



**COURT OF APPEALS
SECOND DISTRICT OF TEXAS
FORT WORTH**

NO. 02-12-00188-CR

JENNIFER BANNER WOLFE

APPELLANT

V.

THE STATE OF TEXAS

STATE

FROM THE 213TH DISTRICT COURT OF TARRANT COUNTY
TRIAL COURT NO. 1200447D

OPINION¹

Appellant Jennifer Banner Wolfe pled not guilty to knowingly causing serious bodily injury to a child, a first-degree felony.² Following a bench trial, the trial court found her guilty and sentenced her to five years' confinement. In one

¹This appeal was originally submitted without oral argument on September 30, 2013. The court, on its own motion on June 10, 2014, ordered the appeal reset without oral argument on July 1, 2014 and assigned it to the current panel. The undersigned was assigned authorship on December 3, 2014.

²See Tex. Penal Code Ann. § 22.04(a)(1), (e) (West Supp. 2014).

point, appellant asserts that the trial court abused its discretion by admitting allegedly unreliable medical expert opinion testimony on abusive head trauma. We affirm.

Background Facts

Appellant maintained an in-home day care and was a state-certified childcare provider. As part of her certification, she received training about the risk of abusive head trauma in small children.

On April 1, 2010, near 7:15 a.m., Mrs. Smith, a teacher, dropped off seven-month-old Jack Smith³ at appellant's home. Although Jack was fighting a cold, had struggled with acid reflux, and had been fussy the night before, that morning, he had been behaving normally.

At 10:22 a.m., an ambulance was dispatched to appellant's home. When paramedics arrived, Jack's skin was blue-hued; he was lying on his back and was receiving CPR by fire department personnel who had already arrived. He did not have a pulse or spontaneous respirations, meaning that he was not getting oxygen and was clinically dead. Appellant said that after eating, Jack had screamed "real loud and just fell back unconscious." Jack had not yet been able to sit up by himself at that time.

³To protect the anonymity of the child at issue, we will use aliases to refer to him and his mother. See *Daggett v. State*, 187 S.W.3d 444, 446 n.3 (Tex. Crim. App. 2005); *McClendon v. State*, 643 S.W.2d 936, 936 n.1 (Tex. Crim. App. [Panel Op.] 1982).

In the ambulance, following the administration of more CPR and advanced life-support procedures, Jack began to have spontaneous respirations along with a weak pulse. He also vomited, but he did not have visible external signs of injury. Upon reaching Cook Children's Hospital, he was awake and crying.

At approximately 10:40 a.m., Mrs. Smith received a call telling her to go to the hospital because Jack was being rushed there. Appellant told Mrs. Smith on the phone that after she had sat Jack down, he had fallen backward.

Mrs. Smith and her husband arrived at the hospital, saw that Jack was pale and still, and learned that he needed immediate surgery to stop bleeding in his brain. During the surgery, a Fort Worth police officer spoke with Jack's parents. Later that day and night, the same officer and personnel from the Texas Department of Human Services interviewed appellant, and she again said that Jack had simply fallen on his head on a foam-padded floor and had immediately gone limp. Eventually, she wrote a statement stating the same but conceding that she had "possibly" sat Jack down hard.

Jack suffered multiple injuries, including a subdural hematoma and retinal hemorrhaging.⁴ He suffered no fractures or other external physical injuries. He remained at the hospital for nine days after his surgery.

⁴A subdural hematoma occurs when there is bleeding beneath the dura. The dura is the thick, leathery-like covering of the brain. Hemorrhaging occurs when blood leaks out of an artery or a vein.

Dr. Richard Roberts, a pediatric neurosurgeon, treated Jack. A preoperative CT scan of Jack's brain showed the presence of two older stages of blood, as well as new bleeding. Dr. Roberts performed an emergency craniotomy to evacuate the hematoma and to decrease the pressure in Jack's brain. Dr. Roberts determined that a bridging vein connected to the sagittal sinus had avulsed, or had been pulled off of the sagittal sinus, causing the brisk bleeding in Jack's brain.

Dr. Ann Ranelle, a pediatric ophthalmologist, assessed Jack's eye injuries after his craniotomy. Jack's right eye was uninjured, but his left eye suffered multilayered retinal hemorrhages that were consistent with nonaccidental trauma and retinoschisis, which occurs when the retina splits apart. That eye also suffered chemosis, which is swelling of a covering over the white part of the eye. The vitreous⁵ base had also separated from the retina in Jack's left eye. Dr. Jayme Coffman, a child-abuse pediatrician, consulted on Jack's case while he was in the hospital and determined that his injuries could not have been caused by falling from a seated position, as appellant had claimed.

A grand jury indicted appellant with knowingly causing serious bodily injury⁶ to Jack by shaking him or by striking him against a hard surface. The indictment included paragraphs alleging that appellant had used her hands as a

⁵The vitreous is a jelly-like substance that gives the eye structure.

⁶Parts of Jack's brain are dead, but as of the time of trial, it was too early to determine the long-term effects of his injuries.

deadly weapon during the crime. Appellant retained counsel; filed several pretrial motions, including requests for a hearing on the reliability of scientific evidence to be presented by the State; waived her right to a jury trial; and pled not guilty. Dr. Roberts, Dr. Ranelle, and Dr. Coffman testified for the State at trial, each opining that Jack's injuries were the result of nonaccidental, abusive head trauma.⁷ Appellant's expert disputed the State's experts' conclusions and proposed that Jack's injuries could have been caused by an unresolved, birth-related subdural hematoma. The trial court convicted appellant and sentenced her to five years' confinement. She brought this appeal.

Reliability of Expert Testimony

Rule of evidence 702 provides, "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise." Tex. R. Evid. 702. Rule of evidence 705(c) governs the reliability of expert testimony and states that "[i]f the court determines that the underlying facts or data do not provide a sufficient basis for the expert's opinion under Rule 702 or

⁷At the beginning of the trial, appellant objected to this expert testimony, and the trial court carried the objection through the trial. Specifically, she challenged "the underlying principle" of shaken baby syndrome or abusive head trauma as unreliable in the scientific community and not reliable in this case. After the State rested, the parties presented arguments on the reliability of the testimony provided by the State's experts, and the trial court overruled appellant's objection.

703, the opinion is inadmissible.” Tex. R. Evid. 705(c); see *Bekendam v. State*, 441 S.W.3d 295, 303 (Tex. Crim. App. 2014). Reliability depends upon whether the evidence has roots in sound scientific methodology. *Vela v. State*, 209 S.W.3d 128, 133 (Tex. Crim. App. 2006); see *Bekendam*, 441 S.W.3d at 303; *Tillman v. State*, 354 S.W.3d 425, 435 (Tex. Crim. App. 2011) (“[T]he proponent must prove two prongs: (1) the testimony is based on a reliable scientific foundation, and (2) it is relevant to the issues in the case.”).

We review a trial court’s ruling admitting expert scientific testimony for an abuse of discretion. *Tillman*, 354 S.W.3d at 435; *Mata v. State*, 46 S.W.3d 902, 908 (Tex. Crim. App. 2001). Thus, we reverse the ruling only when the trial court’s decision was outside the zone of reasonable disagreement. *Tillman*, 354 S.W.3d at 435.

The proponent of scientific evidence is not typically called upon to establish its empirical reliability as a predicate to admission until the opponent of that evidence raises an objection under rule 702. *State v. Esparza*, 413 S.W.3d 81, 86 (Tex. Crim. App. 2013); see Tex. R. Evid. 702. Once the party opposing the evidence asserts a rule 702 objection, the proponent bears the burden of demonstrating by clear and convincing evidence that the evidence is reliable. *Esparza*, 413 S.W.3d at 86; *Mata*, 46 S.W.3d at 908.

For “hard” scientific evidence,⁸ the proponent satisfies this burden by showing the validity of the underlying scientific theory, the validity of the technique applying the theory, and the proper application of the technique on the occasion in question. *Mata*, 46 S.W.3d at 908; *Kelly v. State*, 824 S.W.2d 568, 573 (Tex. Crim. App. 1992); see *Tillman*, 354 S.W.3d at 435 (“The focus of the reliability analysis is to determine whether the evidence has its basis in sound scientific methodology such that testimony about ‘junk science’ is weeded out.”).

Factors that could affect a trial court’s determination of reliability include

(1) the extent to which the underlying scientific theory and technique are accepted as valid by the relevant scientific community, if such a community can be ascertained; (2) the qualifications of the expert(s) testifying; (3) the existence of literature supporting or rejecting the underlying scientific theory and technique; (4) the potential rate of error of the technique; (5) the availability of other experts to test and evaluate the technique; (6) the clarity with which the underlying scientific theory and technique can be explained to the court; and (7) the experience and skill of the person(s) who applied the technique on the occasion in question.

Kelly, 824 S.W.2d at 573. Even if the traditional *Kelly* reliability factors do not perfectly apply to particular testimony, the proponent is not excused from proving its reliability. *Vela*, 209 S.W.3d at 134.

⁸“The ‘hard’ sciences, areas in which precise measurement, calculation, and prediction are generally possible, include mathematics, physical science, earth science, and life science.” *Weatherred v. State*, 15 S.W.3d 540, 542 n.5 (Tex. Crim. App. 2000).

Dr. Roberts's testimony

Dr. Roberts⁹ testified that Jack suffered a subdural hematoma with a significant accumulation of blood; he presented with “compression of the brain that would be worrisome for surviving.” His brain had shifted from the left side toward the right side of his head, which was an indication of increased pressure. Unless treated, the injury would have compressed Jack’s brain stem to the point of causing him to become brain dead, and it also could have permanently paralyzed the right side of his body. Dr. Roberts performed an emergency craniotomy and evacuation of the subdural hematoma to decrease the pressure in Jack’s brain and to allow it to return to its normal state.

During the craniotomy, Dr. Roberts determined that the bridging vein connected to the sagittal sinus¹⁰ had avulsed. Although he did not locate a torn or avulsed vein, he determined that the vein had avulsed, through some sort of force applied to Jack’s head, because the bleeding stopped when he placed a hemostatic agent against the sagittal sinus. Dr. Roberts explained that Jack’s brain had to deform far enough to stretch the bridging vein and tear it from the sagittal sinus. Dr. Roberts explained that the amount of force necessary to

⁹Dr. Roberts attended medical school at Louisiana State University. He completed a six-year residency focused on neurosurgery, and during that time, he assessed children who had brain trauma. He had been working at Cook Children’s Hospital as a pediatric neurosurgeon for more than four years at the time of the trial.

¹⁰The sagittal sinus is a triangular draining vein in the top of the brain.

avulse a bridging vein must arise from a high-energy impact such as a car accident or a fall from a second-story window; he opined that the bridging vein could not have avulsed merely from a fall backwards onto a padded surface from a sitting position.

Dr. Roberts testified that retinal hemorrhage, tearing of the retina (retinoschisis), subdural hematoma, and an avulsed bridging vein “are all classically associated with high-energy input to the head,” not including toppling backwards from a seated position. He opined that Jack’s injury was nonaccidental trauma based on the finding of retinal hemorrhages (including retinal tearing), brain swelling, and the subdural hematoma, coupled with the fact that Jack’s injuries were inconsistent with appellant’s explanation of what had happened.¹¹ Dr. Roberts testified that his opinion was based on principles that the medical community generally accepts.

Dr. Roberts explained that Jack’s injuries could have been caused by striking Jack with or against a hard surface, including a padded play floor like the one in appellant’s house, or by shaking Jack and then exerting upon him some sort of impact, but not by shaking alone. According to Dr. Roberts, the

¹¹Dr. Roberts testified,

[W]e are taught . . . that a patient with a subdural hematoma, including mixed-density subdural hematoma, which can indicate previous trauma, retinal hemorrhaging, and brain swelling are the . . . things that we need to call a . . . non-accidental trauma when . . . the described action does not meet the injuries.

mechanism had to include acceleration and deceleration in order to cause the bridging vein to avulse.

Dr. Roberts proposed that with the exception of the old blood (the chronic subdural hematoma), the remainder of Jack's injuries (the brain swelling, the acute subdural hematoma, the retinal hemorrhaging, and the retinal tearing) all occurred at once because of the impact or the shaking with impact. He also suggested that the amount of force necessary to cause Jack's injuries would have been to a degree that a person would know that she was doing a dangerous act. Jack's lack of external injuries, bruises, fractures, spinal or neck injuries, or grip marks did not change Dr. Roberts's opinion that force had to be applied to avulse the bridging vein.

On cross-examination, Dr. Roberts explained that he had learned that the constellation of subdural hematoma, retinal hemorrhaging, and brain swelling is, in absence of an explanation for the injuries, the result of a nonaccidental trauma. He was trained that shaking impact, rather than shaking alone, typically causes that collection of symptoms. He admitted that Jack did not have visible signs of impact-caused injury to his head, but he testified that the lack of such signs did not change his opinion that force was required to avulse the bridging vein.

Appellant asked Dr. Roberts whether he was familiar with certain studies about shaken baby syndrome, and Dr. Roberts said that he was not familiar with

those studies. Dr. Roberts also testified that he had not written any articles in the field of child abuse.

Dr. Ranelle's testimony

Dr. Ranelle¹² found no hemorrhages in Jack's right eye but found hemorrhaging in all retinal layers of his left eye.¹³ Dr. Ranelle testified that Jack's left eye also suffered retinoschisis, which occurs when the retina splits apart and causes a pocket of blood, and that the vitreous base had separated from the retina in the left eye.

Dr. Ranelle testified that the conjunction of Jack's eye injuries with his brain injuries was consistent with violent, high-energy, intentional trauma, even considering that there were no visible external injuries. She explained in part that nonaccidental trauma caused by an accelerating and decelerating force may be diagnosed from a "baby with a subdural hematoma and multilayered retinal hemorrhages that are confluent [and] that go to the ora."

Based on her experience in treating other, less-severe eye injuries, Dr. Ranelle stated that it was not possible for appellant's version of the facts, the medical treatment that Jack had received, or Jack's birth to have caused his eye

¹²Dr. Ranelle attended medical school at what is now called the Kansas City University of Biomedical Sciences. After completing an osteopathic ophthalmology residency and a pediatric ophthalmology fellowship, she started practicing pediatric ophthalmology in Fort Worth in 2005 and had treated "thousands" of patients, mostly children, by the time of her testimony.

¹³Dr. Ranelle could not explain why violent force would cause hemorrhaging in only one eye's retinal layers.

injuries. Dr. Ranelle opined that Jack's injuries were consistent with an acceleration/deceleration type of force. She explained that she had treated children who had fallen out of second story windows or out of shopping carts onto concrete floors without suffering the serious retinal injuries that Jack had experienced.

Dr. Ranelle explained that retinoschisis can be congenital or result from nonaccidental trauma, but when it occurs in conjunction with the separation of the vitreous base, it is most often from nonaccidental trauma. Dr. Ranelle testified that the retinoschisis and the separation of the vitreous base could not have been secondarily caused by the swelling in Jack's brain.

Dr. Ranelle based her opinions on her training and her experience with healthy children who present this collection of symptoms, which is "very consistent with a violent shaking, traumatic abusive force." She explained that the training she had received during her fellowship taught her to be strongly suspicious of nonaccidental trauma when a child presents with retinal hemorrhaging, subdural hematoma, and no explanation for these injuries:

A. Well, there's usually -- in *Pediatric Ophthalmology* there will still be a chapter on assessing nonaccidental trauma.

Q. And that conclusion is reached in that chapter regarding this constellation that you're testifying about.

A. . . . [W]hat conclusion?

Q. Of nonaccidental trauma.

A. Right. . . . [H]ow do you be suspicious of it? You know, that's the goal. They give you guidelines which you follow. And kind of a procedure, dilate the eye using indirect ophthalmoscope, those types of things. They give you a procedure to follow and then basically outline a situation in which, you know, you should be strongly suspicious of nonaccidental trauma.

. . . .

Q. . . . It doesn't out -- it doesn't [rule out] any other type of cause.

A. Well, yes. It tells you how to rule out other causes, you know.

. . . .

Q. So is it your belief based on those factors in a healthy child, that's [an] axiomatic or automatic conclusion?

A. Yes.

Q. Always.

A. You know, when you say "always," you're talking about an infinite number of times. But, yeah, I mean, I would say 99 percent of the time if in these exact same circumstances, that's what you would look at as child abuse, yeah.

Dr. Ranelle testified as to the theories that cause retinal hemorrhages: "one is just the acceleration and deceleration force basically causes the blood vessels to leak"; another is that the vitreous base tears away from the retina and pulls on the blood vessels, causing hemorrhaging; and a third is when a subarachnoid hemorrhage tracks through the optic nerve up into the retina. She opined that Jack's injuries were caused by an acceleration and deceleration

force.¹⁴ When asked about the lack of external injuries to Jack, Dr. Ranelle testified, “I don’t know what happened to [Jack]. Nobody came up with an explanation of what happened to [Jack]. . . . All I can tell you is that with this constellation of symptoms, you know, other children that I’ve seen, it is very consistent with a violent shaking, traumatic abusive force.”

Dr. Ranelle stated on cross-examination that she was not familiar with literature questioning the use of retinal hemorrhages in a diagnosis of child abuse. She testified that she was aware that “some doctors” question the validity of retinal hemorrhages in nonaccidental trauma, but she disagreed that the medical community, specifically pediatric ophthalmologists, are in a “state of unrest” concerning a diagnosis of child abuse based on retinal hemorrhages without physical injuries.

Dr. Coffman’s testimony

Dr. Coffman¹⁵ testified that she is the medical director of the Child Advocacy, Resource, and Evaluation (CARE) Team at Cook Children’s Hospital. She consulted on Jack’s case while he was in the hospital to opine whether his

¹⁴Regarding the second theory, Dr. Ranelle testified that because the vitreous base is “very highly attached” in children, that theory is not likely. Regarding the third theory, Dr. Ranelle testified that Jack had hemorrhages coming off the optic nerve but no significant swelling.

¹⁵Dr. Coffman attended medical school at the University of Texas Health Science Center in San Antonio. She completed a pediatric residency, opened a pediatric practice, and eventually began working at Cook Children’s Hospital. She is board certified in general pediatrics and child-abuse pediatrics.

injuries were consistent with appellant's story. After examining Jack in the hospital and reviewing his family and medical histories, Dr. Coffman concluded that Jack's injuries were the result of a high-energy, violent impact or a combination of impact and shaking, causing sudden acceleration and deceleration. She opined that the injuries could not have been caused by falling onto a foam-padded floor from a seated position. She explained that the avulsed bridging vein caused the brisk bleeding in Jack's brain and that "there had to be some sort of trauma to cause that [avulsed bridging vein]." Dr. Coffman's review of Jack's medical history and her observations of him revealed no alternative diagnosis for his injuries.

Regarding retinoschisis, Dr. Coffman testified that it is only seen in severe trauma other than one case of leukemia. Dr. Coffman explained that blood testing on Jack revealed that he did not have leukemia or any blood disorder; he also did not have any clotting disorder. She testified that retinoschisis results from severe trauma, both accidental and nonaccidental.

Dr. Coffman testified that there is no "unrest" in the medical field as to a diagnosis of abusive head trauma, although there is unrest in the biomechanical and medical examiner fields. She explained that research of an infant's brain is ongoing but that all fields draw similar conclusions that subdural hemorrhages and extensive retinal hemorrhages are more common in abuse than accident. Dr. Coffman said that she does not use the term "shaken baby syndrome" or rely only on "the triad" of injuries. She explained,

[T]he triad is a fallacy because we don't make our diagnosis based on a triad. The diagnosis is based on the individual patient's presentation and . . . findings. So I would no more diagnose abusive head trauma based on a triad than I would with anything else. . . .

It's based on that individual patient's history, presentation, and findings. I don't use shaken baby syndrome because that is an isolated type of injury. . . . I'm not there when the child gets injured. I don't know if there's impact involved

Dr. Coffman opined that the mechanism used in Jack's case was violent and high energy. She said that an impact onto something padded could cause no bruising or could cause bruising underneath the scalp that would be visible only during an autopsy. She testified that she has seen numerous cases of head trauma in which the child had no visible external scalp bruising but the autopsy revealed bruising underneath the scalp. Dr. Coffman has both had personal experience and read about cases with children sustaining injuries similar to Jack's after having been impacted against a soft surface similar to the padded mat in appellant's house. Dr. Coffman agreed with Dr. Roberts that all of Jack's head and eye injuries occurred simultaneously. Finally, she testified that studies and papers upon which appellant's expert witness relied were flawed and that appellant's expert witness failed to properly consider Jack's retinoschisis in his report. On cross-examination, Dr. Coffman agreed that there is ongoing research into the tolerance and failure limits of the intracranial structures and bridging veins and into what forces cause subdural hematomas and retinal hemorrhages in infants.

Defense witness Dr. Robert Rothfeder's testimony

Appellant's expert witness, Dr. Robert Rothfeder, an emergency-room physician, testified that he has researched abusive head trauma for fifteen years. He stated that the medical community disagrees about the principles for diagnosing abusive head trauma and that this disagreement is "far and away the area of greatest dispute in any medical topic [he has] encountered."

Dr. Rothfeder explained that abusive head trauma was once called shaken baby syndrome and that the theory originally was that the triad of subdural hematoma, retinal hemorrhages, and brain swelling (cerebral edema) could be caused by shaking a baby, which would not produce an external injury or impact point. After studies cast doubt on whether shaking alone could injure the brain of a healthy child, the principle evolved into shaking with impact and, ultimately, into what is now called abusive head trauma. Dr. Rothfeder said that the principle is still based on the same triad. He testified that professionals within the medical community disagree about the validity of the principle; according to Dr. Rothfeder, the principle is accepted by the majority of pediatricians and "the minority of anyone else who is active in the field."

He also testified that a main problem with diagnosing abusive head trauma is that a child who has no external signs of injury could not likely have been impacted in a significant enough way to cause the triad of injuries. He explained, "The big issue for me in this case is the lack of any . . . superficial trauma to the

scalp, to the head, . . . to anything in a case where it's alleged that the subdural hematoma was caused by impact."

Regarding Jack's case, Dr. Rothfeder testified that the probability that the bridging vein could have avulsed by impact without any external signs of impact "is somewhere between zero likelihood and extremely unlikely." Contrary to Dr. Roberts's and Dr. Coffman's testimony, Dr. Rothfeder testified that some of Jack's injuries could have occurred as a result of others. He opined that the swelling of Jack's brain was most likely caused by the lack of oxygen to the brain when Jack went into cardiac arrest and that the retinal hemorrhaging could have been secondarily caused by the swelling of Jack's brain. He also said that the retinoschisis was a progression of the retinal hemorrhages and explained that hemorrhaging in the retina can cause a splitting of the layers sufficient to tear the retina. He opined generally that Jack's injuries may not have been acute and postulated specifically that Jack had suffered from a hemorrhagic stroke with a cause that was unknown but perhaps related to earlier chronic subdural bleeding. In his written report admitted as Defense Exhibit 12, Dr. Rothfeder stated that an alternative explanation for Jack's injuries was that he had an asymptomatic birth-related subdural hematoma that did not resolve, continued to ooze and bleed, perhaps causing intermittent fussiness and other nonspecific symptoms, and finally broke loose spontaneously with rapid bleeding on April 1, 2010. Dr. Rothfeder testified that 46% of babies suffer subdural hematomas during birth.

Dr. Rothfeder also testified that his opinions in this case were based in part on an article by Dr. Steven Gabaeff entitled, "Challenging the Pathophysiologic Connection between Subdural Hematoma, Retinal Hemorrhage and Shaken Baby Syndrome." That article was admitted as Defense Exhibit 13. The article states that bridging veins can be torn because of severe head trauma or extreme cerebrocranial disproportion, which is extra space around the brain. According to the article, cerebrocranial disproportion can occur "in infants with previous birth-related [subdural hematoma]" and "can stretch [bridging veins] to their tensile limit with even minor movement." Thus, according to Dr. Gabaeff, tearing of bridging veins "is an unlikely cause of [subdural hematoma] in a previously healthy infant, but may play some role in the rebleed of an infant with severe [cerebrocranial disproportion] from previous [subdural hematoma or] chronic subdural hematoma."

On cross-examination, Dr. Rothfeder agreed that he has spent the majority of his career as an emergency-room physician, that he is not board certified in pediatrics, that he has not conducted pediatric neurosurgery, that the majority of his patients are children, that he stopped working full time as an emergency room physician in the mid-1990s, that he had not published articles or conducted research regarding issues related to child abuse, that he received about \$8,000 plus expenses for his engagement as an expert in this case, and that most recently he has been primarily working with a personal injury law firm treating motor-vehicle accident patients. In the previous year, he testified as a consultant

for the defense in approximately twelve to fifteen child abuse cases. He also admitted that studies upon which he relied have been criticized.

Reliability of the State's experts' testimony

On appeal, appellant challenges only the reliability of the State's medical expert testimony regarding a diagnosis of abusive head trauma—in general—on the basis of the “triad” of subdural hematoma, retinal hemorrhaging, and brain swelling, without evidence of external injuries. In other words, she argues only that the general theory behind diagnosing abusive head trauma is flawed, relying on debate and disagreement within the scientific community about the general theory. Indeed, she summarizes her argument as follows:

The trial court abused its discretion by allowing medical expert testimony on shaken baby syndrome (or its current vernacular, “abusive head trauma”) as support for its findings. The State presented testimony that the child suffered a non-accidental, intentional . . . head injury; yet, the child displayed no external, physical signs of trauma. *There [is] a vigorous debate supported from multiple sources and studies against the opinion that subdural hemorrhage and retinal hemorrhage in an infant is indicative of Shaken Baby Syndrome (SBS).*

The fact of the matter is that there is growing unrest in the medical community regarding the diagnosis of abusive head trauma on the basis of subdural hematoma, retinal hemorrhaging, and brain swelling, *and the trial court abused its discretion to admit and consider the opinions relying on these markers.* [Emphasis added.]

Appellant does not, at any point within her brief, alternatively argue that even if a diagnosis of abusive head trauma could be reliable with respect to a typical patient based on the symptoms that Jack presented with, it was not reliable as to Jack based on his prior medical history, including the prior bleeding

in his brain.¹⁶ All cites to authority within the brief focus only on attacking the theory of diagnosing abusive head trauma generally. Only three sentences within the eleven-page argument portion of the brief even mention Jack's old brain bleeds; these sentences are unconnected with legal citations and do not purport to challenge the reliability of the experts' testimony based on the old bleeds. Thus, we will examine only the general reliability of testimony relating to diagnosing abusive head trauma.¹⁷

Applying the *Kelly* factors, we cannot conclude that the trial court abused its discretion by overruling appellant's objection and by admitting the evidence provided by the State's experts. 824 S.W.2d at 573. The experts, who demonstrated their unchallenged qualifications to testify about pediatrics generally and the injuries Jack suffered specifically, see *id.*, clearly articulated the

¹⁶We recognize that much of appellant's focus in the trial court, particularly during her cross-examination of the State's experts, was on the prior bleeding. But on appeal, appellant characterizes her trial-court complaint as being that the court "should [have] disregard[ed] the State experts' opinions due to *the general disagreement* and retraction in the medical community that a certain constellation of symptoms was exclusively child abuse." [Emphasis added.] Similarly, on appeal, appellant highlights the "modern unease in the medical community with the reliability of shaken baby or shaken with impact syndrome."

¹⁷"We do not, and cannot, create arguments for parties—we are neither the appellant's nor the appellee's advocate." *Meyer v. State*, 310 S.W.3d 24, 26 (Tex. App.—Texarkana 2010, no pet.); see also Tex. R. App. P. 38.1(i) (requiring a brief to contain a clear argument for the contentions made); *Leshner v. Doescher*, No. 02-12-00360-CV, 2013 WL 5593608, at *3 (Tex. App.—Fort Worth Oct. 10, 2013, pet. denied) (mem. op.) ("It is not the proper role of this court to create or develop arguments for an appellant; we are restricted to addressing the arguments actually raised, not those that might have been raised.").

conditions under which they diagnosed abusive head trauma and confirmed that the pediatric medical community generally accepts the diagnosis of abusive head trauma from the types of injuries that Jack suffered. See *id.* Specifically, Dr. Roberts confirmed that his diagnosis was based on principles generally accepted with the medical community. See *id.* Dr. Ranelle testified that the majority of her peers—pediatric ophthalmologists—would have reached the same conclusions that she did and that she did not “personally know” any doctors who question the link of retinal hemorrhages to nonaccidental trauma. And Dr. Coffman testified that there is no unrest about the diagnosis of abusive head trauma within the fields of pediatric ophthalmology, pediatric radiology, or pediatric neurosurgery, although she recognized unrest with medical examiners and “in the biomechanical world that doesn’t deal with real people.”

Next, the State provided the court with literature supporting the diagnosis of abusive head trauma with the types of injuries that are present here. See *id.* State’s Exhibit 42 is a paper by Dr. Sandeep Narang.¹⁸ The paper addresses

¹⁸See Sandeep Narang, M.D., J.D., *A Daubert Analysis of Abusive Head Trauma/Shaken Baby Syndrome*, 11 Hous. J. Health L. & Pol’y 505 (2011). Although the paper was not submitted into evidence, the trial court stated on the record that both sides had agreed that the court should read the paper, and it indicated that it had reviewed and “marked . . . up” the paper. On appeal, appellant cites other literature related to the validity of a diagnosis for abusive head trauma.

We do not intend to cast a vote on vigorous, longstanding disagreements within the medical community on the plethora of issues concerning the diagnosis of abusive head trauma. We hold only that under the evidence presented here,

recent legal literature, public media, and court decisions calling into question the validity of abusive head trauma as a medical diagnosis. It details the medical literature on abusive head trauma,¹⁹ research- and evidence-based studies on the relation of subdural hematoma and retinal hemorrhaging in abusive head trauma, and case law confirming the validity of abusive head trauma. The paper also includes a list of possible causes of subdural hemorrhages and of retinal hemorrhages in children and details several studies demonstrating the “*significant statistical association*” of both subdural hematomas and retinal hemorrhages with abusive head trauma. Finally, the paper lists fifteen international and domestic medical organizations that have publicly acknowledged the validity of diagnosing abusive head trauma. Dr. Coffman testified that she had reviewed Dr. Narang’s paper and that the paper refuted conclusions made by Dr. Rothfeder.

the trial court did not abuse its discretion by concluding that the State’s experts’ testimony was reliable and by therefore overruling appellant’s objection to it.

¹⁹The paper states that “peer-reviewed medical literature on the topic of [abusive head trauma] is voluminous.” The paper also asserts that “there have been at least 8 systematic reviews, over 15 controlled trials, over 50 comparative cohort studies or prospective case series, and numerous well-designed, retrospective case series/reports, comprising thousands of cases, *supporting* the diagnosis of AHT.” [Footnotes omitted.] See *Kelly*, 824 S.W.2d at 573 (stating that reviewing courts should evaluate, among other factors, “the extent to which the underlying scientific theory and technique are accepted as valid by the relevant scientific community” and “the availability of other experts to test and evaluate the technique”).

Furthermore, we note that the trial court's acceptance of the diagnosis of abusive head trauma in this case was not novel but is instead in line with the decisions of other courts, including courts in Texas, that have upheld convictions based on such testimony. See *Thomas v. State*, No. 03-07-00646-CR, 2009 WL 1364348, at *4–7 (Tex. App.—Austin May 14, 2009, pet. ref'd) (mem. op., not designated for publication); see also *Day v. State*, 2013 OK CR 8, ¶ 7, 303 P.3d 291, 296 (Okla. Crim. App. 2013) (“We have upheld convictions based on evidence of violent shaking, or explicitly of SBS, since at least 1989.”), *cert. denied*, 134 S. Ct. 1303 (2014).

Although evidence exists in the record that some doctors, biomechanical engineers, and medical examiners question the validity of a diagnosis of child abuse based on the “triad” of injuries, that disagreement in and of itself does not make the State's expert testimony unreliable. See *Day*, 2013 OK CR 8 at ¶ 8, 303 P.3d at 296 (“Expert testimony is not rendered unreliable by criticism.”); see also *United States v. Barnette*, 211 F.3d 803, 816 (4th Cir. 2000) (holding that a trial court did not err by admitting expert evidence although there was a “disagreement between professionals” concerning the reliability of the evidence); *New Hampshire Ins. Co. v. Allison*, 414 S.W.3d 266, 276 (Tex. App.—Houston [1st Dist.] 2013, no pet.) (“Conflicting theories between experts . . . do not automatically render one unreliable.”).

Moreover, to the extent that the sources cited by appellant challenge the reliability of a diagnosis of abusive head trauma based on shaking alone, those

sources are inapposite because both Dr. Roberts and Dr. Coffman testified that Jack's injuries could not have occurred by shaking alone. See, e.g., *Cavazos v. Smith*, 132 S. Ct. 2, 10 (2011) (Ginsburg, J., dissenting) ("Doubt has increased in the medical community 'over whether infants can be fatally injured through shaking alone.'") (quoting *State v. Edmunds*, 2008 WI App. 33, ¶ 15, 746 N.W.2d 590, 596 (Wis. Ct. App. 2008, pet. denied)).²⁰

²⁰Appellant relies on *Cavazos* and *Edmunds*. We note that *Cavazos* concerned evidentiary sufficiency, not admissibility. See 132 S. Ct. at 3–4. Likewise, the decision in *Edmunds* did not hinge on the admissibility of expert testimony but instead concerned whether newly discovered evidence required the granting of a motion for new trial. See 746 N.W.2d at 595–99. In fact, the Wisconsin court appeared to base its decision on a jury's entitlement to hear "competing credible medical opinions in determining whether there is a reasonable doubt [of] guilt." See *id.* at 599 (emphasis added).

Appellant also directs us to two recent habeas corpus cases from the court of criminal appeals concerning expert testimony presented at trial that was later viewed as inaccurate based on new scientific evidence. See *Ex parte Henderson*, 384 S.W.3d 833, 833–34 (Tex. Crim. App. 2012) (remanding for new trial because of medical examiner's changing manner of death from "homicide" to "undetermined" based on new science showing that infant's injuries could have been sustained by accidental, short fall onto concrete); *Ex parte Robbins*, 360 S.W.3d 446, 471 (Tex. Crim. App. 2011) (Cochran, J., dissenting) (noting "current legitimate concerns" about the scientific reliability of forensic science in courtrooms), *cert. denied*, 132 S. Ct. 2374 (2012). These cases involve testimony by experts who changed their opinions based on medical advances that they believed discredited their original testimony. The cases do not squarely address the admissibility of expert testimony on abusive head trauma, and they are therefore inapposite.

Finally, the medical articles cited by appellant, while representative of Dr. Rothfeder's testimony and the ongoing dispute concerning the diagnosis of abusive head trauma, do not compel us to hold that the trial court abused its discretion by admitting the State's expert testimony in this case.

For all of these reasons, applying the *Kelly* reliability factors, we cannot conclude that the trial court abused its discretion by admitting the testimony of the State's experts; even if the principles supporting the testimony are not universally accepted in various medical fields, we cannot hold that the State presented inadmissible "junk science." See 824 S.W.2d at 573; see also *Tillman*, 354 S.W.3d at 435. In other words, even acknowledging that reasonable disagreement exists about the scientific reliability and admissibility of the testimony at issue, our standard of review forecloses reversal of the trial court's implicit ruling that the evidence was clearly and convincingly reliable. See *Tillman*, 354 S.W.3d at 435. Thus, we overrule appellant's sole point.

Conclusion

Having overruled appellant's sole point, we affirm the trial court's judgment.

/s/ Terrie Livingston

TERRIE LIVINGSTON
CHIEF JUSTICE

PANEL: LIVINGSTON, C.J.; WALKER and GABRIEL, JJ.

WALKER, J., filed a dissenting opinion.

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