *Id.*

1190. *Id.*

1191. *Id.* at 556.

1192. *Id.* at 553.

1193. *Id.* at 557 (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590 (1993)).

1194. *Id.* (including factors such as "(1) the extent to which the theory has been or can be tested; (2) the extent to which the technique relies upon the subjective interpretation of the expert . . . ; (3) whether the theory has been subjected to peer review and/or publication; (4) the technique's potential rate of error; (5) whether the underlying theory or technique has been generally accepted as valid by the relevant scientific community; and (6) the non-judicial uses which have been made of the theory or technique").

1195. *Id.*; see *Daubert*, 509 U.S. at 593–94; *Daubert II*, 43 F.3d 1311, 1317 (9th Cir. 1995).

1196. *Robinson*, 923 S.W.2d at 558–59. The Texas Supreme Court has noted on several occasions that expert testimony on causation must eliminate other potential causes. *Brown*, *supra* note 1, at 799–800; see also *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (holding that expert's failure to explain how he eliminated potential cause of fire made it conclusory and unreliable); *In re Allied Chem. Corp.*, 227

Following *Daubert*, the Texas Supreme Court also stated that the inquiry focuses “solely on the underlying principles and methodology, not on the conclusions they generate.”<sup>1197</sup> The difficulty with this “methodology only” limitation is that *Daubert* also charged trial courts with assessing “whether the reasoning or methodology underlying the testimony is scientifically valid and . . . whether that reasoning or methodology properly can be applied to the facts in issue.”<sup>1198</sup> To examine the expert’s reasoning or application of a methodology necessarily requires a court to review the expert’s conclusion. Moreover, “it is not always a straightforward exercise to disaggregate method and conclusion.”<sup>1199</sup> The U.S. Supreme Court in *Joiner* later clarified its statement, declaring that “conclusions and methodology are not entirely distinct from one another” and that nothing in “*Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert.”<sup>1200</sup> The Texas Supreme Court followed suit in *Gammill v. Jack Williams Chevrolet, Inc.*<sup>1201</sup>

Applying these factors in *Robinson*, the Texas Supreme Court held that the expert’s “methodology” was unreliable.<sup>1202</sup> For example, his comparative symptomology method failed four of these factors: it (1) had not been subjected to peer review or

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S.W.3d 652, 656 (Tex. 2007) (stating that experts “must also exclude other causes with reasonable certainty”); *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 581 (Tex. 2006) (stating that the expert “failed to set out any process by which he excluded other sources of ignition of the diesel fuel such as mechanical sparks which could be generated when parts of the truck make contact with the pavement, or ignition of the cargo fuel”); *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 500 (Tex. 2001) (affirming appellate court’s reliance on evidence extraneous to expert testimony to rule out other plausible causes of injury and admissibility of expert’s testimony); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 720 (Tex. 1997) (“[I]f there are other plausible causes of the injury or condition that could be negated, the plaintiff must offer evidence excluding those causes with reasonable certainty.”).

1197. *Robinson*, 923 S.W.2d at 557 (quoting *Daubert*, 509 U.S. at 593–94).

1198. Bernstein, *supra* note 246, at 42.

1199. *Bitler v. A.O. Smith Corp.*, 400 F.3d 1227, 1233 (10th Cir. 2004).

1200. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

1201. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 727 (Tex. 1998) (concluding that the expert failed to connect his observations to his opinion, and therefore, was speculative). Therefore, the “methodology only” limitation applies only to the methodological reliability gate, not the predicative and connective reliability gates. Because this limitation applies to one of the three reliability gates, broad statements relying on this limitation should be avoided. *See, e.g.*, *United States v. Stafford*, 721 F.3d 380, 393–94 (6th Cir. 2013) (classifying an admissibility challenge to an expert’s conclusion as a challenge to reliability, not the expert’s qualifications or the opinion’s relevance); *McDowell v. Brown*, 392 F.3d 1283, 1298 (11th Cir. 2004) (“[A] court should meticulously focus on the expert’s principles and methodology, and not on the conclusions that they generate.”).

1202. *Robinson*, 923 S.W.2d at 559–60.

publication; (2) had no known rate of error; (3) had not been generally accepted by members of the relevant scientific community; and (4) was adopted for purposes of litigation.<sup>1203</sup>

*Havner* reiterated that the *Daubert* factors are not the exclusive factors for determining reliability but did not add any new factors or explicitly give one factor more weight than another.<sup>1204</sup> In its application of the *Robinson* factors to the plaintiffs' epidemiological evidence on Bendectin, however, the *Havner* Court stressed the importance of peer review and publication.<sup>1205</sup> The expert's opinions had never "been offered outside the confines of a courthouse."<sup>1206</sup>

The admissibility of nonscientific expert testimony was addressed by the Texas Supreme Court in *Gammill*,<sup>1207</sup> and shortly thereafter by the U.S. Supreme Court in *Kumho Tire Co. v. Carmichael*.<sup>1208</sup> The *Gammill* Court stated that the text of Rule 702 does not adopt "dual standards" for the admissibility of expert testimony.<sup>1209</sup> The Court further explained that "[i]t would be an odd rule of evidence that insisted that some expert opinions be reliable but not others."<sup>1210</sup> Even if an expert's testimony is based upon skill and experience, the expert opinion testimony still must demonstrate reliability, including that it is the product of a "scientifically valid" methodology.<sup>1211</sup> "[A]cknowledging that

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1203. *Id.* The Court stated that the opinions were formed for purposes of litigation. But this will often be true in litigation, even when the expert has already published on the general subject or on the methodology because the principles and methods must be applied to the facts of the case. The critical inquiry is not whether the opinion was formed for purposes of litigation, but whether the methodology, principles, or underlying data were adopted for purposes of litigation. *Id.*

1204. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 712, 714 (Tex. 1997).

1205. *Id.* at 726–27 ("[C]ourts must be 'especially skeptical' of scientific evidence that has not been published or subjected to peer review." (quoting *Brock v. Merrell Dow Pharm., Inc.*, 874 F.2d 307, 313 (5th Cir. 1989), *modified on reh'g*, 884 F.2d 166 (5th Cir. 1989))).

1206. *Id.* at 726.

1207. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 722–23 (Tex. 1998). For a fuller discussion of the reliability issue in *Gammill*, see Brown, *supra* note 1, at 800–04.

1208. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 147 (1999). For a fuller discussion of *Kumho*, see Brown, *supra* note 1, at 785–90.

1209. *Gammill*, 972 S.W.2d at 721.

1210. *Id.* at 726. *Kumho* made a similar observation: "[I]t would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between 'scientific' knowledge and 'technical' or 'other specialized' knowledge. There is no clear line that divides one from the others." *Kumho*, 526 U.S. at 148.

1211. See *Gammill*, 972 S.W.2d at 720–22, 724 (holding that the standard adopted in *Robinson* applies to all scientific testimony).

square pegs do not fit round holes,”<sup>1212</sup> both Courts stated that some of the *Daubert* factors might not apply to nonscientific testimony.<sup>1213</sup> They apply only when “they are reasonable measures of the reliability of expert testimony.”<sup>1214</sup> The *Kumho* Court explained that their applicability depends upon “the particular circumstances of the particular case at issue.”<sup>1215</sup> But in all cases, the expert opinion is admissible only if it is reliable.<sup>1216</sup>

2. *Subsequent Development of Factors for Assessing Methodological Reliability.* Trial courts are granted a great deal of deference in selecting and applying the factors to determine the reliability of an expert’s methodology<sup>1217</sup> because the listed factors may not be relevant, and therefore, are not mandatory.<sup>1218</sup> Indeed, one Texas court of appeals stated, “In non-scientific cases, it is impossible to set out specific criteria for evaluating the reliability of expert testimony, and, ultimately, the trial court has discretion to determine how to assess reliability.”<sup>1219</sup> *Joiner*

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1212. Imwinkelried, *supra* note 881, at 963.

1213. *Kumho*, 526 U.S. at 145–46, 150, 152; *Gammill*, 972 S.W.2d at 724.

1214. *Kumho*, 526 U.S. at 152.

1215. *Id.* at 150. The Court further explained that the *Daubert* factors “may or may not be pertinent in assessing reliability, depending on the nature of the issue, the expert’s particular expertise, and the subject of his testimony.” *Id.*

1216. *Id.* at 152.

1217. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 143 (1997); *see also* *United States v. Charley*, 189 F.3d 1251, 1266 (10th Cir. 1999) (“The trial judge is granted great latitude in deciding which factors to use in evaluating the reliability of expert testimony . . .”); *City of Tuscaloosa v. Harcos Chems. Inc.*, 158 F.3d 548, 562–63 (11th Cir. 1998) (finding abuse of discretion when court fails to make adequate inquiry into *Daubert* factors); *Guadalupe-Blanco River Auth. v. Kraft*, 39 S.W.3d 264, 272 (Tex. App.—Austin 2001) (Patterson, J., dissenting) (“The trial court’s discretion extends to determining which of the *Daubert-Robinson-Gammill* factors reasonably measure whether an expert’s opinion is reliable, and whether other factors might apply.”), *rev’d on other grounds*, 77 S.W.3d 805 (Tex. 2002).

1218. *Kumho*, 526 U.S. at 141, 150 (noting that *Daubert* factors do not “necessarily” apply in every case and “may or may not be pertinent in assessing reliability”); *United States v. John*, 597 F.3d 263, 274 (5th Cir. 2010); *Dart v. Kitchens Bros. Mfg.*, 253 F. App’x 395, 397 (5th Cir. 2007) (quoting *Kumho*, 526 U.S. at 150); *Hathaway v. Bazany*, 507 F.3d 312, 318 (5th Cir. 2007); *Rushing v. Kansas City S. Ry. Co.*, 185 F.3d 496, 506 (5th Cir. 1999); *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 235 (Tex. 2010) (explaining the factors “are non-exclusive, and . . . do not fit every scenario”); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 801 (Tex. 2006) (“[T]he *Robinson* factors cannot always be used in assessing an expert’s reliability . . .”); *Custom Transit, L.P. v. Flatrolled Steel, Inc.*, 375 S.W.3d 337, 357 (Tex. App.—Houston [14th Dist.] 2012, pet. denied) (observing that there is an “imperfect fit between expert testimony concerning certain types of technical issues and [the *Daubert*] reliability factors that arose in the context of cases involving expert scientific testimony”).

1219. *Weingarten Realty Investors v. Harris Cnty. Appraisal Dist.*, 93 S.W.3d 280, 285 (Tex. App.—Houston [14th Dist.] 2002, no pet.).

emphasizes the trial court's discretion in applying the *Daubert* factors.<sup>1220</sup> *Kumho* confers a deeper type of discretion on the trial judge—in the case of nonscientific expertise, discretion to select the factors to apply.<sup>1221</sup>

Neither are the *Daubert* factors exclusive;<sup>1222</sup> they are “illustrative.”<sup>1223</sup> Expert testimony that does not meet all or most of the *Daubert* factors may be admissible.<sup>1224</sup> Courts do not “insist[] upon rigid adherence to the *Daubert* factors; [instead, they] examin[e] the facts of each individual case, considering the *Daubert* factors to the extent they fit the facts.”<sup>1225</sup> Even when one factor does not apply, others may apply or need to be modified.

For example, historians might not be able to offer an error rate for their opinion, but certainly historians test their theories, publish their research in peer reviewed journals and reach general agreement about certain findings. Moreover, although historians do not quantify confidence levels by articulating error rates, the concept of confidence is not alien to the historian's job.<sup>1226</sup>

“[A] court should use, adapt, or reject *Daubert* factors as the particular case demands.”<sup>1227</sup> The issue is whether “enough factors have been considered to make an expert report sufficiently reliable.”<sup>1228</sup> Reliability inquires cannot “be answered by some generic test. The variability of type and purpose of the

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1220. *Joiner*, 522 U.S. at 143 (stating that court of appeals applied “an overly ‘stringent’ review” of the trial court's ruling excluding expert testimony and thus “failed to give the trial court the deference that is the hallmark of abuse-of-discretion review”).

1221. *Kumho*, 526 U.S. at 150 (stating that the *Daubert* factors “may not be pertinent in assessing reliability, depending on the nature of the issue, the expert's particular expertise, and the subject of his testimony” and that their applicability “depends upon the particular circumstances of the particular case at issue”).

1222. *Id.* at 141; *Hathaway*, 507 F.3d at 318; *Cooper Tire*, 204 S.W.3d at 801; *see also* FED. R. EVID. 702 advisory committee's note (“*Daubert* set forth a non-exclusive checklist for trial courts to use in assessing the reliability of scientific expert testimony.”).

1223. *Mathis v. Exxon Corp.*, 302 F.3d 448, 460 (5th Cir. 2002); *see also* *United States v. Fields*, 483 F.3d 313, 342 (5th Cir. 2007) (quoting *Mathis*, 302 F.3d at 460); *Pipitone v. Biomatrix, Inc.*, 288 F.3d 239, 244 (5th Cir. 2002); *Daubert II*, 43 F.3d 1311, 1317 (9th Cir. 1995); *Ex parte Ramey*, 382 S.W.3d 396, 401 (Tex. Crim. App. 2012).

1224. *United States v. Brown*, 415 F.3d 1257, 1268 (11th Cir. 2005) (admitting expert testimony on chemical structure of drugs, which was “based on their knowledge, skill, and experience,” and on “sufficient facts and data,” even though the methodology only satisfied one *Daubert* factor).

1225. *Russell v. Whirlpool Corp.*, 702 F.3d 450, 457 (8th Cir. 2012).

1226. 1 FAIGMAN ET AL., *supra* note 246, § 1:15, at 47–48.

1227. *Unrein v. Timesavers, Inc.*, 394 F.3d 1008, 1011 (8th Cir. 2005). That is because no single requirement exists for measuring reliability. *See id.*

1228. *MicroStrategy Inc. v. Bus. Objects, S.A.*, 429 F.3d 1344, 1355 (Fed. Cir. 2005).

particular testimony at issue requires flexibility.”<sup>1229</sup> Therefore, “[a] significant part of the trial court’s gatekeeper function is to . . . determine which factors and evaluation methodology are most appropriate to apply.”<sup>1230</sup> One reason that this flexibility is required is that “the concept of reliability is a relative one.”<sup>1231</sup>

Nevertheless, trial judges should normally address the *Daubert* factors as a starting point for assessing the reliability of the expert’s methodology<sup>1232</sup> and explain why they do not apply if that is the case.<sup>1233</sup> As explained by the Texas Supreme Court, although the *Daubert* factors<sup>1234</sup> “do not provide a perfect template for evaluating the admissibility of [an expert’s] testimony,” they are appropriate to turn to “initially for guidance.”<sup>1235</sup> After first addressing these factors, trial courts may consider other relevant factors.<sup>1236</sup> And in weighing the *Daubert* factors and other factors, a trial court may identify “the most germane considerations.”<sup>1237</sup> The Fifth Circuit has held that a trial court may apply the *Daubert* factors “too stringently” by limiting a reliability inquiry to those factors.<sup>1238</sup>

Although trial judges have discretion in their selection of the factors for determining the reliability of the expert’s

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1229. *Mathis v. Exxon Corp.*, 302 F.3d 448, 460 (5th Cir. 2002); *see Pineda v. Ford Motor Co.*, 520 F.3d 237, 248 (3d Cir. 2008) (holding district court’s inquiry of the reliability of engineer’s methodology “did not demonstrate the appropriate level of flexibility required by Rule 702”); *Jaurequi v. Carter Mfg. Co.*, 173 F.3d 1076, 1083 (8th Cir. 1999) (“[T]he district court must customize its [*Daubert*] inquiry to fit the facts of each particular case.”).

1230. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 579 (Tex. 2006).

1231. Edward J. Imwinkelried, *The Relativity of Reliability*, 34 SETON HALL L. REV. 269, 269 (2003).

1232. *Hathaway v. Bazany*, 507 F.3d 312, 318 (5th Cir. 2007); *In re J.B.*, 93 S.W.3d 609, 621 (Tex. App.—Waco 2002, pet. denied) (“[A] court should attempt first to apply the *Robinson* factors to proffered expert testimony.”).

1233. *Black v. Food Lion Inc.*, 171 F.3d 308, 314 (5th Cir. 1999).

1234. For simplicity, we will generally refer to the factors used in *Robinson* as the *Daubert* factors because they are based primarily on *Daubert* and *Daubert II*.

1235. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 802 (Tex. 2006).

1236. *Paz v. Brush Engineered Materials, Inc.*, 555 F.3d 383, 388 (5th Cir. 2009) (quoting *Black*, 171 F.3d at 312).

1237. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 692 (5th Cir. 2012); *cf. Bitler v. A.O. Smith Corp.*, 400 F.3d 1227, 1233 (10th Cir. 2004) (stating that the *Daubert* factors “are most relevant in the context of a new and novel scientific theory” but also “provide examples of the general kinds of issues a trial court need probe” for other expert opinions and that a court’s “[f]ailure to consider one, or even any, of these factors, albeit suggestive,” does not necessarily require reversal because the judge’s gatekeeping role “depends on the underlying factual circumstances of the particular case”).

1238. *Dart v. Kitchens Bros. Mfg.*, 253 F. App’x 395, 399 (5th Cir. 2007); *see also Hernandez v. State*, 53 S.W.3d 742, 752 (Tex. App.—Houston [1st Dist.] 2001, no pet.) (“*Daubert* problems arise and criticisms seem justified when the suggested inquiries are too rigidly applied.”).

methodology, “the failure to apply one or another of [the *Daubert* factors] may be unreasonable, and hence an abuse of discretion.”<sup>1239</sup> Trial courts may not “discretionarily . . . disavow the *Daubert* factors.”<sup>1240</sup> Flexibility may be stretched too far.<sup>1241</sup>

Because the *Daubert* factors remain the starting point for reviewing the reliability of an expert’s opinion, we will examine them first before briefly examining some other factors utilized by courts. However, it is worth noting that courts frequently cite an expert opinion’s failure to pass multiple *Daubert* criteria in concluding that the opinion is unreliable.<sup>1242</sup>

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1239. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 159 (1999) (Scalia, J., concurring).

1240. *Black*, 171 F.3d at 311 (clarifying the *Kumho* holding use of “may” is not a grant of discretion).

1241. *Coastal Tankships, U.S.A., Inc. v. Anderson*, 87 S.W.3d 591, 615 (Tex. App.—Houston [1st Dist.] 2002, pet. denied) (Brister, J., dissenting).

1242. *See, e.g.*, *United States v. Semrau*, 693 F.3d 510, 521–22 (6th Cir. 2012) (holding expert’s proposed testimony regarding functional magnetic resonance imaging lie detection results was inadmissible, and noting that there are no known error rates for its use as lie detector “outside the laboratory setting, i.e., in the ‘real-world’ or ‘real-life’ setting,” test lacked general acceptance, and testing by expert differed from testing in studies); *Wells v. SmithKline Beecham Corp.*, 601 F.3d 375, 380 (5th Cir. 2010) (“[T]he bases for the experts’ conclusions pass none of the applicable *Daubert* tests . . .”); *Kentucky Speedway, LLC v. Nat’l Ass’n of Stock Car Auto Racing, Inc.*, 588 F.3d 908, 918 (6th Cir. 2009) (concluding in antitrust claim that expert did not use standard test but used his “own version,” which had not been tested or subjected to peer review and publication, was not generally accepted, and was produced solely for lawsuit); *Polski v. Quigley Corp.*, 538 F.3d 836, 840 (8th Cir. 2008) (holding in personal injury suit that expert’s causation theory was not reliable where expert “relied on an unproven and indeed untested premise” and his theory had not been tested, had never been subjected to peer review and publication, nor had it been generally accepted in the scientific community); *Wills v. Amerada Hess Corp.*, 379 F.3d 32, 48–50 (2d Cir. 2004) (holding district court did not abuse discretion by excluding forensic toxicologist’s oncogene theory of causation of cancer because theory was not generally accepted, was not supported by testing or peer-reviewed literature, and rate of error was unknown, expert relied on affidavit of an unqualified and untrained seaman to quantify dosage of exposure, and expert did not account for smoking as possible cause of cancer); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 804–05 (Tex. 2006) (relying on all *Daubert* factors to conclude that former tire technician’s opinion that a tire separated because of wax contamination during manufacturing process was unreliable); *Matt Dietz Co. v. Torres*, 198 S.W.3d 798, 804 (Tex. App.—San Antonio 2006, pet. denied) (holding that general causation opinion that pesticide exposure caused laryngeal cancer was not based on scientifically accepted methodology when expert did not address *Daubert* factors); *Praytor v. Ford Motor Co.*, 97 S.W.3d 237, 244 (Tex. App.—Houston [14th Dist.] 2002, no pet.) (treating physician opinion that exposure to chemicals released in air bag deployment caused asthma and sinusitis was unreliable when expert did not testify theory had been tested, subject to peer review, or was generally accepted by relevant scientific community and had a significant potential rate of error given expert’s failure to rule out other potential causes); *Wolfson v. BIC Corp.*, 95 S.W.3d 527, 533–34 (Tex. App.—Houston [1st Dist.] 2002, pet. denied) (holding that trial court did not err in excluding chemical engineer’s opinion that butane lighter had a design defect causing it to not extinguish because expert did not “perform any test which may duplicate or verify a failure to extinguish in a mini-BIC lighter” and did not satisfy other *Daubert* factors); *In re J.B.*, 93 S.W.3d 609, 624–26 (Tex. App.—Waco 2002, pet. denied) (applying each of *Daubert* factors to psychologist’s opinion

*a. Testing.* The first factor—whether an expert’s methodology can and has been tested—is a “key question” in determining the reliability of an expert’s methodology.<sup>1243</sup> This inquiry “focuses on both the methodology used in testing and the substantive merit of the theory or technique by evaluating the test results.”<sup>1244</sup> Despite its importance, Professor Imwinkelried has commented that courts should not “place exclusive or even primary emphasis on empirical testing as a validation method” because testing is not required to develop epistemological knowledge.<sup>1245</sup> There are a number of reasons that courts might give less weight to its absence in some cases, such as ethical issues or expense.<sup>1246</sup> Nevertheless, courts have repeatedly relied on the absence of testing in concluding that an expert’s opinion was unreliable.<sup>1247</sup>

The necessity of testing is a frequent issue in products liability claims because of alternative design issues.<sup>1248</sup> A

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on parenting assessment and concluding that opinion was unreliable); *Weiss v. Mech. Associated Servs., Inc.*, 989 S.W.2d 120, 125 (Tex. App.—San Antonio 1999, pet. denied) (holding the expert testimony “falls short of compliance with” *Daubert* factors).

1243. *Daubert v. Merrell Dow Pharm.*, 509 U.S. 579, 593 (1993).

1244. *Brown*, *supra* note 1, at 826–27.

1245. Imwinkelried, *supra* note 877, at 739. He explains, “[M]odernly, rationalist, skeptical decisionmakers commonly rely on other modes of validation. Those modes should also be acceptable in the courtroom.” *Id.*

1246. See *Primiano v. Cook*, 598 F.3d 558, 565–66 (9th Cir. 2010) (“[E]thical concerns often prevent double-blind studies calculated to establish statistical proof.” (quoting *United States v. Sandoval-Mendoza*, 472 F.3d 645, 655 (9th Cir. 2006))); *Garcia v. BRK Brands, Inc.*, 266 F. Supp. 2d 566, 574 (S.D. Tex. 2003) (stating a single test may be permissible when “repeated tests are unavailable or impracticable because of prohibitive expense”).

1247. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 693 (5th Cir. 2012); *Snoznic v. Jeld-Wen, Inc.*, No. 1:09cv42, 2010 WL 1924483, at \*19 (W.D.N.C. May 12, 2010) (“Absent any sort of testing or other scientific analysis, [the expert’s] opinion regarding the ambiguity of the instruction must be excluded as unreliable.”); *Armeanu v. Bridgestone/Firestone N. Am. Tire, LLC*, No. CIV 05-619 JB/DJS, 2006 WL 4060665, at \*16 (D.N.M. Sept. 26, 2006) (“Absent such testing and acceptance, the opinion may be viewed as scientifically unsound and unreliable.”).

1248. *Bourelle v. Crown Equip. Corp.*, 220 F.3d 532, 535–36 (7th Cir. 2000) (quoting *Cummins v. Lyle Indus.*, 93 F.3d 362, 368 (7th Cir. 1996)). Other courts have also relied on an expert’s failure to prepare design drawings for an alternative design in striking a design expert’s opinion. See *Guy v. Crown Equip. Corp.*, 394 F.3d 320, 327 (5th Cir. 2004) (stating expert testimony on feasible design alternative was not definitive); *Masters v. Hesston Corp.*, 291 F.3d 985, 992–93 (7th Cir. 2002) (holding expert opinion was not reliably reached when expert did not test alternative design, did not analyze its impact on product’s function, and therefore, court had “little inkling as to its comparative functionality”); *Bourelle*, 220 F.3d at 537, 539 (explaining that the design expert who had not prepared “‘detailed design or calculations,’ performed ‘an economic feasibility study,’ prepared ‘preliminary design drawings,’ or performed ‘any risk utility type testing’” did not have reliable design opinion and rendered “his opinion akin to ‘talking off the cuff’ and not acceptable methodology”). For additional discussion of applying the testing *Daubert* factor in product liability cases, see *Brown*, *supra* note 1, at 836–37. “The design of the

number of courts have held that a failure to test an alternative design is a “failure to take any steps that would show professional rigor in the assessment” of the design.<sup>1249</sup> Such testing is necessary to determine if the alternative design “is both economically feasible and just as safe as or safer than” the actual design.<sup>1250</sup> Many design “considerations are product and manufacturer specific and cannot be reliably determined without testing” of the alternative design.<sup>1251</sup> While “hands-on testing is not an absolute prerequisite to the admission of expert testimony,” it is necessary when the alternative design “easily lends itself to testing and substantiation”<sup>1252</sup> unless the expert’s opinion “satisfies the other *Daubert* guideposts” used

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alternative is the expert’s methodology of showing its feasibility and safety. As a methodology, many courts properly focus on the first *Daubert* factor—the ability to test the design theory.” *Id.* at 836.

1249. *Dhillon v. Crown Controls Corp.*, 269 F.3d 865, 869 (7th Cir. 2001); *see also* *Winters v. Fru-Con Inc.*, 498 F.3d 734, 742–43 (7th Cir. 2007); *Brown v. Raymond Corp.*, 432 F.3d 640, 648 (6th Cir. 2005) (excluding expert design testimony in part due to lack of testing and favorably quoting district court that “the design of industrial equipment is a complex process and changes to prevent one problem could create other problems, thus increasing the overall danger of using a product”); *Zaremba v. Gen. Motors Corp.*, 360 F.3d 355, 358–59 (2d Cir. 2004) (stating “[n]umerous courts have excluded expert testimony regarding a safer alternative design where the expert failed to create drawings or models or administer tests. . . . In the absence of drawings, models, calculations, or tests,” trial court did not err in excluding design opinion); *Chapman v. Maytag Corp.*, 297 F.3d 682, 688 (7th Cir. 2002) (holding trial court erred in permitting mechanical engineer who never produced any studies, tests, or experiments to justify or verify his conclusions to opine that a resistive short caused electrocution); *Bourelle*, 220 F.3d at 537, 539 (holding the trial court did not err in excluding design expert based in part on expert’s failure to perform any testing); *Brooks v. Outboard Marine Corp.*, 234 F.3d 89, 92 (2d Cir. 2000) (upholding exclusion of an expert who, among other “shortcomings,” “never attempted to reconstruct the accident and test his theory” of a safer design); *Oddi v. Ford Motor Co.*, 234 F.3d 136, 156, 158 (3d Cir. 2000) (stating “haphazard, intuitive inquiry” that was basis for design opinion without any testing, calculations or measurements was unreliable; expert’s opinion was “based on nothing more than his training and years of experience as an engineer” and more is required in this type of case).

One federal court said the same is true for a claim of inadequate warnings: the actual alternative warning should be prepared and tested. *Bourelle*, 220 F.3d at 537, 539 (finding opinion of warning expert who provided gist of proposed warning but did not draft proposed alternative warning was unreliable); *cf.* *Koken v. Black & Veatch Constr., Inc.*, 426 F.3d 39, 47–48 (1st Cir. 2005) (holding in product liability claims after fire blanket failed during torch-cutting operation, engineering expert’s opinion that there should have been warning on blanket was unreliable because expert did not explain any underlying methodology to support opinion).

1250. *Dhillon*, 269 F.3d at 870. The court stated that any tests that are performed must be presented to the court as part of the record, should be performed before the expert forms his opinion, and should be on a comparable product. *Id.*

1251. *Id.*

1252. *Id.* Faigman and his co-authors suggest that “courts should be sensitive to the difficulty or expense of conducting tests on a particular hypothesis. In a product defect case in which \$50,000 in damages is claimed, it might not be reasonable to require tests that would cost \$20,000.” 1 FAIGMAN ET AL., *supra* note 246, § 1:16, at 53.

to examine reliability of the expert's methodology.<sup>1253</sup> An expert's alternative design opinion is reliable "despite a lack of testing [when] the expert has adhered to the 'standards of intellectual rigor that are demanded in [her] professional work,' such as relying on the data generated by other researchers, making proper personal observations or taking other appropriate actions."<sup>1254</sup> An expert's failure to empirically test her theories with alternative designs undermines the reliability of her opinion because "the design of industrial equipment is a complex process and changes to prevent one problem could create other problems, thus increasing the overall danger of using a product."<sup>1255</sup> As part of the expert's alternative design opinion, the expert must consider "the effect of [her] suggested design changes on the functionality of the product."<sup>1256</sup>

On the other hand, when an expert has adequately and successfully tested an alternative design, that factor may strongly favor admissibility of the expert's opinion even when other *Daubert* factors are absent.<sup>1257</sup>

Whether an expert opinion is unreliable due to a lack of testing is often an issue for testimony by fire investigators as well.<sup>1258</sup> In *Whirlpool*, a case arising out of a fire allegedly caused by a clothes dryer, the Texas Supreme Court stressed the importance of testing, but also recognized that it may not always be necessary.<sup>1259</sup> The Court explained that although testing is not always required to make an expert opinion reliable,

lack of relevant testing to the extent it was possible, either by the experts or others, is one factor that points toward a determination that an expert opinion is unreliable. If testing of critical aspects of an expert's testimony has not taken place . . . then an explanation of why it has not is an important consideration in evaluating the expert opinions

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1253. *Dhillon*, 269 F.3d at 870.

1254. *Winters*, 498 F.3d at 742–43 (quoting *Cummins v. Lyle Indus.*, 93 F.3d 362, 369 (7th Cir. 1996)).

1255. *Brown v. Raymond Corp.*, 432 F.3d 640, 648 (6th Cir. 2005) (quoting with approval *Brown v. Raymond Corp.*, 318 F. Supp. 2d 591, 599 (W.D. Tenn. 2004)); see also *Johnson v. Manitowoc Boom Trucks, Inc.*, 484 F.3d 426, 431 (6th Cir. 2007) (same).

1256. 29 WRIGHT & GOLD, *supra* note 52, § 6226, at 91, 107 n.64.14 (Supp. 2014).

1257. *Sappington v. Skyjack, Inc.*, 512 F.3d 440, 454 (8th Cir. 2008) (holding that the trial court erred in excluding opinion that product that complied with then existing ANSI standards was defective despite absence of any industry standard or literature which required his alternative design because design had been "fully tested").

1258. For a detailed discussion of the admissibility of expert testimony on the cause of fires, see 5 FAIGMAN ET AL., *supra* note 246, § 39:65, at 289–91 (2011).

1259. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 642–43 (Tex. 2009).

and determining whether they were substantively more than merely the expert's conclusory, subjective opinion.<sup>1260</sup>

The plaintiffs claimed that Whirlpool's use of a corrugated tube in a dryer's air-circulation system was a design defect that allowed the tube to become clogged and caused lint to be discharged into the dryer where it was ignited by the heater element, which caused the clothes to catch on fire and spread to the rest of the house.<sup>1261</sup> The *Whirlpool* Court applied the *Daubert* factors to question the methodological reliability of the engineer's opinion, observing that the engineer's theory was developed for the lawsuit, had not been published or subjected to peer review, and had not been accepted as a valid theory by any part of a relevant scientific or expert community at large.<sup>1262</sup> The expert

had not seen or read of a test showing that a corrugated lint transport tube in a dryer properly vented such as the Camachos' was, would become clogged with lint to the extent it backed lint up into the blower assembly. He did not personally test his theory. Nor did he test his theory that the lint would be blown through the lint chute seal if the lint transport tube became clogged.<sup>1263</sup>

In contrast, Whirlpool presented expert testimony supported by test results showing that any particles of lint that could pass through the dryer's inlet grill would be much smaller than those in a report relied upon by the plaintiffs' expert—so small that they would self-extinguish and would not have ignited clothing in the drum—and that even if larger pieces could escape, they could not become airborne inside the dryer cabinet.<sup>1264</sup> The Court stated that while it was unnecessary to decide whether Whirlpool's evidence “conclusively” proved that the plaintiffs' expert's opinions were invalid,<sup>1265</sup> it “highlight[ed] the extent to

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1260. *Id.*

1261. *Id.* at 634, 642–43.

1262. *Whirlpool*, 298 S.W.3d at 643. *Whirlpool* thus offers a valuable example of how predicative, methodological, and connective reliability can interact and overlap in the context of a reliability review. *See id.* It is also worth noting that, while *Whirlpool* involved a legal-sufficiency review, the defendant had properly preserved objections to the admissibility of the plaintiffs' expert evidence. Thus, a review of the expert's methodology was not inconsistent with the Court's previous holdings that “when a reliability challenge requires the court to evaluate the underlying methodology, technique, or foundational data used by the expert, an objection must be timely made so that the trial court has the opportunity to conduct this analysis.” *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009).

1263. *Whirlpool*, 298 S.W.3d at 640.

1264. *Id.* at 640–41.

1265. While the Court phrased the issue as whether Whirlpool conclusively disproved Camacho's theory, it is probably better to describe the issue as whether Whirlpool

which [the expert's] theory was subject to testing and examining for reliability."<sup>1266</sup>

In an earlier fire case, *Mack Trucks*, the Court noted, but did not focus on, the absence of testing in concluding that an expert's opinion, that defects in a truck's fuel and battery system caused a fire, was unreliable.<sup>1267</sup> Demonstrating the overlap between methodological and connective reliability, the Court used several *Daubert* factors as part of its *Gammill* "analytical gap" analysis.<sup>1268</sup> It noted that the expert did not test his theory, identify any research or calculations that supported his opinions, or identify any methodology to exclude other possible causes of the fire.<sup>1269</sup> Thus, his opinion was unreliable. Interestingly, the Court also stated that the trial court had discretion to determine the reliability of the expert's opinion by applying five of the six *Robinson* factors without relying on the *Gammill* analytical gap test.<sup>1270</sup> Because the *Gammill* analysis formed the basis for the court of appeals' holding, the Court did not focus on these factors except to make it clear that both the *Gammill* and *Daubert* tests applied.<sup>1271</sup>

In contrast, the Houston First Court of Appeals focused largely on the other *Daubert* factors in holding that a professional fire investigator's origin-of-fire opinion was sufficiently reliable, despite the absence of testing, in part because fire investigation "does not lend itself to testing."<sup>1272</sup> The

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disproved it as a matter of law. *Daubert* recognizes the inherent uncertainty of the scientific enterprise. When an expert relies on inductive reasoning to investigate hypotheses about phenomena, the expert does not regard a proposition as conclusively validated because there is always another conceivable empirical test. As long as an expert can conceive of another empirical test, there is an unavoidable possibility of subsequent falsification of the hypothesis. See JOHN ZIMAN, RELIABLE KNOWLEDGE: AN EXPLORATION OF THE GROUNDS FOR BELIEF IN SCIENCE 2 (1978) ("[W]e have cast off the naive doctrine that all science is necessarily true and that all true knowledge is necessarily scientific." (emphasis omitted)); Imwinkelried, *supra* note 877, at 746 ("Since there is always the possibility of invalidation in a subsequent test, induction can yield only probability."); Edward J. Imwinkelried, *Peer Dialogue: The How and What of "Appropriate Validation" Under Daubert: Reconsidering the Treatment of Einstein and Freud*, 68 MO. L. REV. 43, 44 (2003) ("The experimental process is essentially inductive; and the process cannot yield certainty because there are always further experiments that could be conducted—and, thus, the unavoidable possibility of subsequent falsification of the theory.").

1266. *Whirlpool*, 298 S.W.3d at 642.

1267. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 580–81 (Tex. 2006).

1268. *Id.* at 580. Connective reliability is discussed in the next section of this article. See *infra* Part III.D.

1269. *Mack Trucks*, 206 S.W.3d at 580–81.

1270. *Id.* at 579–80.

1271. *Id.* at 579–81.

1272. *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 150–52 (Tex. App.—Houston [1st Dist.] 2012, pet. filed). One justice dissented, arguing, among other

court stated that the expert's "opinion fits the facts of the case and there [were] no significant analytical gaps in his testimony" and was based on physical evidence, collected samples, burn patterns, damage to property, and elimination of other potential causes.<sup>1273</sup> Additionally, the expert performed "sufficient testing" on the hot box that was the alleged source of the fire and generally followed NFPA 921—a methodology subjected to peer review and publication that was generally accepted by the relevant scientific community and used for nonjudicial purposes—and when he did not, he explained why not.<sup>1274</sup>

The Eighth Circuit has considered the reliability of a fire investigator's origin-of-fire opinion in a number of cases. In two cases, it relied heavily on the expert's failure to conduct testing.<sup>1275</sup> It subsequently rejected "a bright-line rule for testing in fire cases" and stated that a fire expert can in some circumstances "offer a reliable opinion based upon specific observation and expertise."<sup>1276</sup> But lack of testing is still a factor in determining the reliability of an origin-of-fire opinion.<sup>1277</sup> And when an expert does not perform testing, reliability cannot be provided by "vague theorizing" based on general observations and scientific principles.<sup>1278</sup> NFPA 921 is a generally accepted

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things, that the opinion was unreliable due to a lack of testing. *Id.* at 171–72, 183–85 (Massengale, J., dissenting).

1273. *Id.* at 150 (majority opinion).

1274. *Id.* NFPA 921 is the National Fire Protection Association's guide for fire and explosion investigations. *See id.* at 144.

1275. *Pro Serv. Auto., L.L.C. v. Lenan Corp.*, 469 F.3d 1210, 1215–16 (8th Cir. 2006) (describing how the expert's opinion that internal hole in combustion chamber of heater caused fire was unreliable because expert provided no testing or other engineering analysis to support opinion, expert "offered only vague theorizing based upon general principles"); *Truck Ins. Exch. v. MagneTek, Inc.*, 360 F.3d 1206, 1211–13 (10th Cir. 2004) (holding that trial court did not err in excluding as unreliable fire expert's long-term, low-temperature ignition theory because theory was not supported by scientific testing, three publications introduced to support it were inapplicable, expert "underscored the scientific uncertainty" of theory, and theory was questioned in scientific community). *But see McCoy v. Whirlpool Corp.*, 287 F. App'x 669, 675–76 (10th Cir. 2008) (distinguishing *Magnetek*).

1276. *Presley v. Lakewood Eng'g & Mfg. Co.*, 553 F.3d 638, 644 (8th Cir. 2009).

1277. *Id.* at 644–46 (concluding trial court did not improperly weigh lack of testing in assessing reliability of expert's opinions).

1278. *Id.* (holding fire investigator's opinion was not reliable when expert also failed to follow standards of NFPA 921, did not provide any literature supporting ignition theory, theory was inconsistent with NFPA 921, and expert relied on "vague theorizing" based on general observations and scientific principles because there was "too great an inferential leap from these bases"); *see also Zeigler v. Fisher-Price, Inc.*, No. C01-3089-PAZ, 2003 WL 25686840, at \*10 (N.D. Iowa July 1, 2003) (holding that in the absence of scientific testing, an origins opinion based on an expert's "common-sense deductions" merely constituted "unsupported personal observations" and was inadmissible).

methodology for fire investigators,<sup>1279</sup> but the Eight Circuit has also held that failure to follow those “guidelines”<sup>1280</sup> does not require a finding of unreliability.<sup>1281</sup> In some cases, the Eighth Circuit has found a fire investigator’s methodology reliable without addressing NFPA 921.<sup>1282</sup> If a fire expert opines on the specific issue of whether a fire was caused by a defect in the manufacturing process of a particular product, he must offer a reliable methodology for that opinion.<sup>1283</sup>

Courts, on occasion, have downplayed the testing factor when addressing the reliability of nonscientific expert

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1279. *Fireman’s Fund Ins. Co. v. Canon U.S.A., Inc.*, 394 F.3d 1054, 1058–59 (8th Cir. 2005) (concluding that experts in products claim against copier manufacturer did not conform to NFPA 921 methods when testing failed to produce open flame and hypothesized malfunction could not be adequately explained in theory or replicated in test). The *Fireman’s* court stated that NFPA 921 qualifies as “a reliable method endorsed by a professional organization.” *Id.* at 1058–59. The court explained the experts’ opinions were not “carefully examined against empirical data obtained from fire scene analysis and appropriate testing” as required by NFPA standards. *Id.* at 1057–58.

1280. *Russell v. Whirlpool Corp.*, 702 F.3d 450, 454 (8th Cir. 2012) (“NFPA 921 is a document intended to ‘establish guidelines and recommendations for the safe and systematic investigation or analysis of fire and explosion incidents.’ NFPA 921 § 1.2.1.” (quoting NAT’L FIRE PROT. ASS’N, NFPA 921: GUIDE FOR FIRE AND EXPLOSION INVESTIGATIONS § 1.2.1 (2014), available at <http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=921> (last visited Sept. 6, 2014))). The court stated that the expert had testified that “NFPA 921 is a respected investigative method, not that it is a method an investigator must attempt to deploy in every case.” *Id.* at 455; see also *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 150–52 (Tex. App.—Houston [1st Dist.] 2012, pet. filed) (holding professional fire investigator’s origin-of-fire opinion was sufficiently reliable in part because expert generally followed NFPA 921 and when he did not he explained why, and stating that NFPA 921 is “a guideline”).

1281. *Russell*, 702 F.3d at 457–58 (stating that fire investigators may form opinion on “basis of observations and experience” and holding investigator’s methodology was sufficiently reliable when he interviewed witness, eliminated alternative causes, documented the scene, and examined burn patterns because the expert’s “methods are more rigorous than the vague theorizing and *ipse dixit* logic we have rejected in the past. The analytical gap between the existing evidence and the opinion [the expert] offered is not so great as to require exclusion”). In *Russell*, the expert explained why he believed he could not apply this guideline. *Id.* at 455–56.

1282. *Shuck v. CNH Am., LLC*, 498 F.3d 868, 872, 874–75 (8th Cir. 2007) (affirming admissibility of fire causation experts who ruled out oil starvation as cause of fire because they used reliable methodology when they “observed the relevant evidence, applied their specialized knowledge, and systematically included and excluded possible theories of causation,” even though experts did not conduct testing); *Hickerson v. Pride Mobility Prods. Corp.*, 470 F.3d 1252, 1257 (8th Cir. 2006) (holding fire investigator’s origin-of-fire opinion was a sufficiently reliable methodology because it included examination of burn patterns, smoke and heat damage, consideration of witness testimony, and elimination of other possible sources of fire).

1283. *103 Investors I, L.P. v. Square D Co.*, 470 F.3d 985, 990–91 (10th Cir. 2006) (holding fire investigator’s opinion on manufacturing defect was not reliable because investigator was not familiar with basic steps of product’s manufacturing and did not follow any generally accepted scientific methodology for determining whether contamination resulted from manufacturing process or from other cause).

testimony.<sup>1284</sup> For example, the Seventh Circuit in a premises security case held that a district court abused its discretion in excluding an expert opinion, that a college negligently provided premises security, based in part on a lack of testing.<sup>1285</sup> The court stated that this type of opinion “does not easily admit of rigorous testing and replication.”<sup>1286</sup> There were, however, other reliable bases for the expert’s opinion, including the expert’s review of witness statements, inspection of the college, review of the college’s security protocols, and review of literature on campus-security practices, including recommendations in industry guidelines, a methodology that “fits the factual and legal context of this case.”<sup>1287</sup> The court rejected the college’s argument that aspirational guidelines could not provide reliable support for the expert’s security opinion because “consulting them is a methodologically sound practice on which to base an expert opinion in the context of this case.”<sup>1288</sup> The court also rejected the college’s contention that a reliable methodology required the expert to compare the college’s security practices to those at similar schools.<sup>1289</sup>

Even when testing is conducted, the expert’s methodology still may not pass the *Daubert* testing requirement; the testing “must be appropriate and must analytically prove the expert’s hypothesis.”<sup>1290</sup> An expert’s assertion that experiments or field observations “demonstrate,” “establish,” “indicate,” “prove,” or “show” the validity of the hypothesis is a conclusory assertion. Evaluating an experiment is often about numbers: false positive rates, false negative rates, etc. If the expert cannot produce the numbers, the reliability of the test results remains unknown except for the expert’s *ipse dixit*. Test results in a laboratory setting should

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1284. See *Bitler v. A.O. Smith Corp.*, 400 F.3d 1227, 1235–36 (10th Cir. 2004) (stating in products liability claim that defective water heater caused fire that testing is most helpful when used to develop scientific knowledge aimed at causal relations, implying that it is less useful in other situations, and concluding that “testing is not necessary in all instances to establish reliability” and “was not required by the particular factual circumstances of this case”).

1285. *Lees v. Carthage Coll.*, 714 F.3d 516, 524–25 (7th Cir. 2013).

1286. *Id.* at 525.

1287. *Id.* at 524.

1288. *Id.* at 525.

1289. *Id.* at 526.

1290. *Presley v. Lakewood Eng’g & Mfg. Co.*, 553 F.3d 638, 646 (8th Cir. 2009); see also *Shuck v. CNH Am., LLC*, 498 F.3d 868, 875 n.3 (8th Cir. 2007) (“[T]esting, if performed, must be appropriate in the circumstances and must actually prove what the experts claim it proves.”); *DaimlerChrysler Corp. v. Hillhouse*, 161 S.W.3d 541, 554–55 (Tex. App.—San Antonio 2004, pet. granted, judgment vacated w.r.m.) (holding that expert opinion on whether a depowered air bag would have prevented injuries was unreliable because only test used by expert was not shown to be under similar conditions).

be compared to the circumstances of an accident before determining that the results support a reliability finding.<sup>1291</sup> It is not sufficient that an expert has conducted testing; the testing must be under reasonably similar conditions.<sup>1292</sup> The testing must address the issue before the court, not a different issue.<sup>1293</sup>

The Seventh Circuit permitted engineering testimony hypothesizing the manner in which an accident may have occurred without any testing of the expert's theory in *Lapsley v. Xtek, Inc.*<sup>1294</sup> A steel rolling mill worker was injured by industrial grease propelled in a jet stream that had sufficient force to penetrate and pass through a human body like a bullet.<sup>1295</sup> The mill worker's expert testified that a spring mechanism caused the accident and that an alternative design of the mechanism's thrust plate would have prevented the accident.<sup>1296</sup> The defendant challenged the opinions, asserting that the opinions were "not science" because they had not been physically tested, peer reviewed or published, or passed the other *Daubert* factors.<sup>1297</sup> The court disagreed, stating that the engineer used well-established principles of physics in his calculations, principles that "have been used and tested (*i.e.*, peer reviewed) by physicists and engineers for centuries," that his "mathematical models (a form of test) appear[ed] to be well-grounded in the facts and data available," and that he used the well-accepted differential-etiology approach, "starting from the known facts about the accident and eliminating other possible explanations . . . until he was left with a hypothesis that was physically possible and that fit the evidence."<sup>1298</sup>

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1291. See *Hoffman v. Ford Motor Co.*, 493 F. App'x 962, 975–76 (10th Cir. 2012) ("[The expert] failed to show the conditions he found necessary to inertially unlatch the buckles in the laboratory occurred or could have occurred . . . in this accident."), *cert. denied*, 133 S. Ct. 2734 (2013).

1292. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 694 (5th Cir. 2012) (concluding that "experiments conducted under substantially similar conditions" provided a reliable methodology for expert opinion (quoting *United States v. Norris*, 217 F.3d 262, 270 (5th Cir. 2000))); *DaimlerChrysler Corp.*, 161 S.W.3d at 553–55 (explaining how the medical forensic expert's opinion that depowered air bag would have prevented or significantly reduced risk of child's injuries was unreliable and "unsupported by any meaningful analysis" because expert relied on testing from another expert that was not comparable and expert did not perform own test).

1293. *Metabolife Int'l, Inc. v. Wornick*, 264 F.3d 832, 844 (9th Cir. 2001) (holding that efficacy testing did not provide reliable basis for determining safety of diet pill); *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 905–06 (Tex. 2004) (stating that experts' "tests related to *how* the bearing failed and not *when* in the accident sequence the bearing failed" and noting that expert did not explain how tests supported conclusions).

1294. *Lapsley v. Xtek, Inc.*, 689 F.3d 802, 815–16 (7th Cir. 2012).

1295. *Id.* at 804.

1296. *Id.* at 805.

1297. *Id.* at 810.

1298. *Id.* The engineer "could not say exactly how the spring got bound up or cocked and then released." *Id.* at 814. But the court rejected the notion that this rendered his

With respect to the lack of physical testing of an engineer's causation theory, the Seventh Circuit stated that while "[t]esting is certainly one of the most common and useful reliability guideposts for a district court when contemplating proposed Rule 702 evidence . . . physical re-creations of industrial accidents are not always feasible or prudent."<sup>1299</sup> The court went on to state that the defendant's complaint about the lack of physical testing

overlooks the fact that simulation is one of the most common of scientific and engineering tools. Around the world, computers simulate nuclear explosions, quantum mechanical interactions, atmospheric weather patterns, and innumerable other systems that are difficult or impossible to observe directly. A mathematical or computer model is a perfectly acceptable form of test.<sup>1300</sup>

The defendant also criticized the engineer's calculations, asserting that they were "opaque" and insufficiently detailed.<sup>1301</sup> The Seventh Circuit again disagreed, noting that the engineer's calculations to support his opinion were attached to his report and made available to the defendant and the court.<sup>1302</sup> If the defendant wanted to explore the underlying facts and data, the court observed that the defendant could have done so in cross-examination.<sup>1303</sup> The court went on to say this:

Lawyers and judges who were not trained in science can benefit from the famous "Two Cultures" lecture given in 1959 by British scientist and novelist C.P. Snow, in which he described the cultural gap between persons schooled in the sciences and those schooled in the humanities:

A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is about the scientific equivalent of: Have you read a work of Shakespeare's?

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opinion "impermissible conjecture," because the engineer testified about several ways in which the spring could have gotten bound up and the accident itself supported the expert's opinion regarding its release. *See id.*

1299. *Id.* at 815.

1300. *Id.* at 810.

1301. *Id.*

1302. *Id.* at 810–11.

1303. *Id.* at 811.

....

... If [the engineer's notes] appear opaque to some readers, it is more likely because of the "Two Cultures" problem rather than any inadequacy of presentation. As with most informal work-product, the notes could have been even clearer and more self-explanatory, but [the defendant's] lawyers and the district judge all had opportunities to ask [the engineer] to explain his calculations. Based on the written submissions, the district judge here did not feel the need to question [the engineer] directly, and [the defendant] did not request that he hold a hearing to do so.<sup>1304</sup>

When an expert opinion is supported by testing or studies, it may still be subject to an expert challenge because all tests are not "equally valuable. Research methods vary considerably, and some tests amount to no test at all."<sup>1305</sup>

Additionally, an opposing party's criticisms of the reliability of the testing or studies is sometimes viewed as a matter for cross-examination rather than admissibility. In *Taber v. Roush*, a Texas court of appeals held that criticism of the expert's reliance on retrospective (rather than prospective) studies was "properly addressed by cross examination rather than exclusion" because even though retrospective studies are generally "considered to be less reliable than prospective studies," there was a reasonable explanation for the dearth of prospective studies on the subject.<sup>1306</sup> The Texas Supreme Court said in *Gammill*,

The trial court's gatekeeping function under Rule 702 does not supplant cross-examination as "the traditional and appropriate means of attacking shaky but admissible evidence." But neither does the availability of cross-examination relieve the trial court of its threshold responsibility under Rule 702 "of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand."<sup>1307</sup>

The issue of whether testing—or the other *Daubert* factors—applied to an expert opinion on the sequence of an accident was

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1304. *Id.* (quoting C.P. SNOW, *THE TWO CULTURES AND THE SCIENTIFIC REVOLUTION* 15–16 (1961) (emphasis omitted)).

1305. 1 FAIGMAN ET AL., *supra* note 246, § 1:17, at 55.

1306. *Taber v. Roush*, 316 S.W.3d 139, 152–53 (Tex. App.—Houston [14th Dist.] 2010, no pet.).

1307. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 728 (Tex. 1998) (footnote omitted) (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 596–97 (1993)).

addressed by the Texas Supreme Court in *Ramirez*.<sup>1308</sup> The Court first observed that the *Daubert* factors “cannot be used with certain kinds of expert testimony” and that sometimes an expert’s “experience alone may provide a sufficient basis for” an opinion.<sup>1309</sup> “That, however, is not the circumstance in this case.”<sup>1310</sup> The accident reconstructionist’s theory was that the left rear wheel of the plaintiff’s vehicle could, and did, remain pocketed in its wheel well as the vehicle veered across the median, until its impact with another vehicle.<sup>1311</sup> According to the expert’s “floating wheel theory,” the wheel assembly broke before—not after—a collision with a motorist.<sup>1312</sup> The expert’s theory flunked the first two *Daubert* tests: He did not conduct or cite any tests to support his theory and did not identify any supporting publications for his theory.<sup>1313</sup> Nor did he explain how the formulas he used or research he conducted supported his opinions<sup>1314</sup>—a connective reliability problem.<sup>1315</sup>

The Houston First Court of Appeals, in one case, inferred that a theory had been adequately tested because it was well accepted.<sup>1316</sup> In another case, that court stated, “There is no legal or scientific requirement that an expert witness test a generally

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1308. Volkswagen of Am., Inc. v. Ramirez, 159 S.W.3d 897, 901–02 (Tex. 2004).

1309. *Ramirez*, 159 S.W.3d at 905. For a further discussion of *Ramirez*, see *infra* notes 1616–33 and accompanying text.

1310. *Ramirez*, 159 S.W.3d at 905.

1311. *Id.* at 902.

1312. *Id.*

1313. *Id.* at 905. The Court did not review the remainder of the *Daubert* factors nor did it conclude that the opinion was not reliable under those factors. Instead in its conclusion it focused on connective reliability—the existence of an “analytical gap.” *Id.* at 905–06.

1314. *Id.* at 905–06.

1315. See discussion of *Ramirez* in Part III.D (connective reliability) at *infra* notes 1616–33 and accompanying text. In addition to *Gammill*, the Court in two other cases involving vehicular accidents did not examine the *Daubert* factors but instead applied the *Gammill* analytical gap test. See *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239–40 (Tex. 2010); *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 40 (Tex. 2007). *TXI Transportation* is discussed in Part III.D (connective reliability) at *infra* notes 1685–89 and accompanying text. *Ledesma* is discussed in Part III.B (predicative reliability) at *supra* notes 937–43 and accompanying text and Part III.D (connective reliability) at *infra* notes 1678–84 and accompanying text. In both cases, the Court found the opinion reliable. In *Ledesma*, the Court stated, “[T]he *Robinson* factors do not readily lend themselves to a review of the expert testimony in the pending case.” *Ledesma*, 242 S.W.3d at 39.

1316. *N.H. Ins. Co. v. Allison*, 414 S.W.3d 266, 275 (Tex. App.—Houston [1st Dist.] 2013, no pet.) (holding trial court did not abuse discretion in finding cardiologist’s causation opinion reliable because both sides’ “well-qualified experts agreed on the overall theory of how Bill died and that higher-than-normal activity can increase the risk for a heart attack” and therefore “the trial court reasonably could have concluded that these theories have been tested, have been subjected to peer review and/or publication, have been generally accepted as valid by the relevant scientific community, and there are non-judicial uses which have been made of the theories”).

accepted scientific theory for its reliability.”<sup>1317</sup> There is some common sense in these statements; for example, courts do not require an expert to prove gravity under the *Daubert* factors. But while there is no absolute requirement of testing, this statement could be read to make general acceptance the proxy for the methodological reliability inquiry, a proposition rejected in *Daubert*.<sup>1318</sup> That does not mean general acceptance is not circumstantial evidence of the methodological soundness of the underlying theory. If a theory has gained widespread acceptance, presumably other experts have had a chance to review it, and the lack of any substantive criticism indicates the study was reliable. Nevertheless, it might be more accurate to qualify this statement by explaining that testing is not necessary if other evidence of reliability is sufficient or if the court may take judicial notice of reliability.<sup>1319</sup> If a methodology is well established, it may not be difficult to show that the methodology is reliable based on literature or nonjudicial uses.<sup>1320</sup>

The testing requirement can, nonetheless, be read too stringently. The testing to support the reliability of a methodology does not have to be the expert’s own testing; the expert may rely on testing by others.<sup>1321</sup> The mere fact that an expert has never previously performed a test does not make the test results unreliable.<sup>1322</sup> While the testing protocols must be reliable, that does not mean the protocols must be established in any literature.<sup>1323</sup>

Courts examine not only whether an expert has performed testing but also whether the expert *could* have performed testing.<sup>1324</sup> One explanation for the lack of prospective testing is

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1317. *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 162 (Tex. App.—Houston [1st Dist.] 2012, pet. filed).

1318. *Id.*

1319. *Id.* at 697 & n.210 (“[M]any scientific theories and techniques are so well established that trial and appellate courts (or even the Legislature) can take judicial notice of their validity.”).

1320. *N.H. Ins. Co.*, 141 S.W.3d at 275.

1321. *BNSF Ry. Co. v. Phillips*, 434 S.W.3d 675, 695–97 (Tex. App.—Fort Worth 2014, pet. filed) (holding that expert opinion that locomotive engineer suffered back injury from cumulative trauma was sufficiently reliable when opinion was based on expert’s “long experience” and other good science and stating that “an expert does not necessarily have to do his own testing” when testing was conduct by an expert in another case).

1322. *Best v. Lowe’s Home Ctrs., Inc.*, 563 F.3d 171, 180 (6th Cir. 2009) (stating that even though doctor had never before administered test and result was only one point outside the range for malingering, he used a sufficiently reliable methodology and the potential problems were best probed by cross-examination).

1323. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 693–94 (5th Cir. 2012).

1324. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 579 (Tex. 2006); *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995).

ethical considerations that preclude a study.<sup>1325</sup> Ethical considerations provide “assurance that the absence of prospective testing . . . is attributable to unique considerations governing this specific medical issue rather than inherent deficiencies in the challenged expert opinions.”<sup>1326</sup> Two Texas intermediate appellate courts have suggested that even when testing would be unethical, its absence may support a conclusion that the expert’s methodology is unreliable.<sup>1327</sup> Likewise, practical difficulties may provide an adequate explanation for why testing is not feasible.<sup>1328</sup> Courts might ask the objecting party relying on the absence of testing to identify a test that could be conducted on the expert’s theory; if none can be identified, a court might grant this factor less weight. An explanation for the lack of testing “is . . . demanded” in order to provide assurance that its absence “is attributable to unique considerations governing” the case “rather than inherent deficiencies in the challenged expert opinions.”<sup>1329</sup>

Professor Goode and his co-authors helpfully explain:

For the hard sciences, at least, the testability of the theory or technique lies at the core of reliability. A theory or technique cannot be considered scientific unless it is testable and, therefore, falsifiable. Indeed, as one commentary notes, the other three original *Daubert* factors “all presuppose testability; in science, a non-testable hypothesis cannot have an error rate and is exceedingly unlikely to be published in a peer-reviewed journal and

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1325. *Taber v. Roush*, 316 S.W.3d 139, 152 (Tex. App.—Houston [14th Dist.] 2010, no pet.); *Neal v. Dow Agrosiences LLC*, 74 S.W.3d 468, 472–73 (Tex. App.—Dallas 2002, no pet.) (excusing lack of testing because “direct, scientific experimentation to determine whether exposure to” pesticide caused plaintiff’s brain cancer could not be performed but concluding that medical literature did not support opinion).

1326. *Taber*, 316 S.W.3d at 152–53.

1327. *See Couch v. Simmons*, 108 S.W.3d 338, 341–43 (Tex. App.—Amarillo 2003, no pet.) (holding evidence supported trial court’s finding that expert’s opinion—that earlier administration of IV fluids would have prevented patient’s stroke—was unreliable because expert’s own affidavit stated that theory had not been tested because no physician would intentionally withhold IV fluids to test theory, and two peer-reviewed articles expert relied on indicated that there is no “specific beneficial relationship” between administration of IV fluids and stroke outcome); *Helm v. Swan*, 61 S.W.3d 493, 498 (Tex. App.—San Antonio 2001, pet. denied) (holding expert testimony that earlier intravenous fluid therapy would have improved patient’s chances of recovery from severe necrotizing pancreatitis was unreliable because no medical literature supported the opinion and noting that such support was absent because “no medical professional would intentionally delay” the therapy).

1328. *See Custom Transit, L.P. v. Flatrolled Steel, Inc.*, 375 S.W.3d 337, 358 (Tex. App.—Houston [14th Dist.] 2012, pet. denied) (noting that expert whose methodology was assailed for failure to conduct inspection of damaged cargo “explained the practical difficulties involved” in conducting an inspection).

1329. *Taber*, 316 S.W.3d at 153.

achieve general acceptance.” But testability is not sufficient; the theory or technique must actually be tested. A testable theory attains the status of scientific knowledge only when it has successfully survived the crucible of testing.<sup>1330</sup>

Ultimately, the primary requirement under this factor is that “[s]omeone else using the same data and methods . . . be able to replicate the result[s].”<sup>1331</sup> “One of the great strengths of the scientific method is that it permits other scientists to later attempt to duplicate the earlier test to see whether they can replicate the test result.”<sup>1332</sup>

*b. Peer Review and Publication.* The second *Daubert* factor is whether the expert’s theory has been subject to publication and peer review. Peer review and publication “reveal[] whether an expert has submitted the expert’s methodology and conclusions to a group of peers who can then independently and substantively evaluate the expert’s methodology and conclusions.”<sup>1333</sup> Publication results in “exposure to peer review” and “serve[s] as independent indicia of the reliability of the [expert’s theory].”<sup>1334</sup> “[S]ubmission to the scrutiny of the scientific community is a component of ‘good science,’ in part because it increases the likelihood that substantive flaws in methodology will be detected.”<sup>1335</sup> “By the same token, publication and peer review also demonstrate a measure of acceptance of the [expert’s] methodology within the [relevant] community.”<sup>1336</sup>

This test has numerous applications; it is sometimes applied to the expert’s predicate (e.g., has the clinical study on which the expert relies been published in medical journals and subjected to peer review), the expert’s methodology (e.g., has the expert’s approach to projecting profitability been published

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1330. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 57 (footnotes omitted). Testability examines whether an expert’s methodology can be “challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach that cannot reasonably be assessed for reliability.” FED. R. EVID. 702 advisory committee’s note.

1331. *City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1047 (9th Cir. 2014) (alterations in original) (quoting *Zenith Elecs. Corp. v. WH-TV Broad. Corp.*, 395 F.3d 416, 419 (7th Cir.2005)).

1332. Imwinkelried, *supra* note 881, at 969–70.

1333. Brown, *supra* note 1, at 827. See generally Brown, *supra* note 1 (providing further discussion of this factor).

1334. *Ruiz-Troche v. Pepsi Cola of P.R. Bottling Co.*, 161 F.3d 77, 84 (1st Cir. 1998).

1335. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593 (1993).

1336. *Ruiz-Troche*, 161 F.3d at 84.

in economic texts and subjected to peer review), and the expert's conclusion (e.g., did the expert conclude that the chemical used by the defendant causes the disease suffered by the plaintiff in an article he published and subjected to peer review).

Courts sometimes refer to this factor as "publication in peer-reviewed literature."<sup>1337</sup> But courts do not limit their reliability inquiry to literature that goes through a formal prepublication peer-review process. For example, textbooks or treatises are examined by courts.<sup>1338</sup> The existence of literature outside the context of litigation addresses the bias concerns that underlie *Daubert* and its progeny. When that publication is subject to a prepublication peer-review process in a refereed journal, that process functions as an additional evidentiary safeguard. But even when an expert's publication is not subject to prepublication peer-review, it is still subject to postpublication peer review.<sup>1339</sup>

One federal court stated that whether an expert's theory has been subjected to peer-reviewed publication is one of the two primary criteria for establishing the reliability of scientific expert testimony.<sup>1340</sup> The Ninth Circuit stated in *Daubert II* that when scientific experts cannot cite any supporting peer-reviewed publication,

the experts must explain precisely how they went about reaching their conclusions and point to some objective source—a learned treatise, the policy statement of a professional association, a published article in a reputable scientific journal or the like—to show that they have followed the scientific evidence method, as it is practiced by (at least) a recognized minority of scientists in their field.<sup>1341</sup>

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1337. *City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1044 (9th Cir. 2014).

1338. *See, e.g.*, *United States v. Gomes*, 279 F. App'x 861, 871 (11th Cir. 2008) (finding testimony reliable in part based on textbooks relied on by expert); *Sullivan v. U.S. Dep't of the Navy*, 365 F.3d 827, 833–34 (9th Cir. 2004) (holding that trial court erred in excluding expert's opinion "that an abnormally long back operation substantially increased the risk of complications" because statement was supported by four textbooks even though the textbooks did not address "what increase in the risk of infection is probable in the case" and that such an "estimate may be made by the expert putting the principles to work"); *Ruiz-Troche*, 161 F.3d at 84 (noting expert relied on "standard medical textbook"); *Marvelli v. Alston*, 100 S.W.3d 460, 479 (Tex. App.—Fort Worth 2003, pet. denied) (finding expert opinion reliable in part based on expert's "previously written textbooks on the subject, obviously not prepared for judicial use").

1339. *See* Bernstein, *supra* note 622, at 2151 (discussing that published theories and ideas can be tested and verified by other professionals in the field).

1340. *Clausen v. M/V New Carissa*, 339 F.3d 1049, 1056 (9th Cir. 2003).

1341. *Daubert II*, 43 F.3d 1311, 1317–19 (9th Cir.1995).

Similarly, the Houston Fourteenth Court of Appeals stated that courts must “be especially skeptical of scientific evidence that has not been published or subjected to peer review.”<sup>1342</sup>

Nevertheless, lack of publication “will rarely, if ever, be the single dispositive factor that determines the reliability of expert testimony.”<sup>1343</sup> If publication in peer-reviewed literature alone was sufficient to demonstrate reliability, “then the *Frye* standard of general acceptability in the scientific community would have remained adequate.”<sup>1344</sup> The opposite is also true: to require publication for all expert testimony “would effectively resurrect a *Frye*-like bright-line standard, not by requiring that a methodology be ‘generally accepted,’ but by excluding expert testimony not backed by published (and presumably peer-reviewed) studies.”<sup>1345</sup> Thus, while it is an important factor,<sup>1346</sup> it is only a factor. That is largely because publication and peer review “are mere proxies for the determinative factor” of whether the expert’s opinion has a reliable foundation.<sup>1347</sup> Peer review and publication facilitate the ability to make that determination.<sup>1348</sup>

When an expert utilizes an otherwise reliable methodology to reach a conclusion, lack of supporting literature goes to the weight, not the admissibility, of the expert’s opinion.<sup>1349</sup> When

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1342. *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 187 (Tex. App.—Houston [14th Dist.] 2003, pet. denied).

1343. *Smith v. Ford Motor Co.*, 215 F.3d 713, 720 (7th Cir. 2000).

1344. *Allison v. McGhan Med. Corp.*, 184 F.3d 1300, 1313 (11th Cir. 1999).

1345. *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 354 (5th Cir. 2007) (quoting *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir. 1999)).

1346. *Scott v. State*, 165 S.W.3d 27, 54–57 (Tex. App.—Austin 2005) (holding that testimony of a professor of social psychology and criminology whose expertise was in “coercive persuasion or extreme influence in decision-making” that modern interrogation techniques can lead an innocent person to confess, “particularly if the interrogator relies too heavily on ‘very high pressure interrogation techniques’” was unreliable where expert did not cite any supporting literature and some literature had criticized his methodology), *rev’d on other grounds*, 227 S.W.3d 670 (Tex. Crim. App. 2007); *Wiggs v. All Saints Health Sys.*, 124 S.W.3d 407, 412–13 (Tex. App.—Fort Worth 2003, pet. denied) (holding that trial court did not err in excluding an ophthalmologist’s opinion that prolonged hypertension and significant blood loss during surgery damaged optic nerves resulting in ischemic optic neuropathy and blindness because opinion was not based on scientific literature and did not pass other *Daubert* factors, including failure to rule out other causes); *Neal v. Dow Agrosciences LLC*, 74 S.W.3d 468, 472–73 (Tex. App.—Dallas 2002, no pet.) (excusing lack of testing because “direct, scientific experimentation” to determine whether exposure to pesticide caused plaintiff’s brain cancer could not be performed but concluding that medical literature did not support opinion).

1347. 1 FAIGMAN ET AL., *supra* note 246, § 1:23, at 67.

1348. *Id.* (noting that peer review and publication provide a “critical evaluation” from the relevant community of the foundation for the expert’s testimony).

1349. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 694 (5th Cir. 2012) (“The absence of textual support or published studies is not dispositive when reliable methods are used.”); *see also Paz v. Brush Engineered Materials, Inc.*, 555 F.3d 383, 388 (5th Cir. 2009);

there are other factors that demonstrate the reliability of the expert's methodology, an expert opinion should not be excluded simply because there is no literature on point.<sup>1350</sup>

A party relying on the absence of publication should present evidence on "the extent to which this factor bears on the reliability" of the expert's methodology.<sup>1351</sup> Likewise, a party defending an expert whose methodology is not supported by any published literature should offer an explanation for its absence.<sup>1352</sup> For example, a published article might not be expected given the narrow question in the case.<sup>1353</sup> As observed in *Daubert*, "Some propositions . . . are too particular, too new, or of too limited interest to be published."<sup>1354</sup> Publication may not be "typical" for the methodology used by an expert.<sup>1355</sup> A study that was begun prelitigation but has not reached the stage of publication might provide a reliable basis for an expert opinion.<sup>1356</sup> The Houston Fourteenth Court of Appeals explained,

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*Knights*, 482 F.3d at 354; *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 267 (2d Cir.2002) ("Where an expert otherwise reliably utilizes scientific methods to reach a conclusion, lack of textual support may go to the weight, not the admissibility of the expert's testimony." (internal quotation marks omitted)).

1350. *Schneider ex rel. Estate of Schneider v. Fried*, 320 F.3d 396, 406 (3d Cir. 2003) (holding that cardiologist's opinion on standard of care for administration of a drug was sufficiently reliable despite no evidence that opinion was generally accepted or was set forth in peer-reviewed publication because based on cardiologist's experience).

1351. *Smith v. Ford Motor Co.*, 215 F.3d 713, 720 (7th Cir. 2000). The court provided two examples where lack of publication would not suggest unreliability: first, if an engineer is merely applying well-established engineering techniques to the particular materials at issue in this case, and second, if an accident reconstructionist used a methodology based on his extensive practical experience in this area, rather than novel methodology subject to publication. *Id.*

1352. *Primiano v. Cook*, 598 F.3d 558, 565, 567 (9th Cir. 2010) (stating that "[p]eer reviewed scientific literature may be unavailable because the issue may be too particular, new, or of insufficiently broad interest, to be in the literature" or when medical phenomenon was so unusual that "the specialists who publish articles do not see it in their practices").

1353. *White v. Ford Motor Co.*, 312 F.3d 998, 1008 (9th Cir. 2002) (finding that the trial judge did not err in admitting expert opinion on design of parking brake because "scientific bolstering [such] as published articles in reference journals was not required, because there is no reason to suppose that this detail of parking brake manufacture was of general interest to the scientific community and would generate a peer-reviewed literature"), *amended by* 335 F.3d 833 (9th Cir. 2003).

1354. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593 (1993).

1355. *Smith*, 215 F.3d at 720.

1356. *Metabolife Int'l, Inc. v. Wornick*, 264 F.3d 832, 843 (9th Cir. 2001) (holding in defamation action that district court erred in precluding diet pill manufacturer's expert from testifying concerning pill's safety and efficacy based in part on unpublished study that had not been subject to peer review; while the study was unpublished, the data had been generated pre-litigation and "when research is begun pre-litigation, it may be reliable without peer review"). *But see Ruiz-Troche v. Pepsi Cola of P.R. Bottling Co.*, 161 F.3d 77, 84 (1st Cir. 1998) ("Under ordinary circumstances, an unpublished, unreviewed work, standing alone, probably would be insufficient to demonstrate the reliability of a

in one case, that although “retrospective studies are considered to be less reliable than prospective studies because of the potential for inclusion of inaccurate, incomplete or inconsistent information in the records being reviewed,” they may support a finding of reliability when there are explanations for no prospective studies.<sup>1357</sup>

Conversely, the presence of peer-reviewed literature does not guarantee that the expert’s theory will be found reliable.<sup>1358</sup> “[E]ven the highest quality journals sometimes publish work that is later found to be wrong.”<sup>1359</sup> Moreover, peer review varies radically in quality.<sup>1360</sup>

When an expert relies on peer-reviewed literature, *Daubert* does not require that the cited literature “unequivocally” support the expert’s conclusions.<sup>1361</sup>

The publication factor often arises in cases involving medical issues. In *Kudabeck v. Kroger*, the Eighth Circuit affirmed the admission of a chiropractor’s opinion, that a slip and fall caused a grocery store patron’s degenerative disc disease, despite the absence of any supporting studies.<sup>1362</sup> The court stated that published studies are not a prerequisite to satisfy the *Daubert* inquiry.<sup>1363</sup> There is no requirement “that a medical expert must always cite published studies on general causation in order to reliably conclude that a particular object caused a particular illness.”<sup>1364</sup> Instead, “experience with hundreds of patients, discussions with peers, attendance at conferences and

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scientific technique. But when such an article makes the same point as published, peer-reviewed pieces, it tends to strengthen the assessment of reliability.”).

1357. *Taber v. Roush*, 316 S.W.3d 139, 152 (Tex. App.—Houston [14th Dist.] 2010, no pet.).

1358. *See* *Burton v. CSX Transp., Inc.*, 269 S.W.3d 1, 7 (Ky. 2008) (holding that expert testimony based on literature review “must be shown, like all other expert evidence” to be reliable under *Daubert*); *see also* Jack B. Weinstein, *The Effect of Daubert on the Work of Federal Trial Judges*, in 2 SHEPARD’S EXPERT AND SCIENTIFIC EVIDENCE QUARTERLY 1, 7 (Bert Black et al. eds., 1994) (“Peer review is of limited utility in eliminating mistakes or even fraud. Graduate students sometimes do the work; confirmation of experiments described is difficult and expensive; general impressions are relied upon; referees may want to enhance or retard careers; different sets of referees may be used after the first set disagrees; the authors may recommend referees; and so on. Given such a dubious process, it is apparent why the courts cannot rely on any single test of admissibility such as peer review.”).

1359. 1 FAIGMAN ET AL., *supra* note 246, § 1:23, at 66.

1360. *Id.* (noting that scientists and courts ascribe more quality to certain journals).

1361. *See* *Wells v. SmithKline Beecham Corp.*, 601 F.3d 375, 380 (5th Cir. 2010); *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 354 (5th Cir. 2007); *Amorgianos v. Nat’l R.R. Passenger Corp.*, 303 F.3d 256, 266 (2d Cir. 2002).

1362. *Kudabeck v. Kroger*, 338 F.3d 856, 862–63 (8th Cir. 2003).

1363. *Id.*

1364. *Id.* (quoting *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir.1999)).

seminars . . . are tools of the trade, and should suffice for the making of a differential diagnosis even in those cases in which peer-reviewed studies do not exist to confirm the diagnosis of the physician.”<sup>1365</sup> Other federal courts have also permitted physicians to testify despite the absence of any supporting literature.<sup>1366</sup>

The Eighth Circuit, in another case, stated that a medical expert is not always required to “cite published studies on general causation in order to reliably conclude that a particular object caused a particular illness.”<sup>1367</sup> According to the court, “[t]he first several victims of a new toxic tort should not be barred from having their day in court simply because the medical literature, which will eventually show the connection between the victims’ condition and the toxic substance, has not yet been completed.”<sup>1368</sup> This holding is contrary to the mantra of *Havner* and several federal courts that “[l]aw lags science; it does not lead it.”<sup>1369</sup>

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1365. *Id.* (quoting *Heller*, 167 F.3d at 155).

1366. *Roman v. W. Mfg., Inc.*, 691 F.3d 686, 693–94 (5th Cir. 2012) (rejecting argument that the absence of any literature supporting the expert’s testing methodology was fatal because “[t]he absence of textual support or published studies is not dispositive when reliable methods are used,” and concluding that “experiments conducted under substantially similar conditions” provided a reliable methodology for expert opinion (quoting *United States v. Norris*, 217 F.3d 262, 270 (5th Cir. 2000) (internal quotation marks omitted)); *Feliciano-Hill v. Principi*, 439 F.3d 18, 25 (1st Cir. 2006) (finding that physician’s failure to support diagnosis with published authorities did not render opinion unreliable where medical condition was not complex and did not involve novel medical issues but only “a routine diagnosis”); *Dickenson v. Cardiac & Thoracic Surgery of E. Tenn.*, 388 F.3d 976, 980–82 (6th Cir. 2004) (holding that district court abused discretion by excluding physician’s testimony based on extensive, relevant experience despite absence of medical literature supporting opinion).

1367. *Turner v. Iowa Fire Equip. Co.*, 229 F.3d 1202, 1208 (8th Cir. 2000) (quoting *Heller*, 167 F.3d at 155).

1368. *Id.* at 1209.

1369. *Rosen v. Ciba-Geigy Corp.*, 78 F.3d 316, 319 (7th Cir. 1996). This statement by Judge Posner has been quoted repeatedly by courts. *See, e.g.*, *Wells v. SmithKline Beecham Corp.*, 601 F.3d 375, 381 n.33 (5th Cir. 2010); *McClain v. Metabolife Int’l, Inc.*, 401 F.3d 1233, 1247 (11th Cir. 2005); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 728 (Tex. 1997). The *Havner* case further stated, “[T]he law should not be hasty to impose liability when scientifically reliable evidence is unavailable.” *Havner*, 953 S.W.2d at 728. After quoting *Rosen*, the Tenth Circuit stated that “a courthouse is not the proper forum to present inspiration. Only when the insight is properly supported by research is it admissible at trial.” *Goebel v. Denver & Rio Grande W.R.R.*, 346 F.3d 987, 1002 (10th Cir. 2003).

While noting that this statement implements a policy that “the law will avoid false positives at the expense of allowing false negatives,” it has been criticized as “beg[ging] the question” of

what constitutes scientific proof sufficient to create a genuine dispute of material fact. The false negative asymmetry manifests not so much in courts’ judgment that science is required but in their judgment of what science is required . . . . A judge’s most critical decision, frequently, is whether or not to reject out of hand a

A Texas appellate court, in contrast, found that a family physician who could not cite any literature for an opinion, that a worker contracted tetanus on the job, failed the *Daubert* test.<sup>1370</sup>

*c. The Rate of Error.* Rate of error, the third *Daubert* factor, applies best to scientific techniques. It “relates to both the frequency and the type of errors generated by a scientific technique.”<sup>1371</sup> When testing is not performed, it will be difficult to do any more than estimate a rate of error.<sup>1372</sup> When testing is performed, the more errors in the individual applications of the technique or test (e.g. false matches in DNA testing), the less likely the evidence will be considered scientifically reliable.<sup>1373</sup> It is also important to examine the types of errors that occur, “false positives or false negatives[.] Very different consequences flow from the types of mistakes the test makes . . . .”<sup>1374</sup>

When the Texas Supreme Court adopted the *Daubert* factors in *Robinson*, it was careful to note that this factor focuses on “whether the particular *technique or methodology* has been subjected to a rate of error analysis,” not the probability that the opinion reached by the expert is correct.<sup>1375</sup> The acceptable rate of error is likely to vary from one context to the next, and courts have been reluctant to draw hardline standards.<sup>1376</sup> But the

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causal inference that an expert is willing to make from the extant scientific research.

Steve C. Gold, *The “Reshaping” of the False Negative Asymmetry in Toxic Tort Causation*, 37 WM. MITCHELL L. REV. 1507, 1539–40 (2011).

1370. *Tex. Mut. Ins. Co. v. Lerma*, 143 S.W.3d 172, 176–78 (Tex. App.—San Antonio 2004, pet. denied) (holding in wrongful death claim that physician’s causation opinion was unreliable when physician admitted he knew of no scientific literature indicating a person could get tetanus more than twenty-one days after being injured and did not exclude other plausible causes of injury).

1371. *BROWN & RONDON*, *supra* note 35, at 691 n.183.

1372. *See Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 802 (Tex. 2006) (“[T]he technique’s potential rate of error is unknown because no testing of Grogan’s wax contamination theory has been done.”).

1373. *See Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 594 (1993).

1374. 1 FAIGMAN ET AL., *supra* note 246, § 1:20, at 63.

1375. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 559 (Tex. 1995) (“Dr. Warde found that there was a ninety-nine percent probability that Dr. Whitcomb’s *conclusion* that Benlate damaged the plants in Dr. Whitcomb’s study was correct. However, the approach we adopt today inquires whether the particular *technique or methodology* has been subjected to a rate of error analysis.”).

1376. For example, the *Havner* Court discussed Type I (false positive) and Type II (false negative) errors. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 722 (Tex. 1997). These errors do not affect results in the same way, nor do they have the same import in all contexts. *See, e.g., Eli Lilly & Co. v. Teva Pharm. USA, Inc.*, 657 F. Supp. 2d 967, 989 (S.D. Ind. 2009) (“[I]n exploratory drug research, it can be preferable to have a Type I error (false positive) over a Type II error (false negative) because the cost of a false positive is merely that further testing will show that the drug actually does not work,

Texas Supreme Court has indicated that a confidence level of at least 95% or higher is necessary in the context of epidemiological evidence.<sup>1377</sup> One Texas court of appeals noted that differences in costs and benefits can make certain types of error more or less acceptable under the circumstances.<sup>1378</sup>

Even when a rate of error cannot be scientifically quantified, courts can sometimes still inquire into a more informal rate of error. Suppose, for example, that a prosecutor wants to offer testimony that a drug dog's alert indicated that there had been contraband drugs in a piece of luggage. A judge might ask: How often have you seen Rex alert? In what percentage of those cases was there a follow-up search? And what percentage of those searches yielded the discovery of contraband drugs?<sup>1379</sup> In *Daubert*, the Court cites John Ziman's book, *Reliable Knowledge*.<sup>1380</sup> Ziman's point is that in order to determine the validity of a technique, an empiricist should often insist on proof of the results of the use of the technique.<sup>1381</sup>

*d. General Acceptance.* General acceptance was the exclusive test under the old *Frye* standard for admissibility of opinion testimony.<sup>1382</sup> *Daubert* maintained this as one, but only

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while the cost of a false negative is that a potentially valuable drug is eliminated from further study.”), *appeal dismissed*, 366 F. App'x 154 (Fed. Cir. 2009), *and aff'd*, 619 F.3d 1329 (Fed. Cir. 2010); *Wash. Toxics Coal. v. U.S. Dep't of Interior, Fish & Wildlife Serv.*, 457 F. Supp. 2d 1158, 1184–85 (W.D. Wash. 2006) (discussing the different approach taken by Fish and Wildlife Service, which was designed to avoid false negatives (Type II errors), while most other agencies' approaches are designed to avoid false positives (Type I errors), due to the different nature of the agencies' purposes).

1377. *Havner*, 953 S.W.2d at 724 (“Accordingly, we should not widen the boundaries at which courts will acknowledge a statistically significant association beyond the 95% level to 90% or lower values.”). The Court noted that a confidence level of 90% represented a 10 in 100 chance of error. *Id.*

1378. *Exxon Corp. v. Makofski*, 116 S.W.3d 176, 187–88 (Tex. App.—Houston [14th Dist.] 2003, pet. denied) (“As noted in the examples given in *Havner*, differences in costs and benefits make false positives acceptable in some situations but unacceptable in others. For example, it may be appropriate for the EPA to protect people from chemical exposure on weak evidence that it will cause any harm, but that does not make it equally appropriate to impose a judgment of several million dollars on weak evidence that a defendant caused any harm.”).

1379. *DIX ET AL.*, *supra* note 868, § 13, at 41 (“Under this standard, if the proffered expert is a drug or explosive dog handler, there should be a showing of the dog's track record. In the past when the dog has alerted, what percentage of the alerts led to the seizure of contraband drugs?”); *see also* Imwinkelried, *supra* note 881, at 980 (footnotes omitted).

1380. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593–94 (1993) (citing ZIMAN, *supra* note 1265, at 130–33).

1381. Imwinkelried, *supra* note 877, at 761 (citing ZIMAN, *supra* note 1265, at 6, 10, 46, 75).

1382. *Frye v. United States*, 293 F. 1013, 1014 (1923). Professor Imwinkelried observes that when used as the sole criteria for measuring the reliability of expert

one, of the factors to be considered in determining the reliability of opinion evidence.<sup>1383</sup>

A “reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community.” . . . Widespread acceptance can be an important factor in ruling particular evidence admissible, and “a known technique which has been able to attract only minimal support within the community” . . . may properly be viewed with skepticism.<sup>1384</sup>

“That an expert’s technique can only garner minimal support may suggest that the expert is not impartial.”<sup>1385</sup> “A determination of reliability cannot rest solely on a process of ‘counting (scientific) noses[,]’<sup>1386</sup> but the absence of general acceptance is an indicator of a lack of reliability.<sup>1387</sup> An expert’s “bald assurance” that he used a widely accepted methodology is not sufficient to demonstrate reliability.<sup>1388</sup> Courts must look beyond an expert’s conclusory assertions about the *Daubert* factors.<sup>1389</sup> “To establish reliability under *Daubert*, an expert bears the burden of furnishing ‘some objective, independent validation of [his] methodology.’”<sup>1390</sup>

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testimony, this test functions as a “failed, crude proxy” or “surrogate” for whether the expert can reliably draw a proposed opinion. Imwinkelried, *supra* note 881, at 965–66. Indeed, “it amounted to a formal delegation of the admissibility decision to that community.” *Id.* at 965. Thus, while it retains its importance, it is not a per se barrier. “[E]xpert testimony does not have to obtain general acceptance or be subject to peer review to be admitted under Rule 702.” *Schneider ex rel. Estate of Schneider v. Fried*, 320 F.3d 396, 406 (3d Cir. 2003).

1383. *Daubert*, 509 U.S. at 593–94.

1384. *Id.* at 594 (citations omitted) (quoting *United States v. Downing*, 753 F.2d 1224, 1238 (3d Cir. 1985)).

1385. *Brown*, *supra* note 1, at 828.

1386. *United States v. Williams*, 583 F.2d 1194, 1198 (2d Cir. 1978).

1387. *See Club Car, Inc. v. Club Car (Que.) Imp., Inc.*, 362 F.3d 775, 780 (11th Cir. 2004) (discussing that lost profit calculation was “based on flawed methodology that was unaccepted in the accounting community” because calculations were based on gross sales and gross profits); *Zaremba v. Gen. Motors Corp.*, 360 F.3d 355, 358 (2d Cir. 2004) (holding that expert’s failure to show that alternative design was generally accepted supported conclusion that opinion unreliable).

1388. *Guadalupe-Blanco River Auth. v. Kraft*, 77 S.W.3d 805, 808 (Tex. 2002); *Dallas Cnty. v. Crestview Corners Car Wash*, 370 S.W.3d 25, 37 (Tex. App.—Dallas 2012, pet. denied); *see also Imwinkelried*, *supra* note 877, at 760 (stating that courts “should not simply take the expert’s word for the validity of the theory or technique”); *cf. Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 471 (Tex. 2005) (noting expert opinion “had no basis outside his own assertions”).

1389. *Guadalupe-Blanco River Auth.*, 77 S.W.3d at 808; *Crestview Corners Car Wash*, 370 S.W.3d at 37.

1390. *Brown v. Ill. Cent. R.R. Co.*, 705 F.3d 531, 536 (5th Cir. 2013) (alteration in original) (quoting *Moore v. Ashland Chem. Inc.*, 151 F.3d 269, 276 (5th Cir. 1998)); *cf.*

When this factor is satisfied, it is a strong indication that the opinion is sufficiently reliable, but how strong depends on the circumstances. Two concerns that were present under the old *Frye* test remain under this factor: first, how broadly or narrowly should a court define the “relevant scientific community,” and second, how should a court measure “general acceptance.”<sup>1391</sup> Both of these decisions can influence the outcome of this factor.<sup>1392</sup> Professor Goode and his co-authors have noted another important concern: “general acceptance” within a scientific community “is persuasive only if it occurs among practitioners of a creditable field.”<sup>1393</sup>

*e. Subjectiveness.* The next *Daubert* factor—the extent to which the expert’s technique relies upon the subjective interpretation of the expert<sup>1394</sup>—“examines methodology, but it

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Headley v. Church of Scientology Int’l, 687 F.3d 1173, 1181 n.1 (9th Cir. 2012) (noting that the trial court did not abuse discretion in excluding opinion of plaintiff’s expert in psychology of persuasion and mind control who never spoke with plaintiff and did not cite any authority that “reading only deposition transcripts is considered a reliable method in the field of the psychology of persuasion and mind control”).

1391. See Simon A. Cole, *Out of the Daubert Fire and into the Fryeing Pan? Self-Validation, Meta-Expertise and the Admissibility of Latent Print Evidence in Frye Jurisdictions*, 9 MINN. J.L. SCI. & TECH. 453, 471 (2008); see also Thomas Lyons, *Frye, Daubert and Where Do We Go From Here?* 45 R.I.B.J., Jan. 1997, at 5, 5 (observing that courts and commentators have debated what constitutes “general acceptance” and how to define “relevant scientific community”); Ian S. Spechler, *Physicians at the Gates of Daubert: A Look at the Admissibility of Differential Diagnosis Testimony to Show External Causation in Toxic Tort Litigation*, 26 REV. LITIG. 739, 750 (2007) (“Terms like ‘relevant scientific community’ and ‘general acceptance’ are vague and courts had trouble defining them on a case-by-case basis.”).

1392. See Cole, *supra* note 1391, at 473–86. The first question has played a particularly important role in criminal cases. Compare, e.g., *United States v. Orians*, 9 F. Supp. 2d 1168, 1173 (D. Ariz. 1998) (“The acceptance in the scientific community depends in large part on how the relevant scientific community is defined. Defendants urge the court to consider only the portion of the scientific community that is well-versed in polygraph methodology and science. However, the court is reluctant to embrace such a narrow interpretation.”), with *United States v. Smith*, 869 F.2d 348, 352 (7th Cir. 1989) (“Smith’s principal argument is that spectrographic voice identification has not received sufficient general acceptance in the scientific community to be admissible under *Frye*. She contends that in cases where courts have admitted voice identification testimony, these courts have too narrowly defined the relevant scientific community to include only those scientists who use the technique, and not those who oppose its use. The relevant scientific community includes not only those who utilize spectrographic voice identification techniques, but linguists, psychologists and engineers as well.” (footnotes omitted)).

1393. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 59. They provide this example: “Practitioners of graphology may generally accept the proposition that a person’s character and personality traits may be discerned through a detailed study of her handwriting. But the general acceptance of graphology by practitioners of graphology hardly establishes its reliability.” *Id.* (footnote omitted).

1394. This is the second factor listed by *Robinson*. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995). It is not listed in *Daubert*. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593–94 (1993).

also points out the potential for error in the substantive conclusion because no guidelines exist to determine the validity of the conclusion.”<sup>1395</sup> This test somewhat overlaps with the testing and publication factors because when an expert’s methodology has not been shown to be reliable by testing or peer review, it will often fail this test.<sup>1396</sup> The test is closely related to the overarching limitation on expert testimony that it must be more than “subjective belief or unsupported speculation.”<sup>1397</sup>

The Texas Supreme Court relied on this factor when it concluded that an accident reconstructionist’s opinion was unreliable in part because it was based solely upon the expert’s “subjective interpretation of the facts.”<sup>1398</sup> Other courts have excluded opinions when they were “transparently subjective”<sup>1399</sup> and “highly subjective.”<sup>1400</sup>

*f. Nonlitigation Uses.* Whether an expert’s theory has nonlitigation uses, the final *Daubert* factor “does not focus on the expert’s methodology, but on the impartiality or neutrality of the expert.”<sup>1401</sup> It examines whether “outside of the world of litigation,” the expert or the industry have recognized the methodology.<sup>1402</sup> It has been described as the “[f]ollowing-[n]aturally-from-[i]ndependent-[r]esearch factor.”<sup>1403</sup> This

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1395. *Brown*, *supra* note 1, at 828.

1396. *See* *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 802 (Tex. 2006) (noting that expert opinion did not pass this factor because he did not perform any calculations or quantitative analysis and did not rely on any data from scientific community).

1397. *Robinson*, 923 S.W.2d at 557 (quoting *Daubert*, 509 U.S. at 590).

1398. *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 906 (Tex. 2004); *see also In re* Commitment of Bohannon, 388 S.W.3d 296, 305–06 (Tex. 2012) (stating that opinions about behavior and psychology of a sex offender depend largely on the subjective interpretation of the expert, for the purposes of determining whether the offender has a behavioral abnormality that predisposes him to engage in sexually violent conduct, as grounds for commitment as sexually violent predator, and opinions too dependent upon an expert’s subjective guesswork must be excluded (quoting *S.V. v. R.V.*, 933 S.W.2d 1, 42 (Tex. 1996) (Cornyn, J., concurring); *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 217 (Tex. 2010))).

1399. *Brown v. Ill. Cent. R.R. Co.*, 705 F.3d 531, 535–37 (5th Cir. 2013) (holding no error in excluding expert opinion that crossing was ultrahazardous that was “transparently subjective” where expert did not rely on any guidelines or publications but instead on his “education and experience” and admitted that crossing’s visibility complied with Department of Transportation standard).

1400. *Buls v. Fuselier*, 55 S.W.3d 204, 208–09 (Tex. App.—Texarkana 2001, no pet.) (upholding exclusion of podiatrist’s testimony, noting that his opinions were “highly subjective”); *Weiss v. Mech. Associated Servs., Inc.*, 989 S.W.2d 120, 125 (Tex. App.—San Antonio 1999, pet. denied) (noting that the expert opinions were “highly subjective”).

1401. *Brown*, *supra* note 1, at 828.

1402. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 803 (Tex. 2006).

1403. *Johnson v. Manitowoc Boom Trucks, Inc.*, 484 F.3d 426, 434 (6th Cir. 2007).

“important factor . . . may be a valuable indicator of reliability for several reasons. First, an expert whose findings flow from existing research or other work in a field is less likely to be biased toward a particular conclusion by a fee.”<sup>1404</sup>

Second, research or other work that is conducted in the ordinary course of an expert’s business is more likely to satisfy the standards normally applied to experts in the field. Third, the limited number of experts who are actively working in a particular field constrains a party’s ability to shop for an expert who will reach the desired conclusion.<sup>1405</sup>

One federal court described this factor as one of the two primary criteria for establishing the reliability of scientific expert testimony.<sup>1406</sup>

Failure to satisfy this factor “will not render an expert’s opinion unreliable *per se*, [but] ‘opinions formed solely for the purpose of testifying are more likely to be biased toward a particular result.’”<sup>1407</sup> This factor will have limited application in the case of some forensic sciences, where the techniques do not have any nonjudicial applications.

*g. Exclusion of Other Plausible Causes.* As previously discussed,<sup>1408</sup> one *Robinson* factor is an absolute requirement in causation opinions: the expert must take reasonable steps to eliminate—or at least minimize—other plausible causes. This requirement is particularly important when expert testimony is based on differential etiology. The Dallas, El Paso, and Fort Worth Courts of Appeals have all listed this factor as one of four reliability tests in cases involving differential etiology testimony.<sup>1409</sup> Of course, it is not an absolute requirement for all

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1404. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 60; *see also* E.I. du Pont de Nemours & Co. v. Robinson, 923 S.W.2d 549, 559 (Tex. 1995) (“[W]hen an expert prepares reports and findings before being hired as a witness, that record will limit the degree to which he can tailor his testimony to serve a party’s interests.’ On the other hand, opinions formed solely for the purpose of testifying are more likely to be biased toward a particular result.” (citation omitted) (quoting *Daubert II*, 43 F.3d 1311, 1317 (9th Cir. 1995) (on remand))).

1405. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 60. Goode and his co-authors point out that this factor may “be misleading” because “its utility hinges on the credibility of the field in which the expert works.” *Id.*

1406. Clausen v. M/V New Carissa, 339 F.3d 1049, 1056 (9th Cir. 2003).

1407. Quiroz *ex rel.* Quiroz v. Covenant Health Sys., 234 S.W.3d 74, 89 (Tex. App.—El Paso 2007, pet. denied) (quoting *Robinson*, 923 S.W.2d at 559).

1408. *See supra* notes 370, 393, 1196 and accompanying text; *see also supra* note 1196 and accompanying text. As previously noted, the Texas Supreme Court has recognized an exception to the strict application of this rule in certain multi-defendant toxic tort cases. *See Bostic v. Ga.-Pac. Corp.*, 10-0775, 2014 WL 3797159, at \*11 (Tex. July 11, 2014).

1409. *State Farm Lloyds v. Hamilton*, 265 S.W.3d 725, 730 (Tex. App.—Dallas 2008, pet. dism’d) (stating expert testimony is unreliable “if: (1) the foundational data

expert opinions because all opinions do not address causation, but it is a requirement in Texas for expert causation opinions.<sup>1410</sup> The Advisory Committee's notes for the Federal Rules also include this factor.<sup>1411</sup> It is a valid epistemological technique, provided it is reliably applied. Diagnostic tests, for example, can often be used to eliminate other plausible causes.

The Texas Supreme Court has repeatedly identified "reasonable certainty" as the standard for an expert's elimination of other plausible causes, when it is possible to do so.<sup>1412</sup> The Ninth Circuit has cautioned that this requirement must be balanced against "the difficulties in establishing certainty in the medical sciences."<sup>1413</sup> A Texas court of appeals expanded this principle in stating that "an expert should address evidence that contradicts his conclusions."<sup>1414</sup> However, it also said that an expert "is not required . . . [to] categorically exclude each and every possible alternative cause in order to render the proffered testimony admissible."<sup>1415</sup> The court further stated that "there is room for discussion regarding the degree to which admissibility and sufficiency determinations depend on exclusion of proffered or alternative explanations for a particular event."<sup>1416</sup> The Texas Supreme Court stated in a recent case that it does not require

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underlying the opinion is unreliable; (2) the methodology used by the expert to interpret the underlying data is flawed; (3) notwithstanding the validity of the underlying data and methodology, there is an analytical gap in the expert evidence; or (4) the expert fails to rule out other plausible causes"); *Quiroz*, 234 S.W.3d at 88 (same); *Allstate Tex. Lloyds v. Mason*, 123 S.W.3d 690, 698 (Tex. App.—Fort Worth 2003, no pet.) (same).

1410. The underlying principle, however, has application to other expert opinions. The Texas Supreme Court has stated: "When the facts support several possible conclusions, only some of which support the expert's conclusions, the expert must explain to the fact finder why those conclusions are superior based on verifiable evidence, not simply the expert's opinion." *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*9 (Tex. Aug. 22, 2014).

1411. FED. R. EVID. 702 advisory committee's note ("Whether the expert has adequately accounted for obvious alternative explanations.").

1412. See, e.g., *Bostic*, 2014 WL 3797159, at \*4; *Merck & Co. v. Garza*, 347 S.W.3d 256, 265–66 (Tex. 2011); *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 720 (Tex. 1997). *Bostic* relaxes this requirement somewhat for multi-defendant asbestos cases by holding that a plaintiff in such cases need not prove but-for causation with respect to each defendant's asbestos containing products. *Bostic*, 2014 WL 3797159, at \*6.

1413. *Messick v. Novartis Pharm. Corp.*, 747 F.3d 1193, 1198 (9th Cir. 2014). The court further stated, "[W]e do not require that an expert be able to identify the sole cause of a medical condition in order for his or her testimony to be reliable. It is enough that a medical condition be a substantial causative factor." *Id.* at 1199.

1414. *Custom Transit, L.P. v. Flatrolled Steel, Inc.*, 375 S.W.3d 337, 358 (Tex. App.—Houston [14th Dist.] 2012, pet. denied) (quoting *U.S. Info. Sys., Inc. v. Int'l Bhd. of Elec. Workers Local Union No. 3*, 313 F. Supp. 2d 213, 235 (S.D.N.Y. 2004)).

1415. *Id.* (quoting *U.S. Info. Sys., Inc.*, 313 F. Supp. 2d at 325).

1416. *Id.*

the exclusion of “the universe of all other possible causes.”<sup>1417</sup> The Court has also indicated that, in some scenarios, the universe of possible causes “is simply too large and too uncertain” for an expert to be able to prove her own theory of causation simply by eliminating other plausible causes.<sup>1418</sup>

*h. Other Factors.* The Advisory Committee’s notes identify five other factors utilized by courts to measure the reliability of expert opinions.<sup>1419</sup> Professor Goode and his co-authors identify a total of sixteen factors.<sup>1420</sup> One court identified eighteen factors.<sup>1421</sup> *Robinson* also mentioned one other methodological flaw: “[B]eginning from a preordained conclusion to fit a litigation strategy, and then constructing explanations to support the conclusion. . . . A methodology that is designed to confirm a preconceived conclusion is the antithesis of the scientific method and unreliable by definition.”<sup>1422</sup> Thus, an expert cannot reach an opinion and then search for supporting data.<sup>1423</sup>

Courts have relied on a number of other factors for excluding expert opinions. For example, the expert’s methodology will not be reliable when the expert fails “to apply his own methodology

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1417. *Bostic v. Ga.-Pac. Corp.*, No. 10-0775, 2014 WL 3797159, at \*13 (Tex. July 11, 2014).

1418. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 807–08 (Tex. 2006).

1419. FED. R. EVID. 702 advisory committee’s note. The committee includes the analytical gap analysis as one of these factors. We believe it is better to treat this as a separate requirement and as subsumed within the “reliably applied” test in Rule 702. FED. R. EVID. 702(d).

1420. 2 GOODE, WELLBORN & SHARLOT, *supra* note 114, § 702.6, at 56.

1421. *Marcum v. Adventist Health Sys./W.*, 193 P.3d 1, 4 & n.7 (Or. 2008) (quoting *State v. Brown*, 687 P.2d 751, 759 n.5 (Or. 1984)).

1422. *Control Solutions, Inc. v. Gharda USA, Inc.*, 394 S.W.3d 127, 182 (Tex. App.—Houston [1st Dist.] 2012, pet. filed) (Massengale, J., dissenting); see *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 559 (Tex. 1995) (stating that expert used “problematic” methodology by “coming to a firm conclusion first and then doing research to support it” (quoting *Claar v. Burlington N. R.R. Co.*, 29 F.3d 499, 502–03 (9th Cir. 1994))); *Quiroz ex rel. Quiroz v. Covenant Health Sys.*, 234 S.W.3d 74, 89 (Tex. App.—El Paso 2007, pet. denied) (“[G]oal-oriented reasoning is contrary to the foundation of the scientific method.”); *Wolfson v. BIC Corp.*, 95 S.W.3d 527, 534 (Tex. App.—Houston [1st Dist.] 2002, pet. denied) (stating experts should “avoid coming to a firm conclusion first and then doing research to support those conclusions—this is the antithesis of the scientific method”).

1423. *Martinez v. City of San Antonio*, 40 S.W.3d 587, 592–95 (Tex. App.—San Antonio 2001, pet. denied) (holding in toxic tort case arising out of claim that residents were exposed to lead contaminated soil during a construction project that trial court did not abuse discretion in excluding expert opinion quantifying amount of lead in construction dust emissions due to faulty methodology when expert used an enrichment factor before he located report to support that methodology).

reliably.”<sup>1424</sup> Rejection of an expert’s theory by a peer-reviewed journal also supports a finding of lack of reliability.<sup>1425</sup> When an expert uses a methodology that he has never used before the litigation in question, that factor may suggest a lack of reliability.<sup>1426</sup> “Talking off the cuff—deploying neither data nor analysis—is not an acceptable methodology.”<sup>1427</sup> Similarly, common sense is not a reliable methodology,<sup>1428</sup> or at least if it is, the expert’s opinion will not assist the trier of fact. “[A]ny proper methodology would include intellectual analysis and independent review and verification of the underlying data” provided to an expert.<sup>1429</sup> Experts also cannot “rely on a proposition or technique that is literally ineffable. An ineffable notion might be acceptable mysticism at a meeting of the Jedi Council, but it does not qualify as acceptable expertise in court.”<sup>1430</sup>

Similarly, courts have relied on other factors to find an expert opinion sufficiently reliable. For example, an expert’s use of the same methodology on multiple occasions may also support a reliability conclusion.<sup>1431</sup> Acceptance of an expert’s methodology by an opposing expert is a factor supporting the reliability of an expert’s methodology.<sup>1432</sup> One court relied in part on the failure of the opposing expert to challenge the expert’s methodology.<sup>1433</sup> In

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1424. *Amorgianos v. Nat’l R.R. Passenger Corp.*, 303 F.3d 256, 268 (2d Cir. 2002). This is similar to impeachment by prior inconsistent conduct. The witness’s conduct suggests that the witness herself believes it is inappropriate to use the methodology in some circumstances. That tends to undermine the credibility of her claim that she used the proper methodology.

1425. *Brownsville Pediatric Ass’n v. Reyes*, 68 S.W.3d 184, 196 (Tex. App.—Corpus Christi 2002, no pet.) (excluding expert’s opinion where study he relied on “was rejected for publication by his peers”).

1426. *Atl. Richfield Co. v. Farm Credit Bank of Wichita*, 226 F.3d 1138, 1166 (10th Cir. 2000) (noting expert had not previously used methodology for determining value of CO<sub>2</sub>).

1427. *Lang v. Kohl’s Food Stores, Inc.*, 217 F.3d 919, 924 (7th Cir. 2000); *see also* *Bourelle v. Crown Equip. Corp.*, 220 F.3d 532, 539 (7th Cir. 2000).

1428. *See* *Myers v. Ill. Cent. R.R. Co.*, 629 F.3d 639, 640–41, 644–45 (7th Cir. 2010) (treating physicians’ opinion that conductor sustained cumulative trauma injuries from workplace as not reliable because lack of knowledge of plaintiffs’ medical history and work duties; their only methodology was “common sense”).

1429. *Auto Indus. Supplier Emp. Stock Ownership Plan v. Ford Motor Co.*, 435 F. App’x 430, 454, 457 (6th Cir. 2011) (stating expert could not rely on documents that were never shown to be business records and were prepared by unidentified persons and procedures).

1430. *DIX ET AL.*, *supra* note 1379, § 13, at 38.

1431. *See* *Von Hohn v. Von Hohn*, 260 S.W.3d 631, 637–38 (Tex. App.—Tyler 2008, no pet.) (rejecting challenge to business valuation expert in divorce between a lawyer and spouse because expert had valued this same law firm in a divorce case approximately five years earlier using the same methodology and experts on both sides had used income approach to value partnership interest in firm while husband’s main complaint was use of the income approach (as opposed to the asset approach)).

1432. *See* *Correa v. Cruisers, a Div. of KCS Int’l, Inc.*, 298 F.3d 13, 26 (1st Cir. 2002).

1433. *DaimlerChrysler Motors Co. v. Manuel*, 362 S.W.3d 160, 190 (Tex. App.—Fort Worth 2012, no pet.) (stating that “the *Robinson* test for reliability of scientific opinions”

some situations, “mathematical deduction is not only a viable option, but in some respects, it is superior to empirical testing.”<sup>1434</sup> The other factors examined by courts vary as widely as the different types of experts and issues presented in cases.<sup>1435</sup>

Professor Risinger identifies a “feedback” loop as a potential factor for the reliability of the expert’s methodology.<sup>1436</sup> Under this test, courts could examine whether there “are real-world, practice-based, empirically unambiguous indices of success or failure in coming to one’s conclusions.”<sup>1437</sup> For example, the reliability of an auto mechanic’s opinion could be examined by how successful she is in the real world because the mechanic will receive negative feedback from customers if she does not fix the brake problem.<sup>1438</sup> In some forensic sciences there is no such loop, but courts could inquire into whether experts who make future projections—such as economists, accountants, and life care planners—have ever subsequently examined the accuracy of their predictions.

Courts have also rejected some factors. For example, an expert’s methodology is not necessarily unreliable simply because an opposing expert uses a different methodology.<sup>1439</sup> Under this

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was not applicable to lost profits opinion and noting that opposing expert did not criticize methodology).

1434. Imwinkelried, *supra* note 877, at 746.

1435. See, e.g., *Ortiz v. City of Chicago*, 656 F.3d 523, 537 (7th Cir. 2011) (holding trial court erred in excluding expert physician’s opinion; his failure to consult with treating physician is matter that goes only to the weight, not to the admissibility, of opinion where expert had medical records and other data for opinion and “we do not see what additional information he could have discovered from speaking to a primary care physician that he did not already have before him”); *Brinker v. Evans*, 370 S.W.3d 416, 423–24 (Tex. App.—Amarillo 2012, pet. denied) (holding soils expert who testified that it was likely that ground underneath truck collapsed did not give reliable testimony when he engaged in a number of assumptions because he did not conduct any soil testing, and did not examine accident scene until years after accident); *Loram Maint. of Way, Inc. v. Ianni*, 141 S.W.3d 722, 731–32 (Tex. App.—El Paso 2004) (holding psychiatrist’s testimony on causation regarding impact of amphetamine abuse on worker satisfied *Robinson* factors even though he did not interview the worker because he used a generally reliable methodology, relied on family and co-workers’ accounts, and used a technique that was standard in the field and did not have a substantial rate of error), *rev’d on other grounds*, 210 S.W.3d 593 (Tex. 2006).

1436. D. Michael Risinger, *Defining the “Task at Hand”: Non-Science Forensic Science After Kumho Tire Co. v. Carmichael*, 57 WASH. & LEE L. REV. 767, 776 (2000).

1437. *Id.*

1438. *DIX ET AL.*, *supra* note 1379, § 13, at 37 (stating that another test is “whether there is a feedback loop, alerting a member of the profession when she has erred. An auto mechanic may lack the formal education to qualify as a scientific expert, but his customers are likely to provide him with feedback as to whether his repair work on their car was successful”).

1439. *Williams v. State*, 406 S.W.3d 273, 284 (Tex. App.—San Antonio 2013, pet. denied) (“Competing expert opinions are not legally insufficient because they contradict each other . . . .”); see also 4 WEINSTEIN & BERGER, *supra* note 27, § 702.05[3], at 702-114

principle, when opposing parties present physician experts with different theories of how a plaintiff's injury came about, if both theories are based on different but reliable methodologies, it is for the jury to decide which physician is most likely correct.<sup>1440</sup> In *New Hampshire Insurance Co. v. Allison*, both sides' physicians agreed that the plaintiff died as a result of a rupture at the site of a plaque buildup in the plaintiff's artery, which became blocked and caused a heart attack.<sup>1441</sup> The experts also agreed that increased physical activity can increase the risk of heart attack.<sup>1442</sup> But they disagreed over whether the plaintiff's heart attack was caused by the plaintiff's physical activity during his employer's "fire training school."<sup>1443</sup> The defendant's expert testified that the increased risk of heart attack after increased physical activity only lasted for forty-five minutes, at which time the risk returned to baseline.<sup>1444</sup> Because the plaintiff's heart attack occurred more than forty-five minutes after his increased activity during fire training, the expert concluded that the fire training had no correlation with the heart attack.<sup>1445</sup> The plaintiff's expert, on the other hand, opined that the plaintiff's activity during fire training caused his heart attack because, from a cardiac perspective, the plaintiff had been stable and asymptomatic up until the time of the training; he testified that there was a continuity of symptoms from the time the fire training ended until the plaintiff had his heart attack.<sup>1446</sup> The defendant argued that the plaintiff's expert testimony was unreliable because it was contrary to the defendant's evidence that the increased risk of heart attack after physical activity lasted only forty-five minutes.<sup>1447</sup> "Essentially," the court stated, "[the defendant] is asking us to presume that its expert's theory

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("A trial court's determination that the proffered testimony of one expert witness is reliable and helpful does not necessarily mean that the contradictory testimony of another witness, concerning the same subject matter but using a different methodology, is not also reliable and helpful."). There can be competing schools within a discipline. It may simply be a case in which both sides' methodology passes muster under *Daubert*. Professor Imwinkelried argues that that is essentially what is happening with shaken baby syndrome where there is a classic, legitimate battle of the experts. Edward J. Imwinkelried, *Shaken Baby Syndrome: A Genuine Battle of the Scientific (And Non-Scientific) Experts*, 46 CRIM. L. BULL. 156, 158, 180–91 (2010).

1440. See, e.g., *N.H. Ins. Co. v. Allison*, 414 S.W.3d 266, 275–76 (Tex. App.—Houston [1st Dist.] 2013, no pet.).

1441. *Id.* at 270.

1442. *Id.*

1443. *Id.*

1444. *Id.* at 271.

1445. *Id.*

1446. *Id.*

1447. *Id.* at 275–76.

is reliable in order to determine that [the plaintiff's] expert's theory is unreliable. Conflicting theories between experts, however, do not automatically render one unreliable."<sup>1448</sup> The court held that the plaintiff's expert's opinion was supported by his experience and training, did not suffer from too great an analytical gap, and was thus sufficiently reliable even if the defendant's expert's opinion was also sufficiently reliable.<sup>1449</sup>

The courts have refused to consider credibility as a *Daubert* factor.<sup>1450</sup> The timing of the expert's opinion or the length of time it takes to arrive at the opinion address more the persuasiveness of the opinion than its reliability.<sup>1451</sup> An expert's methodology is not unreliable simply because it is different than the methodology advocated by the opposing party.<sup>1452</sup> Nor is a methodology unreliable merely because the methods are subject to "further testing and refinement."<sup>1453</sup> "A 'disagreement over, not an absence of, controlling standards' is not a basis to exclude expert testimony."<sup>1454</sup> The Ninth Circuit has stated that an imperfect execution of reliable laboratory techniques or minor flaw in adhering to protocols is not sufficient.<sup>1455</sup>

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1448. *Id.* at 276.

1449. *Id.*

1450. *Miller v. Pfizer, Inc.*, 356 F.3d 1326, 1335 (10th Cir. 2004); *State v. Smith*, 335 S.W.3d 706, 714 (Tex. App.—Houston [14th Dist.] 2011, pet. ref'd) ("Issues of credibility and reliability are not the same. A jury should evaluate a witness's credibility, but unreliable evidence should never reach the jury." (citation omitted)); *see also City of Pomona v. SQM N. Am. Corp.*, 750 F.3d 1036, 1044 (9th Cir. 2014) (stating that courts should not exclude expert opinions "merely because they are impeachable" (quoting *Alaska Rent-A-Car, Inc. v. Avis Budget Grp., Inc.*, 738 F.3d 960, 969 (9th Cir. 2013))); *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1314 (Fed. Cir. 2014) ("A judge must be cautious not to overstep its gatekeeping role and . . . judge credibility, including the credibility of one expert over another.").

1451. *See Kuhn v. Wyeth, Inc.*, 686 F.3d 618, 628 (8th Cir. 2012) (holding that expert opinion was not unreliable although expert was retained shortly before *Daubert* hearing and relied on studies provided by plaintiffs' counsel when the studies provided a reliable basis for opinion).

1452. *Kudabeck v. Kroger Co.*, 338 F.3d 856, 857, 860–63 (8th Cir. 2003) (holding that district court did not err in admitting treating chiropractor's testimony that patient's fall in grocery store triggered degenerative disc disease despite absence of any cited supportive published studies because he performed a reliable differential diagnosis, he did not rely only on patient's word about her medical history, and he based his opinion on his experience. "Simply because [the expert] did not conduct his examination and treatment . . . in the manner Kroger preferred, does not render [his] testimony unreliable.").

1453. *City of Pomona*, 750 F.3d at 1044 ("[O]ngoing research . . . does not necessarily invalidate the reliability of expert testimony.").

1454. *Id.* at 1045 (quoting *United States v. Chischilly*, 30 F.3d 1144, 1154 (9th Cir. 1994)).

1455. *Id.* at 1047–48.

The *Daubert* factors may have no direct applicability in some circumstances. But deductive reasoning—a recognized branch of logic—is an acceptable methodology.<sup>1456</sup> “In some disciplines such as geology, scientists must rely on controlled observation . . . .”<sup>1457</sup>

Expert testimony on legal matters offers a good example of when the *Daubert* factors may have limited application.<sup>1458</sup> Such testimony ordinarily must be strictly limited because it is the job of the trial judge, not an expert, to determine what the law is and to instruct the jury accordingly.<sup>1459</sup> This presents some unique problems.

1456. Imwinkelried, *supra* note 1265, at 45.

1457. *Id.*; see also *id.* at 51 (stating that controlled observation “would be satisfactory to a skeptical rationalist”).

1458. Legal expert testimony is frequently offered in two contexts: opinions relating to the reasonableness and necessity of attorney’s fees and opinions relating to the standard of care and causation in legal malpractice actions. Opinions about attorney’s fees are typically based on the attorney’s experience and knowledge of the relevant legal market, and are discussed in the predicative-reliability section above. See *supra* notes 895–920 and accompanying text. Judicial review of causation opinions in legal malpractice cases often focuses on whether the legal expert provided an adequate and logically valid explanation of how and why the alleged breach of care caused the claimant’s injury, as discussed in the connective-reliability section below. See *infra* notes 1657–69 and accompanying text.

1459. See *Fleming v. Kinney ex rel. Shelton*, 395 S.W.3d 917, 928 (Tex. App.—Houston [14th Dist.] 2013, pet. denied) (stating that a legal expert may not testify on pure questions of law, but “may state an opinion on a mixed question of law and fact if the opinion is limited to the relevant issues and is based on proper legal concepts” (quoting *Greenberg Traurig of N.Y., P.C. v. Moody*, 161 S.W.3d 56, 94 (Tex. App.—Houston [14th Dist.] 2004, no pet.)); see also *Durkin v. Platz*, 920 F. Supp. 2d 1316, 1332 (N.D. Ga. 2013) (“Expert testimony is admissible where the expert’s ‘specialized knowledge will help the *trier of fact* to understand the evidence or to determine a fact in issue.’ Thus, expert testimony regarding a pure legal issue is not relevant to the fact-finder.” (citation omitted) (quoting FED. R. EVID. 702(a)); *Greenberg Traurig of N.Y., P.C.*, 161 S.W.3d at 99 (stating that when a trial court permits attorneys to opine on the law, “the trial judge voluntarily allows his role as the legal expert in the courtroom to be usurped or diminished by the testifying attorney” and the “the jury will be tempted to turn to the expert, rather than the trial judge, for guidance on the law”); *Akin v. Santa Clara Land Co.*, 34 S.W.3d 334, 339 (Tex. App.—San Antonio 2000, pet. denied); *Upjohn Co. v. Rylander*, 38 S.W.3d 600, 611 (Tex. App.—Austin 2000, pet. denied) (“Nevertheless, an expert may offer an opinion on a mixed question of law and fact as long as the opinion is confined to the relevant issues and based on proper legal concepts.”); *Mega Child Care, Inc. v. Tex. Dep’t of Protective & Regulatory Servs.*, 29 S.W.3d 303, 309 (Tex. App.—Houston [14th Dist.] 2000, no pet.).

The 1999 *Eight Gates* article stated:

As recently explained in *Burkhart v. Washington Metropolitan Area Transit Authority*, “[e]ach courtroom comes equipped with a ‘legal expert,’ called a judge, and it is his or her province alone to instruct the jury on the relevant legal standards.” A contrary rule would result in jury confusion. “[I]f an expert witness were allowed to testify to legal questions, each party would find an expert who would state the law in the light most favorable to its position.” Another danger is that “once the jury hears of the attorney’s experience and expertise, [the jury] might think the witness even more reliable than the judge.”

Brown, *supra* note 1, at 771–72 (alteration in original) (footnotes omitted) (quoting *Burkhart v. WMATA*, 112 F.3d 1207, 1213 (D.C. Cir. 1997); *Askanase v. Fatjo*, 130 F.3d 657, 673 (5th Cir. 1997)).

First, expert testimony on the law is an area of expertise where two generally applicable principles of judicial reliability review converge. The first general principle is that courts evaluate the reliability of an expert's opinion by "focusing solely on the underlying principles and methodology," not the correctness of the expert's conclusions.<sup>1460</sup> The second general principle is that expert testimony that is premised on an incorrect understanding of the law or on a legally incorrect theory is incompetent.<sup>1461</sup> Because of the overlap of these two principles, legal expert testimony is a rare specimen in which courts must evaluate both the validity of the expert's methodology and the soundness of the expert's legal conclusions. In evaluating the correctness of the expert's legal conclusions, two *Daubert* factors may be helpful: whether the expert's statement about the applicable legal principle is reflected in publications and whether the expert has made statements about the legal principle in question in a nonjudicial setting. But those questions are asked for a different purpose than in a *Daubert* methodological inquiry; they are asked to determine the correctness of the expert's statement of law rather than the validity of the expert's underlying methodology.

Second, under the procedures commonly used in jury trials, the legal expert "must testify before the jury has received the jury charge and before it has been instructed on specific elements and standards concerning specific claims. The lawyers, the expert, and the judge begin trial with knowledge of the generally applicable duties and their potential scope; the jurors do not."<sup>1462</sup> Thus, trial courts sometimes permit expert testimony on legal matters that provide needed context or background. There are two potential solutions to the problem of experts testifying on the law. First, in order to apply legal concepts to the issues in the case, the expert may be given "some leeway" to reference the controlling 'legal terms' and related concepts while testifying. Otherwise, a jury would not be able to make sense of the expert's testimony or measure it against the charge's requirements, and the sponsoring litigant could not meet a motion for directed verdict."<sup>1463</sup> Under this procedure,

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1460. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995) (citing *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993)); *see supra* notes 251, 1375 and accompanying text; *see also supra* note 34.

1461. *See supra* notes 231–32, 973–74 and accompanying text.

1462. *Fleming*, 395 S.W.3d at 928.

1463. *Id.* at 928–29.

the standards governing admission of expert testimony do not automatically foreclose every reference to legal terms . . . . Such an expert properly may include these references when the trial court sets appropriate limits. The continuum of potentially relevant testimony from an expert likely will vary according to the specific facts and the specific legal standards being litigated in specific cases.<sup>1464</sup>

Thus, the expert must be given some latitude but cannot “testify without any limits whatsoever.”<sup>1465</sup> The limits in that case are to ensure that the expert correctly identifies the legal principles.

There is another, and in the view of the Authors, better solution in many cases: give the portion of the jury charge on the applicable legal principle immediately before the expert’s testimony and then limit the expert to applying that law or explaining its rationale. This procedure has been successfully used in at least one jury trial.<sup>1466</sup> It is somewhat analogous to the trial court’s determination of the scope of patent claims “as a matter of law” after a *Markman* hearing.<sup>1467</sup> Admittedly, it requires more pretrial work by the trial judge—although not a great deal more if the court ensures that the expert’s opinion on the law is correct before admitting it. The larger problem is that evidence evolves during trials and therefore the legal principles implicated by the evidence may likewise evolve as a trial progresses. But this same weakness applies to expert testimony generally: if the evidence evolves in an unanticipated way after the expert testifies, the expert may need to be recalled as a witness. Another difficulty is that sometimes the distinction between statements of the law and statements applying the law

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1464. *Id.* at 929 (citation omitted).

1465. *Id.* In *Fleming*, the expert’s

testimony crossed the border of inadmissibility when she undertook to (1) explain to the jury the application of specific Texas Disciplinary Rules of Professional Conduct, along with the asserted “interaction” between these rules and fiduciary duty standards; (2) opine that Fleming violated at least half a dozen specific disciplinary rules, identified by number; and then (3) tell the jury that violating the enumerated rules “necessarily” established a breach of the fiduciary duty Fleming owed to his clients.

*Id.* “This testimony is unreliable because it contravenes Texas law” that the violation of a disciplinary rule does not create any presumption that a legal duty to a client has been breached. *Id.* at 931.

1466. An Author of this Article, Justice Brown, used it as a trial judge when the parties offered opposing legal experts, one of whom was a former Texas Supreme Court Justice.

1467. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (“[W]e conclude that the interpretation and construction of patent claims, which define the scope of the patentee’s rights under the patent, is a matter of law exclusively for the court.”), *aff’d*, 517 U.S. 370 (1996).

is not very bright. But even then some limitation is better than none and narrows the areas of possible disputes on the applicable legal principles.

*i. Experience and the Daubert Factors.* As discussed above, an expert's experiences sometimes provide predicative data for her opinion.<sup>1468</sup> In that instance, the expert must demonstrate that her experience, together with any other predicate for the opinion, offers a sound and probative basis for opinion.<sup>1469</sup> When an expert's experience forms part of the predicate for her opinion, courts sometimes speak of experience as a means of assessing methodological reliability in addition to—or on rare occasion, in substitution for—the *Daubert* factors.<sup>1470</sup> We suggest that the applicability of the *Daubert* factors is governed by the same test regardless of whether the expert's opinion is predicated in whole or in part on the expert's training and experience: “[A] trial court should consider the [*Daubert*] factors . . . when doing so will be helpful in determining reliability of an expert's testimony, regardless of whether the testimony is scientific in nature or experience-based.”<sup>1471</sup>

Experience can be subject to some of the *Daubert* factors—for example, if the expert ever tested her experience, published her experience, or had any experience on this issue outside litigation.<sup>1472</sup> The *Daubert* factors “may or may not be pertinent in assessing reliability, depending on the nature of the issue, the expert's particular expertise, and the subject of his

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1468. See *supra* Part III.B.2.c.i.

1469. See *supra* Part III.B.2.c.i.

1470. See *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009) (“[I]n very few cases will the evidence be such that the trial court's reliability determination can properly be based only on the experience of a qualified expert to the exclusion of factors such as those set out in *Robinson*, or, on the other hand, properly be based only on factors such as those set out in *Robinson* to the exclusion of considerations based on a qualified expert's experience.”); see also *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 215–16 (Tex. 2010) (quoting same and stating, “In determining whether expert testimony is reliable, a court should consider the factors we set out in [*Robinson*], as well as the expert's experience, knowledge, and training”); *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 499 (Tex. 2001) (“[T]he *Robinson* factors may not apply to certain testimony.”).

1471. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578–79 (Tex. 2006) (rejecting court of appeals' implication that *Gammill's* “analytical gap” test replaced the *Robinson* factors when the expert's testimony was based primarily on the expert's knowledge, training, and experience).

1472. See *id.* at 579 (observing that *Gammill* was not intended “to imply that a trial court should never consider the *Robinson* factors when evaluating the reliability of expert testimony that is based on knowledge, training or experience”; rather the court must apply the “most appropriate” factors and evaluation methodology).

testimony.”<sup>1473</sup> In other situations, however, the *Daubert* factors will not be helpful.<sup>1474</sup> In most situations, the focus of an inquiry into the expert’s experiences is best viewed not as a *Daubert* factor for reviewing reliability but as predicate data, the sufficiency of which must be analyzed by its quantity and similarity to the question at issue and perhaps its temporal proximity to the events in question.

For example, in *Transcontinental Insurance Co. v. Crump*, the plaintiff’s physician expert relied on his “experience and training as a transplant specialist and surgeon, his dealings with infection-susceptible immunosuppressed patients, and his direct dealings with [the plaintiff]—which included taking cultures directly from the wound site for diagnostic purposes” to opine that the plaintiff’s death was caused by his on-the-job injury rather than his preexisting conditions.<sup>1475</sup> The Texas Supreme Court held that this experience, in combination with the factual predicate to which was applied (specifically, evidence that the plaintiff was in good health before the injury despite his preexisting conditions and evidence that the plaintiff contracted an infection at the injury site within days after the injury occurred), were sufficiently reliable to support the physician’s causation opinion.<sup>1476</sup> But the Court was careful to note that, as discussed above,<sup>1477</sup> the mere fact that the physician relied on his medical experience and the well-accepted differential diagnosis technique to determine the cause of the plaintiff’s injury did not exempt the physician’s testimony from scrutiny.<sup>1478</sup> Here the

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1473. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999).

1474. *See* *United States v. Joseph*, 542 F.3d 13, 21–22 (2d Cir. 2008) (holding that testimony by clinical sexuality professor on sexual behavior on the Internet based on interviews and conversations was sufficiently reliable and stating, “[P]eer review, publication, potential error rate, etc. . . . are not applicable to this kind of testimony, whose reliability depends heavily on the knowledge and experience of the expert, rather than the methodology or theory behind it.” (alteration in original) (quoting *United States v. Hankey*, 203 F.3d 1160, 1169 (9th Cir. 2000))); *Burns v. Baylor Health Care Sys.*, 125 S.W.3d 589, 595–97 (Tex. App.—El Paso 2003, no pet.) (holding that trial court erred in excluding board certified safety engineer’s opinion that parking garage floor may have created the optical illusion that there was no curb because the opinion was reliable; it was based on the expert’s extensive experience in safety management which he applied to the underlying facts).

1475. *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 218 (Tex. 2010).

1476. *Id.*

1477. *See supra* Part III.C.2.j (discussing “differential diagnosis”).

1478. *Crump*, 330 S.W.3d at 216–17. In *Abilene Independent School District v. Marks*, a court of appeals rejected a challenge to physician expert testimony on causation of the plaintiff’s knee injury based on the fact that the physician had not reviewed all of the plaintiff’s medical records. *Abilene Indep. Sch. Dist. v. Marks*, 261 S.W.3d 262, 271–72 (Tex. App.—Eastland 2008, no pet.). The court held that the scope of the physician’s review of medical records went to the weight of the physician’s testimony, not its

expert's experience functioned as predicate data for the expert's opinion.

Importantly, the *Crump* Court applied both the *Daubert* factors and *Gammill's* "analytical gap" test to the expert's testimony, stating that "[t]he mere fact that differential diagnosis was used does not exempt the foundation of a treating physician's expert opinion from scrutiny—it is to be evaluated for reliability as carefully as any other expert's testimony. Both the *Daubert* factors and *Gammill* analyses are appropriate in this context."<sup>1479</sup> Before *Crump*, courts of appeals had frequently applied only the *Gammill* test to determine the reliability of expert medical opinions based primarily on the physician's experience and training.<sup>1480</sup> The Court clarified in *Crump* that both tests apply, though not all of the *Daubert* factors are relevant to differential diagnosis testimony.<sup>1481</sup> Applying the *Daubert* factors, the Court observed that the physician's differential diagnosis had been used for nonlitigation purposes—specifically, to treat the plaintiff.<sup>1482</sup> Turning to other *Daubert* factors, the Court stated that a physician's differential diagnosis "may be too dependent upon the physician's subjective guesswork or produce too great a rate of error—for example, when there are several consistent, possible causes for a particular set of symptoms."<sup>1483</sup> "Yet," the Court advised, "a medical causation expert need not 'disprove or discredit every possible cause other

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reliability. *Id.* at 272. The court further stated that the doctor's opinion regarding causation had a reliable foundation because it was based on the physician's professional experience and review of sufficient medical evidence in the patient's file. *Id.*

1479. *Crump*, 330 S.W.3d at 217.

1480. See, e.g., *Brandt v. Surber*, 194 S.W.3d 108, 131–32 (Tex. App.—Corpus Christi 2006, pet. denied) ("Because the expert opinions are based on the experience of the experts, the *Robinson* factors are not applicable. However, appellees were still required to show that there was a sufficient connection between the experts' interpretation of the data contained in the medical records and the opinions offered." (citations omitted) (citing *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 724–26 (Tex. 1998))); *JCPenney Life Ins. Co. v. Baker*, 33 S.W.3d 417, 428 (Tex. App.—Fort Worth 2000, no pet.) ("[The expert's] opinions are based largely upon his experience and observations in the medical field. Thus, his opinions are clearly not the type of testimony that can be easily evaluated under the *Robinson* factors. In cases such as this, *Gammill* directs us to determine whether there is an 'analytical gap' between the expert's opinion and the basis on which it is founded."); *In re D.S.*, 19 S.W.3d 525, 529 (Tex. App.—Fort Worth 2000, no pet.) ("Because Dr. Hunt's opinion concerning the cause of D.S.'s burns is not the type of evidence that can be readily evaluated under the *Daubert* factors, we will apply the more general reliability test espoused in *Gammill*."). But see *Brazil v. Khater*, 223 S.W.3d 418, 421 (Tex. App.—Amarillo 2006, pet. denied) (rejecting argument that *Robinson* factors were necessarily inapplicable to physician's testimony under *Gammill*).

1481. *Crump*, 330 S.W.3d at 217.

1482. *Id.*

1483. *Id.*

than the one espoused by him.”<sup>1484</sup> The testimony offered in *Crump* was sufficiently reliable in this regard because the physician “adequately excluded, with reasonable medical certainty, the other plausible causes raised by the evidence.”<sup>1485</sup>

In *Praytor v. Ford Motor Co.*, in which a plaintiff asserted that his asthma was caused by chemicals released when his airbag deployed during a car accident, a Texas court of appeals held that a treating physician could not rely on his physical examination of the plaintiff, his review of medical literature, and his experience treating two other patients with similar symptoms to reach a reliable opinion on causation.<sup>1486</sup> The court first rejected the expert’s reliance on his physical examination of the plaintiff: “A treating physician’s assertion that a physical examination confirmed causation should not be accepted at face value.”<sup>1487</sup> The court observed that the expert did not state whether his theory satisfied any of the *Daubert* factors.<sup>1488</sup> The court rejected the expert’s reliance on medical literature because the expert failed to identify what literature he read or whether the literature consisted of peer-reviewed studies.<sup>1489</sup> With regard to the expert’s reliance on his experience treating other patients, the court stated that the expert’s “treatment of those two patients and [the plaintiff] does not qualify as a scientific study that meets the statistical requirements of *Havner* or that can be tested or reviewed by [the expert’s] peers.”<sup>1490</sup> The court recognized the “widespread acceptance” of the differential diagnosis technique in the medical industry but discredited the expert’s use of that methodology because the expert failed to properly perform the “rul[ing] out” step of eliminating other plausible causes of the injury.<sup>1491</sup>

The Texas Supreme Court has indicated that only in “very few cases” will courts be able to assess reliability based on the *Daubert* factors to the exclusion of the expert’s experience or based on the expert’s experience to the exclusion of the *Daubert*

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1484. *Id.* at 218 (alterations omitted) (quoting *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 424 (5th Cir. 1987)).

1485. *Id.*

1486. *Praytor v. Ford Motor Co.*, 97 S.W.3d 237, 244–45 (Tex. App.—Houston [14th Dist.] 2002, no pet.).

1487. *Id.* at 244.

1488. *Id.*

1489. *Id.* at 244–45.

1490. *Id.* at 244.

1491. *Id.* at 245 (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 758 (3d Cir. 1994)).

factors; both should be reviewed.<sup>1492</sup> In those rare cases when courts may assess methodological reliability based solely on experience, we suggest that the court is not substituting the qualifications gate for the methodological reliability gate; instead, the methodology employed by the expert is, in fact, the observational gathering of empirical data through experience—a methodology that may (or may not) be valid for reaching a particular opinion in a particular case.<sup>1493</sup> But it would be better to view the experience not as the methodology of gathering data—since the experiential data has already been gathered—unless the expert combines her experience with those of other experts to build a stronger base of similar experiences to those in question.

Expert testimony on the standard of care, for example, often cannot readily be evaluated under the *Daubert* factors because the standard of care is based on what a person of ordinary prudence would do under the same or similar circumstances, considering the defendant's specialized knowledge, training, and experience. Expert opinions on the standard of care are based on the ordinary negligence standard of care, an issue that juries ordinarily can evaluate without expert assistance, as modified in light of the defendant's expertise, a modification that typically requires expert explanation.<sup>1494</sup> The determination of what is reasonable under a given set of circumstances involves a normative analysis, not readily susceptible to the scientific

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1492. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009).

1493. In the beekeeper example, for instance, the Texas Supreme Court indicated that the beekeeper's experience in observing "enough bees in various circumstances to show a pattern" would be a sufficient basis for his opinion that bees take off into the wind. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998). On the other hand, observation of bees, however extensive and varied, might not be a valid methodology for collecting data and drawing conclusions regarding how the aerodynamics of bees' wings work. *See id.* at 724–25 (quoting *Berry v. City of Detroit*, 25 F.3d 1342, 1349–50 (6th Cir. 1994)). The nature of the experience required to support an opinion—including how extensive and varied the experience must be—necessarily depends on the nature of the opinion offered. *Compare* *Plantation Pipe Line Co. v. Cont'l Cas. Co.*, No. 1:03-CV-2811-WBH, 2006 WL 6106248, at \*11–12 (N.D. Ga. Sept. 25, 2006) (admitting testimony of expert on empirical projections based on his eight years of experience and personal familiarity with groundwater plume), *with* *Rohwer v. Fed. Cartridge Co.*, No. 03-CV-2872 JMR/FLN, 2004 WL 2677200, at \*3–4 & n.3 (D. Minn. Nov. 18, 2004) (excluding expert testimony based on expert's three instances of personal experience because testimony was "nothing more than his own anecdotal observations").

1494. *See* *Jackson v. Axelrad*, 221 S.W.3d 650, 655–56 (Tex. 2007) (explaining the standard of care applicable to physicians and other professionals). *See generally* *Imwinkelried*, *supra* note 1265, at 50 (stating that extensive experience "should be adequate validation in the malpractice case"); *id.* at 52 ("[S]ometimes collective, successful clinical experience will constitute adequate foundation [for a malpractice opinion].").

method,<sup>1495</sup> but this is not troubling because the jury itself is considered well equipped to make such normative judgments.<sup>1496</sup> What expert testimony brings to the table in these instances is the expert's specialized knowledge, training, and experience, which is consistent with the defendant's relevant knowledge, training, and experience;<sup>1497</sup> thus, in opining on the applicable standard of care, the expert necessarily relies on such knowledge, training, and experience as a predicate. The reliability of that predicate and the expert's qualifications to offer testimony on the subject naturally overlap.<sup>1498</sup> When the admissibility of expert testimony on the applicable standard of care is challenged on reliability grounds (rather than qualifications), courts require experts to be sufficiently specific in explaining how they derived the applicable standard of care from their specialized knowledge, training, and experience so that juries can make the necessary normative judgments—a connective reliability issue.<sup>1499</sup> Standard

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1495. One commentator has advocated a positive, rather than normative, analysis of the reasonably prudent person concept—i.e., that reasonableness should be determined by statistically prevalent norms of conduct. See Alan D. Miller & Ronen Perry, *The Reasonable Person*, 87 N.Y.U. L. REV. 323, 370 (2012). We have found no evidence in Texas case law of courts requiring evidence of statistical norms to establish the applicable standard of care. We posit that evidence of statistical norms would be relevant to demonstrating standards of care even under a normative definition, and such statistical evidence offered by an expert would be subject to review for methodological reliability.

1496. See, e.g., *Villarini-Garcia v. Hosp. Del Maestro, Inc.*, 8 F.3d 81, 87 (1st Cir. 1993) (observing that juries make “normative judgments all the time in negligence cases, and jurors are no less well equipped to decide what a reasonable lay person would and should do when faced with a certain amount of information about a medical problem and the possibility of malpractice”).

1497. Importantly, the testifying expert's knowledge, training, and experience does not have to be the same as that of the defendant-expert in all ways, only in the relevant aspects. See *supra* notes 127–30 and accompanying text.

1498. *Guidroz-Brault v. Missouri Pac. R.R. Co.*, 254 F.3d 825, 830 (9th Cir. 2001) (holding opinion on standards of care of locomotive engineer was sufficiently reliable when based on extensive experience as locomotive engineer and instructor); see also *Schneider ex rel. Estate of Schneider v. Fried*, 320 F.3d 396, 406 (3d Cir. 2003) (holding cardiologist's opinion on the standard of care for administration of a drug was sufficiently reliable despite any evidence that opinion was generally accepted or was set forth in peer-reviewed publication because it was based on cardiologist's experience); *Hynes v. Energy W., Inc.*, 211 F.3d 1193, 1205 (10th Cir. 2000) (stating that “extensive scientific credentials” provided a reliable basis for opinion on industry practice). An expert on the standard of care may also rely on literature or standards promulgated by an industry group.

1499. See, e.g., *Frazza v. United States*, 529 F. Supp. 2d 61, 73 (D.D.C. 2008) (“Dr. Atlas’ testimony regarding the use of mats and cones does not establish ‘a specific, articulable (and articulated) standard of care.’ Significantly, Dr. Atlas bases his testimony on two things: his own ‘experience’ and his observations of buildings in Washington D.C. on a rainy day. However, an expert cannot rely upon ‘his own experience and on anecdotal observations to form an opinion’ because these things fail ‘to provide any basis . . . by which the jury could determine what the standard of care was and how [Defendant’s] conduct deviated from it.” (alteration in original) (citations omitted) (quoting District of

of care testimony is thus another good example of the inevitable overlap among the different gates.

In situations when an expert's opinion is based largely on his experience, Texas courts frequently focus on connective reliability—whether the expert's reasoning from his experience to his conclusion suffers from any analytical gaps.<sup>1500</sup> That does not mean an expert's opinion predicated on experience is insulated from methodology challenges,<sup>1501</sup> but frequently the *Daubert* factors will not be very helpful in assessing the expert's methodology.<sup>1502</sup>

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Columbia v. Carmichael, 577 A.2d 312, 315–16 (D.C. 1990)); Varner v. District of Columbia, 891 A.2d 260, 272–73 (D.C. 2006) (“Mr. Bates was unable to identify any specific standard of care requiring Gallaudet to collect, without a request or subpoena from police or prosecutors, incident reports relating to non-violent crimes involving a student who had not been identified as a potential suspect. Rather, Mr. Bates relied solely upon ‘the general duty that a university would have to protect its students from harm from others.’ He went on to concede that he knew of no standard specifically requiring a college or university to provide such information to the police during a homicide investigation. An expert may not rely upon a general duty of care to establish an objective standard requiring specific conduct.”); *Carmichael*, 577 A.2d at 315 (“[W]hen normative standards are used by an expert as a basis for assessing negligence, at the very least the expert must be specific as to what standards were violated and how they were violated. This can be done only by comparing specific standards with specific facts or conduct.”).

1500. See *Five Star Int'l Holdings Inc. v. Thomson, Inc.*, 324 S.W.3d 160, 168 (Tex. App.—El Paso 2010, pet. denied) (applying *Gammill* analytical gap test rather than *Daubert* factors when expert opinion is based on experience and training); *Brandt v. Surber*, 194 S.W.3d 108, 131 (Tex. App.—Corpus Christi 2006, pet. denied) (applying analytical gap test to experience based testimony because for such testimony “the *Robinson* factors are not applicable”); *In re R.O.C.*, 131 S.W.3d 129, 135 (Tex. App.—San Antonio 2004, no pet.) (stating that *Daubert* factors apply when testimony “is purely scientific” but when the factors do not apply, court applies analytical gap test); *Wiggs v. All Saints Health Sys.*, 124 S.W.3d 407, 411 & n.3 (Tex. App.—Fort Worth 2003, pet. denied) (rejecting contention that medical causation opinions are reviewed exclusively by analytical gap test since the cases do not hold that a trial court cannot consider the *Daubert* factors); *State Farm Lloyds v. Mireles*, 63 S.W.3d 491, 499 (Tex. App.—San Antonio 2001, no pet.) (refusing to apply *Robinson* factors to engineer's opinion that plumbing leak in bathroom caused foundation to move but holding that opinion was unreliable based on analytical gap between his foundation experience with large commercial buildings “which had nothing in common with the facts of this case”); *JCPenney Life Ins. Co. v. Baker*, 33 S.W.3d 417, 427–28 (Tex. App.—Fort Worth 2000, no pet.) (holding physician's causation opinion that death resulted from automobile accident and not from preexisting cardiac problem was reliable because analytical gap test applied to opinion based largely on experience and observations and expert had extensive experience with condition in question and in making cause-of-death determinations); *In re D.S.*, 19 S.W.3d 525, 529–30 (Tex. App.—Fort Worth 2000, no pet.) (holding expert's opinion that child had been forcibly immersed in hot water was reliable even though it did not satisfy the *Daubert* factors because his theory could not be tested since it would be immoral to intentionally submerge children in hot liquids in order to study the effects of the burns; expert relied on experience and there was no analytical gap between experience and opinion).

1501. *Brandt*, 194 S.W.3d at 131–32.

1502. A couple of the *Daubert* factors used to examine the reliability of methodology might also apply here. For example, a court might consider whether the expert published

Expert opinions by physicians offer a good example: a broad statement that physicians can or cannot reach opinions based on their experience should be avoided because the reliability of the experience depends on how the physician is using this data.<sup>1503</sup> When a physician testifies about the standard of care, that opinion is generally based at least in part on the physician's own experiences,<sup>1504</sup> and the gathering of those experiences could be described very generally as a methodology. When physicians testify about an expected outcome from certain medical devices, prescription drugs, or physical ailments based on their patients' outcomes under similar conditions, the predicate data may provide a sufficiently reliable basis provided the expert has an adequate quantity of experience.<sup>1505</sup> When a physician testifies about causation based on a differential diagnosis, courts often require the physician's initial determination of general causation in which the physician identifies all relevant potential causes of the subject's symptoms to have a more reliable predicate than simply experience but are often more accepting of experience as a reliable predicate for eliminating likely alternative causes.<sup>1506</sup> Some argue that physicians are not in the business of diagnosing cause; they are in the business of treating patients.<sup>1507</sup> But

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her experience. A court might also modify the *Daubert II* factor that considers whether a technique was developed for litigation purposes by examining whether the expert has ever claimed this experience outside a litigation setting, such as in speeches or in training of other experts.

1503. We discuss physicians' use of experience as a predicate for opinion evidence in the previous section. *See supra* notes 889–92 and accompanying text.

1504. *See Dickenson v. Cardiac & Thoracic Surgery of E. Tenn.*, 388 F.3d 976, 979–82 (6th Cir. 2004) (holding trial court erred in excluding cardiac surgeon from opining on standard of care for pulmonologist in extubation claim; stating that his “extensive relevant experience” in extubation decisions provided a reliable basis for opinion even though he could not identify any authoritative journals and could not “recall the mechanical details of the ventilator used in the operation” and rejecting district court's statement that physician “must demonstrate a familiarity with accepted medical literature or published standards in these other areas of specialization in order for his testimony to be reliable in the sense contemplated by Federal Rule of Evidence 702”).

1505. *See Primiano v. Cook*, 598 F.3d 558, 567 (9th Cir. 2010) (stating physician's “comparison of what happened with [plaintiff's] artificial elbow with what surgeons who use artificial elbows ordinarily see” against his own experience and that reflected in peer-reviewed literature was a reliable “methodology of evidence based medicine”); *see also JCPenney Life Ins. Co.*, 33 S.W.3d at 427–28 (holding physician's causation opinion that death resulted from automobile accident and not from preexisting cardiac problem was reliable because analytical gap test applied to opinion based largely on experience and observations and expert had extensive experience with condition in question and in making cause-of-death determinations). *But see Purina Mills, Inc. v. Odell*, 948 S.W.2d 927, 934, 939 (Tex. App.—Texarkana 1997, pet. denied) (holding that veterinarians' personal experience from examining and diagnosing specific cows did not show reliability of causation opinion).

1506. *See discussion infra* Part III.C.2.j (discussing differential diagnosis predicates).

1507. *See Wynacht v. Beckman Instruments, Inc.*, 113 F. Supp. 2d 1205, 1209 (E.D. Tenn. 2000) (“[The expert] is an experienced physician, qualified to diagnose medical

sometimes physicians' treatment decisions require them to determine the cause of an ailment. Thus, the type of opinion offered by the physician may impact the scrutiny to which it is subjected and whether the *Daubert* factors will apply.

Accident reconstructionists are an excellent example of experts who use predicative data, methodology, and logical reasoning to reach subsidiary opinions that lead to an ultimate opinion on the cause of an accident. The Texas Supreme Court has stated that the *Robinson* factors "are particularly difficult to apply in vehicular accident cases involving accident reconstruction."<sup>1508</sup> With regard to an accident reconstructionist's methodology, courts should examine whether the expert follows "accepted accident reconstruction protocol."<sup>1509</sup> Reliable methodologies for accident reconstructionists may include taking witness statements<sup>1510</sup> and performing physical inspections of the vehicles or the accident site.<sup>1511</sup> In some cases an accident reconstructionist may have sufficient data to employ a computer model, and both the methodology of doing so and the data inputted into the model may be reviewed by courts. As shown in our discussion of *Lincoln v. Clark* below, reconstructionists often rely heavily on extrapolations from predicate data.<sup>1512</sup> Thus, their opinions often are best analyzed under connective reliability and predicative reliability gates.<sup>1513</sup> For these two gates, the *Daubert*

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conditions and treat patients. The ability to diagnose medical conditions is not remotely the same, however, as the ability to deduce, delineate, and describe, in a scientifically reliable manner, the causes of those medical conditions.").

1508. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 235 (Tex. 2010). *But see Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 579–80 (Tex. 2006) ("[T]he trial court would have been within its discretion to measure the reliability of Elwell's testimony, at least in part, by considering (1) the extent to which Elwell's theory had been or could be tested; (2) the extent to which his methodology relied upon his subjective interpretation; (3) the methodology's potential rate of error; (4) whether the underlying theory or methodology has been generally accepted as valid by the accident reconstruction and post-collision fire investigation community; and (5) the non-judicial uses that have been made of his methodology. These are similar to factors 1, 2, 4, 5 and 6 of those enumerated in *Robinson*. But, as we have said above, that is not to imply that the trial court was precluded from measuring Elwell's methodology by *Gammill's* analytical gap analysis.").

1509. *TXI Transp.*, 306 S.W.3d at 238.

1510. *Id.*

1511. *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 40 (Tex. 2007).

1512. See discussion of *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79 (Tex. App.—Houston [1st Dist.] 2009, no pet.), *infra* Part III.D, notes 1701–20.

1513. The same is true for fire investigator's opinions. Some of the investigator's sub-opinions leading to the ultimate origin-of-fire conclusion may not be based on a methodology but on the predicate data of the expert's experience. Thus, the Eighth Circuit has concluded that experience may provide a sufficiently reliable basis for some fire opinions. See *Russell v. Whirlpool Corp.*, 702 F.3d 450, 457 (8th Cir. 2012) ("In the context of fire investigations, we have held expert opinions formed on the basis of observations and experience may meet this reliability threshold."); *Presley v. Lakewood Eng'g & Mfg. Co.*, 553 F.3d 638, 644 (8th Cir. 2009) (rejecting "a bright-line rule for testing in fire cases"

factors do not apply (except possibly to the extent the predicate data include literature subject to review for the author's methodology). Instead, courts should examine predicative and connective reliability. As for all experts it is important to analyze each opinion of the accident reconstructionist separately; thus, when a reconstructionist cannot reliably create the entire accident sequence, she might still reliably recreate part of the accident.

Opinions by accident reconstructionists are also a good reminder that the three reliability gates are interlocking and may overlap.<sup>1514</sup> A reconstructionist's use of photographs to reach an opinion on various aspects of an accident could be called a methodology, which could under certain conditions be tested and published.<sup>1515</sup> But reaching conclusions from that data is also a logical reasoning process and therefore fits under the connective reliability gate. One reason that the gates interlock is that an expert's reasoning process could also be described as a methodology. For example, "extrapolating from animal studies" could be described as a "very general methodology."<sup>1516</sup>

*j. Differential Diagnosis (Etiology).*<sup>1517</sup> Differential diagnosis is a "routine diagnostic method used in internal medicine whereby a treating physician formulates a hypothesis

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and stating that fire expert can in some circumstances "offer a reliable opinion based upon specific observation and expertise").

1514. *Cf. Morris v. State*, 361 S.W.3d 649, 654–55 (Tex. Crim. App. 2011) ("[W]e [have] also explicitly refrained from developing rigid distinctions between 'hard' science, 'soft' sciences, and nonscientific testimony because we recognized that the distinction between various types of testimony may often be blurred.").

1515. *See J.B. Hunt Transp., Inc. v. Gen. Motors Corp.*, 243 F.3d 441, 444 (8th Cir. 2001) (accident reconstruction's three-impact theory was not based on eyewitness testimony but primarily on impressions of photographs and expert conceded that he had insufficient evidence to completely reconstruct accident and therefore was inadmissible speculation).

1516. *See Bernstein, supra* note 246, at 42.

1517. This factor is sometimes referred to as differential diagnosis for physicians but it is more accurately described as differential etiology because it is an attempt to use process-of-elimination reasoning to identify a cause. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL & EMOTIONAL HARM § 28 cmt. (c)(4) (2010) ("Courts frequently refer to the elimination of other known causes for a plaintiff by employing the medical terminology of 'differential diagnosis.' . . . This technique is more accurately described as a 'differential etiology.'"); Joseph Sanders & Julie Machal-Fulks, *The Admissibility of Differential Diagnosis Testimony to Prove Causation in Toxic Tort Cases: The Interplay of Adjective and Substantive Law*, 64 LAW & CONTEMP. PROBS. 107, 108 (2001) (stating that when process-of-elimination reasoning "is presented by physicians, it frequently goes by the name of 'differential diagnosis,' although some courts have more appropriately called it 'differential etiology'"). In *Turner v. Iowa Fire Equipment Co.*, the court stated that the treating physician testified about a medical differential diagnosis—the identification of the condition in order to determine its treatment—but not about the a differential diagnosis, the identification of the condition's cause. *Turner v. Iowa Fire Equipment Co.*, 229 F.3d 1202, 1208 (8th Cir. 2000).

as to likely causes of a patient's presented symptoms and eliminates unlikely causes by a deductive process of elimination."<sup>1518</sup> Differential diagnosis is a two-step process: first, the physician considers all relevant potential causes of a patient's symptoms (often referred to as "ruling in" potential causes); second, the physician eliminates all but one potential cause or all but one set of integrated causes (often referred to as "ruling out" potential causes).<sup>1519</sup> Differential diagnosis is a well-accepted technique in the medical field and when performed by a treating physician, is not subject to the same heightened risk of bias that plagues epidemiological studies.<sup>1520</sup>

Many jurisdictions, including Texas, have recognized differential diagnosis as a suitable methodology by which medical experts can demonstrate specific causation.<sup>1521</sup> But "the results of a differential diagnosis are far from reliable *per se*."<sup>1522</sup> As one court has explained:

Calling something a "differential diagnosis" or "differential etiology" does not by itself answer the reliability question but prompts three more: (1) Did the expert make an accurate diagnosis of the nature of the disease? (2) Did the expert reliably rule in the possible causes of it? (3) Did the expert reliably rule out the rejected causes? If the court

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1518. *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 216 (Tex. 2010).

1519. *See, e.g., Johnson v. Arkema, Inc.*, 685 F.3d 452, 468 (5th Cir. 2012) (quoting *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 262 (4th Cir. 1999)); *Pluck v. BP Oil Pipeline Co.*, 640 F.3d 671, 678 (6th Cir. 2011); *Junk v. Terminix Int'l Co.*, 628 F.3d 439, 449 (8th Cir. 2010); *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 674 (6th Cir. 2010); *Best v. Lowe's Home Ctrs., Inc.*, 563 F.3d 171, 179–80 (6th Cir. 2009); *Kudabeck v. Kroger Co.*, 338 F.3d 856, 860–61 (8th Cir. 2003); *Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1210–11 (10th Cir. 2002); *Westberry*, 178 F.3d at 262.

1520. *Compare Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 719 (Tex. 1997), with *Westberry*, 178 F.3d at 262.

1521. *See Crump*, 330 S.W.3d at 216–17; *see also, e.g., Johnson*, 685 F.3d at 468–69 ("Many courts have found that a properly performed differential diagnosis can yield a reliable expert opinion."); *Pluck*, 640 F.3d at 678 ("This circuit has recognized differential diagnosis as an 'appropriate method for making a determination of causation for an individual instance of disease.'" (quoting *Hardyman v. Norfolk & W. Ry. Co.*, 243 F.3d 255, 260 (6th Cir. 2001))); *Goebel v. Denver & Rio Grande W. R.R. Co.*, 346 F.3d 987, 999 (10th Cir. 2003) (holding that courts "can admit a differential diagnosis that it concludes is reliable if general causation has been established"); *Westberry*, 178 F.3d at 262–63 (observing that the "differential diagnosis" technique "has widespread acceptance in the medical community, has been subject to peer review, and does not frequently lead to incorrect results" and that "the overwhelming majority of the courts of appeals that have addressed the issue have held that a medical opinion on causation based upon a reliable differential diagnosis is sufficiently valid to satisfy the first prong of the Rule 702 inquiry" (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 758 (3d Cir. 1994))).

1522. *Johnson*, 685 F.3d at 468; *see also Tamraz*, 620 F.3d at 674 ("Calling something a 'differential diagnosis' or 'differential etiology' does not by itself answer the reliability question[.]"); *Best*, 563 F.3d at 179 ("Not every opinion that is reached via a differential-diagnosis method will meet the standard of reliability required by *Daubert*.").

answers “no” to any of these questions, the court must exclude the ultimate conclusion reached.<sup>1523</sup>

The Texas Supreme Court has likewise rejected an argument for a “less strict” application of the *Robinson* factors to differential diagnosis evidence: “The mere fact that differential diagnosis was used does not exempt the foundation of a treating physician’s expert opinion from scrutiny—it is to be evaluated for reliability as carefully as any other expert’s testimony.”<sup>1524</sup>

Often the testifying expert is a treating physician who made the diagnosis, or a retained expert who makes the diagnosis for purposes of the litigation by reviewing the claimant’s medical records. In either instance, the reliability review of the differential diagnosis focuses on the testifying expert’s own methodology.<sup>1525</sup> But when the expert relies on some other source to “rule in” potential causes or to “rule out” likely alternative causes, the other source will need to provide a reliable predicate for the expert’s decision to include/exclude the potential cause.<sup>1526</sup>

The first step in the differential-diagnosis technique, “ruling in” potential causes, overlaps the issue of “general causation”—a

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1523. *Tamraz*, 620 F.3d at 674.

1524. *Crump*, 330 S.W.3d at 216–17. On the other hand, some federal courts have indicated that a physician’s differential diagnosis testimony may be afforded greater leeway in reliance on the physician’s experience and expertise. The Ninth Circuit recently held in *Messick v. Novartis Pharmaceuticals Corp.* that a district court erred in excluding a differential diagnosis where a physician “repeatedly referred to his own extensive clinical experience as the basis for his differential diagnosis, as well as his examination of [the plaintiff’s] records, treatment, and history.” *Messick v. Novartis Pharm. Corp.*, 747 F.3d 1193, 1198–99 (9th Cir. 2014). The court opined that “[m]edicine partakes of art as well as science, and there is nothing wrong with a doctor relying on extensive clinical experience when making a differential diagnosis. . . . A doctor using a differential diagnosis grounded in significant clinical experience and examination of medical records and literature can certainly aid the trier of fact and cannot be considered to be offering ‘junk science.’” *Id.* The court stated that the expert was not obligated to “identify the sole cause of a medical condition in order for his or her testimony to be reliable. It is enough that a medical condition be a substantial causative factor.” *Id.* at 1199.

Other courts have been somewhat less deferential. In *Bland v. Verizon Wireless, (VAW) L.L.C.*, for example, the Eighth Circuit held that a physician’s testimony that the plaintiff’s ingestion of freon caused her exercise-induced asthma was unreliable because the physician failed to investigate the home or other environments to determine other possible causes of asthma and most cases of exercise-induced asthma have no known cause. *Bland v. Verizon Wireless, (VAW) L.L.C.*, 538 F.3d 893, 897–98 (8th Cir. 2008). The Eighth Circuit indicated in *Bland*, as it has in prior cases, that a strong temporal link may be, but is not necessarily, sufficient to support an opinion on causation. *See id.*; *see also* *Flesner v. Bayer AG*, 596 F.3d 884, 891 (8th Cir. 2010) (indicating that it is only in a “narrow category” of cases that a temporal link alone will support causation); *Bonner v. ISP Techs., Inc.*, 259 F.3d 924, 931 (8th Cir. 2001) (indicating that in some circumstances a temporal link is, alone, evidence of causation).

1525. *See, e.g., Crump*, 330 S.W.3d at 217–18. Analysis of the reliability of an expert’s methodology is discussed in detail above. *See supra* Part III.C.

1526. *See supra* discussion Part III.B (discussing predicative reliability).

physician cannot reliably identify a substance as a potential cause of a patient's injury if the substance does not cause that type of injury. The second step, "ruling out" potential causes, focuses on a patient's particular circumstances and thus addresses the narrower issue of "specific causation." Differential-diagnosis evidence thus encompasses both general and specific causation. Sometimes, a claimant will produce separate evidence of general causation to justify the expert's decision to "rule in" the substance in question as a potential cause of the claimant's illness or injury.<sup>1527</sup> In that instance, general causation, which is typically reviewed first, will already be supported by reliable evidence, which can then be relied on by the differential-diagnosis expert in his decision to "rule in" the substance in question as a potential cause. But when there is not already reliable evidence of "general causation," a differential-diagnosis expert will have to identify an adequate predicate for concluding that the substance in question is capable of causing the kind of injury suffered by the claimant before the expert can "rule in" that substance as a potential cause.<sup>1528</sup> An expert cannot rely on differential diagnosis evidence "to circumvent the requirement of general causation."<sup>1529</sup>

Likewise, a testifying physician cannot rely on evidence of general causation to bypass a reliable basis for specific causation.<sup>1530</sup> Under *Robinson* and *Havner*, expert causation evidence—including expert causation opinions based on a differential diagnosis technique (or any etiology technique)<sup>1531</sup>—

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1527. See *Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1210–11 (10th Cir. 2002) ("In many of the decisions in which a differential diagnosis has been deemed reliable, the party relying on the diagnosis has offered independently reliable evidence that the allegedly dangerous drug or substance had harmful effects." (citing examples)).

1528. See, e.g., *Johnson v. Arkema, Inc.*, 685 F.3d 452, 469 (5th Cir. 2012) (affirming exclusion of physician's differential-diagnosis testimony that certain chemicals caused claimant's lung disease and pulmonary fibrosis when physician ruled-in the chemicals as potential causes based on the same evidence relied upon to establish general causation, which the court had already rejected).

1529. *Id.* at 468–69.

1530. See, e.g., *Roche v. Lincoln Prop. Co.*, 175 F. App'x 597, 602–03 (4th Cir. 2006) (upholding exclusion of differential diagnosis testimony because, among other shortcomings, the physician's "reliance on the literature addressing general causation is misplaced because the medical literature provides no scientific support for specific causation").

1531. The requirement that experts rule out other potential causes has been particularly important in manufacturing and design defect cases. See, e.g., *Nissan Motor Co. v. Armstrong*, 145 S.W.3d 131, 137 (Tex. 2004); see also *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 237 (Tex. 2010) (stating expert's failure to rule out alternative causes of incident may render opinion unreliable); *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 42 (Tex. 2007) ("Texas law does not generally recognize a product failure or malfunction, standing alone, as sufficient proof of a product defect. Instead, we have held that 'a specific defect must be identified by competent evidence

must adequately rule out other potential causes to provide any basis for a causation conclusion.<sup>1532</sup>

In *Crump*, the Texas Supreme Court explained the parameters of this requirement:

[I]n some cases, a physician's differential diagnosis may be too dependent upon the physician's subjective guesswork or produce too great a rate of error—for example, when there are several consistent, possible causes for a particular set of symptoms. . . . Yet a medical causation expert need not “disprov[e] or discredit[] every possible cause other than the one espoused by him.” Few expert opinions would be reliable if the rule were otherwise. Still, if evidence presents “other plausible causes of the injury or condition that *could* be negated, the [proponent of the testimony] *must* offer evidence excluding those causes with reasonable certainty.”<sup>1533</sup>

The Texas Supreme Court has stated that “a thorough occupational/exposure history and medical history” are “vitally important” to the ruling-out step of differential diagnosis.<sup>1534</sup>

The ruling-in step of the differential diagnosis process may be too dependent on guess work when a significant number of the incidents of the disease in question are attributed to idiopathic (i.e.,

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and other possible causes must be ruled out.” (footnotes omitted) (quoting *Armstrong*, 145 S.W.3d at 137)).

In *Cooper Tire*, the Texas Supreme Court held that plaintiffs' expert could not use an etiological elimination of other potential causes to establish the existence of a manufacturing defect (not merely causation). *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 807–08 (Tex. 2006). The Court stated, “The universe of possible causes for the tire failure is simply too large and too uncertain to allow an expert to prove a manufacturing defect merely by the process of elimination. As stated above, even if plaintiffs had eliminated every conceivable reason for the tire failure other than a product defect existing when the tire left Cooper Tire's plant, they did not eliminate the possibility of a design defect.” *Id.*

The requirement has also been discussed in a variety of other cases. *See, e.g.*, *BNSF Ry. Co. v. Phillips*, 434 S.W.3d 675, 689–95 (Tex. App.—Fort Worth 2014, pet. filed) (rejecting argument that plaintiff expert's causation opinion was unreliable for failing to negate other potential causes because his “conclusory testimony on cross-examination” about other potential causes was no evidence of other potential causes and therefore did not trigger any duty for the plaintiff's expert to exclude other potential causes of his injuries with reasonable certainty).

1532. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 720 (Tex. 1997) (“Further, if there are other plausible causes of the injury or condition that could be negated, the plaintiff must offer evidence excluding those causes with reasonable certainty.”); *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 559 (Tex. 1995) (holding that expert's opinion on what caused damage to plaintiffs' trees was “little more than speculation” because he admitted that there were other potential causes of the damage, including root rot, and failed to rule out those causes).

1533. *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 217–18 (Tex. 2010) (alteration in original) (citations omitted) (quoting *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 424 (5th Cir. 1987); *Havner*, 953 S.W.2d at 720).

1534. *In re GlobalSantaFe Corp.*, 275 S.W.3d 477, 488 (Tex. 2008) (quoting *In re Silica Prods. Liab. Litig.*, 398 F. Supp. 2d 563, 593 (S.D. Tex. 2005)).

unknown) causes. On remand, the district court in *Milward*<sup>1535</sup> excluded the testimony of an expert who attempted to use a differential diagnosis technique to conclude that the plaintiff's AML was caused by exposure to the defendant's product because the expert could not reliably eliminate other probable causes of AML.<sup>1536</sup> The court stated that the "fundamental problem with differential diagnosis in this context" was that "between 70 and 80 percent of cases of AML are idiopathic—meaning they have no known cause."<sup>1537</sup> The court observed:

When a disease has a discrete set of causes, eliminating some number of them significantly raises the probability that the remaining option or options were the cause-in-fact of the disease. The same cannot be said when eliminating a few possible causes leaves not only fewer possible causes but also a high probability that a cause cannot be identified.<sup>1538</sup>

At least one Texas appellate court has likewise indicated that when a disease is frequently idiopathic, it may be more difficult for an expert to reliably determine causation through differential diagnosis.<sup>1539</sup>

3. *Conclusion.* Courts cannot mechanically use the *Daubert* factors as a checklist (e.g., "reliability wins by a score of 4 to 2"). The factors are too flexible, sometimes overlap, and often need to be supplemented with other factors for such a rule. More importantly, as courts have gradually recognized, the crucial question is whether the expert has presented enough empirical data and reasoning to validate the proposition that by using this theory or technique he can accurately draw the proposed specific inference in question.

#### D. *Connective Reliability*<sup>1540</sup>

In *General Electric Co. v. Joiner*, the U.S. Supreme Court held: [N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. A

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1535. See *supra* notes 584–95 and accompanying text (discussing *Milward*).

1536. *Milward v. Acuity Specialty Prods. Grp., Inc.*, 969 F. Supp. 2d 101, 108–09 (D. Mass. 2013).

1537. *Id.* at 109.

1538. *Id.* (citations omitted).

1539. See *Coastal Tankships, U.S.A., Inc. v. Anderson*, 87 S.W.3d 591, 610–11 (Tex. App.—Houston [1st Dist.] 2002). *But see* *Wilcox v. Hempstead*, 992 S.W.2d 652, 657 (Tex. App.—Fort Worth 1999, no pet.).

1540. For a further discussion of connective reliability and its early development in the law, see Brown, *supra* note 1, at 804–11.

court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.<sup>1541</sup>

Seven months later, in *Gammill v. Jack Williams Chevrolet, Inc.*, the Texas Supreme Court said, “The same is true of *Robinson* and the Texas Rules of Evidence: “[I]t is not so simply because an expert says it is so.”<sup>1542</sup> We treat this reliability test as the sixth gate: connective reliability.<sup>1543</sup> One commentator has described this “analytical gap” test as “a more abstract and flexible method of measuring reliability.”<sup>1544</sup>

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1541. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997); *see also, e.g.*, *Winters v. Fru-Con Inc.*, 498 F.3d 734, 743 (7th Cir. 2007) (quoting *Clark v. Takata Corp.*, 192 F.3d 750, 757 (7th Cir. 1999)). *Joiner* applied the test to an expert’s extrapolation from animal studies to humans—the gap between the two needed to be bridged. *Joiner*, 522 U.S. at 143–44. And the exposures in the animal studies in *Joiner* created an additional gap—the animals were exposed to much higher levels of PCBs over a longer period of time than the claimant in *Joiner* had been. *Id.* at 144. In *Kumho Tire Co. v. Carmichael*, the Court explained that a trial court must examine the expert’s “particular method of analyzing the data . . . to draw a conclusion regarding the particular matter.” *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 154 (1999).

1542. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998) (quoting *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 712 (Tex. 1997)). The Court observed that the expert failed “to show how his observations, assuming they were valid, supported his conclusions,” leaving a fatal “analytical gap” in the process that produced the expert’s opinion. *Id.* at 727.

In adopting *Joiner*, the *Gammill* Court quotes *Havner*, which dealt in part with expert reliance on animal studies to support a conclusion relating to causation in humans, similar to the excluded testimony in *Joiner*. *See Havner*, 953 S.W.2d at 729–30. Because it predated *Joiner* and *Gammill*, *Havner* rejected the expert testimony presented under a predicative-reliability analysis, concluding that the epidemiological studies and animal studies on which the expert relied did not provide an adequate basis for his opinions. *See id.* at 730. The *Havner* Court’s analysis of the expert’s reliance on epidemiological studies is well-suited for the predicative-reliability gate—the epidemiological studies reached “just the opposite” conclusion on causation than the expert did, and they therefore provided no support for his conclusion. *Id.* But the Court’s analysis of the expert’s reliance on animal studies would have been better-suited for the connective-reliability gate later developed in *Joiner* and *Gammill*—studies evidencing causation in animals (as opposed to studies failing to find any evidence of causation in humans) could support an expert’s conclusion on causation in humans if the expert adequately bridged the “gap” between the animal-related data and the human-related opinion by, for example, providing adequately supported testimony demonstrating substantial similarity between animals and humans with regard to the effect of the substance in question and the etymology of the disease in question.

1543. The phrase “connective reliability” is based on the *Joiner* opinion, which was quoted with approval by *Gammill*: “[N]othing in either *Daubert* or the Federal Rules of Evidence requires a . . . court to admit opinion evidence that is *connected* to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.” *Joiner*, 522 U.S. at 146 (cited with approval by *Gammill*, 972 S.W.2d at 726) (emphasis added); *see also* Ronald J. Allen & Joseph S. Miller, *The Common Law Theory of Experts: Deference or Education?*, 87 NW. U. L. REV. 1131, 1136–37 (1993) (arguing evidentiary rules should force experts to educate jury on reasons for expert’s opinion so jury can make its own intelligent decision, not keep information from the jury and thus force jury to blindly defer to or reject expert’s inferences).

1544. Kimberly S. Keller, *Bridging the Analytical Gap: The Gammill Alternative to Overcoming Robinson & Havner Challenges to Expert Testimony*, 33 ST. MARY’S L.J. 277, 279 (2002).

This gate may be the most important gate for practice in Texas courts because it is often used by appellate lawyers to raise challenges to expert testimony for the first time after the jury renders a verdict. In the wake of *Joiner* and *Gammill*, the “*ipse dixit*” and “analytical gap” language has echoed throughout hundreds of Texas expert opinion cases.<sup>1545</sup> Most of these cases involve postjudgment legal-sufficiency challenges to expert evidence, rather than prejudgment challenges to the admissibility of the evidence. Typically, the party who lost at trial argues that the expert testimony offered by the prevailing party to prove an element of his cause of action is conclusory—it is the “mere *ipse dixit* of a credentialed witness” and “there is simply too great an analytical gap between the data and the opinion proffered”—and therefore the testimony constitutes “no evidence” to support the judgment in the prevailing party’s favor.<sup>1546</sup> As discussed above, postjudgment attacks on the reliability of expert testimony pose a particularly potent threat because the evidence in the case is closed and the party proffering the evidence has no opportunity to supplement the record with additional materials or explanation.<sup>1547</sup> As a practical matter, the connective reliability requirement may be an especially powerful tool on appeal because it is founded in logic, rather than scientific expertise, and thus may be “more readily

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1545. See, e.g., *Elizondo v. Krist*, 415 S.W.3d 259, 264 (Tex. 2013); *In re Commitment of Bohannon*, 388 S.W.3d 296, 305 (Tex. 2012); *Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC*, 386 S.W.3d 256, 262 (Tex. 2012); *Jelinek v. Casas*, 328 S.W.3d 526, 536 (Tex. 2010); *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 219 (Tex. 2010); *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239 (Tex. 2010); *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 639 (Tex. 2009); *City of San Antonio v. Pollock*, 284 S.W.3d 809, 822–23 (Tex. 2009) (Medina, J., dissenting); *Arkoma Basin Exploration Co. v. FMF Assocs. 1990-A, Ltd.*, 249 S.W.3d 380, 389 n.32 (Tex. 2008); *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 39 (Tex. 2007); *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578–79 (Tex. 2006); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800–01 (Tex. 2006); *Romero v. KPH Consolidation, Inc.*, 166 S.W.3d 212, 223 (Tex. 2005); *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470–71 (Tex. 2005); *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 904–05 (Tex. 2004); *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245, 257–58 (Tex. 2004), *abrogated by Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008); *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629 (Tex. 2002); *Earle v. Ratliff*, 998 S.W.2d 882, 890 (Tex. 1999); *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999). In addition to these Texas Supreme Court cases, this language can be found in more than 250 court of appeals’ opinions on expert testimony issued in the last fifteen years.

1546. See, e.g., *Elizondo*, 415 S.W.3d at 264; *Enbridge*, 386 S.W.3d at 261–62; *Jelinek*, 328 S.W.3d at 532, 536; *Crump*, 330 S.W.3d at 219; *Whirlpool*, 298 S.W.3d at 643; *Pollock*, 284 S.W.3d at 822–23 (Medina, J., dissenting); *Arkoma Basin*, 249 S.W.3d at 389 & n.32; *Cooper Tire*, 204 S.W.3d at 799–801; *Iracheta*, 161 S.W.3d at 470–71; *Ramirez*, 159 S.W.3d at 904–05; *Zwahr*, 88 S.W.3d at 628–29; *Earle*, 998 S.W.2d at 890; *Burrow*, 997 S.W.2d at 234–35; cf. *Romero*, 166 S.W.3d at 223.

1547. See *supra* Part III.A.6.

understood and applied” than the *Daubert* factors.<sup>1548</sup> “The nature of the studies in each case, the plausibility of the extrapolations from them, and the known soundness of the basic theory—in sum, the expert’s causal reasoning—must be unpacked and inspected to verify that it is sound science.”<sup>1549</sup>

The 1999 *Eight Gates* article observed that *Daubert* requires not only a reliable methodology underlying an expert’s opinion but also a reliable application of the methodology to the facts of the case.<sup>1550</sup> In other words, the methodology must be validly connected to the facts of the case.<sup>1551</sup> Although once an issue for the jury, *Daubert* relegates the assessment of this reliability to the judge:

It is no longer the case that if the methodology is sound, the possible misapplication in a specific case becomes a question for the jury. *Daubert* provides that “*any* step that renders the analysis unreliable . . . renders the expert’s testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology.”<sup>1552</sup>

This is also true when the expert cannot connect foundational data to the expert’s conclusions. Thus, there are two

1548. See Richard O. Faulk & Robert M. Hoffman, *Beyond Daubert and Robinson: Avoiding and Exploiting “Analytical Gaps” in Expert Testimony*, 33 *ADVOC. (TEX.)* 71, 71–72 (2005).

We have stated above that evidence that is not reliable is necessarily neither helpful to the jury nor relevant to the case. As with the other reliability gates, this is true of the connective-reliability gate. The Texas Supreme Court has held that an expert opinion “that is conclusory or speculative is not relevant evidence.” *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 232 (Tex. 2004). Texas courts have also treated the “fit” and “tied” requirements to a relevance inquiry. See generally *Tillman v. State*, 354 S.W.3d 425, 438 (Tex. Crim. App. 2011) (stating that “[t]he relevance inquiry is whether evidence ‘will assist the trier of fact and is sufficiently tied to the facts of the case’” and therefore an expert “must make an effort to tie pertinent facts of the case to the scientific principles which are the subject of his testimony” (quoting *Jordan v. State*, 928 S.W.2d 550, 555 (Tex. Crim. App. 1996))); *Dallas Cnty. v. Crestview Corners Car Wash*, 370 S.W.3d 25, 35 (Tex. App.—Dallas 2012, pet. denied) (“To be relevant, the expert’s opinion must be based on the facts . . .”); *Praytor v. Ford Motor Co.*, 97 S.W.3d 237, 243 (Tex. App.—Houston [14th Dist.] 2002, no pet.) (“To be relevant, the proposed testimony must be sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute.”); cf. *Dickerson v. State Farm Lloyd’s Inc.*, No. 10-11-00071-CV, 2011 WL 3334964, at \*4 (Tex. App.—Waco Aug. 3, 2011, pet. denied) (stating that in automobile-accident cases, Texas Supreme Court analyzes “whether the expert’s opinion actually fits the facts of the case” by utilizing the “analytical gap” test).

1549. DAVID H. KAYE, DAVID E. BERNSTEIN & JENNIFER L. MNOOKIN, *THE NEW WIGMORE: A TREATISE ON EVIDENCE—EXPERT EVIDENCE* § 10.5.1 (Supp. 2012).

1550. *Brown*, *supra* note 1, at 804–05.

1551. *Id.*

1552. *Capra*, *supra* note 596, at 710–11 (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994)). The comments to the amendments to the Federal Rules adopted in 2000 quote this passage from *In re Paoli Railroad Yard PCB Litigation*. FED. R. EVID. 702 advisory committee’s note.

principal types of “gaps” that can undermine the reliability of an expert’s opinion: (1) a gap between the underlying data, facts, or assumptions and the opinion; and (2) a gap between the expert’s methodology and the opinion.<sup>1553</sup> Texas courts have found fatal analytical gaps both between the predicative data and the conclusion<sup>1554</sup> and between the methodology and the conclusion.<sup>1555</sup> When the expert’s reasoning from premise to conclusion includes a leap of faith, the leap, if big enough, necessitates exclusion of the opinion as an improper extrapolation regardless of whether the premise is a methodology, technique, or data relied on by the expert.<sup>1556</sup> And even if the opinion is admitted without objection, the opinion may be deemed conclusory and therefore “no evidence.”<sup>1557</sup>

The Texas Supreme Court has used a number of phrases to describe the requirements under this gate: the expert must connect the opinion with the existing data,<sup>1558</sup> show “the

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1553. *City of San Antonio v. Pollock*, 284 S.W.3d 809, 823 n.2 (Tex. 2009) (Medina, J., dissenting) (“One observer has suggested that analytical gaps are of two types: ‘(1) the underlying data-facts gap, which focuses on material variances between the data underlying the expert opinion and the actual facts of the plaintiff’s case; and (2) the methodology-conclusion gap, which focuses on whether the expert properly explains how the methodology was applied to the plaintiff’s facts in arriving at the conclusion.’” (emphasis omitted) (quoting Keller, *supra* note 1544, at 310)).

1554. *See Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 728–30 (Tex. 1997) (discussing animal studies). *Havner* predated *Gammill* and thus did not use the phrase “analytical gap,” but post-*Gammill* analysis of whether animal studies provide a reliable basis for a causation opinion fit under this rubric.

1555. *See Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 904–06 (Tex. 2004); *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245, 254, 257–58 (Tex. 2004), *abrogated on other grounds by Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008).

1556. *Brown*, *supra* note 1, at 805; *see also Johnson v. Arkema, Inc.*, 685 F.3d 452, 460 (5th Cir. 2012) (“[A]n expert may extrapolate data from studies of similar chemicals. However, [t]o support a conclusion based on such reasoning, the extrapolation or leap from one chemical to another must be reasonable and scientifically valid.” (alteration in original) (citations omitted) (quoting *Moore v. Ashland Chem. Inc.*, 151 F.3d 269, 279 (5th Cir. 1998))); *McDowell v. Brown*, 392 F.3d 1283, 1299–1300 (11th Cir. 2004) (stating neurology expert’s opinion that less than twenty-four-hour delay in treatment had caused inmate’s partial paraplegia based on study regarding forty-eight-hour delay was unreliable because expert “‘leap[ed]’ from an accepted scientific premise to an unsupported one” and stating that “there is no fit where a large analytical leap must be made between the facts and the opinion”); *Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194, 1202 (11th Cir. 2002) (holding that expert’s opinion was based on “several scientifically unsupported ‘leaps of faith’”); *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*11–14 (Tex. Aug. 22, 2014) (noting expert opinion relied on several “leaps of logic”); 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:10, at 787 (stating connective reliability examines “how closely the conclusion is connected to the underlying data—whether it is but a short step from the data to conclusion or a long inferential leap. The closer the connection, the better the fit”).

1557. *See, e.g., Elizondo v. Krist*, 415 S.W.3d 259, 264 (Tex. 2013); *Pollock*, 284 S.W.3d at 822–23 (Medina, J., dissenting); *Ramirez*, 159 S.W.3d at 904–06.

1558. *See Ramirez*, 159 S.W.3d at 904–06.

connection between the data relied on and the opinion offered,”<sup>1559</sup> “connect the data relied on and his or her opinion and . . . show how that data is valid support for the opinion reached,”<sup>1560</sup> connect “the expert’s theory to the underlying facts and data in the case,”<sup>1561</sup> connect the expert’s “observations with his conclusions,”<sup>1562</sup> “explain the basis of [the expert’s] statements to link his conclusions to the facts,”<sup>1563</sup> “explain why” the data lead to the conclusion,<sup>1564</sup> show “how” his observations

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1559. *Ramirez*, 159 S.W.3d at 906; *cf.* *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 239 (Tex. 2010) (“Reliability may be demonstrated by the connection of the expert’s theory to the underlying facts and data in the case.”).

1560. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 642 (Tex. 2009).

1561. *TXI Transp.*, 306 S.W.3d at 239.

1562. *Ramirez*, 159 S.W.3d at 912 (Hecht, J., concurring); *see also id.* at 913 (noting that there must be a “bridge between [the expert’s] credentials, experience, and observations on the one side, and [the expert’s] opinions on the other”); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 805 (Tex. 2006) (“Essentially, the only basis for the link between the [engineer’s] observations and his conclusions was his own say-so.” (citing *Ramirez*, 159 S.W.3d at 912–13 (Hecht, J., concurring))).

1563. *Earle v. Ratliff*, 998 S.W.2d 882, 890 (Tex. 1999); *see also* *Bowie Mem’l Hosp. v. Wright*, 79 S.W.3d 48, 50, 52 (Tex. 2002) (applying *Earle* to report requirements under Texas Medical Liability and Insurance Act); *Hanson v. Greystar Dev. & Const., LP*, 317 S.W.3d 850, 853 (Tex. App.—Fort Worth 2010, pet. denied) (“An expert’s simple *ipse dixit* is insufficient to establish a matter; rather, the expert must explain the basis of his statements to link his conclusions to the facts.”); *Branton v. Wood*, 100 S.W.3d 645, 648 (Tex. App.—Corpus Christi 2003, no pet.) (quoting *Earle* and stating that “[t]o constitute competent, non-conclusory summary judgment evidence, ‘the expert must explain the basis of his statements to link his conclusions to the facts’”); *cf.* *City of San Antonio v. Pollock*, 284 S.W.3d 809, 820 (Tex. 2009) (noting that court of appeals in similar case had “reviewed all of the studies the parties could produce attempting to link ALL to benzene exposure”).

1564. *Earle*, 998 S.W.2d at 890; *see also* *Jelinek v. Casas*, 328 S.W.3d 526, 536 (Tex. 2010) (stating that “[t]he expert must explain why” the opinion is “preferable to competing inferences that are equally consistent with the known facts”). The Texas Supreme Court has repeatedly tied an analytical gap with an expert’s “failure to explain why” the basis for the expert’s opinion supports the opinion reached. *See Elizondo v. Krist*, 415 S.W.3d 259, 265–66 (Tex. 2013) (stating that the expert attorney provided “no analysis to explain how” various factors would be applied to determine a case’s fair settlement value and did not “explain why” the settlements were unreasonable (quoting *Elizondo v. Krist*, 338 S.W.3d 17, 21–22 (Tex. App.—Houston [14th Dist.] 2010), *aff’d*, 415 S.W.3d 259 (Tex. 2013))); *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 839 (Tex. 2010) (observing that an expert cannot neglect to account for inconsistencies raised by his theory and failed to explain why he ruled out another potential cause of the incident); *Whirlpool*, 298 S.W.3d at 642 (observing that the expert did not explain how the data supported his opinion and that the expert’s test “did not support all the various and critical parts of his opinion”); *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245, 257–58 (Tex. 2004) (stating that “the gap in [the expert’s] analysis was his ‘failure to show how his observations . . . supported his conclusions’” and that the expert “failed to sufficiently explain” why the differences between his predicted well and a well he used for comparison would not result in different production rates (quoting *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 727 (Tex. 1998))). The examination of whether the expert explained “why” or “how” data supports the expert’s opinion originated in *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144–46 (1997).

support his conclusions,<sup>1565</sup> demonstrate the stated basis for an opinion supports the opinion,<sup>1566</sup> show “the manner in which the principles and methodologies are applied by the expert to reach the conclusions,”<sup>1567</sup> and ensure there is no “flaw in the expert’s reasoning from the data” that renders the expert’s opinions “dubious.”<sup>1568</sup> Texas intermediate appellate courts use a number of these same phrases.<sup>1569</sup> For example, the First Court of

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1565. *Gammill*, 972 S.W.2d at 727 (noting that failure to show how observations supported conclusion created an analytical gap in the expert’s analysis); *see also Pollock*, 284 S.W.3d at 817 (stating that the expert’s opinion in *Ramirez* was unreliable because the expert “could not explain how the wheel detached before the accident but nevertheless remained in the car’s wheel well while the car crossed the median and collided with another car”); *Cooper Tire*, 204 S.W.3d at 805 (stating that expert did not explain how defective tire could be used for 30,000 miles and suffer a nail puncture without failing); *Ramirez*, 159 S.W.3d at 902, 905–06 & n.3 (Tex. 2004) (noting that the expert did “not attempt to explain how the left wheel remained ‘tucked’ in the left rear wheel well throughout the accident sequence,” “never explain[ed] how” certain tests supported his opinion, did “not explain how” the tests supported his theory of the accident, failed to provide a “[sufficient explanation]” for how his opinion was supported by the “laws of physics,” failed to “answer an important question,” and did “not close the ‘analytical gap’ by explaining how the [product] could behave as he described”); *Church v. Exxon Mobil Corp.*, No. 01-11-00802-CV, 2012 WL 5381233, at \*5 (Tex. App.—Houston [1st Dist.] Nov. 1, 2012, no pet.) (“An opinion is conclusory if it does not state the underlying facts and explain how those facts support the conclusion reached.”); *cf. City of Laredo v. Montano*, 414 S.W.3d 731, 736 (Tex. 2013) (concluding that expert’s estimate of the average number of weekly hours he worked on a case was “simply devoid of substance” because attorney’s testimony provided “no clue as to how [the lawyer] came to conclude that six hours a week was a ‘conservative’ estimate of his time” and “offered nothing to document his time in the case”); *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d 434, 440 (Tex. 2007) (stating that expert must provide factfinder facts and data underlying expert’s testimony for factfinder “to accurately assess the testimony’s worth”); *Shenoy v. Jean*, No. 01-10-01116-CV, 2011 WL 6938538, at \*6 (Tex. App.—Houston [1st Dist.] Dec. 29, 2011, pet. denied) (“It is the expert’s explanation of ‘how’ and ‘why’ causation exists that allows the factfinder to weigh the credibility of the expert’s opinion and, when expert opinions conflict, to decide which testimony to disregard. . . . Expert testimony that merely states a final conclusion on an essential element of a cause of action . . . without providing a factual basis for that conclusion does not aid the jury in its role as factfinder but, rather, supplants it. This, an expert may not do.”).

1566. *Pollock*, 284 S.W.3d at 817–18 (“But even when some basis is offered for an opinion, if that basis does not, on its face, support the opinion, the opinion is still conclusory. . . . [I]f . . . the basis offered provides no support, the opinion is merely a conclusory statement and . . . the mere *ipse dixit* of a credentialed witness.”).

1567. *Whirlpool*, 298 S.W.3d at 637.

1568. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997).

1569. *See, e.g., Russell Equestrian Ctr., Inc. v. Miller*, 406 S.W.3d 243, 246–48 (Tex. App.—San Antonio 2013, no pet.) (holding in personal injury claim arising from collision between defendant’s vehicle and two horses that escaped from equestrian center that driver’s expert’s testimony was conclusory and speculative because it did not “explain how the alleged inadequacies of the electric fence and absence of a gate on the perimeter fence proximately caused the horses’ escape” and the expert conceded that he did not know the precise manner in which the horses escaped); *Wilson v. Shanti*, 333 S.W.3d 909, 911, 915 (Tex. App.—Houston [1st Dist.] 2011, pet. denied) (stating that *Gammill* requires the expert to “link his conclusions to the data or facts” and striking expert opinion for failure to link data with opinion); *Plunkett v. Conn. Gen. Life Ins. Co.*, 285 S.W.3d 106, 116 (Tex.

Appeals explained that the expert must show that too great an analytical gap does not exist “as the expert connects the foundational data or methodology with the opinion.”<sup>1570</sup> The Dallas and Fort Worth Courts of Appeals have observed that “an expert’s simple *ipse dixit* is insufficient to establish a matter; rather, the expert must explain the basis of the statements to link the conclusions to the facts.”<sup>1571</sup> The Dallas court also stated that the expert must reliably apply the methodology to the facts of the case.<sup>1572</sup>

Federal Rule 702 states that the expert must “reliably appl[y] the principles and methods to the facts of the case.”<sup>1573</sup> As explained in the Advisory Committee’s notes, “If the expert purports to apply principles and methods to the facts of the case, it is important that this application be conducted reliably.”<sup>1574</sup> One commentator has treated the analytical gap test as an example of this rule.<sup>1575</sup> As explained by the Federal Circuit, “one

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App.—Dallas 2009, pet. denied) (stating that an expert must “close the ‘analytical gap’ by showing ‘the connection between the data relied on and the opinion offered.’” (quoting *Ramirez*, 159 S.W.3d at 906)).

1570. *Wilson*, 333 S.W.3d at 913.

1571. *Qui Phuoc Ho v. MacArthur Ranch, LLC*, 395 S.W.3d 325, 333 (Tex. App.—Dallas 2013, no pet.); *Marvelli v. Alston*, 100 S.W.3d 460, 478 (Tex. App.—Fort Worth 2003, pet. denied) (quoting *Earle v. Ratliff*, 998 S.W.2d 882, 890 (Tex. 1999)); *see also* *Damian v. Bell Helicopter Textron, Inc.*, 352 S.W.3d 124, 148 (Tex. App.—Fort Worth 2011, pet. denied).

1572. *In re S.E.W.*, 168 S.W.3d 875, 884 (Tex. App.—Dallas 2005, no pet.) (“The court must independently evaluate the underlying data to ensure that the methodology is reliably applied in this specific case.”).

1573. FED. R. EVID. 702(d).

1574. FED. R. EVID. 702 advisory committee’s note.

1575. 4 WEINSTEIN & BERGER, *supra* note 27, § 702.05[2][d], at 702-105. As discussed in this section, Texas courts have generally focused on the “analytical gap” language rather than language referencing the reliability of the expert’s “application” of scientific or technical principles and methods to the facts of the case. But the Texas Court of Criminal Appeals requires that an expert’s technique be reliably applied in the context of scientific expert testimony. *Emerson v. State*, 880 S.W.2d 759, 763-69 (Tex. Crim. App. 1994) (en banc) (taking judicial notice of (1) the validity of the scientific theory of HGN testing and (2) the validity of the technique applying the theory and holding that the remaining *Kelly* admissibility issue—whether the officer properly applied the theory—had to be established by the State); *Kelly v. State*, 824 S.W.2d 568, 573 (Tex. Crim. App. 1992) (en banc) (“[T]he technique must have been properly applied on the occasion in question.”). At least one Texas appellate court has rejected a strict, mechanical application of this requirement, noting that minor variations in application of a technique may affect only the weight and not the admissibility of the evidence. *See, e.g.,* *McCarthy v. State*, No. 01-12-00240-CR, 2013 WL 5521926, at \*3, \*6 (Tex. App.—Houston [1st Dist.] Oct. 3, 2013, no pet.) (“*Emerson* squarely places the burden on the proponent of the HGN testing—in this case, the State—to establish that the officer properly applied the HGN test” but slight variations in its administration “do not render the evidence inadmissible or unreliable, but may affect the weight to give the testimony.” (quoting *McRae v. State*, 152 S.W.3d 739, 743 (Tex. App.—Houston [1st Dist.] 2004, pet. ref’d)); *see also* *United States v. Gipson*, 383 F.3d 689, 696-97 (8th Cir. 2004) (“[W]hen the application of a scientific

major determinant of whether an expert should be excluded under *Daubert* is whether he has justified the application of a general theory to the facts of the case.”<sup>1576</sup> Professor Graham describes this test as requiring proof the scientific theory is “employed in a manner consistent with processes customarily employed by experts in the particular field.”<sup>1577</sup> The U.S. Supreme Court, citing the preliminary draft of Rule 702, stated this principle ensures that courts examine not only the general reliability of the expert’s theory but also the specific question presented in deciding the particular issues in the case.<sup>1578</sup>

Federal courts have examined whether an expert’s extrapolation from data to a conclusion is reliable,<sup>1579</sup> a sufficient

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methodology is challenged as unreliable under *Daubert* and the methodology itself is otherwise sufficiently reliable, outright exclusion of the evidence in question is warranted only if the methodology ‘was so altered [by a deficient application] as to skew the methodology itself.’” (second alteration in original) (emphasis omitted) (quoting *United States v. Beasley*, 102 F.3d 1440, 1448 (8th Cir. 1996)); *United States v. Shea*, 211 F.3d 658, 668 (1st Cir. 2000) (“[A]ny flaws in [the expert’s] application of an otherwise reliable methodology went to weight and credibility and not to admissibility.”).

For nonscientific testimony, the Court of Criminal Appeals also requires the expert to properly rely on or utilize the principles involved in that field. *Weatherred v. State*, 15 S.W.3d 540, 542 (Tex. Crim. App. 2000) (following *Nenno v. State*, 970 S.W.2d 549, 561 (Tex. Crim. App. 1998)).

1576. *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1316 (Fed. Cir. 2011).

1577. 5 GRAHAM, *supra* note 34, § 702:5, at 218.

1578. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 156–57 (1999).

1579. *Johnson v. Arkema, Inc.*, 685 F.3d 452, 460 (5th Cir. 2012) (“[A]n expert may extrapolate data from studies of similar chemicals. However, [t]o support a conclusion based on such reasoning, the extrapolation or leap from one chemical to another must be reasonable and scientifically valid.” (citations omitted) (alteration in original) (quoting *Moore v. Ashland Chem. Inc.*, 151 F.3d 269, 279 (5th Cir. 1998))). The Fifth Circuit in *Johnson* held that the district court did not abuse its discretion in excluding an expert opinion that MBTC and HCl can cause restrictive lung disease and pulmonary fibrosis. *Id.* at 459–60. The expert “could not cite to one epidemiological or controlled study of humans indicating that exposure to MBTC or HCl could cause restrictive lung disease and pulmonary fibrosis.” *Id.* at 460. The plaintiff relied on a “class of chemicals” theory that the two chemicals are part of a larger group of chemicals that are “strong irritants,” which have been tied to lung scarring following acute exposure. *Id.* The court stated that an expert may form a reliable opinion regarding the effects of exposure to a particular chemical by extrapolating data from studies of similar chemicals, but “‘the extrapolation or leap from one chemical to another must be reasonable and scientifically valid.’ Thus, courts are free to reject a theory based on extrapolation when ‘there is simply too great an analytical gap between the data and the opinion proffered.’” *Id.* at 460–61 (quoting *Moore*, 151 F.3d at 279; *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)). The expert recognized that respiratory irritants have different chemical structures and that the exposure level must be of a sufficient concentration to cause inflammation but failed to “explain how” the properties of other similar irritants compared to the two chemicals in question or how he determined that the exposure level was sufficient to cause the plaintiff’s injury. *Id.* at 461–62. Accordingly, the trial court did not abuse its discretion in concluding that there was “too great of an analytical gap between the data and the opinion proffered.” *Id.* (quoting *Joiner*, 522 U.S. at 146); *see also* FED. R. EVID. 702 advisory committee’s note (identifying one reliability factor as “[w]hether the expert has unjustifiably extrapolated

connection exists between the data and conclusion,<sup>1580</sup> “too great a divide” exists between the expert’s data and conclusions,<sup>1581</sup> the expert explains how the opinion is supported by the data,<sup>1582</sup> and the conclusion flows from the data.<sup>1583</sup> They also examine the nexus,<sup>1584</sup> link,<sup>1585</sup> or correlation<sup>1586</sup> between the data and the

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from an accepted premise to an unfounded conclusion”); *Fuesting v. Zimmer, Inc.*, 421 F.3d 528, 536 (7th Cir. 2005) (stating that one “indicator of unreliability is the unjustifiable extrapolation from an accepted premise to an unfounded conclusion” and that expert’s reliance on basic polymer science was insufficient to “bridge the analytical gap between these basic principles and his complex conclusions”), *vacated in part on reh’g on other grounds*, 448 F.3d 936 (7th Cir. 2006); *Bocanegra v. Vicmar Servs., Inc.*, 320 F.3d 581, 585–89 (5th Cir. 2003) (holding that trial court erred in excluding toxicology expert’s testimony regarding the effect driver’s marijuana use eight hours earlier had on his driving ability on the night of fatal accident; opinion was reliable when expert relied on “extensive scientific literature showing that impairment of mental and cognitive functions from marijuana use continues to occur for at least twelve hours after the acute ‘high’ has worn off” and explaining that expert’s extrapolation from studies was not unreliable despite lack of evidence on the quality and quantity of marijuana ingested by driver and the degree of impairment did not require exclusion because “[t]he real world . . . does not operate like a controlled study. If all variables were required to be eliminated in a case where an actor has used marijuana or another drug and then been involved in an accident, evidence of drug use would never be presented to the fact-finder.” Without such evidence the trial would bear “little resemblance to what actually happened.”).

1580. *Lauzon v. Senco Prods., Inc.*, 270 F.3d 681, 687 (8th Cir. 2001) (stating expert must “sufficiently connect[]” opinion with facts of case).

1581. *Samaan v. St. Joseph Hosp.*, 670 F.3d 21, 33 (1st Cir. 2012).

1582. *Mahmood v. Narciso*, 549 F. App’x 99, 103 (3d Cir. 2013) (stating that while an expert may have had an independent basis to reach his conclusions, his conclusions “scarcely contained analysis—beyond a litany of sources listed as reviewed—showing how he reached” them); *Wendler & Ezra, P.C. v. Am. Int’l Grp., Inc.*, 521 F.3d 790, 791 (7th Cir. 2008) (holding there was no error in excluding expert opinion on source of posting on electronic bulletin board when expert failed to “say what software he used, what data he fed it, what results it produced, and how alternative explanations (including spoofing) were ruled out” because it amount to mere *ipse dixit*—“[a]n expert who supplies nothing but a bottom line supplies nothing of value to the judicial process” (quoting *Mid-State Fertilizer Co. v. Exch. Nat’l Bank of Chi.*, 877 F.2d 1333, 1339 (7th Cir. 1989))); *Cook ex rel. Estate of Tessier v. Sheriff of Monroe Cnty.*, 402 F.3d 1092, 1111 (11th Cir. 2005) (“[A] trial court may exclude expert testimony that is ‘imprecise and unspecific,’ or whose factual basis is not adequately explained.”); *Zuzula v. ABB Power T & D Co.*, 267 F. Supp. 2d 703, 713 (E.D. Mich. 2003) (stating that an expert “must explain not only what she did to reach her conclusion, but why and how she arrived at her result as well”); *see also* FED. R. EVID. 702 advisory committee’s note (stating a witness testifying on the basis of experience “must explain how that experience leads to the conclusion,” “why that experience is a sufficient basis,” and “how that experience is reliably applied” to the facts of the case).

1583. *Wisdom v. TJX Cos.*, 410 F. Supp. 2d 336, 341 (D. Vt. 2006) (“[T]he court is not obligated to accept a conclusion if it does not reliably flow from the facts available and methodologies used.”).

1584. *See Weisgram v. Marley Co.*, 169 F.3d 514, 517–21 (8th Cir. 1999) (reversing the admission of expert testimony because “the nexus between his observations of the contacts and his conclusion that the heater was defective is not scientifically sound”); *see also* *Grp. Health Plan, Inc. v. Philip Morris USA, Inc.*, 344 F.3d 753, 760–61 (8th Cir. 2003) (finding, in HMOs’ lawsuit against tobacco companies seeking to recoup increased health-care costs, no abuse of discretion in excluding plaintiffs’ causation expert because there was a disconnect between the expert’s testimony that members became ill because

expert's conclusion. For expert opinions based on scientific research or test results, one federal circuit court has observed that there must be a "connection between the scientific research or test result to be presented and particular disputed factual issues in the case."<sup>1587</sup> A failure "to bridge the analytical gap" is fatal.<sup>1588</sup> Similarly, expert testimony that is "imprecise and unspecific" or founded on an inadequately explained factual basis is inadmissible.<sup>1589</sup> Federal courts also examine whether an expert reliably applies foundational data or a methodology to the facts of the case.<sup>1590</sup>

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tobacco companies delayed marketing safer low tar cigarettes and plaintiff's theory that tobacco companies committed fraud by falsely marketing low tar cigarettes as allegedly healthier alternatives and that disconnect "weighs heavily against the admission of his testimony under *Daubert* because it undermines the existence of a 'legal nexus between the injury and the defendants' wrongful conduct' and thus does not properly 'fit' the HMOs' case" (citing *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 270 (2d Cir. 2002)); *Baker Valley Lumber, Inc. v. Ingersoll-Rand Co.*, 813 A.2d 409, 415–16 (N.H. 2002) (noting that a reliability analysis includes examining whether there is "a logical nexus between the expert's observations and conclusions"); *cf. LeLeaux v. Hamshire-Fannett Indep. Sch. Dist.*, 835 S.W.2d 49, 54 (Tex. 1992) (Doggett, J., dissenting) (noting that nexus "means a 'connection' or 'link'").

1585. *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 355 (5th Cir. 2007) (stating the data relied on by expert "failed to provide a 'relevant' link with the facts at issue" and therefore his "opinion was not based on 'good grounds'").

1586. *Mid-State Fertilizer Co.*, 877 F.2d at 1339–40 (holding that the expert must state both the foundation for the expert's opinion and the reasoning from that foundation).

1587. *Oddi v. Ford Motor Co.*, 234 F.3d 136, 145 (3d Cir. 2000) (quoting *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 743 (3d Cir. 1994)).

1588. *Wells v. SmithKline Beecham Corp.*, 601 F.3d 375, 378–81 (5th Cir. 2010) (holding that the district court did not abuse its discretion in excluding experts, in part because they failed to bridge analytical gap between generalized nature of class-wide dopamine agonist study and specific characteristics of Requip, "a drug that functions differently than other dopamine agonists").

1589. *Brown v. Ill. Cent. R.R. Co.*, 705 F.3d 531, 536–37 (5th Cir. 2013) (holding district court did not abuse its discretion in excluding testimony from driver's expert asserting that crossing was ultrahazardous because expert failed to furnish "some objective, independent validation of [his] methodology" when he relied on various guidelines and publications but "failed to explain how any of these authorities" supported his conclusion (alteration in original)); *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 671 (6th Cir. 2010) (holding district court erred in admitting neurologist's causation opinion because he "never explained how he made th[e] leap" of faith from general causation to specific causation); *Cook ex rel. Estate of Tessier v. Sheriff of Monroe Cnty.*, 402 F.3d 1092, 1111 (11th Cir. 2005) ("[A] trial court may exclude expert testimony that is 'imprecise and unspecific,' or whose factual basis is not adequately explained."); *United States v. Frazier*, 387 F.3d 1244, 1265 (11th Cir. 2004) (holding no error in finding the absence of a sufficiently verifiable, quantitative basis for opinion when expert "never explained just how" experience and various texts supported opinion).

1590. *Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd.*, 326 F.3d 1333, 1343–46 (11th Cir. 2003) (rejecting challenge to the application of expert testimony on computational fluid because the challenge focused on the specific application of the method, not on the reliability of the method in general; while the expert may have used incorrect data or failed to include data, such flaws "are of a character that impugn the *accuracy* of his

1. *Successful Challenges to Connective Reliability in the Texas Supreme Court.* As discussed in Part III.A above, in Texas, “conclusory” expert testimony is no evidence and will not support a judgment even when the opposing party failed to object to the testimony when it was admitted at trial.<sup>1591</sup> As discussed in Part III.A.2.b, expert evidence can constitute “no evidence” when there is an “analytical gap” between the opinion proffered and the facts of the case or the predicate on which the opinion is based.<sup>1592</sup> In fact, when expert testimony fails the “analytical gap” test in Texas, it is usually treated as “no evidence.”<sup>1593</sup> This means that a connective-reliability challenge can usually be raised for the first time after the verdict.<sup>1594</sup> But not always.<sup>1595</sup> For this reason, a number of the Texas Supreme Court’s key “connective

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results, not the general scientific *validity* of his methods”) (emphasis added). This requirement also originated in *Daubert*. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592–93 (1993) (stating methodology must be “properly . . . applied to the facts in issue”); *see also* *Krueger v. Johnson & Johnson Profl, Inc.*, 160 F. Supp. 2d 1026, 1031 (S.D. Iowa 2001) (holding that expert applied principles and methods “in an unreliable fashion”), *aff’d*, 66 F. App’x 661 (8th Cir. 2003); *cf.* *United States v. Kokenis*, 662 F.3d 919, 927–28 (7th Cir. 2011) (holding expert opinion unreliable because expert did not offer any evidence that pooling capital theory was applicable to transactions in question).

1591. *See supra* Part III.A.2; *see also supra* notes 268–69 and authorities cited therein. Federal courts have sometimes held that expert opinions without any stated basis are conclusory and thus inadmissible, *see, e.g., Zamecnik v. Indian Prairie School District No. 204*, 636 F.3d 874, 881 (7th Cir. 2011) (stating expert opinion that failed to identify any supporting research or methodology was not reliable; “Mere conclusions, without a ‘hint of an inferential process,’ are useless to the court.” (quoting *Mid-State Fertilizer Co.*, 877 F.2d at 1339)); but they generally have not relied on this principle as a means of holding that a reliability challenge may be raised for the first time after the verdict. *See supra* note 458.

1592. *See supra* Part III.A.2.b.

1593. *See supra* Part III.A.2.b.

1594. *See supra* Part III.A.2.b.

1595. The First Court of Appeals held in a recent case that an analytical gap objection was waived because it was not timely made in the trial court. *Church v. Exxon Mobil Corp.*, No. 01-11-00802-CV, 2012 WL 5381233, at \*4–5 (Tex. App.—Houston [1st Dist.] Nov. 1, 2012, no pet.) (mem. op.). The defendant’s expert explained the factual basis for his opinions that an accident where a restroom sink fell and injured the plaintiff did not occur as the plaintiff described it: he based his conclusions on the outcomes of his experiments, which he described in detail. *Id.* at \*2–3. On appeal, the plaintiffs complained that the expert’s experiments did not take into account some of the conditions in the restroom and testimony from two witnesses. *Id.* at \*3. The court of appeals stated that an evaluation of the merits of this complaint would require it to evaluate the expert’s underlying methodology, technique, or foundational data. That is, we must examine whether too great an analytical gap exists between the conditions present during [the] experiments and the conditions in the . . . restroom on the day [in question]. This is precisely the type of complaint that requires the appellant to have made a timely objection in the trial court.

*Id.* at \*5 (citations omitted). This opinion highlights that it is sometimes difficult to distinguish between a challenge to the foundational data and a challenge to an analytical gap because an analytical gap challenge necessarily requires reviewing the underlying data in order to determine the size of the gap between the data and the conclusion.

reliability” cases are discussed in Part III.A above, with regard to determining when opinion evidence is conclusory: an expert opinion that fails at the connective reliability gate is usually conclusory.<sup>1596</sup>

In 2004, the Court held for the first time an expert’s trial opinion was “incompetent” and no evidence based on an analytical gap in *Kerr-McGee Corp. v. Helton*.<sup>1597</sup> While the Court did not use the term “conclusory,” the Court’s analysis demonstrates when an opinion will be deemed conclusory. *Helton* concerned the probative value of expert testimony on the quantity of gas that would be produced from a hypothetical well.<sup>1598</sup> The expert relied on data from two surrounding wells to make his projections.<sup>1599</sup> But the Court held that this data, even if it was of the type relied upon by experts in the field and even if it was accurate, did not support the expert’s opinion because of an analytical gap between the data and the expert’s conclusion.<sup>1600</sup>

Helton argued that Kerr-McGee did not preserve error because in the trial court it had objected only to the expert’s foundational data, not to the expert’s methodology.<sup>1601</sup> The Court agreed that the defendant’s trial objection was what we call predicative reliability—that the opinion “was not sufficiently supported with facts or data”<sup>1602</sup>—but held the flaw in the expert’s reasoning fell within this issue.

In any event, the Court focused on the analytical gap between the data and the opinion. The Court observed that the hypothetical well had characteristics of a lower performing well than the two wells used for comparison, and some of the

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1596. See *supra* Part III.A.

1597. *Kerr-McGee Corp. v. Helton*, 133 S.W.3d 245, 247, 258 (Tex. 2004). Neither *Robinson* nor *Havner* describe the expert testimony that was unreliable in those cases as conclusory. *Havner* did state that “speculative testimony” is insufficient. *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 719 (Tex. 1997). In *Gammill*, the first analytical gap case in Texas, the Court affirmed a summary judgment for the defendant because of unreliable expert testimony. *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 715, 728 (Tex. 1998). The Court did not label the unreliable testimony as “conclusory,” “incompetent,” or “no evidence.”

1598. *Helton*, 133 S.W.3d at 257–58.

1599. *Id.* at 255, 257.

1600. *Id.* at 258.

1601. *Id.* at 252–53. *Helton* also presented a second preservation of error issue because the defendant did not object to the testimony until immediately after cross-examination. *Id.* at 251–52. The Court concluded that the objection was not too late because the basis for the objection became apparent during the cross-examination. *Id.* at 252. Moreover, the plaintiff was not subject to trial by ambush and had the opportunity to respond to the objection. *Id.*

1602. *Id.* at 253.

characteristics of the hypothetical well—such as its porosity and permeability—were unknown.<sup>1603</sup> Although it was “possible that the hypothetical well would have produced as much as [the expert] projected,” the Court’s task “is not to determine whether [the expert’s] opinion regarding the hypothetical well’s productivity is correct.”<sup>1604</sup> The Court acknowledged that the expert offered possible explanations for his conclusions; nevertheless, he did not “testify with any specificity how these factors affected his calculations.”<sup>1605</sup> The expert “failed to sufficiently explain” why the differences between his predicted well and the comparison wells “would not result in different production rates.”<sup>1606</sup> Quoting *Gammill*, the Court stated that “the gap in [the expert’s] analysis was his ‘failure to show how his observations . . . supported his conclusions.’”<sup>1607</sup> The expert’s opinion therefore was “incompetent” and no evidence.<sup>1608</sup>

Justice Hecht concurred, noting an analytical gap between the factual premises—the geology of the area, the characteristics of the wells used for comparison, and other factors affecting a well’s production—and the expert’s conclusions.<sup>1609</sup> But he added one other reason for rejecting the testimony: the expert’s methodology did not comply with industry standards for determining where to drill. “Reliability does not mean one thing outside the courtroom and something less inside. If the industry would rely on expert analysis like [the expert’s] to determine where to drill, then it was reliable for purposes of the trial. If not, it should not have been admitted.”<sup>1610</sup>

Arguably, the Court also signaled more willingness to consider reliability challenges raised for the first time postverdict by rejecting the plaintiff’s contention that the defendant waived error when it failed to object to two documents that summarized

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1603. *Id.* at 255–56.

1604. *Id.* at 257.

1605. *Id.*

1606. *Id.* at 258.

1607. *Id.* at 257; *see also* *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 839 (Tex. 2010) (observing that an expert cannot neglect to account for inconsistencies raised by his theory and that he failed to explain why he ruled out another potential cause of the incident (citing *Volkswagen of Am., Inc. v. Ramirez*, 159 F.W.3d 897, 910–12 (Tex. 2009))); *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 642 (Tex. 2009) (observing repeatedly that the expert did not explain how the data supported his opinion and that the expert’s test “did not support all the various and critical parts of his opinion”); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 805 (Tex. 2006) (stating that expert did not explain how defective tire could be used for 30,000 miles and suffer a nail puncture without failing).

1608. *Helton*, 133 S.W.3d at 258.

1609. *Id.* at 261–62 (Hecht, J., concurring).

1610. *Id.* at 262.

the expert's opinion. The exhibits contained the same unreliable damages calculation as the testimony. The Court reasoned that if the opinion is unreliable, the exhibits were also unreliable and no evidence.<sup>1611</sup> The failure to object did not waive error because the defendant's challenge was a no-evidence challenge, rather than a challenge to admissibility.<sup>1612</sup> The Court did not address why this no-evidence holding did not eliminate the need to address whether the expert challenge was timely; if the opinion was conclusory due to an analytic gap, there was no need to make an objection to either the testimony or the exhibit. As discussed above, such a holding would have been arguably consistent with the Court's subsequent holdings on error preservation, particularly *Pollock*.<sup>1613</sup>

The key point in *Helton*, at least for error preservation purposes, was its holding that the expert's testimony was incompetent because of an analytical gap. This holding was important because of two other well-established preservation rules: (1) incompetent evidence does not support a judgment "even if admitted without objection";<sup>1614</sup> and (2) conclusory testimony "cannot support a judgment even when no objection was made to the statements at trial."<sup>1615</sup> The Court in *Helton* treated the expert's opinion as conclusory.

In the same year that the Court decided *Helton*, the Court held in *Ramirez*, that an expert's opinion was conclusory despite the expert's incantation of scientific principles, physical evidence, and testing.<sup>1616</sup> The driver of a Passat was killed when the vehicle went across the grassy median and crashed into an oncoming vehicle.<sup>1617</sup> It was undisputed that the left rear wheel separated from the vehicle; the dispute was whether the crash caused the separation or the separation caused the crash. The defendant did not object to the expert's methodology used to conclude that the rear wheel of the plaintiff's car came loose from the axle causing the accident.<sup>1618</sup> The Court therefore was limited

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1611. *Id.* at 252 (majority opinion).

1612. *Id.*

1613. *See supra* notes 322–26 and accompanying text.

1614. *City of Keller v. Wilson*, 168 S.W.3d 802, 812 (Tex. 2005) (relying on *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 232 n.1 (Tex. 2004) and *Henry v. Phillips*, 151 S.W. 533, 537–38 (Tex. 1912) (applying rule to hearsay testimony, which before the adoption of TEX. R. EVID. 803 was incompetent)). *Coastal Transport* described the inadmissible evidence as "incompetent" and "conclusory." *Coastal Transp.*, 136 S.W.3d at 232.

1615. *Coastal Transp.*, 136 S.W.3d at 232.

1616. *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 905, 910–12 (Tex. 2004).

1617. *Id.* at 901.

1618. *Id.* at 911.

to reviewing the face of the record.<sup>1619</sup> But that limited review demonstrated that even if the methodology was reliable, “the facts on which he relied did not support his conclusion.”<sup>1620</sup>

A metallurgist testified that a defect existed in a metal bearing in the axle, and also offered testimony that the wheel assembly broke before—not after—the collision.<sup>1621</sup> While his testimony was lengthy, the metallurgist did not identify any data, testing, or physical evidence (other than the grass in the wheel hub) supporting his causation opinion.<sup>1622</sup> For example, the expert’s testimony that a defect in the Passat’s left rear wheel assembly would be consistent with “erratic vehicle behavior” was an “unsupported conclusion” because the expert did not identify any supporting data such as other testimony, tests, and skid marks.<sup>1623</sup> The one piece of physical evidence the metallurgist relied on—the finding of grass in the wheel hub—was “just as consistent with the wheel coming off in the median after the Passat went out of control as it is with a wheel separation prior to entering the median.”<sup>1624</sup> Finally, the metallurgist’s testimony failed “to answer a crucial question raised by the [plaintiff’s] theory of causation—how the floating wheel stayed in the wheel well as the Passat traveled through the median and collided with the Mustang.”<sup>1625</sup> Thus, the metallurgist’s causation opinion was conclusory.<sup>1626</sup> The Court concluded that the causation opinion was conclusory because of “fatal gaps in an expert’s analysis. . . . While juries are important to our legal system, they cannot credit as some evidence expert opinions that are not reliable or are conclusory on their face. These principles are consistent with a legal-sufficiency review.”<sup>1627</sup>

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1619. *Id.*; see also *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817–18 (Tex. 2009) (discussing *Ramirez*, 159 S.W.3d at 911).

1620. *Pollock*, 284 S.W.3d at 817–18 (discussing *Ramirez*, 159 S.W.3d at 911).

1621. *Ramirez*, 159 S.W.3d at 910–11.

1622. *Id.* at 911.

1623. *Id.* at 905–06, 911.

1624. *Id.* at 911.

1625. *Id.*

1626. The Court stated that the bulk of the testimony relied upon by the dissent concerned his opinion on the existence of a defect, not causation. *Id.* at 911–12.

1627. *Id.* The Court also held that an accident reconstructionist’s testimony that the vehicle’s left rear wheel detached from the stub axle at the time of the collision but stayed “tucked underneath” the left rear wheel well as the car went across the grassy median was inadmissible. *Id.* at 904, 906. The expert relied on the “laws of physics” as the basis for his “floating wheel” theory and provided a very short explanation. *Id.* at 904. But that explanation was insufficient. *Id.* at 906. He also relied on “generally accepted” accident reconstruction principles, but again these principles were general and he did not show how they led to his conclusion. See *id.* at 905–06. He did perform tests but those tests concerned how the bearing failed and not when it failed. *Id.* Looking to the *Daubert*

Justice Hecht's concurrence detailed other gaps in the metallurgist's analysis. While the metallurgist performed a microscopic examination of the wheel bearing, he did not "connect [his] observations with his conclusions" except through his "so-say."<sup>1628</sup> He did not present any "objective tests that actually associate microscopic conditions with producing causes, or by statistical correlations between such conditions and bearing failures, or by analyses in the professional literature of the science of metallurgy."<sup>1629</sup> The validity of his opinions "can be measured by one thing, and one thing only: his personal credibility."<sup>1630</sup>

Chief Justice Jefferson in dissent set out the detailed testimony of the metallurgist and argued that his testimony was legally-sufficient evidence to support the jury verdict and was not equivalent to "the paltry testimony at issue in *Coastal*."<sup>1631</sup> By treating the testimony as conclusory,

the Court sets a dangerous precedent that threatens to fundamentally alter the nature of no-evidence review. Rather than indulging every reasonable inference in favor of the jury's finding, the Court adopts a contrary approach, tipping the scale in the opposite direction to dismiss as "conclusory" expert testimony that supports the verdict.<sup>1632</sup>

He observed that the expert's methodology was unchallenged and that the expert's conclusions were "in a technical area in which judges have no particular expertise" and therefore should be reviewed under factual sufficiency, not legal sufficiency.<sup>1633</sup>

Less than two years after *Ramirez*, in *Cooper Tire*, a 2006 manufacturing defect case, the Court utilized the *Daubert* factors in holding that a former tire technician's opinion was speculative

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factors, the Court observed that he did not rely on any supporting tests, studies, or calculations and therefore failed to show any connection between his data and opinion. *Id.* at 904–06. His opinion was "based solely upon his subjective interpretation of the facts." *Id.* at 906. Thus, the *Ramirez* Court treats the *Daubert* factors as part of its analysis of whether an analytical gap exists; the expert could have tried to fill the gap between the data of the accident and the opinion with tests or literature but he failed to do so.

In *Wal-Mart Stores, Inc. v. Merrell*, the Court summarized *Ramirez* as holding that expert testimony that "failed to account for the sequence of events" was conclusory. *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 839 (Tex. 2010). While the *Ramirez* expert provided "some evidence" for his defect theory, "he neglected to account for inconsistencies raised by this theory, thereby nullifying the probative value of his testimony." *Id.*

1628. *Ramirez*, 159 S.W.3d at 912 (Hecht, J., concurring).

1629. *Id.* at 912–13.

1630. *Id.* at 913.

1631. *Id.* at 915–17 (Jefferson, C.J., dissenting).

1632. *Id.* at 917 (footnote omitted).

1633. *Id.* at 917 n.3. In response, the Court stated that its decision was consistent with *Coastal Transport, Schaefer*, and *Havner*. *Id.* at 910–12 (majority opinion).

and an engineer's opinion was conclusory and therefore the opinions were no evidence to support the jury verdict.<sup>1634</sup> The former tire technician's opinion that a tire separated because of wax contamination during the manufacturing process was unsupported by any scientific testing, peer-reviewed studies, or any support in the scientific community.<sup>1635</sup> It was nothing more than "subjective belief or unsupported speculation"—essentially a "naked hypothesis untested and unconfirmed by the methods of science," and was legally insufficient to establish a manufacturing defect that caused the failure.<sup>1636</sup> The bulk of the testimony by the second expert, an engineer, addressed other issues, but he also testified, over one and one-half pages of transcript, that the tire contained a manufacturing defect based on his microscopic examination and x-rays of the tire.<sup>1637</sup> The Court stated that he offered the opinion in a "conclusory fashion."<sup>1638</sup> His opinion was not supported by the *Daubert* factors; it was subjective and unsupported by any testing or peer-reviewed literature.<sup>1639</sup> There was no proof that his observational technique—his methodology—was generally accepted or used in non-judicial contexts. It was "fundamentally unsupported."<sup>1640</sup> Utilizing the "link" test used by Justice Hecht in his *Ramirez* concurrence, the Court stated that "the only basis for the link between the [engineer's] observations and his conclusions was his own say-so."<sup>1641</sup>

In *Mack Trucks*, a 2006 products liability decision arising out of a truck fire, the Court concluded that the expert's opinion that defects in the truck's fuel and battery system caused the fire was inadmissible under the *Gammill* analytical gap test.<sup>1642</sup> The expert "did no more than set out 'factors' and 'facts' which were consistent with his opinions" and then his conclusion.<sup>1643</sup> The

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1634. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800–06 (Tex. 2006).

1635. *Id.* at 802–03.

1636. *Id.* at 805 (quoting *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995)).

1637. *Id.*

1638. *Id.* at 805–06.

1639. *Id.* at 806.

1640. *Id.*

1641. *Id.* (citing *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 912–13 (Tex. 2004) (Hecht, J., concurring)).

1642. *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 575, 580–81 (Tex. 2006).

1643. *Id.* at 581; *see also Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 643 (Tex. 2009) (describing *Mack Trucks* as "noting that factors relied on by an expert consistent with the release of diesel fuel prior to a fire were not probative evidence that diesel fuel was released because of an asserted defect in the fuel system").

The Court also held that testimony from the plaintiff's expert on a possible cause of the fire was "speculative" and affirmed a summary judgment for the defendant. *Mack Trucks*, 206 S.W.3d at 583–84. The Court's holding in this part of the case did not

Court evaluated the testimony using several *Daubert* factors as part of its *Gammill* analysis; it noted that the expert did not test his theory, identify any research or calculations that supported his opinions, or identify any methodology “by which he excluded other sources for ignition of the diesel fuel.”<sup>1644</sup> “In sum, [he] did not testify . . . to a methodology by which he reached [his] conclusions” and the trial court “was not required to accept his opinions at face value just because” he was well-qualified.<sup>1645</sup> While the Court did not use the term conclusory, that is the clear import of its holding. *Mack Trucks*, therefore, is another example of the Court using the *Daubert* factors in determining that an expert’s testimony had no support and therefore was no evidence.

In its 2009 decision in *Whirlpool*, the Texas Supreme Court held that an expert’s failure to offer “an explanation of why” testing of the expert’s opinion was not performed may, along with the absence of other *Daubert* factors, rendered that opinion conclusory.<sup>1646</sup> The plaintiffs brought a wrongful death action against the clothes dryer manufacturer after a house fire.<sup>1647</sup> An electrical engineer testified that the dryer was defectively designed because it allowed accumulated lint to be drawn into the heater where it ignited.<sup>1648</sup> The Court stated that the reliability inquiry includes a rigorous examination of “the manner in which the principles and methodologies are applied by the expert to reach the conclusions.”<sup>1649</sup> First, the Court analyzed the opinion under the analytical gap test.<sup>1650</sup> The expert relied on a report by the Consumer Product Safety Commission but he did not explain how it supported his conclusion.<sup>1651</sup>

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rely on the *Daubert* factors or any failure in the underlying data; it was based on the nature of the testimony itself. *Id.* The testimony regarding the other possible ignition source “is not evidence that it probably did so.” *Id.* at 583.

1644. *Mack Trucks*, 206 S.W.3d at 580–81.

1645. *Id.* at 581.

1646. *Whirlpool*, 298 S.W.3d at 642–43.

1647. *Id.* at 634.

1648. *Id.* at 634–36.

1649. *Id.* at 637.

1650. *Id.* at 639.

1651. *Id.* at 642. Note that the Court has on more than one occasion utilized its description of an opinion as “subjective” as support for its holding that the opinion was conclusory. *Id.* at 643; *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 806 (Tex. 2006) (stating that the expert’s opinion was stated “in conclusory fashion” and “was subjective”); *cf.* *Tex. Div.-Tranter, Inc. v. Carrozza*, 876 S.W.2d 312, 314 (Tex. 1994) (“[Plaintiffs] subjective beliefs are no more than conclusions and are not competent . . . .”); *Brownlee v. Brownlee*, 665 S.W.2d 111, 112 (Tex. 1984) (stating affidavits consisting of nothing more than conclusions or expressions of subjective belief are not competent summary judgment proof).

The subjectiveness of the expert’s opinion is a *Robinson* factor. *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 557 (Tex. 1995) (identifying as one of its

If testing of critical aspects of an expert's testimony has not taken place either by the expert or others in the relevant scientific or expert community, then an explanation of why it has not is an important consideration in evaluating the expert opinions and determining whether they are substantively more than merely the expert's conclusory, subjective opinion.<sup>1652</sup>

The Court underscored its requirement that "each material part of an expert's theory must be reliable."<sup>1653</sup> And the other facts relied on by the expert were "consistent with and support a conclusion that fire was in and around the dryer, not that the fire originated as [the expert] said it did."<sup>1654</sup> Next, the Court determined that the expert's methodology failed the *Daubert* factors.<sup>1655</sup> Ultimately, the Court held that the testimony was conclusory.

Importantly, in *Whirlpool*, the Court rejected the contention that experience can always be used to fill gaps in an expert's application of the principles, methodologies, and facts of the case:

If courts merely accept "experience" as a substitute for proof that an expert's opinions are reliable and then only examine the testimony for analytical gaps in the expert's logic and opinions, an expert can effectively insulate his or her conclusions from meaningful review by filling gaps in the testimony with almost any type of data or subjective opinions.<sup>1656</sup>

The Texas Supreme Court recently applied the connective reliability test to find expert testimony conclusory in *Elizondo v. Krist*, a legal malpractice lawsuit in which the plaintiffs alleged that their attorney failed to obtain an adequate settlement for personal injuries suffered in an industrial plant explosion.<sup>1657</sup> The significance of *Elizondo* is that it makes more explicit that a sufficiently large analytical gap in the expert's reasoning makes the expert's opinion conclusory; the question remains how large the gap must be.

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factors "the extent to which the technique relies upon the subjective interpretation of the expert"). It also underlies part of the rationale of *Daubert*. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590 (1993) (noting that scientific evidence is grounded "in the methods and procedures of science... connotes more than subjective belief or unsupported speculation").

1652. *Whirlpool*, 298 S.W.3d at 642–43.

1653. *Id.* at 637.

1654. *Id.* at 643.

1655. *Id.* at 642–43.

1656. *Id.* at 639.

1657. *Elizondo v. Krist*, 415 S.W.3d 259, 260–61, 266 (Tex. 2013).

*Elizondo* has facts similar to those in *Burrow v. Arce*,<sup>1658</sup> but in *Elizondo* the affidavit was submitted by the plaintiffs in response to the defendant law firm's no-evidence summary judgment motion on damages. In *Burrow* the affidavit was submitted in support of the defendant law firm's traditional summary judgment motion.<sup>1659</sup> The attorney-affiant in *Elizondo* represented more than 500 of the over 4000 claimants in litigation arising from the explosion and served as the court-appointed plaintiffs' liaison counsel with the defendant on discovery issues.<sup>1660</sup> The attorney, based on this experience, identified ten criteria used by the plant owner to determine a claimant's settlement value.<sup>1661</sup> He opined that the case had a settlement value of forty to sixty times the settlement amount obtained by the lawyer-defendant based on four criteria: (1) the injured worker's injuries and work history; (2) the lawyer's experience in the litigation arising out of this explosion; (3) his knowledge of general settlement values; and (4) the settlement criteria used by the plant owner.<sup>1662</sup> The expert did not state, however, how he applied these factors to determine the settlement value.

As discussed above, the Court approved the attorney's reliance on the defendant's other settlements with similarly situated plaintiffs as a predicate for his opinion about the value of the plaintiffs' claims.<sup>1663</sup> The Court also approved of the general methodology, observing that an expert may reach an opinion on malpractice damages "by persuasively comparing all the circumstances of the case to the settlements obtained in other cases with similar circumstances arising from the event."<sup>1664</sup> But the attorney affidavit fell short at the connective reliability gate because the attorney merely stated that he considered these factors and that based on them the Court should "take his word that the settlement was inadequate."<sup>1665</sup> The expert did not provide a "reasoned basis" for concluding the settlements were inadequate nor did he "explain why" the settlements were unreasonable.<sup>1666</sup> Specifically, even though the expert explained how strong or weak the plaintiffs'

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1658. *Burrow v. Arce*, 997 S.W.2d 229 (Tex. 1999); see *supra* notes 301–08 and accompanying text.

1659. *Elizondo*, 415 S.W.3d at 261; *Burrow*, 997 S.W.2d at 234.

1660. *Elizondo*, 415 S.W.3d at 260, 272.

1661. *Id.* at 262.

1662. *Id.* at 261–62.

1663. See *supra* note 914 and accompanying text.

1664. *Elizondo*, 415 S.W.3d at 263.

1665. *Id.* at 264–66.

1666. *Id.* at 265 (quoting *Burrow v. Arce*, 997 S.W.2d 229, 236 (Tex. 1999)).

claims were on each of the factors considered by the defendant in determining settlement amounts, because the expert did not disclose the amount of any of the other settlements, there was no means by which to compare the settlement amount of similarly situated plaintiffs to the settlement amount at issue.<sup>1667</sup> The expert “fail[ed] to link” the settlement amount to the factors of the case.<sup>1668</sup> Thus, “[a] fatal analytical gap divide[d] the recitation of the facts . . . and the declaration of its settlement value” and the expert’s opinions were conclusory.<sup>1669</sup>

In the Court’s most recent case on expert testimony, *Houston Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, the Court held that “material shortcomings” in the data relied on by the expert, the expert’s reasoning, and the failure to account for differences between the underlying data and the facts of the case made the expert’s opinions “conclusory” and “incompetent.”<sup>1670</sup>

2. *Unsuccessful Challenges in the Texas Supreme Court.* The Court rejected an analytical gap challenge to expert testimony on the cause of a crop failure in *Helena Chemical*.<sup>1671</sup> Some farmers claimed a grain seller misrepresented a particular grain’s production in dry land.<sup>1672</sup> The expert, a plant scientist,<sup>1673</sup> testified, based on a physical inspection of the crop, weather and weed control reports, the seller’s marketing literature, and plant samples from adjacent fields used for comparison purposes, that the seed did not produce well in dry land.<sup>1674</sup> The expert admitted, however, that the test results “should be taken with a grain of salt.”<sup>1675</sup> The Court stressed the expert’s substantial experience and noted that he “explained” the results of several crop trials and “why . . . and . . . how they supported his opinions.”<sup>1676</sup> Thus, his “experience, coupled with his thorough testimony about the methodology he employed,” were sufficient to demonstrate the connection between his opinion and the underlying data.<sup>1677</sup>

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1667. *Id.* at 264–66.

1668. *Id.* at 266 (quoting *Elizondo v. Krist*, 338 S.W.3d 17, 22 (Tex. App.—Houston [14th Dist.] 2010), *aff’d*, 415 S.W.3d 259 (Tex. 2013)).

1669. *Id.*

1670. *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*8–15 (Tex. Aug. 22, 2014).

1671. *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 491, 500–01 (Tex. 2001).

1672. *Id.* at 491.

1673. *Helena Chem. Co. v. Wilkins*, 18 S.W.3d 744, 753 (Tex. App.—San Antonio 2000), *aff’d*, 47 S.W.3d 486 (Tex. 2001).

1674. *Helena Chem.*, 47 S.W.3d at 498, 500–01.

1675. *Helena Chem.*, 18 S.W.3d at 754.

1676. *Helena Chem.*, 47 S.W.3d at 501.

1677. *Id.*

An analytical gap did not exist in *Ford Motor Co. v. Ledesma*, a claim involving a manufacturing defect in the u-bolts holding a truck's rear axle to its rear springs.<sup>1678</sup> The critical factual dispute was whether the truck's axle dislodged and caused the accident or whether the axle dislodged as a result of the accident.<sup>1679</sup> Ledesma's expert, a mechanical engineer, opined that the manufacturer did not sufficiently tighten the u-bolts fastening the drive shaft to the truck.<sup>1680</sup> The expert relied on his measurements of various truck components and on various Ford specifications.<sup>1681</sup> His inspection revealed that the u-bolts were under-torqued, but the torques might have changed due to the accident.<sup>1682</sup> He explained a number of reasons that the u-bolt could have become under-torqued during manufacturing, and identified a number of his observations of the components that "were consistent with his theory of a u-bolt that was loose before the accident."<sup>1683</sup> Because the expert offered a "plausible theory" based on his observations and measurements, there was not "too great" of an analytical gap so as to make the admission of this testimony an abuse of discretion.<sup>1684</sup>

In *TXI Transportation*, the Court also rejected an analytical gap argument and held that an accident reconstructionist's opinion on the cause of an auto-truck collision was not conclusory.<sup>1685</sup> It had factual support, even though the facts were disputed.<sup>1686</sup> Physical evidence supported his theory and he did not cherry-pick parts of the driver's testimony or twist its meaning.<sup>1687</sup> "Reliability may be demonstrated by the connection of the expert's theory to the underlying facts and data in the case."<sup>1688</sup> Unlike *Ramirez*, those connections were made in *TXI Transportation*. In summary, the expert's "observations, measurements, and calculations were . . . tied to the physical evidence in the case which likewise provided support for his conclusions and theory."<sup>1689</sup>

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1678. *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 36–37, 40–41 (Tex. 2007).

1679. *Id.* at 36.

1680. *Id.* at 37–38.

1681. *Id.* at 38.

1682. *Id.* at 37–38.

1683. *Id.* at 38.

1684. *Id.* at 39–41.

1685. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 234, 239–40 (Tex. 2010).

1686. *Id.* at 236.

1687. *Id.* at 237–38.

1688. *Id.* at 239.

1689. *Id.* at 240.

In *Crump*, the Texas Supreme Court approved the use of a differential diagnosis methodology and found no gap between that methodology and the expert's medical opinion.<sup>1690</sup> After rejecting Crump's contention that courts should use a "less strict" application of the *Daubert* factors to assess the reliability of the expert's opinion because differential diagnosis is an established medical technique,<sup>1691</sup> the Court analyzed first whether the expert's methodology was sound under the *Daubert* factors and then whether it passed *Gammill's* analytical gap test.<sup>1692</sup> The Court determined that there was not an impermissible analytical gap: "As explained above in addressing the [*Daubert*] factors, an analytical gap between the data and opinion is not shown here because" the expert had shown how his observation supported his conclusions.<sup>1693</sup> The Court stated that any remaining gaps "between the data and the conclusion drawn from it go to the weight of [the expert's] testimony—not its reliability."<sup>1694</sup> *Crump* reaffirms that not all analytical gaps must be filled. By identifying some gaps as "fatal,"<sup>1695</sup> "large,"<sup>1696</sup> or "significant,"<sup>1697</sup> the Court indicates that some gaps are permissible; they simply must not be "too great."<sup>1698</sup>

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1690. *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 213, 217–19 (Tex. 2010); *see also supra* notes 1517–34 and accompanying text (discussing differential diagnosis and *Crump*).

1691. *Crump*, 330 S.W.3d at 216; *see supra* Part III.C.2.j (discussing differential diagnosis as a predicate for expert testimony).

1692. *Crump*, 330 S.W.3d at 216–19.

1693. *Id.* at 219.

1694. *Id.* at 220.

1695. *Elizondo v. Krist*, 415 S.W.3d 259, 264–66 (Tex. 2013) (stating that an expert's testimony is unreliable and no evidence "if there are fatal gaps in his analysis that leave the court to take his word" and twice identifying a "fatal gap" in the expert's analysis); *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 912 (Tex. 2004) ("We are not required . . . to ignore fatal gaps in an expert's analysis or assertions that are simply incorrect."); *see also City of San Antonio v. Pollock*, 284 S.W.3d 809, 825 (Tex. 2009) ("[T]he City maintains that [the expert's] testimony contains a fatal 'analytical gap' because he failed to account for atmospheric conditions. This analytical gap, the City argues, renders [the expert's] opinion conclusory.").

1696. *Pollock*, 284 S.W.3d at 819.

1697. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 235 (Tex. 2010) ("In other words, we determine whether there are any significant analytical gaps in the expert's opinion that undermine its reliability."); *see also Crump*, 330 S.W.3d at 217 (quoting *TXI Transp.* for this proposition).

1698. *Elizondo*, 415 S.W.3d at 264; *In re Commitment of Bohannon*, 388 S.W.3d 296, 305 (Tex. 2012); *Enbridge Pipelines (E. Tex.) L.P. v. Avinger Timber, LLC*, 386 S.W.3d 256, 262 (Tex. 2012); *Crump*, 330 S.W.3d at 219; *TXI Transp.*, 306 S.W.3d at 239; *Pollock*, 284 S.W.3d at 823; *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 39 (Tex. 2007); *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 578 (Tex. 2006); *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800 (Tex. 2006); *Ramirez*, 159 S.W.3d at 904–05; *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629 (Tex. 2002); *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726–27 (Tex. 1998) (quoting *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)).

The Court's rejection of analytical gap challenges in these three cases demonstrates that the gap between an expert's opinions and the facts or predicative data on which they are based can be filled by the expert herself, by another expert, or by other evidence. Additionally, given the rule that some matters do not require expert testimony, a gap can also be filled through common experiences and information available to jurors (and the judges). Finally, some gaps may be so small that they do not need to be filled.

3. *Texas Courts of Appeals' Cases Examining Alleged Analytical Gaps.* Texas courts of appeals have frequently concluded that expert testimony failed the connective reliability test either by affirming trial court rulings excluding expert testimony or by reversing a contrary trial court ruling,<sup>1699</sup> but they have also frequently denied reliability challenges both by agreeing and disagreeing with the trial court.<sup>1700</sup>

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1699. See, e.g., *Plunkett v. Conn. Gen. Life Ins. Co.*, 285 S.W.3d 106, 116–17 (Tex. App.—Dallas 2009, pet. denied) (holding expert did not close gap between conclusions and foundational data and did not offer any “empirical evidence or methodology that explains the validity of his extrapolation”); *Driskill v. Ford Motor Co.*, 269 S.W.3d 199, 202, 205 (Tex. App.—Texarkana 2008, no pet.) (holding that analytical gap existed “between the origin of a fire in the left rear area of an engine compartment and the conclusion that the [speed control deactivation switch] in that area was the cause-in-fact of the fire”); *Feria v. Dynagraphics Co.*, No. 08-00-00078-CV, 2004 WL 500869, at \*1–2, \*7 (Tex. App.—El Paso Mar. 15, 2004, pet. denied) (mem. op.) (holding, in toxic tort case, that trial court did not err in granting a motion to strike expert testimony on the grounds that the plaintiffs had failed to present sufficient epidemiological data to support causation because when an expert's opinion is based on medical literature, the expert “must base his opinion on a ‘broad reading of the medical literature’” and it is insufficient for the expert to tender “hundreds of pages” of articles without explaining how the articles supported her opinion (quoting *Minn. Mining & Mfg. Co. v. Atterbury*, 978 S.W.2d 183, 193 (Tex. App.—Texarkana 1998, pet. denied))); see also *Hudgens v. Bell Helicopters/Textron*, 328 F.3d 1329, 1330–31, 1343–44 (11th Cir. 2003) (holding in products liability claim against a maintenance contractor that the trial court did not err in excluding an engineer's opinion regarding spar cracks in a vertical fin because expert offered “no explanation of how he formed the opinion” nor did he explain “the likelihood he assigns to each of the unknowns nor spoken with the sort of ‘precision and logic’ that would allow us to assess the relationship between his experience as a materials engineer and his opinion in this case” (quoting *United States v. Frazier*, 322 F.3d 1262, 1268 (11th Cir. 2003))); *Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194, 1202 (11th Cir. 2002) (holding that expert's opinion was based on “several scientifically unsupported ‘leaps of faith’”); *DeGrate v. Exec. Imprints, Inc.*, 261 S.W.3d 402, 411 (Tex. App.—Tyler 2008, no pet.) (concluding, without citing *Gammill* or analytical gap test, that expert failed to provide basis for opinion the candles were defectively designed).

1700. See, e.g., *Duncan-Hubert v. Mitchell*, 310 S.W.3d 92, 96–97, 101–06 (Tex. App.—Dallas 2010, pet. denied) (reversing trial court order granting no-evidence summary judgment in election contest after striking testimony by assistant professor of sociology that it was impossible, from a statistical analysis, to determine with any degree of reasonable accuracy whether outcome of election would have been different had the complained-of irregularities not occurred because expert testified about facts supporting opinion and explained how he reached that opinion); *Gen. Motors Corp. v. Burry*, 203

An example of an intermediate court addressing gaps between the underlying data and the expert's opinion is *Lincoln v. Clark Freight Lines, Inc.*, a wrongful death lawsuit arising from an intersection collision.<sup>1701</sup> The plaintiff sought to exclude the opinion of a qualified sheriff's deputy that the decedent's father, who was driving a Ford Mustang, and not the tractor-trailer driven by the defendant, ran the red light.<sup>1702</sup> The plaintiff contended on appeal that an analytical gap existed between the data and the deputy's conclusions.<sup>1703</sup>

First, the plaintiff argued that because the deputy used a Camaro in his coefficient of friction test, rather than a Mustang, all of the opinions drawn from his calculations were flawed.<sup>1704</sup> In other words, the plaintiff argued that the expert could not extrapolate data from one type of vehicle to another type of vehicle. The court rejected this contention, noting the deputy's testimony that the differences between the Camaro and the Mustang had no effect on the coefficient of friction value.<sup>1705</sup> For example, while the Mustang had a manual transmission and the Camaro had an automatic transmission, those differences did not alter the coefficient of friction value.<sup>1706</sup> Similarly, the expert explained that the weight difference between the vehicles "did not matter" in determining the coefficient of friction.<sup>1707</sup> The

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S.W.3d 514, 534–35 (Tex. App.—Fort Worth 2006, pet. denied) (holding that expert sufficiently explained how the proposed alternative safer design would function); Halim v. Ramchandani, 203 S.W.3d 482, 489, 492 (Tex. App.—Houston [14th Dist.] 2006, no pet.) (affirming trial court determination in medical malpractice claim that there was not too great an analytical gap between the doctor's expert opinions and the basis for which they were founded—the expert's experience—and rejecting contention that *Havner* requires epidemiological evidence in medical malpractice claim); *In re D.S.*, 19 S.W.3d 525, 528–30 (Tex. App.—Fort Worth 2000, no pet.) (affirming reliability of expert opinion that child suffered an intentional immersion burn rather than an accidental injury based on comparison of the burn pattern with the parent's explanation); Ford Motor Co. v. Aguiniga, 9 S.W.3d 252, 263–64 (Tex. App.—San Antonio 1999, pet. denied) (concluding in automobile fatality that the plaintiffs' expert's opinion that a faulty pump relay caused the engine to stall, resulting in steering and brake failure, was based on objective data such as photographs of the pump relay and a visual examination of the relay and no analytical gap existed between the data and the conclusion); Kroger Co. v. Betancourt, 996 S.W.2d 353, 362–63 (Tex. App.—Houston [14th Dist.] 1999, pet. denied) (concluding there was no analytical gap between expert's opinion on saddle jack and the facts when expert relied on discovery in case, operator's manual, repair documents, and equipment inspection).

1701. *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79, 81, 83 (Tex. App.—Houston [1st Dist.] 2009, no pet.).

1702. *Id.* at 81–82.

1703. *Id.* at 83.

1704. *Id.* at 86–92.

1705. *Id.* at 88–89.

1706. *Id.* at 87.

1707. *Id.* at 86 n.6.

deputy “explained why”—a key ingredient for connective reliability<sup>1708</sup>—the dissimilarities between the Camaro and the Mustang did not affect the coefficient of friction value.<sup>1709</sup> Looking to the law on admissibility of experiments, the court stated that when dissimilarities between an accident and a reconstructed experiment are minor and either can be made clear by explanation or do not affect the test result, a trial court is within its discretion to admit experiment data.<sup>1710</sup>

Next, the plaintiff contended that the deputy’s underlying data and methodology were unreliable because he did not use a Durometer to measure and compare the consistency of the tires between the Camaro and the Mustang.<sup>1711</sup> In other words, the plaintiff argued that the expert could not extrapolate data from one type of tire to another type of tire. The deputy admitted that a Durometer would have measured the hardness of the tires’ rubber, but he did not have one at the time of his accident reconstruction.<sup>1712</sup> He determined the hardness of the tire rubber between the Mustang and the Camaro by eyeballing the tires.<sup>1713</sup> By observing the tires on both vehicles, he could tell that the tires were of a soft consistency.<sup>1714</sup> He testified that he had previously conducted testing with similar tires, both on Mustangs and Camaros, and they would yield similar results.<sup>1715</sup> Based on his experience in conducting hundreds of tests with vehicles with soft rubber tires, regular passenger cars, and harder truck tires, he concluded that the test results between the two types of vehicles were consistent.<sup>1716</sup> He chose the Camaro as a testing vehicle because it had soft rubber tires consistent with the wide, slick, soft rubber tires that were on the Mustang.<sup>1717</sup> Consequently, while he did not use a Durometer, the deputy’s experience in testing the coefficient of friction with similar tires was sufficient to provide a reliable basis for his conclusion.<sup>1718</sup> The court concluded the trial court did not err in finding that the

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1708. See *supra* note 1564 and accompanying text.

1709. *Lincoln*, 285 S.W.3d at 88.

1710. *Id.* at 84, 88.

1711. *Id.* at 89. The plaintiff also contended on appeal that the expert “never indicated that he factored into the equation the age of the tires, the tread, or air pressure of the tires.” *Id.* at 89 n.7. But this specific complaint was not raised with the trial court and therefore was waived. *Id.*

1712. *Id.* at 89.

1713. *Id.*

1714. *Id.*

1715. *Id.*

1716. *Id.*

1717. *Id.*

1718. *Id.* at 89–91.

expert's testimony regarding the coefficient of friction and causation was reliable.<sup>1719</sup>

In addition to demonstrating the importance of “explaining how and why” an expert extrapolates from data to a conclusion, *Lincoln* teaches a second lesson: a gap may, in an appropriate case, be filled with experience. The gap between the test results on the Camaro tire and the expert's conclusions about the Mustang was bridged by the expert's experience testing tires. In *Lincoln*, the experience-gap-filler was extensive in a wide range of comparable settings. Thus, although the methodology of “eyeballing” the tires may not be appropriate to fill the gaps in some settings—such as a manufacturing defect claim against a tire manufacturer<sup>1720</sup>—it may be appropriate in other settings.

*Taber v. Roush*, a medical malpractice case, underscores that not all extrapolations from data to an opinion will be considered fatal.<sup>1721</sup> The parties presented opposing experts on whether an infant's nerve injuries suffered during birth were caused by the obstetrician's negligence.<sup>1722</sup> The court rejected the plaintiff's contention that the trial court erred in admitting expert testimony that maternal forces of labor may cause some forms of brachial plexus injury.<sup>1723</sup> The plaintiff contended that the opinion was unreliable because of “an analytical gap between the nonspecific brachial plexus injuries discussed in the literature” and the baby's severe brachial plexus injury known as an avulsion injury (a permanent injury which occurs when a brachial plexus nerve root is physically pulled out of the spinal cord).<sup>1724</sup> The court observed that it could not “weigh[] the relative persuasive power of competing medical articles in a vacuum” or “ask[] in the abstract whether an excessive lateral traction explanation for brachial plexus injuries has more medical merit than a natural forces of labor explanation” because “[c]ourts are not equipped to make medical judgments of this nature.”<sup>1725</sup>

The court stated:

Fair and equitable application of the standards governing admissibility of expert testimony begins with fidelity to the

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1719. *Id.* at 91.

1720. *Kumho Tire Co., v. Carmichael*, 526 U.S. 137, 143, 156–58 (1999).

1721. *Taber v. Roush*, 316 S.W.3d 139, 143 (Tex. App.—Houston [14th Dist.] 2010, no pet.).

1722. *Id.* at 148–49.

1723. *Id.* at 160.

1724. *Id.* at 146–47.

1725. *Id.* at 153–54.

record. The specific legal task this court is called upon to perform . . . must be accomplished in the context of specific testimony. This context encompasses not only the disputed expert testimony itself, but also [the plaintiff's] competing expert testimony and the testimony of fact witnesses.<sup>1726</sup>

Although the defense experts “acknowledged that no medical literature attributes permanent avulsion injuries like the one [in question] to the natural forces of labor,” both parties’ experts relied on a degree of interpretation “in applying the existing literature to opine about causation based upon specific circumstances” in question.<sup>1727</sup> The court concluded that the twenty-two publications relied upon by the defense were sufficient to bridge the gap between the theory and the infant’s specific avulsion injury even though the causation issue “unavoidably involves an element of speculation.”<sup>1728</sup> Finally, the court held that although the natural-forces-of-labor theory is a hypothesis, that label “is not dispositive because this characterization by itself does not answer the reliability question. If the ‘hypothesis’ is supported by reliable data and methodology, and proffered in conformity with existing standards governing admission of expert testimony, then it is admissible.”<sup>1729</sup>

In contrast, an expert’s attempt to link data to his conclusions failed because of a lack of transparency in *Abraham v. Union Pacific Railroad Co.*, a toxic tort suit under the Federal Employers Liability Act (FELA) arising from railroad employees’ exposure to creosote used to treat railroad ties at an industrial plant.<sup>1730</sup> The trial court struck the plaintiffs’ causation expert, and granted the railroad summary judgment.<sup>1731</sup> The court of appeals began by observing that unreliable expert testimony amounts to “no evidence,” and not even FELA’s relaxed causation standard can transform “no evidence” into “some evidence.”<sup>1732</sup> Therefore, the expert’s opinion had to meet the well-established reliability rules.<sup>1733</sup>

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1726. *Id.* at 154.

1727. *Id.* at 154–56.

1728. *Id.* at 156.

1729. *Id.* at 159. The dissenting justice criticized the majority, in part, because the expert opinions of numerous medical doctors did not connect the foundational data to the particular type of injury (i.e., avulsion) in the case. *Id.* at 180 (Anderson, J., dissenting).

1730. *Abraham v. Union Pac. R.R. Co.*, 233 S.W.3d 13, 16, 23–24 (Tex. App.—Houston [14th Dist.] 2007, pet. denied).

1731. *Id.* at 16.

1732. *Id.* at 19–20.

1733. *Id.*

The court then examined the scientific reliability of the expert's opinion that the plaintiffs' exposure to creosote caused their injuries. The court focused on the plaintiffs' exposure levels at the plant because proof of the exposure level "is essential to any reliable expert opinion that the particular substance caused a disease."<sup>1734</sup> The plaintiffs' expert relied upon an EPA creosote study on exposure over an eight-hour day to provide descriptions of job categories of workers applying creosote in different parts of a plant and corresponding creosote exposure levels.<sup>1735</sup> He testified that he extrapolated from the EPA data to form his opinion on the workers' creosote exposures by examining the workers' depositions and concluding that their exposures were "similar" to those in the study.<sup>1736</sup> He did not include any specifics regarding his extrapolation methods nor did he take any notes regarding his extrapolations.<sup>1737</sup>

The expert did prepare a chart rating each plaintiff's purported exposure as high, medium, or low, but failed to include any job category information for the workers even though the EPA study observed that different job categories had different exposures.<sup>1738</sup> Instead, he correlated each plaintiff's alleged creosote exposure to the length of employment at the plant.<sup>1739</sup> Because a plaintiff must prove his exposure level using scientifically valid methods, the lack of evidence as to job categories meant the court could not determine whether any plaintiff had creosote exposure levels comparable to those in the EPA study.<sup>1740</sup>

The court held that "[s]cientific knowledge of the harmful level of exposure to a chemical plus knowledge that the plaintiffs were exposed to such quantities are minimal facts necessary to sustain the plaintiffs' burden in a toxic tort case."<sup>1741</sup> Although production of a mathematically precise table equating levels of harm with levels of exposure was not necessary, production of evidence from which a reasonable person could conclude that the exposure probably caused the injuries was necessary.<sup>1742</sup> Plaintiffs' lack of evidence of creosote exposures at levels equal to or greater than the exposures in the EPA study proved fatal to their case. The summary judgments were affirmed.<sup>1743</sup>

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1734. *Id.* at 21.

1735. *Id.* at 20–21.

1736. *Id.* at 21–22.

1737. *Id.* at 22.

1738. *Id.*

1739. *Id.*

1740. *Id.* at 22–23.

1741. *Id.* at 22.

1742. *Id.*

1743. *Id.* at 24.

4. *Experience-Based Expert Testimony.* The reliability of experience as a basis for an expert opinion can be difficult to evaluate. One problem is that experience can be the foundation for an opinion, a gap-filler, or both. It is the predicative foundation for an opinion when it is the basis for the opinion. For example, in a medical malpractice case, the expert may not rely on any textbooks or written standards or guidelines to determine the standard of care; she might rely solely on her own experience. And in an area of medicine in which there are no written standards, experience may be the only potential basis from which to determine the standard of care. The same is true in a legal malpractice case.

But that does not mean that the opinion is shielded from a reliability examination.<sup>1744</sup>

If courts merely accept “experience” as a substitute for proof that an expert’s opinions are reliable and then only examine the testimony for analytical gaps in the expert’s logic and opinions, an expert can effectively insulate his or her conclusions from meaningful review by filling gaps in the testimony with almost any type of data or subjective opinions.<sup>1745</sup>

Thus, for an expert opinion based solely on the expert’s experience, courts at a minimum must examine whether “there is a sufficient connection between the existing data and the opinion offered or if there is ‘simply too great an analytical gap’ for the expert testimony to be considered reliable.”<sup>1746</sup>

Additionally, as discussed in the section on predicate reliability, the experience must be substantial enough to warrant the conclusion that the expert can provide reliable testimony. Minimal relevant experience—or a claim to experience that the expert cannot provide a meaningful description of—may be insufficient.<sup>1747</sup>

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1744. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 801 (Tex. 2006) (citing *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998)).

1745. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 639 (Tex. 2009).

1746. *St. Clair v. Alexander*, No. 13-08-00218-CV, 2009 WL 3135812, at \*3 n.4 (Tex. App.—Corpus Christi Sept. 30, 2009, pet. denied) (mem. op.).

1747. *Gross v. Burt*, 149 S.W.3d 213, 240–41 (Tex. App.—Fort Worth 2004, pet. denied) (concluding that analytical gap existed between expert opinion that threshold disease could be treated effectively outside the seventy-two hour window recommended by the CRYO-ROP study and expert’s experience because expert’s personal experience did not cover time frame in question and no studies supported his theory); *Wiggs v. All Saints Health Sys.*, 124 S.W.3d 407, 409, 412–14 (Tex. App.—Fort Worth 2003, pet. denied) (holding in medical malpractice case that trial court did not err in finding that the plaintiffs had not presented reliable causation evidence because there was an analytical gap between the opinion and both the literature relied on by the expert and the expert’s

The reason that the reliability of an opinion based on experience is not solely a predicative reliability question is that the expert often must make inferences or interpretations from that data. The Advisory Committee's notes give the following example of expert testimony based primarily on the expert's experience in the field:

[W]hen a law enforcement agent testifies regarding the use of code words in a drug transaction, the principle used by the agent is that participants in such transactions regularly use code words to conceal the nature of their activities. The method used by the agent is the application of extensive experience to analyze the meaning of the conversations. So long as the principles and methods are reliable and applied reliably to the facts of the case, this type of testimony should be admitted.<sup>1748</sup>

In this example, the expert takes his experience (or observations)—his predicate data—and applies that data by logic, reasoning, and common sense to reach a conclusion. A court reviews that application under connective reliability. The *Daubert* factors may have some applicability, but they are unlikely to be decisive. To the extent the law enforcement agent relies purely on his own personal observation of, and participation in, similar transactions, like the beekeeper in *Gammill*, the agent's predicate data is sufficiently reliable if the agent has observed the terms at issue used in “enough [conversations] in various circumstances to show a pattern” of usage.<sup>1749</sup> To the extent the agent also relies on literature and materials provided to him in training, the *Daubert* factors may come into play.<sup>1750</sup>

Even when the predicate data is extensive experience, courts must analyze connective reliability. Professor Risinger explains, “Substantial experience of relevant similarity to what is at issue

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experience; “the quality of [the expert's] experience” did not make his opinion reliable because he had almost “no experience at all”); *see also* *United States v. Frazier*, 387 F.3d 1244, 1265 (11th Cir. 2004) (holding no error in finding the absence of a sufficiently verifiable, quantitative basis for opinion when expert “never explained just how” experience and various texts supported opinion).

1748. FED. R. EVID. 702 advisory committee's note.

1749. *Gammill*, 972 S.W.2d at 726.

1750. *See, e.g.*, *Escamilla v. State*, 334 S.W.3d 263, 269 (Tex. App.—San Antonio 2010, pet. ref'd) (holding that opinion of expert with extensive experience conducting sexual assault examinations was not reliable because expert stated that her opinion was “based on [her] training,” conferences she attended, “[her] readings and stuff,” and “research and the peer reviews,” and because expert could not identify specific articles or studies, did not establish that her technique was generally accepted in the medical community, identified “peer review” as sharing information with other nurses, and did not know the potential rate of error for the application of her theory).

in the case at hand is a necessary condition for the reliability of experience-based expertise, but in most contexts it is not a sufficient condition to establish reliability.”<sup>1751</sup> When an expert testifies not only to a summary of that experience, but also about inferences based on those experiences, the expert’s opinion “is based in part on experience, but in part on some translation scheme to mediate between previous experiences and a particular conclusion in this case. In those circumstances, reliability is dependent on both sufficient experience and a reliable translation system.”<sup>1752</sup> This “translation system” may involve the application of some kind of scientific or technical method, subject to methodological reliability, or it may involve logical reasoning, subject to connective reliability, or it may involve both.

Experience can also be a gap-filler. Experience may be the link used to reach a conclusion when the predicate data is insufficient. Sometimes experience is necessary to fill gaps. For example, an appraisal may require some judgment calls about the selection of the appropriate data or the interpretation of the data.<sup>1753</sup> *Lincoln v. Clark Freight Lines, Inc.*,<sup>1754</sup> is another example. In that case, the expert used data from a Camaro to reach conclusions about a Mustang.<sup>1755</sup> The expert explained that the extrapolation from that data was reliable based on prior experience.<sup>1756</sup>

In *Royce Homes, L.P. v. Humphrey*, the expert’s experience was insufficient to fill the gap.<sup>1757</sup> The plaintiff sought to recover damages to his home from flooding allegedly caused by a homebuilder.<sup>1758</sup> The plaintiff’s expert testified that the home’s market value decreased 20% based on “flood stigma.”<sup>1759</sup> The

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1751. Risinger, *supra* note 1436, at 775.

1752. *Id.* at 775–76. Professor Risinger calls experts who use their testimony for descriptive purposes—such as explaining industry practice—as “‘everyday summarizational’ experts.” *Id.* at 770 n.13, 775. He identifies experts who “translate their experience into particular adjudicative inferences” as translational experts. *Id.* at 770 n.13.

1753. *Harris Cnty. Appraisal Dist. v. Kempwood Plaza Ltd.*, 186 S.W.3d 155, 161 (Tex. App.—Houston [1st Dist.] 2006, no pet.) (“It is not error for an appraiser to use his or her personal experience and expertise to make certain determinations.”).

1754. *Lincoln v. Clark Freight Lines, Inc.*, 285 S.W.3d 79 (Tex. App.—Houston [1st Dist.] 2009, no pet.). For a full discussion of *Lincoln*, see *supra* text accompanying notes 1701–19.

1755. *Lincoln*, 285 S.W.3d at 86–90.

1756. *Id.* at 90.

1757. *Royce Homes, L.P. v. Humphrey*, 244 S.W.3d 570, 578–79 (Tex. App.—Beaumont 2008, pet. denied).

1758. *Id.* at 573.

1759. *Id.* at 575, 577.

basis for his opinion was his forty years of experience in assessing flood damages to homes, his work with over a hundred properties that suffered “flood stigma,” and his twenty-three years’ handling housing foreclosures for a bank.<sup>1760</sup> The court held that he “[did] not sufficiently explain why” his experience justified a 20% adjustment.<sup>1761</sup>

Likewise, the expert’s experience did not satisfy connective reliability for causation in *Couch v. Simmons*, a medical malpractice case in which the trial court struck the plaintiff’s expert’s affidavit and granted the defendant summary judgment.<sup>1762</sup> A professor of pediatric neurology stated that the treating physician negligently failed to administer intravenous fluids, causing the plaintiff’s stroke.<sup>1763</sup> The expert conceded that the use of IV fluids to prevent strokes was a theory that had not been directly tested but stated that it was supported by peer-reviewed articles and by his experience.<sup>1764</sup> The absence of testing was not fatal because the expert explained the absence of testing—physicians are unwilling to deprive patients of the fluids to perform a proper test with a control group.<sup>1765</sup> But two of the articles relied upon to establish the causal relationship conceded that there was no scientific proof of a relationship between the administration of the fluids and stroke outcome.<sup>1766</sup> The expert also failed to state which outcome was more likely from the use of IV fluids—either no stroke at all or a lesser stroke.<sup>1767</sup> The court of appeals held that the trial court did not err in striking the expert’s affidavit because he did not show sufficient personal experience in the effects of delayed IV fluid administration.<sup>1768</sup>

Finally, experience can be the basis for an opinion, in addition to a gap-filler. A good example of experience serving as both a gap-filler and as a separate basis for the expert’s opinion

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1760. *Id.* at 575.

1761. *Id.* at 579.

1762. *Couch v. Simmons*, 108 S.W.3d 338, 339–43 (Tex. App.—Amarillo 2003, no pet.).

1763. *Id.* at 340.

1764. *Id.* at 341–42.

1765. *Id.* at 342.

1766. *Id.* 342–43.

1767. *Id.* at 340.

1768. *Id.* at 342–43; *see also* *Page v. State Farm Lloyds*, 259 S.W.3d 257, 267–68 (Tex. App.—Waco 2008) (concluding trial court erred in excluding expert’s testimony regarding property damage because there was no analytical gap between his repair estimates and the bases for his estimate—his training and experience, his inspection of property and a software program frequently used in construction industries), *rev’d in part on other grounds*, 315 S.W.3d 525 (Tex. 2010).

is *Helena Chemical*.<sup>1769</sup> The expert in that case relied on a number of pieces of data to support his opinion on the productivity of certain seed purchased by the plaintiff. The reliability of that data was undisputed.<sup>1770</sup> The expert then used his experience to explain why several tests he performed were significant and how they supported his opinions.<sup>1771</sup> In other words, he used his experience to extrapolate from the data to reach his conclusion.

#### IV. CONCLUSION & PRACTICE TIPS

We have attempted in Part III of this Article to demonstrate that the three reliability gates—predicative reliability, methodological reliability, and connective reliability—are inextricably intertwined, overlapping, and synergetic, but they are nevertheless distinct requirements that expert evidence must independently satisfy to meet the standards for admissible and competent evidence. Each gate is necessary, and no two gates are, alone, sufficient.

In Part III.A, we explored the availability of postverdict legal-sufficiency challenges to expert evidence and the rules and standards that govern such challenges on appeal. Particularly, we focused on when a party may raise a legal-sufficiency challenge based on the unreliability of expert evidence, even though the party did not raise that complaint before the evidence was admitted at trial. Part III.B discussed two kinds of predicative reliability—one that must be challenged preverdict to be preserved for review on appeal (predicative soundness) and one that can be challenged for the first time after the verdict (predicative probativeness). In Part III.C, we examined methodological reliability and observed that it typically cannot be the basis for a legal-sufficiency challenge if it was not first made the basis for a timely challenge to admissibility in the trial court. But in Part III.D, we studied connective reliability, which can almost always be raised for the first time postverdict, and discovered that, perhaps because connective reliability links (and to some degree integrates) predicative and methodological reliability, the *Daubert* factors that measure methodological reliability are sometimes a component of a legal-sufficiency challenge. In short, we have demonstrated that a litigator must

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1769. *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486 (Tex. 2001). For a further discussion of *Helena Chem.*, see *supra* notes 1671–77 and accompanying text.

1770. *Helena Chem.*, 47 S.W.3d at 500.

1771. *Id.* at 501.

endeavor to understand the three reliability gates and the distinctions between them to ensure that each is satisfied, to determine how and when to preserve objections based on each, and to anticipate and protect against postverdict attacks on the reliability of expert testimony. Yet we have also demonstrated that these concepts are quite difficult to understand, for courts as well as practitioners. We offer the following “lessons” and “tips” in an effort to alleviate some of this burden.

The key lessons that parties offering and opposing expert testimony should take away from this Article are (1) in Texas, expert opinions are subject to both admissibility and legal-sufficiency challenges based on reliability;<sup>1772</sup> (2) causation opinions are subject to particularly exacting scrutiny;<sup>1773</sup> (3) it is the basis of an expert’s opinion, not his qualifications to offer an opinion, that gives the opinion probative value;<sup>1774</sup> (4) an expert must identify the basis or predicate for his opinion, and if the expert fails to do so, or if the predicate identified is not reliable or does not support the expert’s opinion, the expert’s opinion is likewise not reliable;<sup>1775</sup> (5) reliability is not correctness—an opinion that is the product of an unreliable methodology is not reliable even if it happens to be correct, and conflicting opinions that result from different but reliable methodologies may both be reliable even if one is necessarily incorrect;<sup>1776</sup> and (6) when an expert opinion is founded in part on reasoning and analysis, a meaningful “analytical gap” in the expert’s logic renders the opinion unreliable.<sup>1777</sup>

Connective reliability is perhaps the most important reliability gate because it links—and to a degree, subsumes—both predicative and methodological reliability. It requires experts to explain their reasoning and thus show how they bridge

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1772. See *supra* Part III.A.

1773. Specifically, expert testimony on the “causation” element of a claim is subject to a particular set of rules and standards. Under *Robinson*, an expert causation opinion is not reliable, and therefore not admissible, if the expert fails to rule out other plausible causes; under *Merrell*, an expert causation opinion is conclusory, and therefore not probative evidence, if the expert fails to rule out other plausible causes. See *supra* notes 370, 393, 1196, 1532 and accompanying text.

1774. See, e.g., *Hous. Unlimited, Inc. Metal Processing v. Mel Acres Ranch*, No. 13-0084, 2014 WL 4116810, at \*15 (Tex. Aug. 22, 2014). However, as discussed above, an expert’s qualifications and experience sometimes form part of the basis for his opinion. See *supra* Part III.B.2.c.i.

1775. See *supra* Part III.A.2.e.

1776. See *supra* notes 251, 1375 and accompanying text; see also *supra* note 34. Except, however, a legal expert must state the law correctly. See *supra* notes 1461 and accompanying text.

1777. See *supra* Part III.D.

any gap between the predicative data or methodology they rely on and their conclusions. In short, experts must be transparent and show their work, much like high school math teachers require for problem solving on tests. Thus, to ensure that their conclusions are not deemed conclusory and pass the connective reliability gate, experts should (1) make plain the information they considered and why that information was appropriate to consider; (2) explain how they used the information; and (3) explain why their use of information leads to their conclusion. This explanatory process must be used for each of the experts' opinions. By doing so, a party can avoid the following five traps.

First, unreliable expert testimony may prove fatal to a claim or affirmative defense even when a party prevails with the factfinder. An appellate court may consider a properly preserved preverdict objection to the reliability of expert testimony as part of a challenge to the trial court's decision to admit that evidence, and an appellate court may consider a challenge to reliability that was raised for the first time postverdict as a legal-sufficiency challenge. When expert testimony is necessary to prove a claim or affirmative defense<sup>1778</sup> and the expert testimony is unreliable, there will be no evidence to support the verdict. Thus, a party must consider not only whether the expert's testimony will pass the reliability gate at trial, but also on appeal.

Second, a preverdict objection is properly preserved if it challenges all three parts of the reliability inquiry. If the preverdict objection does not challenge the methodology of the opinion, that challenge may not be raised as part of a legal-sufficiency challenge to the evidence that is based on methodological flaws by the expert unless (1) the methodological flaws are apparent from the record;<sup>1779</sup> or (2) the flaws are incorporated into a broader argument that the opinion is conclusory or contains an analytical gap, as discussed below. *Coastal Transport* states such challenges are waived unless the flaw is apparent from the face of the record.<sup>1780</sup> But other cases

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1778. See, e.g., *FFE Transp. Servs., Inc. v. Fulgham*, 154 S.W.3d 84, 90–91 (Tex. 2004); see also *supra* note 16.

1779. See *supra* notes 264–69 and accompanying text (discussing *Coastal Transport*).

1780. *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 233 (Tex. 2004) (“When the testimony is challenged as conclusory or speculative and therefore non-probative on its face, however, there is no need to go beyond the face of the record to test its reliability. We therefore conclude that when a reliability challenge requires the court to evaluate the underlying methodology, technique, or foundational data used by the expert, an objection must be timely made so that the trial court has the opportunity to conduct this analysis. However, when the challenge is restricted to the face of the record[—]for example, when expert testimony is speculative or conclusory on its face[—] then a party may challenge the legal sufficiency of the evidence even in the absence of any

suggest they are not.<sup>1781</sup> The *Coastal Transport* Court's reference to "underlying methodology, technique, or foundational data" could be a reference to the methodology, techniques, or foundation used in studies or data collections relied upon by an expert rather than the expert's own methodology.

*Ramirez*, *Pollock*, *Whirlpool*, and *Merrell* indicate that methodological and foundational challenges that are determinable on the face of the record may be raised for the first time postverdict as "conclusory" or "speculative." For example, the Court in *Ramirez* discussed a *Daubert* factor—the absence of testing—in support of its holding that the testimony was conclusory.<sup>1782</sup> Likewise, the Court in *Whirlpool* relied on the absence of testing and evidence satisfying some of the other *Daubert* factors in holding that an expert's opinion was conclusory. And a number of courts have found that when an expert relies on literature or other foundational data and that literature or data is not in the record, the opinion is unreliable.<sup>1783</sup> It is but a short step when the supporting data are missing from the record to conclude that not only is the opinion

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objection to its admissibility."); see also *supra* notes 264–69 and accompanying text (discussing *Coastal Transport*).

1781. See, e.g., *Merck & Co. v. Garza*, 347 S.W.3d 256, 262 (Tex. 2011) ("In analyzing whether there was evidence of causation [in *Havner*], we started with the general proposition that 'a determination of scientific reliability is appropriate in reviewing the legal sufficiency of evidence.' We reiterated that courts must look beyond the bare opinions of qualified experts and independently evaluate the foundational data underlying an expert's opinion in order to determine whether the expert's opinion is reliable." (footnote omitted) (quoting *Merrell Dow. Pharm., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997)); *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 637 (Tex. 2009) ("When expert testimony is involved, courts are to rigorously examine the validity of facts and assumptions on which the testimony is based, as well as the principles, research, and methodology underlying the expert's conclusions and the manner in which the principles and methodologies are applied by the expert to reach the conclusions. An expert's opinion might be unreliable, for example, if it is based on assumed facts that vary from the actual facts, or it might be conclusory because it is based on tests or data that do not support the conclusions reached. In either instance, the opinion is not probative evidence." (citations omitted)); *id.* at 640 ("We agree with *Whirlpool* that proper appellate legal-sufficiency review pursuant to *Whirlpool's* challenge requires evaluating Clayton's testimony by considering both *Robinson*-type factors and examining for analytical gaps in his testimony."); *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009) ("An expert's opinions that the defendant acted with conscious indifference were simple assertions with no basis at all, and we held that they were legally insufficient to support the judgment. But even when some basis is offered for an opinion, if that basis does not, on its face, support the opinion, the opinion is still conclusory." (footnote omitted)).

1782. *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 910–12 (Tex. 2004). The court of appeals had held that the expert did not need to perform testing to reach a reliable opinion on causation. *Volkswagen of Am., Inc. v. Ramirez*, 79 S.W.3d 113, 124 (Tex. App.—Corpus Christi 2002) (citing *Gen. Motors Corp. v. Sanchez*, 997 S.W.2d 584, 592 (Tex. 1999)).

1783. See *supra* notes 410, 415–24 and accompanying text.

unreliable but that it is conclusory because the factfinder and appellate court are only provided with the *ipse dixit* of the expert. Thus, careful witness preparation and presentation should also proceed as if not only have analytical gap and conclusory objections been made, but also methodological and predicate reliability objections.

In neither *Ramirez* nor *Whirlpool* was it necessary for the Court to treat the opinions as conclusory because neither involved a preservation of error problem due to timely objections at trial.<sup>1784</sup> The Court's label of these opinions as conclusory nevertheless identifies arguments that should be raised when there is no trial objection. And to do so is not far from agreeing with the appellant's original suggestion in *Maritime Overseas*—which the Court rejected—that the standards “articulated in *Robinson* and *Havner* are the proper standards for reviewing the [legal] sufficiency” of expert testimony.<sup>1785</sup> It is also worth noting that the only Justice left from the *Maritime Overseas* Court is then-Justice Hecht, who dissented on this issue.

Third, a party may raise a conclusory objection for the first time postverdict as part of a legal-sufficiency challenge.<sup>1786</sup> In determining the amount of detail to present to a jury about the basis for an expert's opinion, a party has to balance the benefits of a fulsome explanation that will protect it in the event of a posttrial motion or appeal against the risk of alienating the jury by presenting too much detail. If the party loses the jury, all the legal niceties about protecting the record become academic. But

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1784. To be clear, there were two experts whose testimony was challenged in *Ramirez*. Volkswagen argued that both experts' testimony was unreliable and no evidence to support the jury verdict of a defect in the vehicle. For the first expert, Ronald Walker, the Court relied on both the *Daubert* factors and the *Gammill* test to hold that his opinion was solely “his subjective interpretation of the facts,” “unreliable,” and “no evidence.” *Ramirez*, 159 S.W.3d at 906. For the second expert, Edward Cox, the dissent argued that the legal sufficiency of his testimony was not presented as an issue to the Court. *Id.* at 909. Volkswagen did not dispute in the Supreme Court—as it did in the trial court and court of appeals—that his testimony was unreliable but it did contend that it was no evidence to support the defect finding. *Id.* at 902–03. The dissent argued that Volkswagen could not contest the reliability of Cox's testimony in its no evidence challenge in the Supreme Court. “[N]o evidence challenges to conclusory or speculative testimony that is non-probative on its face” could be raised at any time, while “no evidence challenges to the reliability of expert testimony in which we evaluate the underlying methodology, technique or foundational data used by the expert” must be preserved. *Id.* at 910.

1785. *Mar. Overseas Corp. v. Ellis*, 971 S.W.2d 402, 408 (Tex. 1998).

1786. See *supra* notes 264–69 and accompanying text (discussing the requirements to preserve a legal-sufficiency challenge); see also *Olympic Arms, Inc. v. Green*, 176 S.W.3d 567, 584 (Tex. App.—Houston [1st Dist.] 2004, no pet.) (“In a complaint regarding the reliability of expert testimony, a party must present it to the trial court, or appellate review is waived. No objection is required, however, to preserve a no-evidence challenge to conclusory expert testimony.” (citation omitted)); *supra* Part III.A.1.

the lesson from Texas appellate decisions is that a party who proceeds with minimal detail in the absence of an objection does so at its peril. In short, when making this balance, a party must therefore proceed as if the other party has made an objection that the evidence is conclusory, speculative and unreliable because the expert fails to provide a predicate for her opinion, because the expert provides a predicate for his opinion but the predicate provided does not actually support the opinion, or because the process by which the expert reasoned from his predicate to her opinion about the facts of the case leaves too great an analytical gap. And a preverdict objection to the lack of a supportive predicate or to the existence of an analytical gap is not necessary to preserve error for a legal-sufficiency challenge based on these defects. The burden, therefore, falls on the proponent of the expert opinion to identify the potential gaps as part of witness preparation by carefully examining the underlying methodology and predicate data and the links necessary to reach the expert's conclusion and then plugging those gaps during the expert's testimony.

Careful witness preparation will identify some opinions as conclusory with little effort. For example, an expert's use of words and phrases from a jury charge will not, without more, constitute evidence.<sup>1787</sup> Similarly, when an expert offers no support for an opinion, it is conclusory.<sup>1788</sup> But in some cases it is more difficult to determine if an opinion is conclusory. *Arkoma Basin* is the only explicit definition of when a statement is conclusory by the Texas Supreme Court; it narrowly defines a conclusory statement as one that is essentially a "conclusion without any explanation."<sup>1789</sup> Two courts of appeals have given

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1787. See *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 805–06 (Tex. 2006) (stating that expert "did little more than throw out terms" that were in dispute in tire manufacturing defect claim "when stating, in conclusory fashion, that the belt separation must have originated at the plant."); *W.C. LaRock, D.C., P.C. v. Smith*, 310 S.W.3d 48, 56–58 (Tex. App.—El Paso 2010, no pet.) (holding that expert testimony that medical defendant's conduct in reasonable medical probability caused injury was legally insufficient evidence of causation; the sufficiency determination "does not turn on semantics or on the use by the expert witness of any particular term or phrase" and expert's "testimony raised only mere possibilities, speculation, and surmise"); *Merrell Dow Pharm., Inc. v. Havner*, 907 S.W.2d 535, 542 (Tex. App.—Corpus Christi 1994) ("Reasonable probability cannot be created by the mere utterance of magic words by someone designated an expert."), *rev'd on other grounds*, 953 S.W.2d 706 (Tex. 1997).

1788. See *supra* notes 295–96 and accompanying text (discussing *Romero* and *Pollock*).

1789. *Arkoma Basin Exploration Co. v. FMF Assocs. 1990-A, Ltd.*, 249 S.W.3d 380, 389 & n.32 (Tex. 2008); see also *Barzoukas v. Found. Design, Ltd.*, 363 S.W.3d 829, 840 (Tex. App.—Houston [14th Dist.] 2012, pet. filed) (quoting *Pink v. Goodyear Tire & Rubber Co.*, 324 S.W.3d 290, 296–97 (Tex. App.—Beaumont 2010, pet. dism'd)); *Pink*, 324 S.W.3d at 296–97 (quoting *Arkoma Basin*, 249 S.W.3d at 389 & n.32).

similar narrow definitions in other contexts. One defined it as a statement that “expresses subjective belief and gives no factual support for that belief.”<sup>1790</sup> Another defined it as a statement “that does not provide the underlying facts to support the conclusion.”<sup>1791</sup>

Despite these narrow definitions, the Texas Supreme Court treats an expert opinion as conclusory when an explanation is given but leaves an analytical gap. *Ramirez* imports the “analytical gap” test into the analysis of whether expert testimony is conclusory and whether a trial objection is necessary. And the Court went further in *Pollock* when it held that even when some explanation is offered for an opinion, if that explanation “does not, on its face, support the opinion, the opinion is still conclusory.”<sup>1792</sup> *Pollock* treated expert testimony as conclusory when the stated basis does not in fact support the opinion. *Pollock* may represent the high water mark for how forgiving the Court will be when an expert opinion has a stated basis that is part of the record—there, studies—but the stated basis does not in fact support the expert’s conclusion. And arguably *Pollock* could be limited to a case where a party at least objects that the evidence is conclusory before the close of the evidence. While that objection is not normally needed for a legal-sufficiency review of evidence, it arguably could be required because Rule 705(a) of the Texas Rules of Evidence allows an expert to present an opinion without stating its basis “unless the court requires otherwise.”<sup>1793</sup> Such a requirement arguably would reconcile the tension between *Arkoma Basin* and *Pollock*.

Fourth, as discussed above under the predicative-reliability gate, a preverdict objection is not necessary when an expert’s opinion is based on facts that are contrary to the undisputed evidence.<sup>1794</sup> Nonetheless, it is also helpful to think of this as a

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1790. *Hawthorne v. Star Enters., Inc.*, 45 S.W.3d 757, 759 (Tex. App.—Texarkana 2001, pet. denied).

1791. *Weech v. Baptist Health Sys.*, 392 S.W.3d 821, 826 (Tex. App.—San Antonio 2012, no pet.) (quoting *Rizkallah v. Conner*, 952 S.W.2d 580, 587 (Tex. App.—Houston [1st Dist.] 1997, no writ)).

1792. *City of San Antonio v. Pollock*, 284 S.W.3d 809, 817 (Tex. 2009).

1793. TEX. R. EVID. 705(a).

1794. *Arkoma Basin*, 249 S.W.3d at 388 (stating that no objection is necessary when expert “assumed facts contrary to those on the face of the record”); *City of Keller v. Wilson*, 168 S.W.3d 802, 813 (Tex. 2005) (“[I]f an expert’s opinion is based on certain assumptions about the facts, we cannot disregard evidence showing those assumptions were unfounded.”); *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499–500 (Tex. 1995) (holding opinion that spray caused frostbite was legally insufficient as it assumed absence of redness when plaintiff admitted the contrary); see also *Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039, 1057 (8th Cir. 2000) (“An expert opinion cannot sustain a jury’s verdict when it is not supported by sufficient facts to validate it in the eyes of the

lack of connective reliability; the disconnect between the expert's opinions and an assumption was one basis for striking the expert opinion in *Joiner*, the seminal analytical gap case.<sup>1795</sup>

Some language in opinions suggests that any reliability challenge can be made postverdict because unreliable testimony is no evidence. For example, the San Antonio Court of Appeals recently stated in a condemnation case,

Proffered expert testimony is nothing more than an opinion, and does not rise to the level of evidence unless it passes muster under the Rules of Evidence. . . . Therefore, if the only "evidence" supporting an issue is unreliable expert testimony, then it is really "no evidence," and the challenging party is entitled to judgment.<sup>1796</sup>

*Coastal Transport*, however, requires reliability challenges to the expert's underlying methodology and foundational data to be made in the trial court first before an appellant may argue that these reliability defects make the expert's opinion no evidence. But as discussed above, there remain two large exceptions that threaten to swallow this rule: (1) if the flaw is apparent from the face of the record; and (2) the flaws in the methodology or foundational data support a holding that the opinion was conclusory.<sup>1797</sup>

Fifth, in the context of expert testimony on causation, a failure to rule out other potential causes may render an opinion conclusory and speculative, and therefore can be raised for the first time postverdict.<sup>1798</sup> Again, the lawyer must proceed as if

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law, or when indisputable record facts contradict or otherwise render the opinion unreasonable . . . ." (quoting *Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 242 (1993)); *Price v. Divita*, 224 S.W.3d 331, 338 (Tex. App.—Houston [1st Dist.] 2006, pet. denied) (holding that experts presumed facts that were not supported by the record and therefore their testimony amounted to surmise, conjecture, and speculation).

1795. See *supra* note 1541.

1796. *Williams v. State*, 406 S.W.3d 273, 282 (Tex. App.—San Antonio 2013, pet. denied); see also *Schronk v. Laerdal Med. Corp.*, No. 10-12-00118-CV, 2013 WL 6570907, at \*4 (Tex. App.—Waco Dec. 12, 2013, pet. denied) ("[U]nreliable expert testimony is not relevant evidence and, therefore, constitutes no evidence").

1797. *Borg-Warner Corp. v. Flores*, 232 S.W.3d 765, 769 n.11 (Tex. 2007) (stating that appellant "did not challenge, either before trial or at the time the evidence was offered, the reliability of [appellee's] experts and has, therefore, waived any reliability challenge that would require us to evaluate the experts' underlying methodology, technique, or foundational data"); *In re Commitment of Barbee*, 192 S.W.3d 835, 843 (Tex. App.—Beaumont 2006, no pet.) ("[W]hen the complaint concerns the foundational data used or relied upon by the expert, a party must present a timely objection to the trial court to preserve any complaint for appeal.").

1798. *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) ("An expert's failure to explain or adequately disprove alternative theories of causation makes his or her own theory speculative and conclusory."); *Emmett Props., Inc. v. Halliburton Energy Servs., Inc.*, 167 S.W.3d 365, 373 (Tex. App.—Houston [14th Dist.] 2005, pet. denied) ("An

this objection has been made before concluding his presentation of the expert. Despite these requirements for careful preparation and presentation of expert testimony, it is worth emphasizing that “not every gap or inconsistency in an expert’s testimony is sufficient to render it unreliable and inadmissible.”<sup>1799</sup> The gaps must be “significant,”<sup>1800</sup> “fatal,”<sup>1801</sup> or “large enough”<sup>1802</sup> to create a lack of reliability. Some gaps are “not so great as to require exclusion.”<sup>1803</sup> Or as stated by the Texas Supreme Court, some gaps “between the data and the conclusion drawn from it go to the weight of [the expert’s] testimony—not its reliability.”<sup>1804</sup>

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expert’s failure to rule out other causes of the damage renders his opinion little more than speculation and therefore, unreliable.”); *Tex. Mut. Ins. Co. v. Lerma*, 143 S.W.3d 172, 177 (Tex. App.—San Antonio 2004, pet. denied) (stating that when a party asserts a “no evidence” challenge against a causation expert, the expert “must exclude other plausible causes of the injury with reasonable certainty”).

1799. 29 WRIGHT & GOLD, *supra* note 52, § 6266, at 91, 104 n.64.8 (Supp. 2014).

1800. *In re Scrap Metal Antitrust Litig.*, 527 F.3d 517, 529–30 (6th Cir. 2008) (rejecting contention that expert used erroneous data which then produced an erroneous conclusion because this argument “confuses the *credibility and accuracy* of [the expert’s] opinion with its *reliability*” but recognizing that “a significant error in application” may render the opinion inadmissible).

1801. *Martini v. City of Pearland*, No. 14-11-00111-CV, 2012 WL 1345744, at \*4 (Tex. App.—Houston [14th Dist.] Apr. 17, 2012, pet. denied) (mem. op.).

1802. *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 746 (3d Cir. 1994) (“[A] judge should only exclude the evidence if the flaw is large enough that the expert lacks ‘good grounds’ for his or her conclusions.”).

1803. *Russell v. Whirlpool Corp.*, 702 F.3d 450, 456–58 (8th Cir. 2012) (holding trial court did not abuse discretion in overruling objection that methodology of fire investigator into fire’s cause was unreliable when investigator did not employ National Fire Protection Association guidelines and concluding that analytical gap between the existing evidence and expert’s opinion was “not so great as to require exclusion”); *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 852 (Fed. Cir. 2010) (“When the methodology is sound, and the evidence relied upon sufficiently related to the case at hand, disputes about the degree of relevance or accuracy (above this minimum threshold) may go to the testimony’s weight, but not its admissibility.”), *aff’d*, 131 S. Ct. 2238 (U.S. 2011); *Amorgianos v. Nat’l R.R. Passenger Corp.*, 303 F.3d 256, 269–70 (2d Cir. 2002) (holding, in toxic tort case, that trial court did not err in excluding testimony of treating internist because “there was ‘too great an analytical gap between’ the conclusions reached by the authors” of articles relied on by the internist and the internist’s conclusions and noting the trial court’s extremely thorough review of the scientific literature but stating this degree of review “may not always be necessary to evaluate whether proffered expert testimony is admissible”); *Campbell v. Metro. Prop. & Cas. Ins. Co.*, 239 F.3d 179, 185–86 (2d Cir. 2001) (finding no abuse of discretion in admitting expert testimony that plaintiffs were suffering from lead poisoning; “[t]o the extent that [defendant] asserts that there were gaps or inconsistencies in the reasoning . . . such arguments go to the weight of the evidence, not to its admissibility”).

1804. *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 220 (Tex. 2010). For further discussion of Texas cases on this, see discussion of *Crump*, *supra* notes 1690–94 and accompanying text; see also *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (“A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.”) (cited with approval by *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 727 (Tex. 1998)); *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 904 (Tex. 2004) (examining whether “there is too great an analytical gap”); *Harris Cnty.*

Mueller and Kirkpatrick similarly caution that the rule does not mean “that judges can never admit evidence produced by processes and methods that depart from some ideal or some standard protocol.”<sup>1805</sup> Importantly,

[t]he test of admissibility is not whether a particular scientific opinion has the best foundation, or even whether the opinion is supported by the best methodology or unassailable research. . . . The goal is reliability, not certainty. Once admissibility has been determined, then it is for the trier of fact to determine the credibility of the expert witness.<sup>1806</sup>

“[C]ourts may admit somewhat questionable expert testimony where it falls within the range where experts in the field in question may reasonably differ.”<sup>1807</sup> The Authors hope this Article will aid lawyers in determining when an expert opinion is unreliable and when it is questionable but still legally reliable.

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Appraisal Dist. v. Houston 8th Wonder Prop., L.P., 395 S.W.3d 245, 253–54 (Tex. App.—Houston [1st Dist.] 2012, pet. denied) (“As to reliability, the court must examine the expert’s methodology, foundational data, and whether too great an analytical gap exists between the data and methodology, on the one hand, and the expert’s opinions, on the other.”); Wilson v. Shanti, 333 S.W.3d 909, 913 (Tex. App.—Houston [1st Dist.] 2011, pet. denied) (stating that the three components of the reliability inquiry are “the expert’s methodology, foundational data, and whether too great an analytical gap exists as the expert connects the foundational data or methodology with the opinion”).

1805. 3 MUELLER & KIRKPATRICK, *supra* note 187, § 7:10, at 793.

1806. *In re TMI Litig.*, 193 F.3d 613, 665 (3d Cir. 1999), *amended*, 199 F.3d 158 (3d Cir. 2000).

1807. 29 WRIGHT & GOLD, *supra* note 52, § 6266, at 95, 120 n.79.3 (Supp. 2014).