IN THE
ARIZONA COURT OF APPEALS
DIVISION TWO

THE STATE OF ARIZONA,
Appellee,

v.

STEVEN JAMES BROWN,
Appellant.

No. 2 CA-CR 2015-0154
Filed August 11, 2016

THIS DECISION DOES NOT CREATE LEGAL PRECEDENT AND
MAY NOT BE CITED EXCEPT AS AUTHORIZED BY APPLICABLE RULES.
NOT FOR PUBLICATION
See Ariz. R. Sup. Ct. 111(c)(1); Ariz. R. Crim. P. 31.24.

Appeal from the Superior Court in Pima County
No. CR20121089001
The Honorable Kenneth Lee, Judge

AFFIRMED

COUNSEL

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Counsel for Appellee

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MEMORANDUM DECISION

Presiding Judge Vásquez authored the decision of the Court, in which Chief Judge Eckerstrom and Judge Miller concurred.

V Á S Q U E Z, Presiding Judge:

¶1 After a jury trial, Steven Brown was convicted of reckless child abuse under circumstances likely to cause death or serious physical injury. The trial court sentenced him to a 3.5-year prison term. On appeal, Brown argues the trial court erred when it denied his motion to preclude expert witness testimony concerning the diagnosis of abusive head trauma, formerly known as shaken baby syndrome. He also contends insufficient evidence supported his conviction and the prosecutor committed misconduct during cross-examination of the two defense experts. For the reasons stated below, we affirm.

Factual and Procedural Background

¶2 We view the facts and all reasonable inferences therefrom in the light most favorable to upholding Brown's conviction. *See State v. Allen*, 235 Ariz. 72, ¶ 2, 326 P.3d 339, 341 (App. 2014). On November 10, 2011, Brown picked up his five-month-old daughter, J., from her mother's home at 7:30 in the morning and took her to his residence. At 1:45 that afternoon, Brown's mother came home from work and picked J. up out of her bouncer, but J. was limp "like a noodle" and moaning. Brown called 9-1-1 and, when paramedics arrived, he explained he "was feeding her . . . a bottle, holding her in his arms, and that she leaned back . . . and then came forward again, struck her head on his shoulder, and then was unconscious after that."

¶3 J. was unconscious and experiencing seizures when she arrived at the hospital. Doctors determined J. had diffuse, bilateral retinal hemorrhages and bilateral subdural hematoma, but no sign of significant external trauma. They ruled out several potential causes, including bleeding disorders, meningitis, and viral

encephalitis. Instead, doctors diagnosed J. with abusive head trauma, possibly caused by shaking. J. survived her injuries, but with permanent brain damage.

¶4 A grand jury indicted Brown for two counts of child abuse under circumstances likely to cause death or serious physical injury, first for inflicting "subdural hematomas and/or retinal hemorrhages" and second for failing to seek medical attention. Brown filed a motion to preclude the state from presenting evidence regarding abusive head trauma pursuant to Rule 702, Ariz. R. Evid., and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). During an evidentiary hearing on the matter, Dr. Merlin Lowe, a pediatric hospitalist, testified for the state. He explained that, although doctors cannot perform a "gold standard study [testing the diagnosis] because we obviously don't shake children," retrospective and prospective observational studies suggest that subdural hematoma and retinal hemorrhages are common symptoms of abusive head trauma. Lowe concluded J.'s "injuries [were] consistent with [a] shaking mechanism" and Brown's explanation was implausible. Defense expert, Dr. John Plunkett, a forensic pathologist, disagreed. He testified that biomechanical studies show it is impossible to shake a child hard enough to cause subdural hematoma without severely injuring the child's neck, unless the shaking is coupled with some sort of impact. The trial court denied Brown's motion, reasoning that although "no testing can be done on infants" to prove shaking without impact can cause subdural hematoma, the diagnosis was still "the prevailing opinion in the medical profession."

¶5 The jury found Brown guilty of one count of reckless child abuse under circumstances likely to cause death or serious physical injury for causing the injury, but acquitted him on the second count, failure to timely seek medical attention. The trial court sentenced him as described above. This appeal followed. We have jurisdiction pursuant to A.R.S. §§ 12-120.21(A)(1), 13-4031, and 13-4033(A).

Expert Opinion

¶6 Brown argues the trial court erred in denying his motion to "preclude medical doctors from offering the diagnosis of 'abusive head trauma'" because the state "failed to prove the reliability of the diagnosis." He also makes specific challenges to Lowe's qualifications and the opinion he rendered as an expert witness in this case. We review a court's ruling to admit expert testimony for an abuse of discretion. *State v. Favela*, 234 Ariz. 433, ¶ 4, 323 P.3d 716, 717 (App. 2014).

¶7 Rule 702 governs the admissibility of expert opinions and provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:
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> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
>
> (b) the testimony is based on sufficient facts or data;
>
> (c) the testimony is the product of reliable principles and methods; and
>
> (d) the expert has reliably applied the principles and methods to the facts of the case.

¶8 When applying Rule 702, our supreme court "has made clear that 'trial courts should serve as gatekeepers in assuring that proposed expert testimony is reliable and thus helpful to the jury's determination of facts at issue.'" *Ariz. State Hosp./Ariz. Cmty. Prot. & Treatment Ctr. v. Klein*, 231 Ariz. 467, ¶ 29, 296 P.3d 1003, 1009 (App. 2013), *quoting* Ariz. R. Evid. 702 cmt. to 2012 amend. "As the

proponent of the expert testimony, the [s]tate bears the burden of establishing its admissibility by a preponderance of the evidence." *State v. Bernstein*, 237 Ariz. 226, ¶ 9, 349 P.3d 200, 202 (2015). Nevertheless, "rejection of expert testimony is the exception rather than the rule." Fed. R. Evid. 702 advisory committee note, 2000 amends.; *see State v. Salazar-Mercado*, 234 Ariz. 590, ¶ 7, 325 P.3d 996, 998-99 (2014) (federal corollary to Rule 702, as well as court decisions interpreting federal rule, are persuasive authority when applying the Arizona rule).

Rule 702(a)

¶9 Rule 702(a) "goes primarily to relevance." *Daubert*, 509 U.S. at 591. "Expert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful." *State ex rel. Montgomery v. Miller*, 234 Ariz. 289, ¶ 21, 321 P.3d 454, 463 (App. 2014), *quoting Daubert*, 509 U.S. at 591. To satisfy Rule 702(a), an expert must provide "creditable grounds supporting . . . a link" between the expert's special knowledge and a fact at issue. *Daubert*, 509 U.S. at 591. If the expert meets this "liberal minimum qualification[]," then the expert's "level of expertise goes to credibility and weight, not admissibility." *State v. Delgado*, 232 Ariz. 182, ¶ 12, 303 P.3d 76, 80 (App. 2013), *quoting Kannankeril v. Terminix Int'l, Inc.*, 128 F.3d 802, 809 (3d Cir. 1997).

¶10 Brown essentially argues for a more restrictive standard. He asserts "the trial court should have properly determined which specialization is relevant," either Lowe's specialization in pediatrics or Plunkett's in forensic pathology. Brown does not point to any persuasive legal authority supporting this assertion and instead relies on A.R.S. § 12-2604, which governs medical-malpractice cases and is inapplicable here. As this court has stated, the question of "[w]hether a witness is qualified as an expert is to be construed liberally, and it would be an abuse of discretion 'to exclude testimony simply because . . . the proposed expert does not have the specialization that the court considers most appropriate.'" *Delgado*, 232 Ariz. 182, ¶ 12, 303 P.3d at 80, *quoting Kannankeril*, 128 F.3d at 809; *see also State v. Romero*, 239 Ariz. 6, ¶ 15, 365 P.3d 358, 362 (2016) ("The trial court should not assess whether

the opposing party's expert is as qualified as—or more convincing than—the other expert.").

¶11 Brown also argues Lowe did not have any specialized understanding of abusive head trauma and his testimony regarding the diagnosis was "nothing beyond that of a medical student regurgitating what he was taught." Essentially, Brown contends that Lowe was not qualified to offer opinions about non-accidental head trauma. We disagree with this argument for two reasons. First, Lowe's testimony clearly shows he has relevant specialized knowledge in this area: He has treated hundreds of children suffering from "both accidental and non-accidental trauma," regularly evaluates children "where there is concern of possible abuse" as part of his hospital's child protection team, and participates in "extensive continuing education" in the area of child abuse, including the review of new literature and evidence in the field. Second, even "[c]areful study may suffice to qualify an expert if it affords greater knowledge on a relevant issue than the jury possesses." *Id.* ¶ 17. Thus, medical expert testimony need not reach a particular level of complexity before it satisfies the requirements of Rule 702(a). Accordingly, the trial court did not err by concluding Lowe had sufficient specialized knowledge to testify under Rule 702(a). *See Favela*, 234 Ariz. 433, ¶ 4, 323 P.3d at 717.

Rule 702(b)

¶12 "Rule 702(b) examines the quantity of information possessed by an expert, not the reliability or admissibility of the information itself." *Miller*, 234 Ariz. 289, ¶ 29, 321 P.3d at 465. When an expert's methodology requires a certain set of data, the expert must gather that data before rendering an opinion. *See, e.g.*, *United States v. Crabbe*, 556 F. Supp. 2d 1217, 1223 (D. Colo. 2008) (where expert's methodology relied on measurement of distance, Rule 702(b) requires only that witness testify measurement was in fact obtained); *cf. Salazar-Mercado*, 234 Ariz. 590, ¶ 6, 325 P.3d at 998 (discussing Rule 702(d) and noting expert may apply "principles and methods to the particular facts of the case"). In the case of a physician, that data may be gathered by "firsthand observation" or numerous other sources "of considerable variety, including statements by patients and relatives, reports and opinions from

nurses, technicians and other doctors, hospital records, and X rays."[1] Fed. R. Evid. 703 advisory committee note, 1972 proposed rules; *see* Fed. R. Evid. 702 advisory committee note, 2000 amends. (referring to Rule 703 advisory note while describing scope of "data").

¶13 Here, Lowe reviewed all of J.'s "medical records for her hospitalization," as well as her primary care physician's records created prior to her hospitalization. His report thoroughly summarizes that information and, on cross-examination, he was able to recall J.'s injuries and symptoms. Thus, Lowe's opinion was "based on sufficient facts or data." Ariz. R. Evid. 702(b); *see Favela*, 234 Ariz. 433, ¶ 4, 323 P.3d at 717.

Rule 702(c)

¶14 Rule 702(c) provides that an expert's testimony should be "the product of reliable principles and methods." "Under this requirement, an expert must be able to explain how his methods, reasoning and opinions are based on 'an accepted body of learning or experience.'" *Miller*, 234 Ariz. 289, ¶ 23, 321 P.3d at 463, *quoting* Fed. R. Evid. 702 advisory committee note, 2000 amends. Although mere speculation is insufficient, the testimony's "reliability need not be established to a degree of scientific certainty." *Id.* To assist in this analysis, *Daubert* and other cases have compiled a number of factors that could reflect on a method's reliability.[2] The list of factors is not

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[1]In his opening brief, Brown raises a number of arguments directed at Rule 702(b). Those arguments, however, do not challenge Lowe's knowledge of J.'s specific injuries and instead attack the reliability of the theory underlying the diagnosis of abusive head trauma. We therefore address those arguments under Rule 702(c).

[2]*Daubert* instructs courts to consider whether a theory or method (1) is testable; (2) is subjected to peer review and publication; (3) is generally accepted within the relevant scientific community; (4) has a "known or potential rate of error"; and (5) has control standards for its application. 509 U.S. at 593-94. Courts have also considered whether the theory or method (6) is based on independent research or prepared solely for litigation; (7) originates

exhaustive, and a court should consider a specific factor only if it is a "reasonable measure[] of the reliability of [the] expert testimony." *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 151-52 (1999); *see Ariz. State Hosp./Ariz. Cmty. Prot. & Treatment Ctr.*, 231 Ariz. 467, ¶ 28, 296 P.3d at 1009.

¶15 Here, in addition to the requirements under Rule 702, the trial court considered the factors identified in *Daubert*[3] and explained:

> Given the nature of the medical conditions at issue[,] no testing can be done on infants to determine if either [Lowe's or Plunkett's theory of the] mechanisms of injury is objectively verifiable. The instant case falls squarely within the category of experience[-]based opinions.
>
> At the present time the medical opinion[] of the State's witnesses is the prevailing opinion in the medical profession on the subject of Abusive Head Trauma/Shaken Baby Syndrome. It is the accepted medical diagnosis of the doctors who actually treat the infants for this condition. It is the diagnosis taught at medical schools to medical students.

¶16 Brown argues on appeal that the trial court's conclusion "ignore[s] the plethora of scientific literature" presented by both parties. He therefore suggests the court should have considered

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from a discipline known to produce reliable results; (8) has been approved by other courts; and (9) has non-judicial uses. *Miller*, 234 Ariz. 289, ¶ 25, 321 P.3d at 464; *see also* Fed. R. Evid. 702 advisory committee note, 2000 amends.

[3]The trial court did not apply the additional factors listed in *Miller*, 234 Ariz. 289, ¶ 25, 321 P.3d at 464, which was published eighteen days after the pretrial hearing in this case.

more factors to determine the reliability of the scientific research supporting the diagnosis, and if it had done so, the court would have excluded any reference to the diagnosis by Lowe or J.'s treating physicians. In response, the state suggests we may disregard the bulk of Brown's arguments on this issue because the trial court found Lowe's testimony was "squarely within the category of experience[-]based opinions." We agree with Brown, however, that Lowe's testimony was not based solely on experience.

¶17 In the case of medical expert testimony, an opinion may be both "grounded in science" and the product of the expert's "previous experiences and sound judgment." *Sandretto v. Payson Healthcare Mgmt., Inc.*, 234 Ariz. 351, ¶ 13, 322 P.3d 168, 173 (App. 2014). Such testimony is not only permissible, but often inevitable: "There is no clear line that divides the one from the other[]." *Kumho Tire Co.*, 526 U.S. at 148. In other words, Rule 702's language, which refers to an "expert's scientific, technical, or other specialized knowledge," does not describe separate camps, but rather a spectrum of knowledge. Consequently, "[a]pplication of the *Daubert* factors, . . . particularly to medical testimony . . . requires flexibility." *Sandretto*, 234 Ariz. 351, ¶ 13, 322 P.3d at 173.

¶18 In this case, Lowe testified that the theory underlying the diagnosis of abusive head trauma is supported by studies comparing the symptoms of children suffering from accidental and intentionally inflicted traumatic head injuries. These studies rely on the collective experience of medical professionals who treated and observed the children. But Lowe noted that researchers analyzed those observations and discovered that some symptoms can help determine whether a brain injury was non-accidental. *See Miller*, 234 Ariz. 289, ¶ 31, 321 P.3d at 465 (testability turns on whether theory "can be challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach"), *quoting* Fed. R. Evid. 702 advisory committee note, 2000 amends. They also quantified their results, suggesting how accurately a doctor could use a symptom, or set of symptoms, to exclude the possibility of an accidental trauma.[4]

[4]For example, in one study, researchers concluded that none of the observed children who suffered accidental head trauma had

And Lowe testified those results were peer reviewed and published in medical journals.

¶19 Accordingly, the trial court's characterization of Lowe's testimony as "squarely within the category of experience[-]based opinions" was not entirely accurate. *See Kumho Tire Co.*, 526 U.S. at 152 (abuse-of-discretion standard applies equally to "the trial court's decisions about how to determine reliability as to its ultimate conclusion"). However, nothing in the record indicates the court did not consider the science-based evidence that was presented. Specifically, the record does not support Brown's assertion that the court "ignore[d] the plethora of scientific literature" and testimony that supported his position and refuted the state's position. In its ruling, the court accepted Lowe's testimony, observing that "[t]he diagnosis has been the subject of numerous peer reviewed medical articles and is an accepted diagnosis among pediatricians."[5] It also noted, consistent with the studies presented by Lowe, that "[i]t is the bilateral findings and the severity of the injuries that distinguishes the diagnosis of Abusive Head Trauma from a simple closed head injury." We therefore consider below the other reliability factors that the trial court considered but did not expressly discuss in its ruling to determine whether the record, viewed in the light most

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the combination of subdural hematoma, severe retinal hemorrhages, and no sign of external impact. Thus, the researchers concluded this set of symptoms had 100 percent specificity—that is, it had a "high diagnostic value" when excluding the possibility of accidental trauma.

[5]Brown challenges the "generally accepted" factor, stating that those in forensic pathology and biomechanical engineering do not rely on the diagnosis. But as we have already noted, "[w]hether a witness is qualified as an expert is to be construed liberally, and it would be an abuse of discretion 'to exclude testimony simply because . . . the proposed expert does not have the specialization that the court considers most appropriate.'" *Delgado*, 232 Ariz. 182, ¶ 12, 303 P.3d at 80, *quoting Kannankeril*, 128 F.3d at 809. It is sufficient that Lowe's peers in pediatric medicine accept the research and the diagnosis.

favorable to upholding the ruling, nonetheless supports the court's conclusion that Lowe's testimony was reliable. *See State v. Foshay*, 239 Ariz. 271, ¶ 5, 370 P.3d 618, 621 (App. 2016).

¶20 Lowe's testimony regarding various observational studies provides some evidence that the theory underlying the diagnosis of abusive head trauma is reliable from a scientific perspective. It is testable and—because the researchers quantified the accuracy of their results—has a known rate of error. *See Daubert*, 509 U.S. at 593-94. Brown attacks the reliability of the studies that support the diagnosis. He points to a study by one doctor who concluded that, after searching a database for the medical subject heading term "shaken baby syndrome," there were few published studies on the subject and therefore a lack of evidence supporting the diagnosis. The same doctor also found that most of the studies were opinion based and that none used "perfect" scientific methods, such as "prospective blinded studies with sufficient numbers to allow . . . statistical conclusions and comparisons." However, as the trial court correctly noted in its ruling, researchers cannot perform perfect, prospective blinded studies in this context on children who are alive. In addition, Lowe noted that researchers generally did not use the medical subject heading term "'shaken baby syndrome' . . . until after the timeframe searched, so [the study] missed a significant amount of the articles that were published." Lowe testified that, had the author used "more inclusive terms, he likely would have found over 10,000 [relevant] studies."

¶21 Brown also attacks the reliability of Lowe's observational studies by pointing to two biomechanical studies that were "failed attempts by . . . proponents to validate" the diagnosis in the absence of blunt-force trauma to the head. In the studies, researchers used lifelike dolls and anesthetized lambs to study shaking as the mechanism of injury. The studies suggested that shaking alone, without impact, was sufficient to cause brain injury. Plunkett criticized the studies, however, stating that their findings that no impact had occurred were contradicted by the fact that the heads of the dolls or lambs impacted their chests. But even if Plunkett's criticism is valid and the biomechanical mock-ups were flawed, the trial court still could have concluded they do not

invalidate the findings made in other studies based on the observations from actual cases of head trauma in children. *See Foshay*, 239 Ariz. 271, ¶ 5, 370 P.3d at 621 (viewing evidence in light most favorable to upholding court's ruling).

¶22 Next, Brown argues the diagnosis of abusive head trauma is made "solely in anticipation of litigation" and lacks "non-judicial uses." He correctly notes that Lowe acknowledged initially that "[t]he in-hospital treatment would be [the] same" for either accidental or abusive head trauma if "the same panoply of symptoms" were present. But Lowe also testified that "if the injuries were concern for inflicted injury or abusive injury, then we know based on studies that those children tend to have more severe injuries, so I would actually pursue more of an evaluation for them to [e]nsure we're not missing other injuries that might be present." He noted that diagnosing the cause of trauma can help doctors predict a child's "overall . . . outcome[]." And finally, although Lowe conceded that preventing future abuse outside the hospital necessarily entails reporting the diagnosis to social services, reporting abuse is still consistent with medical professionals' general goal of protecting patient health. We therefore disagree with Brown that the diagnosis has no "medical treatment purpose[]."

¶23 Lastly, Brown relies on *Ex parte Henderson*, 384 S.W.3d 833 (Tex. Crim. App. 2012), and *State v. Edmunds*, 746 N.W.2d 590 (Wis. Ct. App. 2008), to support his argument that "courts' past allowance of [abusive-head-trauma] testimony for over a generation has led to post-conviction relief for numerous petitioners whose convictions were determined to be wrongful." But the courts in these cases did not prohibit expert testimony regarding abusive head trauma. Rather, they granted relief because evidence of new scientific findings supporting contrary opinions like those offered by Plunkett in this case had not also been presented. *See Henderson*, 384 S.W.3d at 833-34; *Edmunds*, 746 N.W.2d 590, ¶¶ 12, 15. Thus, these cases do not establish that courts have completely rejected the diagnosis. *See Miller*, 234 Ariz. 289, ¶¶ 24-25, 321 P.3d at 464. Accordingly, although we agree the trial court did not consider other reliability factors mentioned in this case, the record nevertheless supports its conclusion that Lowe's testimony met the

requirements of Rule 702(c). *See Favela*, 234 Ariz. 433, ¶ 4, 323 P.3d at 717.

Rule 702(d)

¶24 The final subsection of Rule 702 directs courts to consider whether "the expert has reliably applied the principles and methods to the facts of the case." An expert opinion must "rest[] upon good grounds," but "not all errors in the application of reliable principles or methods will warrant exclusion." *Bernstein*, 237 Ariz. 226, ¶¶ 14, 18, 349 P.3d at 203-04. To determine if the opinion rests on good grounds, a court should consider "whether: (1) the expert employs the same care as a litigation expert as he would in his regular professional work outside the courtroom; (2) the expert has accounted for obvious alternative explanations, and (3) the expert's opinion adequately accounts for available data and unknown variables." *Miller*, 234 Ariz. 289, ¶ 27, 321 P.3d at 464.

¶25 As noted above, Lowe reviewed all of the available medical records from J.'s treatment. He also explained that abusive head trauma is a diagnosis of "both inclusion and exclusion"—that is, although subdural hematoma and retinal hemorrhages are "suggestive of . . . abusive head trauma," when a child has those symptoms, Lowe also "tr[ies] to exclude other possible causes," such as "particular types of bleeding disorders or other possible genetic syndromes." He also considers the history provided by a child's caregivers to rule out the possibility of an accidental injury. In his report, Lowe excluded the possibility of a bleeding disorder or genetic syndromes and determined that Brown's account of the incident—that J. bumped her head on his shoulder—was not "a plausible explanation for the extensive injuries she . . . sustained."[6]

[6]Brown argues he was "disallowed from pursuing further questioning" on this subject during the pretrial hearing. He correctly points out the trial court sustained an objection when defense counsel stated during Lowe's cross-examination, "Let's talk about what [Brown] actually said." Nevertheless, under Rule 702(d), "it is sufficient if the expert has at least considered the alternative explanation, and has ruled it out in reaching his

Instead, he explained, "[w]hen looking at possible causes [J.'s symptoms, including] subdural hematomas, devastating brain injury, and bilateral, multilayered, numerous retinal hemorrhages, abusive head trauma rises to the top of the list."

¶26 Brown nonetheless argues Lowe "was utterly careless in his testimony" and "had no grasp of the literature upon which he purportedly based his testimony" because of the following exchange during cross-examination regarding the study using lambs:

> Q: . . . [Y]ou indicated that there was no head impact with the sheep, correct? . . .
>
> A: Correct.
>
> Q: The study says there is no head impact except the head is actually hitting the chest of the individual shaking the sheep?
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> A: I need to read that study again. I believe the head was hitting the chest of the sheep.
>
> . . . .
>
> Q: Not onto the lamb's chest, but onto the individual shaking its chest, correct?
>
> A: No, I believe that is the lamb's chest.

We fail to see how this exchange shows any negligence on Lowe's part. Brown's own expert testified "the lamb's chin hit the lamb's chest." Thus, this exchange only shows that Lowe hesitated in the face of a factually incorrect assertion by defense counsel; it does not show Lowe was "utterly careless." Accordingly, Lowe's opinion satisfies the requirements of Rule 702(d). The trial court did not err by denying Brown's motion to preclude Lowe's testimony. *See Favela*, 234 Ariz. 433, ¶ 4, 323 P.3d at 717.

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opinion." *Miller*, 234 Ariz. 289, ¶ 55, 321 P.3d at 470. Lowe's report and testimony confirm that he did just that.

Sufficient Evidence

¶27 Brown argues the state presented insufficient evidence to support his conviction for reckless child abuse under circumstances likely to cause death or serious physical injury. This court reviews de novo the sufficiency of the evidence supporting a conviction. *State v. Allen*, 235 Ariz. 72, ¶ 6, 326 P.3d 339, 342 (App. 2014). "[T]he relevant question is whether, after viewing the evidence in the light most favorable to the prosecution, *any* rational trier of fact could have found the essential elements of the crime beyond a reasonable doubt." *State v. West*, 226 Ariz. 559, ¶ 16, 250 P.3d 1188, 1191 (2011), *quoting State v. Mathers*, 165 Ariz. 64, 66, 796 P.2d 866, 868 (1990). We will reverse only if no substantial evidence supports the conviction. *State v. Rivera*, 226 Ariz. 325, ¶ 3, 247 P.3d 560, 562 (App. 2011). "Substantial evidence is proof that reasonable persons could accept as sufficient to support a conclusion of a defendant's guilt beyond a reasonable doubt." *Id.*, *quoting State v. Spears*, 184 Ariz. 277, 290, 908 P.2d 1062, 1075 (1996).

¶28 Section 13-3623(A), A.R.S., requires proof that, "[u]nder circumstances likely to produce death or serious physical injury," a person has "cause[d] a child . . . to suffer physical injury." Physical injury is defined as "the impairment of physical condition and includes . . . subdural hematoma . . . or any physical condition that imperils health or welfare." § 13-3623(F)(4). And "physical injury that creates a reasonable risk of death or that causes serious or permanent disfigurement, serious impairment of health or loss or protracted impairment of the function of any bodily organ or limb" amounts to "[s]erious physical injury." § 13-3623(F)(5).

¶29 On appeal, Brown does not dispute that J. suffered physical injuries, including a subdural hematoma, which created a reasonable risk of death and left her with a serious impairment. Instead, he seems to challenge whether sufficient evidence shows he "cause[d]" the injuries. § 13-3623(A). Specifically, he argues that, according to the state's own witnesses, injury caused by shaking necessarily requires evidence of an axonal injury, but that there was no evidence of such an injury presented at trial.

¶30 Brown misconstrues the testimony in this case. Lowe, Dr. Dinesh Talwar, a pediatric neurologist, and Dr. Andreas Theodorou, a pediatric intensive care physician, all described how severe trauma could cause brain injuries. In doing so, they described two specific types of brain injuries that can occur: First, axonal injuries, which are "shearing" injuries to the axon of a nerve cell, and second, anoxic and hypoxic-ischemic injuries, which result from the lack of oxygen caused by difficulty in breathing or lack of blood supply to the brain.[7] And contrary to Brown's argument, Dr. Theodorou testified that "[w]hatever caused the subdural, in other words, the force that tore bridging veins, most likely caused the brain cells to have an injury or what we call shear." But neither he nor any other treating physician testified that proof of an axonal injury was necessary to diagnose abusive head trauma. Lowe testified at trial that J.'s symptoms—subdural hematoma, retinal

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[7]Talwar described the mechanism of injury as follows:

> [W]hen there is a severe trauma to the brain, there is also disruption of the brain pathways, the white matter of the brain. What's called a shearing injury or axonal injury. So the impulses in the brain are not being communicated from one area to the other well as a result of that particular injury, and that results in loss of consciousness or semi-comatose state.

He further explained:

> That semi-comatose state then leads to other changes in the body, which include[] depressed breathing, so they don't breathe as well. It also leads to decrease in blood pressure, the heart doesn't pump blood as well. So the hypoxic-ischemic encephalopathy that occur[s] is a consequence of the initial trauma and follows the initial trauma.

hemorrhages, and no sign of significant external impact—were sufficient to exclude the possibility of an accidental injury. And the physicians also ruled out other possible non-traumatic causes of her symptoms, such as viral encephalitis.

¶31 Brown also argues "the evidence was insufficient to convict [him] because the doctors could not rule out that any injury occurred prior to his assuming care of the baby." In doing so, he points to J.'s mother, who took care of J. the night before and who purportedly had said J. was "shaky and fussy all night long." Brown maintains that, because J. went into foster care after her discharge from the hospital, her doctors must have been uncertain who inflicted the abuse or they would have released J. into her mother's care. And he notes that the testimony of Dr. Raymond Carmody, the neuroradiologist who interpreted images of J.'s brain, implied that J.'s injury could have occurred as many as twelve hours before the images were taken. Thus, Brown concludes the evidence was insufficient to "satisfy the standard of proof beyond a reasonable doubt."

¶32 To obtain a criminal conviction, the state has the burden of proving a defendant's guilt beyond a reasonable doubt, and the state met its burden in this case. *See State v. Portillo*, 182 Ariz. 592, 594, 898 P.2d 970, 972 (1995). In the context of this appeal, Brown must demonstrate that no substantial evidence supports his conviction. *See Rivera*, 226 Ariz. 325, ¶ 3, 247 P.3d at 562. And, although Carmody was uncomfortable providing a timeframe more specific than "a matter of hours old," other doctors testified that symptoms would have been apparent "right away," "very quickly," or within "two to three hours." Therefore, the record contains substantial evidence that "reasonable persons could accept as sufficient to support a conclusion" that J. suffered her injuries while in Brown's care. *See id.*, *quoting Spears*, 184 Ariz. at 290, 908 P.2d at 1075.

Prosecutorial Misconduct

¶33 Brown argues he should "receive a new trial because the prosecutor engaged in misconduct during his cross-examination of defense expert witnesses." Misconduct occurs when (1) the

prosecutor "called to the jury's attention matters it should not have considered in reaching its decision" and (2) "the jurors were in fact influenced by the remarks." *State v. Nelson*, 229 Ariz. 180, ¶ 39, 273 P.3d 632, 641 (2012), *quoting State v. Newell*, 212 Ariz. 389, ¶ 60, 132 P.3d 833, 846 (2006).

> Prosecutorial misconduct "is not merely the result of legal error, negligence, mistake, or insignificant impropriety, but, taken as a whole, amounts to intentional conduct which the prosecutor knows to be improper and prejudicial, and which he pursues for any improper purpose with indifference to a significant resulting danger of mistrial."

State v. Aguilar, 217 Ariz. 235, ¶ 11, 172 P.3d 423, 426-27 (App. 2007), *quoting Pool v. Superior Court*, 139 Ariz. 98, 108-09, 677 P.2d 261, 271-72 (1984).

¶34 Brown characterizes a number of alleged instances of misconduct as either "disrespectful," "argumentative," or "misrepresent[ing]" irrelevant prior testimony. We address each allegation in turn and then consider their cumulative effect. *See State v. Manuel*, 229 Ariz. 1, ¶ 22, 270 P.3d 828, 833 (2011). If Brown objected to the prosecutor's statement and preserved the issue for review, *see State v. Gallardo*, 225 Ariz. 560, ¶ 35, 242 P.3d 159, 167 (2010), Brown "must demonstrate that '(1) misconduct is indeed present; and (2) a reasonable likelihood exists that the misconduct could have affected the jury's verdict.'" *State v. Moody*, 208 Ariz. 424, ¶ 145, 94 P.3d 1119, 1154 (2004), *quoting State v. Atwood*, 171 Ariz. 576, 606, 832 P.2d 593, 623 (1992), *disapproved on other grounds by State v. Nordstrom*, 200 Ariz. 229, ¶ 25, 25 P.3d 717, 729 (2001). If Brown failed to object, however, he must show the error was "so egregious as to deprive [him] of a fair trial and render the resulting conviction a denial of due process." *State v. Hernandez*, 170 Ariz. 301, 307, 823 P.2d 1309, 1315 (App. 1991).

¶35 Brown first argues the prosecutor was disrespectful because he referred to Brown's experts as "Doc" three times during

cross-examination. Brown objected to the term during cross-examination of the first witness, and the prosecutor agreed not to use the term again. The following day, the prosecutor used the term "Doc" again—drawing another objection—and apologized. "[A] prosecutor cannot attack the expert with non-evidence, using irrelevant, insulting cross-examination." *State v. Roque*, 213 Ariz. 193, ¶ 161, 141 P.3d 368, 404 (2006), *quoting In re Zawada*, 208 Ariz. 232, ¶ 14, 92 P.3d 862, 867 (2004). However, using the informal term "Doc" instead of the proper title "Doctor" three times over the course of two days of testimony does not rise to the level of prosecutorial misconduct, particularly when the prosecutor used the proper title throughout the rest of cross-examination. *Cf. Zawada*, 208 Ariz. 232, ¶ 16, 92 P.3d at 867 (describing "intentional, knowing attack . . . on the experts").

¶36 Next, Brown argues the prosecutor committed misconduct by making the following two statements to Brown's first expert:

> A: Yeah. I'd like to make several comments about this case, if you would allow me.
>
> Q: You can make comments when you are asked follow-up questions by counsel. What I want to know is did you testify to that in that case? So that's a yes or no question, if you're capable of answering it in that manner.
>
> *
>
> Q: They're saying much more than that. I was actually trying to—I'm sorry, Doctor. I don't mean to interrupt your lecture here, but I'm actually trying to do what is called cross-examination, and what that involves is me asking really specific questions.

¶37 The trial court overruled Brown's objections to both statements on the grounds they were argumentative. Because of the expert's apparent tendency to testify in long narratives, the prosecutor's attempts to get concise answers were permissible. The prosecutor better explained his concern later during the cross-examination:

> I just want to get through m[y questions] somewhat quickly. I apologize. I have some more to get through. I don't mean to cut you off or be rude, but I'm just trying to get the answers to my question right now. And then we'll come back and you can talk all you want with [defense counsel].

Accordingly, we cannot say these comments amounted to misconduct. *See Nelson*, 229 Ariz. 180, ¶ 39, 273 P.3d at 641.

¶38 Brown also argues that on two occasions, "the prosecutor asked a complete question and, as [Brown's second expert] began to answer, interrupted the witness by insisting that he be allowed to finish his question."[8] Brown did not object at trial to the prosecutor's statements. And on appeal, Brown does not explain how these interruptions "called to the jury's attention matters it should not have considered in reaching its decision" or "influenced" the jury's verdict. *See Nelson*, 229 Ariz. 180, ¶ 39, 273 P.3d at 641, *quoting Newell*, 212 Ariz. 389, ¶ 60, 132 P.3d at 846. The argument is therefore waived. *State v. Bolton*, 182 Ariz. 290, 298, 896 P.2d 830, 838 (1995) (issue waived for insufficient argument).

¶39 Brown's remaining arguments concern the prosecutor's questions attacking the experts' tendency to render similar opinions on behalf of defendants in other cases. The first expert stated he testified "more for defense than prosecution," and the second stated

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[8]Brown also points to a third instance when the prosecutor asked to "finish the question before [the expert] start[ed] to answer," but the record shows this statement was not interrupting an answer by the expert.

he had only consulted "for the prosecution one time." Brown points to seven statements made by the prosecutor that he asserts were argumentative:

> Q: The question is, did you testify in this case, where the father said that he had a choking infant, and so he held the infant up by the feet, and spanked the infant, and that is how the infant got . . . bilateral retinal hemorrhages, . . . where the pediatric ophthalmologist said the retinal was literally covered with hemorrhages, did you say it was from birth, the birthing process, remarkably similar to what you talked about here today?
>
> *
>
> Q: Would you like to keep your focus to that in this case: the retinal hemorrhages and what could have caused them? Is that where you should be focused as the retinal specialist?
>
> A: I'm focused wherever I'm asked to focus.
>
> Q: Okay. Including areas outside of[] your expertise?
>
> *
>
> Q: . . . [C]an you clarify for us, today you said [you] consulted in 3,000 cases. So if it was 1,200 in 2009, then you've been a busy boy for the last five years, right?
>
> *

Q: So you like to talk about the Rooks study when you talk about perinatal subdural hematomas?

*

Q: Do you remember saying that in 2009 in Palacios?

A: No, I don't remember.

Q: Do you think you did say it, or did the court reporter just make that up?

. . . .

Q: So you were wrong in Palacios?

A: I was wrong. Somebody was wrong. I mean, I don't know. I don't really ever see these transcripts. . . . If I had an opportunity to correct it, I would have corrected it.

*

Q: That was before you were banished from testifying in San Diego by three different judges, right?

*

Q: And the reality is, and I just want to make sure we cover this for the jury, the reality is that you come into child abuse cases, you've testified in hundreds of child abuse cases, and if they involve fractures, what you'll say, along with Patrick Barnes a lot of the time, is that those fractures are really rickets. They're not fractures at all. That's where rickets comes from in your testimony?

¶40 Brown objected to the first five statements, but even as to those instances, we cannot say that there was a reasonable likelihood any misconduct could have affected the jury's verdict. *See Nelson*, 229 Ariz. 180, ¶ 39, 273 P.3d at 641; *Aguilar*, 217 Ariz. 235, ¶ 11, 172 P.3d at 426-27. A prosecutor "may strike hard blows, [although] he is not at liberty to strike foul ones," and "[i]t is as much his duty to refrain from improper methods calculated to produce a wrongful conviction as it is to use every legitimate means to bring about a just one." *State v. Bible*, 175 Ariz. 549, 600, 858 P.2d 1152, 1203 (1993), *quoting Berger v. United States*, 295 U.S. 78, 88 (1935).[9] In this case, as the state notes, the prosecutor could legitimately challenge the "expert's credentials and employment for impeachment purposes." *State v. Burns*, 237 Ariz. 1, ¶ 156, 344 P.3d 303, 334 (2015). And the prosecutor's statements related to evidence supporting the inference that the experts' opinions were biased because they frequently testified favorably for defendants. *See also State v. Livingston*, 206 Ariz. 145, ¶ 13, 75 P.3d 1103, 1106 (App. 2003) (parties have "right to show everything which may in the slightest degree affect [an adverse witness's] credibility"), *quoting State v. Ramos*, 108 Ariz. 36, 39, 492 P.2d 697, 700 (1972). To the extent the prosecutor's statements were inappropriate, they did not rise to the level of that seen in *State v. Comer*, 165 Ariz. 413, 426-27, 799 P.2d 333, 346-47 (1990) (prosecutor's characterization of defendant as "monster," "filth," and "reincarnation of the devil on earth" inappropriately appealed to jurors' "passions and fears"). And because the evidence supported the same inference the prosecutor implied in his statements, it is unlikely any improper statement "called to the jury's attention matters it should not have considered in reaching its decision" or independently influenced the jurors. *See Nelson*, 229 Ariz. 180, ¶ 39, 273 P.3d at 641.

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[9] We do not condone name-calling or insulting comments, such as the prosecutor's statement that an expert was a "busy boy." *See State v. Comer*, 165 Ariz. 413, 426, 799 P.2d 333, 346 (1990). Such statements are generally "non-evidence," directed at the jury's passion, and add nothing of substance to the state's body of evidence against the defendant. *Roque*, 213 Ariz. 193, ¶ 161, 141 P.3d at 404, *quoting Zawada*, 208 Ariz. 232, ¶ 14, 92 P.3d at 867.

¶41 Brown also argues that the prosecutor, while questioning a defense expert about his previous experience testifying, "misrepresented the subject matter of that prior testimony without having transcripts but instead using published opinions from the appeals." And he asserts "those two cases yielded no information relevant to the issues." Brown did not object to either line of questioning, and we disagree with both of his arguments on appeal. First, Brown does not explain how the prosecutor "misrepresented" the expert's previous testimony. *See Bolton*, 182 Ariz. at 298, 896 P.2d at 838 (waiver for insufficient argument). Second, the prosecutor's questions did not yield any information because the expert stated he did not recall testifying in those cases.

¶42 Last, Brown points to two instances where the trial court sustained objections to the prosecutor's statements. The first began after the prosecutor asked an expert several questions about a previous case in which he had testified. The prosecutor then moved on, asking the expert if he "remember[ed] writing a report in this case." The expert, apparently still thinking of the former case, answered, "No. Many cases, I'm asked to write a report." In response to this incorrect answer, the prosecutor asked if the report was "just a cut and paste job." In the second instance, towards the end of his cross-examination, the expert clarified an answer, stating, "We've already discussed that, and I agree with you." The prosecutor, in response, stated: "Okay. Thank you. Sometimes it's hard for me to tell when you agree with me, Doctor."

¶43 Although we agree with the trial court's conclusion that these comments were improper, it instructed the jury that, "[i]f the Court sustained an objection to a lawyer's question, you must disregard it." This court presumes "jurors follow the court's instructions," and therefore any resulting prejudice was cured. *Gallardo*, 225 Ariz. 560, ¶ 44, 242 P.3d at 168, *quoting Newell*, 212 Ariz. 403, ¶ 69, 132 P.3d at 847. Thus, these statements are not grounds for reversal. *See State v. Payne*, 233 Ariz. 484, ¶ 120, 314 P.3d 1239, 1268 (2013).

¶44 Moreover, Brown cannot show these two statements, combined, "permeated the trial and infected it with unfairness." *See id.* ¶¶ 134-35. Brown's cumulative error argument therefore fails

as well. *See Manuel*, 229 Ariz. 1, ¶ 22, 270 P.3d at 833. Accordingly, he is not entitled to a new trial based on prosecutorial misconduct. *Moody*, 208 Ariz. 424, ¶ 145, 94 P.3d at 1154; *Hernandez*, 170 Ariz. at 307, 823 P.2d at 1315.

Disposition

¶45 For the foregoing reasons, we affirm Brown's conviction and sentence.