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Supreme Court of Kentucky **FINAL**

2001-SC-0628-DG

DATE 11-11-04 E.N.A.G. COURT, D.C.

GEORGE E. MILLER, M.D.

APPELLANT

V.

APPEAL FROM COURT OF APPEALS
2000-CA-1331
KENTON CIRCUIT COURT NO. 98-CI-01120

CURTIS ELDRIDGE, AS
ADMINISTRATOR OF THE ESTATE OF
SANDRA L. ELDRIDGE; AND BARBARA
JEAN ELDRIDGE, AS NEXT FRIEND
AND LIMITED GUARDIAN OF APRIL
DANIELLE SMITH, AN INFANT

APPELLEES

OPINION OF THE COURT BY JUSTICE KELLER

REVERSING

I. INTRODUCTION

Kentucky's appellate courts review trial court rulings regarding the admissibility of expert witness testimony under an abuse of discretion standard. The Court of Appeals in this case held that the admission of the testimony of Bruce Taylor ("Taylor") had been an abuse of discretion because his testimony failed to meet the relevance and reliability requirements of Daubert v. Merrell Dow Pharmaceuticals, Inc.¹ We must determine whether the Court of Appeals properly applied the abuse of discretion standard of review. We hold that it did not because it improperly applied the abuse of discretion standard to the trial court's findings of fact instead of its decision to admit the evidence,

¹ 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993).

and it substituted its own findings for those of the trial court, thus engaging in an improper de novo review. Furthermore, we find that the trial court committed no clear error or abuse of discretion. We therefore reverse.

II. BACKGROUND

The underlying cause of action in this case is a medical malpractice claim against Dr. George Miller (“Dr. Miller”) for negligently performing a diagnostic angiography and causing the death of thirty-one year old Sandra Eldridge (“Ms. Eldridge”). The diagnostic angiography procedure required Dr. Miller to pass a guidewire through Ms. Eldridge’s femoral artery and through a possibly occluded segment of her left iliac artery. Dr. Miller passed a catheter over the guidewire, removed the guidewire, and hand-injected contrast dye through the catheter three times. Dr. Miller determined that a clot had occluded the artery and then performed a bypass surgery to remedy the occlusion. Several hours after the surgery, Ms. Eldridge became unresponsive—the basilar artery in her brain had become occluded, and she had suffered a large infarction, or death of tissue, in her brain. The prognosis was hopeless, so Ms. Eldridge’s family made the decision to discontinue life support. Ms. Eldridge passed away on June 6, 1997.

Curtis Eldridge, the Administrator of Ms. Eldridge’s estate, and Barbara Jean Eldridge, the next friend and limited guardian of April Danielle Smith (“the Eldridges”), filed their claim against Dr. Miller based on the opinion of Dr. Clay Skinner, a vascular surgeon, who theorized that Dr. Miller had passed the guidewire through the clot itself, causing the clot to break up and then lodging pieces of the clot within the hollow tip of the catheter. Dr. Miller’s subsequent injection of contrast dye through the catheter caused loose pieces of the clot, or emboli, to travel retrograde, or against the flow of

blood, for a distance of over ten inches. The emboli then entered the left subclavian artery and ultimately lodged in the basilar artery in her brain, causing the occlusion that resulted in her death.

Dr. Miller retained several experts who testified at trial that Dr. Skinner's retrograde emboli theory was impossible. Dr. Miller also retained Taylor, a biomedical engineer with a Ph.D. in physiology and who specializes in the field of blood flow, specifically for the purpose of challenging Dr. Skinner's theory. Taylor initially hypothesized that Dr. Skinner's theory was impossible because it disregarded certain fundamental laws of motion. Taylor developed several computer models and two "bench top" models designed to demonstrate the flaws he alleged in Dr. Skinner's theory. Taylor then prepared a written report of his results, a copy of which was forwarded to the Eldridges.

The Eldridges filed a motion in limine to preclude Taylor from testifying unless a Daubert hearing was held. The trial court ordered the parties to proceed with Taylor's deposition and to elicit all materials necessary for a future Daubert hearing. After deposing Taylor, the Eldridges filed a second motion to preclude Taylor's testimony at trial, alleging that his proposed testimony failed to meet the Daubert standard of relevancy, or "fit," because his bench top models had not taken into account the complexities of the human body or the specifics of Ms. Eldridge's case; the motion did not explicitly attack the reliability of Taylor's methodology. The motion described much of the testimony and made repeated references to specific pages in Taylor's discovery deposition. The Eldridges did not include a copy of the deposition with their motion, but they did attach the following exhibits: the affidavit of Dr. Skinner criticizing Taylor's report and methodology, Dr. Skinner's curriculum vitae, the report of Professor Daniel

Richardson criticizing Taylor's report and methodology, Richardson's biographical sketch, Taylor's written report, and Taylor's curriculum vitae.

Dr. Miller filed a response to the motion in which he argued that Dr. Skinner's theory could be discounted simply by reference to "fundamental laws of nature governing force, resistance, and flow," and that Taylor's demonstrative bench top models were scientifically valid and would assist the trier of fact. Dr. Miller also attached two exhibits—an affidavit of Taylor and four pages from Taylor's discovery deposition—to his response. A complete copy of the discovery deposition was never included in the record on appeal.

On March 8, 2000, the trial court entered an order scheduling a Daubert hearing for later that same day. No recording or transcript of this hearing was included in the record on appeal; however, the trial court entered an order on March 23, 2000, that reads in relevant part:

On March 8, 2000 the Court had a hearing regarding pending discovery issues in the above-captioned case. After hearing arguments from all counsel the Honorable Judge Stephens orders the following:

1. Dr. Taylor's bench models will not be presented to the jury by Dr. Taylor. Defendant will be permitted to proffer this evidence for the record but does not request a Daubert hearing.

The case then proceeded to trial, during which Taylor's videotaped testimony² was presented to the jury. The jury found no fault on Dr. Miller's part, and the trial court entered a judgment to that effect on April 24, 2000. The Eldridges appealed to the

² The discovery deposition is distinct from the videotaped testimony that was presented to the jury. The discovery deposition was taken on January 27, 2000, prior to the Daubert hearing. The videotaped testimony is in the record and was taken after the trial court's ruling on the second motion to preclude. Taylor was scheduled to appear in court during the trial, but after sustaining an injury he was unable to travel to Kenton

Kentucky Court of Appeals, which reversed the judgment of the trial court because of the admission of Taylor's testimony. This appeal followed.

III. ANALYSIS

A. Daubert

The issues in this case arise from the application of Daubert by the trial court and the Court of Appeals. Though Daubert expressly deals with expert testimony in federal courts, its standards for admissibility of expert testimony and for review of a trial court's decisions as to admissibility have been adopted in Kentucky.³ As such, before examining the merits of the case, a short review of Daubert and its progeny may prove helpful.

1. Reliability and Relevance

Under Daubert, the trial court functions as a "gatekeeper" charged with keeping out unreliable, pseudoscientific evidence:

[T]he trial judge must determine at the outset . . . whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails 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.⁴

County; therefore, his testimony was videotaped prior to trial so that it could be shown to the jury.

³ See Mitchell v. Commonwealth, Ky., 908 S.W.2d 100 (1995), overruled on other grounds by Fugate v. Commonwealth, Ky., 993 S.W.2d 931 (1999).

⁴ Daubert, 509 U.S. at 592-93, 113 S.Ct. at 2796 (footnote omitted).

This procedure exists, in essence, to “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”⁵ Thus the trial court must first assess the reliability of the expert testimony—“a factual determination for the trial judge”⁶—and then evaluate its relevance.

In evaluating the reliability of expert testimony, a trial court may consider a variety of factors:

The factors set forth in Daubert and adopted in Mitchell that a trial court may apply in determining the admissibility of an expert's proffered testimony include, but are not limited to: (1) whether a theory or technique can be and has been tested; (2) whether the theory or technique has been subjected to peer review and publication; (3) whether, with respect to a particular technique, there is a high known or potential rate of error and whether there are standards controlling the technique's operation; and (4) whether the theory or technique enjoys general acceptance within the relevant scientific, technical, or other specialized community.⁷

Application of these “Daubert factors” is often the cornerstone of the reliability analysis.

In addition to being reliable, the proposed testimony must “assist the trier of fact to understand the evidence or to determine a fact in issue.’ This condition goes primarily to relevance. . . . The consideration has been aptly described . . . as one of ‘fit.’”⁸

⁵ Id. at 589, 2795; see also Goodyear Tire and Rubber Co. v. Thompson, Ky., 11 S.W.3d 575, 578 (“[P]roffered expert testimony . . . must be both relevant and reliable.”).

⁶ ROBERT G. LAWSON, THE KENTUCKY EVIDENCE LAW HANDBOOK § 6.20[6], at 456 (4th ed. 2003).

⁷ Goodyear Tire and Rubber Co. v. Thompson, Ky., 11 S.W.3d 575, 578-79 (2000) (citing Daubert, 509 U.S. at 592-94, 113 S.Ct. at 2796-97, 125 L.Ed.2d at 482-83).

⁸ See Daubert, 509 U.S. at 591, 113 S.Ct. at 2795-96.

2. Appellate Review

The decisions of trial courts as to the admissibility of expert witness testimony under Daubert are generally entitled to deference on appeal because trial courts are in the best position to evaluate first hand the proposed evidence. As such, when an appellate court subsequently reviews the trial court's Daubert ruling, it must apply the "abuse of discretion standard."⁹ And as we have noted in the past, "[t]he test for abuse of discretion is whether the trial judge's decision was arbitrary, unreasonable, unfair, or unsupported by sound legal principles."¹⁰

Unfortunately, this standard is somewhat nebulous, and its application by appellate courts is often difficult. This difficulty in defining and applying "abuse of discretion" is illustrated by the importation by various courts of the clearly erroneous standard into the abuse of discretion standard. These courts maintain that an abuse of discretion also occurs when a trial court "relies on clearly erroneous findings of fact."¹¹

⁹ Goodyear Tire and Rubber Co. v. Thompson, Ky., 11 S.W.3d 575, 577 (2000) ("[A]buse of discretion is the proper standard of review of a trial court's evidentiary rulings."); see also Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137, 152-53, 119 S.Ct. 1167, 1176 (1999) ("Our opinion in Joiner makes clear that a court of appeals is to apply an abuse-of-discretion standard when it 'review[s] a trial court's decision to admit or exclude expert testimony.'" (alteration in original)).

¹⁰ Goodyear, 11 S.W.3d at 581.

¹¹ Walters v. Moore, Ky. App., 121 S.W.3d 210, 215 (2003) (quoting Romstadt v. Allstate Ins. Co., 59 F.3d 608, 615 (6th Cir. 1995)); see also Zervos v. Verizon New York, Inc., 252 F.2d 163, 168-69 (2nd Cir. 2001) ("Finally, there is abuse-of-discretion review. This is a second, more complicated, species of deferential appellate review. When a district court is vested with discretion as to a certain matter, it is not required by law to make a particular decision. Rather, the district court is empowered to make a decision—of its choosing—that falls within a range of permissible decisions. A district court 'abuses' or 'exceeds' the discretion accorded to it when (1) its decision rests on an error of law (such as application of the wrong legal principle) or a clearly erroneous factual finding, or (2) its decision—though not necessarily the product of a legal error or a clearly erroneous factual finding—cannot be located within the range of permissible decisions." (footnotes omitted, third emphasis added)); Oddi v. Ford Motor Corp., 234 F.3d 136, 147 (3rd Cir. 2000)(noting, in the context of a Daubert decision, that an abuse

Decisions as to admissibility under Daubert then are especially difficult to evaluate under this standard because they are predicated on findings of fact as to reliability. But as Judge Friendly noted:

[I]n many instances the admission or exclusion of evidence turns on the judge's determination of a preliminary question of fact Such a determination is protected by the "unless clearly erroneous" provision of Federal Rule of Civil Procedure 52(a) and affirmance should be placed on that ground rather than on "discretion."¹²

Though he was speaking of the Federal Rules, Judge Friendly's analysis applies equally to Kentucky's rules, given that the clearly erroneous provision of CR 52.01 is identical to that in the federal rule and that "[r]eliability of expert testimony is a factual determination for the trial judge under KRE 104(a)."¹³

Thus, we note that clear error and abuse of discretion are separate standards of review. Clear error applies to a review of a trial court's findings of fact; abuse of discretion applies in other situations where, for example, a "court is empowered to make a decision—of its choosing—that falls within a range of permissible decisions."¹⁴ And as a result, the distinct aspects of the Daubert analysis—the findings of fact, i.e., reliability or non-reliability, and the discretionary decisions, i.e., whether the evidence will assist trier of fact and the ultimate decision as to admissibility—must be reviewed under different standards. Because the findings of fact that Daubert rulings are based

of discretion can arise from a clearly erroneous finding of fact); Christian Schmidt Brewing Co. v. G. Heileman Brewing Co., 753 F.2d 1354, 1356 (6th Cir 1985) ("A district court abuses its discretion when it relies on clearly erroneous findings of fact, or when it improperly applies the law or uses an erroneous legal standard." (citations omitted)).

¹² Henry J. Friendly, Indiscretion About Discretion, 31 EMORY L.J. 747, 780-81 (1982).

¹³ LAWSON, supra note 6 § 6.20[6], at 456.

¹⁴ Zervos, 252 F.2d at 169.

on are preliminary in nature—the ultimate decision as to admissibility depends on these findings—an error that is alleged in the trial court's findings of fact must be reviewed for clear error before the appellate court can reach the discretionary aspects of the trial court's decision.

B. Trial Court's Order

As a preliminary matter, it is not clear whether the March 23, 2000 order issued by the trial court was actually a ruling on the Eldridges' motion to preclude the testimony of Taylor. The order contains some curious language—"Defendant . . . does not request a Daubert hearing"—even though a Daubert hearing had already been held. But more problematic is the fact that the order did not include specific Daubert findings, did not expressly rule on the motion itself, did not state whether Taylor would be permitted to testify, and did not state whether Taylor would be permitted to rely on the bench top models. The order simply precluded Dr. Miller from presenting Taylor's bench top model to the jury. Ultimately Taylor did give videotaped testimony, which the trial court allowed Dr. Miller to show to the jury at trial.

Despite the lack of specific Daubert findings in the trial court's order, the parties, as well as the trial court and the Court of Appeals, have treated the order of March 23, 2000 as dispositive of the Eldridges' February 24, 2000 motion to preclude. Specifically, in addition to the express holding that the bench top models themselves were inadmissible, the order has been read as holding that Taylor's testimony would be allowed at trial. Because the order has been treated as a ruling on the motion to preclude by the Court of Appeals and especially by the trial court, given that it did allow Taylor to testify at trial, and the parties did not raise this as an issue on appeal, we assume for purposes of this appeal that the order was in fact such a ruling.

C. Application of the Abuse of Discretion Standard by the Court of Appeals

The Court of Appeals purported to apply the abuse of discretion standard when it reviewed the trial court's Daubert ruling allowing Taylor's testimony at trial. We disagree that it did so. It did not find that the lack of express Daubert findings was arbitrary, unfair, or unreasonable, or an application of the wrong legal standard. In fact, the Court of Appeals never made any finding that the trial court's decision was arbitrary, unreasonable, or unfair, or that it applied the wrong legal standard.

Instead the Court of Appeals simply stated that Taylor's testimony was neither reliable nor relevant, and that as a result, the trial court's admission of the testimony, was an abuse of discretion. But by finding that Taylor's testimony was unreliable, in addition to being irrelevant, the Court of Appeals was reviewing the trial court's findings of fact. And because reliability is a preliminary question of fact reserved to the trial judge,¹⁵ clear error, not abuse of discretion, was the appropriate standard of review. The Court of Appeals prematurely reached the abuse of discretion standard.

D. Inadvertent De Novo Review

It is possible that the Court of Appeals simply misidentified the standard of review that it was applying. Perhaps in ruling that Taylor's "methodology in its entirety" had failed to meet both the reliability and relevance requirements of Daubert—in revisiting the trial court's finding that Taylor's testimony would be reliable—the Court of Appeals was in fact attempting to engage in clear error review. If this is so, then the Court of Appeals compounded its error by failing to give sufficient deference to the trial court—by engaging, in effect, in a de novo review of the trial court's factual findings.

¹⁵ KRE 104(a); LAWSON, supra note 6, § 6.20[6], at 456.

By reviewing Taylor's written report and his trial testimony, then applying Daubert's relevancy and reliability factors to the testimony, the Court of Appeals engaged in the Daubert analysis anew. And upon reaching a different conclusion than the trial court, it simply reversed the trial court. Though the Court of Appeals labeled this approach abuse of discretion, it was actually a de novo review of the facts.

Only by finding that the trial court's Daubert analysis was simply incorrect did the Court of Appeals find an abuse of discretion. The Court of Appeals failed to actually show that the trial court's ruling was arbitrary, unreasonable, unfair, unsupported by sound legal principles, or clearly erroneous. The Court of Appeals never even approached this mode of analysis because it chose instead to re-apply Daubert to the facts and let the result—that, in its opinion, the trial court got it wrong—dictate the finding of abuse of discretion.

We recognize that it is sometimes difficult to distinguish between the de novo, clear error, and abuse of discretion standards of review. All three require the appellate court to review the record and the trial court's ruling. But deference to the trial court's factual findings and ruling in such matters as evidentiary questions is required because the trial court is in the best position to evaluate the evidence.

Inadvertent use of the de novo standard may seem inevitable given that it is so difficult to review the record and to find mistaken rulings, but then not to disturb them unless they fall under one of the categories of abuse of discretion or are clearly erroneous. This is especially so given the complexity of the Daubert analysis. It is arguable that if a given Daubert analysis is simply incorrect, then an abuse of discretion or a clearly erroneous finding of fact must have occurred—that if the trial court reached the wrong Daubert result, then some sort of arbitrariness, unreasonableness,

unfairness, lack of sound legal principles, or clear factual error must inhere in the trial court's decision. And in a case such as this, where the trial court failed to make express findings of fact and law, it is even more tempting for an appellate court to redo the analysis that the trial court presumably performed.

But such an argument must fail because reversing the lower court simply because the "correct" result was not reached in an evidentiary ruling ignores the deference due to the trial court. This is why de novo review is not the standard of review for evidentiary rulings. Instead, a review of the trial court's findings of fact as to reliability is limited to a clear error review. Where the trial court fails to make express findings of fact, as in this case, an appellate court should engage in such clear error review by looking at the record to see if there is substantial evidence to support the trial court's ruling. And a review of the trial court's ruling as to whether the expert testimony would assist the trier of fact is then reviewed under the abuse of discretion standard.

Appellate courts must be careful to avoid the sort of unfettered review of the record and of the trial court's rulings that indicates a de novo review. And appellate courts must recognize the unfortunate but necessary corollaries of deference to the trial court: that it is possible for a trial court to rule contrary to what an appellate court would rule without abusing its discretion or being clearly erroneous, and that an appellate court is powerless to disturb such rulings. The abuse of discretion and clear error standards allow an appellate court to walk this fine line—to engage in a meaningful review without resorting to retrying the issue—by requiring a thorough but deferential examination of the record and the trial court's findings of fact and rulings.

E. Our Review

We conclude by noting that a careful review of the record shows that the trial court's finding of reliability was supported by substantial evidence and therefore was not clearly erroneous, and that the trial court did not abuse its discretion in admitting the testimony.

1. Clear Error

The Court of Appeals agreed with the trial court that Taylor's computer and bench top models were inadmissible. We note that while this decision was within the sound discretion of the trial court, this conclusion regarding the admissibility of Taylor's models themselves is questionable given that they were based on physical laws of fluid motion, et cetera, and because any assertions, e.g., those by Dr. Skinner, as to oversimplicity of the models when compared to the human body go more to the weight of the evidence rather than admissibility. But we need not revisit the issue because the trial court held that the models were inadmissible and Miller has not challenged that decision by cross-appeal.

In finding that Taylor's testimony was unreliable, the Court of Appeals relied solely on an application of the four Daubert factors to Taylor's so-called methodology. The Court of Appeals noted that (1) Taylor's methodology had never been tested in a human being; (2) Taylor knew of no studies or literature regarding retrograde embolization, and he had not previously conducted such a study himself, thus there had been no opportunity for peer review of his methodology; (3) Taylor's methodology was not an accepted "technique" for calculating maximum retrograde travel of an embolus in a circulatory system and it was not clear what effect the various estimations of unknown

values had on the accuracy of the experiments and conclusions,¹⁶ thus, although he attempted to allow for maximum particle migration, there was significant potential for error; and (4) as there were no common techniques for making his calculations, it was apparent that Taylor's techniques did not have "general acceptance" in the scientific community. The Court of Appeals also concluded that Taylor's testimony was based solely on his bench top models—his "methodology." Because the methodology did not appear to fall squarely within the four factors of reliability named in Daubert, the court concluded that Taylor's testimony would not satisfy the reliability requirement.

The first problem with this approach is that it relies too heavily on the factors elaborated in Daubert. While the Daubert factors are helpful in evaluating the reliability of expert testimony, they are not an exclusive list. The Supreme Court stated in Daubert itself that a trial court's consideration is not limited to the four listed factors.¹⁷ The Court has also noted that the Daubert factors might not even be relevant in a given case:

Daubert adds that the gatekeeping inquiry must be "tied to the facts" of a particular "case." We agree with the Solicitor General that "[t]he factors identified in Daubert 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." The conclusion, in our view, is that we can neither rule out, nor rule in, for all cases and for all time the applicability of the factors mentioned in Daubert, nor can we now do so for subsets of cases categorized by

¹⁶ Some of the unknown values include the size, composition, and initial velocity of the emboli; the velocity of Ms. Eldridge's blood; and the velocity of the contrast dye leaving the catheter.

¹⁷ Daubert, 509 U.S. at 589, 113 S.Ct at 2795; see also Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137, 150-51, 119 S.Ct. 1167, 1175 (1999) ("Our emphasis on the word 'may' thus reflects Daubert's description of the Rule 702 inquiry as 'a flexible one.' Daubert makes clear that the factors it mentions do not constitute a 'definitive checklist or test.' . . . [Daubert] made clear that its list of factors was meant to be helpful, not definitive." (emphasis in original, citation omitted)).

category of expert or by kind of evidence. Too much depends upon the particular circumstances of the particular case at issue.¹⁸

As an example of this, the Court observed that “[i]t might not be surprising in a particular case . . . that a claim made by a scientific witness has never been the subject of peer review, for the particular application at issue may never previously have interested any scientist.”¹⁹

Taylor’s methodology was a unique attempt to test the theory proposed by Dr. Skinner. And to do this, Taylor had to try to model a situation—retrograde travel of emboli in the human body—that is extremely rare. It is “not . . . surprising,” then, that Taylor’s methodology has not been extensively tested, has not been subjected to peer review, and has not garnered general acceptance in the scientific community. But the clear implication of Daubert and Kumho Tires is that the absence of any or all of these factors does not necessarily render the methodology unreliable.

The Daubert factors were designed to make distinctions between science and pseudo-science, between, for example, astronomy and astrology. The factors are not meant to give the final answer as to the validity of a scientific theory or technique. Rigid application of the Daubert factors, however, simply lumps methodologies like the one used by Taylor in with the likes of magic and snake-oil cures simply because the methodologies are novel. This approach would forever prevent the introduction of techniques custom-made to test rare fact situations. But while Daubert burdens courts with a gatekeeping role, it does not require, or even allow, a court simply to lock the gate to innovative or unique scientific techniques that have been newly developed in

¹⁸ Kumho Tire, 526 U.S. at 150, 119 S.Ct. at 1175 (citations omitted, alteration in original, emphasis added).

¹⁹ Id. at 151, 1175.

response to the unusual facts of a particular case. Yet, when the Court of Appeals reviewed the reliability of Taylor's testimony, it did exactly this by applying only the four listed Daubert factors, and by doing so in a mechanistic fashion.

We disagree with the Court of Appeals's conclusion that Taylor's opinions were based solely on the results of his bench top models. There is evidence that Taylor's conclusions were supported by, but not based on, the results of the models. His methodology was actually a two-part approach. First he applied his own knowledge of the basic laws of motion and blood flow to how an embolus might have traveled retrograde in the blood stream. This led him to conclude that Dr. Skinner's theory was impossible. Then he tested that conclusion with bench top and computer models that were designed to emulate the conditions found in the human body. With regard to the basis of his opinions, Taylor was explicit:

4. . . . My opinions are based upon well-recognized scientific principles that I apply and are applied by other biomedical engineers in the study of blood flow dynamics.

5. My conclusions are in no way based upon the bench top model criticized by Dr. Skinner in his affidavit. However, the bench top model is applicable to the facts of this case because the conditions in that model are more conducive to the migration of a particle retrograde (against fluid flow) than would ever be expected in a living human being.

. . . .

9. The bench top model merely supports my conclusions that are based on established, sound, tested scientific principles and laws of nature.

And in his report, Taylor noted that the Eldridges' theory "[a]t initial inspection . . . seems to disregard Newton's laws of motion and the principle of Conservation of Momentum, two of the most important and time-tested laws of physics and science"—an assessment he arrived at before performing his computer and bench top

experiments. The bench top models were offered more as demonstrative evidence than as the experimental technique used to test Dr. Skinner's theory.

As such, application of the Daubert factors to the bench top models was misplaced. The trial court had already denied the admissibility of the models, yet it had let Taylor testify. We do not know exactly why the trial court allowed Taylor to testify, yet there is ample evidence in Taylor's report and his affidavit to support a finding that his conclusions were based on an application of the general laws of motion and fluid flow, and his own specialized knowledge of blood flow—and not the excluded models. To describe Taylor's methodology as consisting of only the bench top models and focusing the Daubert analysis on those models only led the Court of Appeals to confuse the issues.

The more appropriate focus of the Daubert reliability analysis then is the actual basis of Taylor's opinions. On this point, we would note that the Court of Appeals overlooked a variety of evidence that was available to the trial court and which supports the trial court's de facto finding that the testimony would be reliable. Again, we note that Taylor claimed that his conclusions, and thus his testimony, were not based on the results of the excluded bench top models. Instead he based his testimony on widely, even universally, accepted physical and scientific principles. We also note that Taylor has an undergraduate degree in biology and two advanced degrees in physiology and that his area of expertise is blood flow and the measurement of blood pressure.

There is little question that the scientific techniques and principles, i.e., basic laws of motions and principles of blood flow, that served as the basis of Taylor's opinions are reliable. And it is clear that Taylor had a thorough understanding of those scientific techniques and principles. At the very least, the points raised by the Court of

Appeals regarding Taylor's qualifications were sufficiently balanced by the facts that we have noted so as to require an appellate ruling that the trial court's findings were supported by substantial evidence.

2. Abuse of Discretion

The Court of Appeals also held that Taylor's testimony failed Daubert's test of relevance. Again, the court noted that Taylor's conclusions were based only on the bench top experiments and computer models, which had been excluded. Thus, upon reviewing the report and Taylor's trial testimony, the Court of Appeals found that Taylor's "methodology" did not take into account the complexities of the human circulatory system or the unique circumstances of Ms. Eldridge's surgery. And the Court of Appeals held that Taylor's methodology and, by extension, his trial testimony did not meet the relevancy, or "fit," requirement of Daubert.²⁰

As discussed already, there is ample evidence in the record that Taylor's testimony was not in fact based on his models. And, perhaps more importantly, the Court of Appeals's reading of the Daubert "fit" requirement is far too restrictive. Proposed expert testimony does not have to take into account every possible factor or variable in a unique, complex system, e.g., the human body, in order to be relevant. Such an undertaking would likely be impossible by any expert witness. Fortunately, the Daubert Court included an illuminating example:

The study of the phases of the moon, for example, may provide valid scientific "knowledge" about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (absent creditable grounds supporting such a link), evidence that the

²⁰ See Daubert, 509 U.S. at 591, 113 S.Ct. at 2795-96 ("Rule 702 further requires that the evidence or testimony 'assist the trier of fact to understand the evidence or to determine a fact in issue.' This condition goes primarily to relevance. . . . The consideration has been aptly described . . . as one of 'fit.'").

moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night. Rule 702's "helpfulness" standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.²¹

Taylor's proposed testimony—"based on established, sound, tested scientific principles and laws of nature" and "Newton's laws of motion and the principle of Conservation of Momentum"—that it would have been impossible for an embolus to travel retrograde for the distance alleged by the Eldridges is similar to an application of scientific knowledge about the phases of the moon to the question of the amount of light on a given night. To extend the "phases of the moon" analogy, Taylor's failure to account for all of the complexities of the human body or the specifics of Ms. Eldridge's condition would be comparable to a failure by an expert to account for bad weather or a witness's poor eyesight when giving testimony as to the effect of phases of the moon on the amount of natural light, and thus on visibility, on a given night. In both cases, the failure to take into account those further variables goes more to the weight of the testimony than its admissibility.

Taylor's proposed testimony was based on time-tested principles of physics with which he was very familiar, and it addressed both the general properties of blood flow and the specific question of whether emboli could travel the distance alleged by the Eldridges. Thus, Taylor's testimony met the Daubert standard for relevance, and the trial court did not abuse its discretion when it, in effect, ruled that Taylor's testimony would assist the trier of fact.

Though the argument has not been raised as such, the fact that the trial court failed to include specific factual findings and legal conclusions to support its decision to

²¹ Id. at 592-92.

admit the testimony could imply that the decision was arbitrary, unreasonable, or unfair, or that the trial court applied the wrong legal standard. But we note that sufficient findings in this regard, namely that Taylor was qualified to give expert testimony as to blood flow and that his testimony would be reliable, are implicit in the fact that the trial court allowed him to testify at trial. And while we prefer that trial courts include findings of fact and conclusions of law in their Daubert rulings—they certainly make review by an appellate court much easier and more meaningful—failure to include those findings and conclusions is not automatically indicative of arbitrariness, unreasonableness, unfairness, or application of the wrong legal standard. Such a failure, absent a motion at trial requesting findings of fact, is not grounds for reversal.²² No such request was made of the trial court. As we have discussed above, the proper appellate approach when the trial court fails to make express findings of fact is to engage in a clear error review by looking at the record to see if the trial court’s ruling is supported by substantial evidence.

Finally, we note that the trial court conducted the matter appropriately by allowing the parties to engage in discovery and then to submit extensive memoranda of law, complete with affidavits and excerpts from depositions, on the issues. The trial court held a hearing as required by Daubert. There is no evidence that the trial court applied the outdated Frye²³ test or a legal standard other than Daubert. We find no evidence that the trial court was arbitrary, unreasonable, or unfair, or that it applied the wrong legal standard, and thus we can find no abuse of discretion.

²² CR 52.04.

²³ Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), overruled by Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993).

IV. CONCLUSION

The Court of Appeals's finding that the trial court abused its discretion overlooks the substantial evidence in the record that Taylor's testimony was both reliable and relevant. And there is nothing in the record to lead to the conclusion that Taylor was engaging in the sort of pseudoscientific quackery that Daubert is intended to keep out of trial. Any minor problems with Taylor's qualifications, his use of scientific principles to arrive at his opinions, or his application of the variables specific to Ms. Eldridge's case were fertile ground for a robust cross-examination by the Eldridges' attorneys—not reasons to exclude his testimony at trial.

But the significant jump in the Court of Appeals's logic from unreliable to abuse of discretion is just as important an error. This disconnect is evidence of a deeper flaw, namely failure to properly apply the clearly erroneous standard. It was the responsibility of the Court of Appeals only to review the trial court's factual findings and whether the trial court abused its discretion in its decision to admit Taylor's testimony—not to supplant the trial court by engaging in its own determination as to whether the testimony was reliable and should have been admitted.

Accordingly, we find that under the proper standard, the trial court's implicit finding that Taylor's testimony would be reliable was not clearly erroneous and the trial court did not abuse its discretion in then allowing Taylor to testify at trial. The Court of Appeals improperly substituted its judgment as to the relevance, reliability, and admissibility of Taylor's testimony for that of the trial court. The decision of the Court of Appeals is hereby reversed and the judgment of the trial court is reinstated.

All concur.

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