Eddie Lee Savage, Jr. v. State of Maryland, No. 82, September Term, 2016. Opinion by Greene, J.

CRIMINAL JUSTICE—FRYE-REED—OPINION OF NEUROPSYCHOLOGIST

The *Frye-Reed* test applies to evaluate expert testimony that is based on a scientific method or technique. The basis of the expert's opinion must first be shown to be generally accepted as reliable within the expert's particular scientific field. Upon the threshold determination by the trial judge that the opinion is generally accepted within the relevant scientific community, the expert must then provide an analytical bridge between the accepted science which forms the basis of the expert's opinion *and* the expert's ultimate conclusions in the particular case. In this case, the "analytical gap" between the expert's review of a Personality Assessment Inventory of Petitioner and the expert's conclusions about Petitioner's conduct, which were proffered as part of an imperfect self-defense argument, did not adequately reflect the data and information available to him. The expert did not provide adequate details to explain how his analysis of the Personality Assessment Inventory of Petitioner provided the information to form his conclusion, separate from Petitioner's self-reporting, of Petitioner's conduct.

CLOSING ARGUMENT—FIFTH AMENDMENT—RIGHT TO REMAIN SILENT

Generally, parties are granted wide latitude during closing argument except that counsel's summation may not abridge a defendant's constitutional right to remain silent. Where a prosecutor's closing argument comments upon a conflicting story of a witness, the Petitioner's Fifth Amendment right to remain silent is not abridged because the focus of the prosecutor's comments were on the witness's testimony rather than the defendant's testimony.

Circuit Court for Wicomico County
Case No. 22-K-13-000535
Argued: April 4, 2017

IN THE COURT OF APPEALS

OF MARYLAND

No. 82

September Term, 2016

EDDIE LEE SAVAGE, JR.

v.

STATE OF MARYLAND

Barbera, C.J.
Greene,
Adkins,
McDonald,
Watts,
Hotten,
Getty,

JJ.

Opinion by Greene, J.
Barbera, C.J., Adkins and McDonald, JJ.,
concur.

Filed: August 4, 2017

A jury in the Circuit Court for Wicomico County convicted Eddie Lee Savage, Jr. ("Petitioner") of second degree murder, attempted second degree murder and associated offenses stemming from an assault on Kenneth and Joshua Sparks. The Circuit Court sentenced Mr. Savage to 30 years for second degree murder conviction, 30 years for attempted second degree murder, and one year for reckless endangerment, to be served consecutively. For sentencing purposes, the convictions for attempted second degree murder and reckless endangerment were merged with his conviction for second degree murder. The Court of Special Appeals upheld all but one of Petitioner's convictions in an unreported opinion, and he sought further review in this Court. We granted *certiorari* in this case to examine the proper scope for the threshold evaluation of expert scientific evidence, as set forth in *Frye v. United States*, 54 App. D.C. 46, 293 F. 1013 (1923), and adopted by this Court in *Reed v. State*, 283 Md. 374, 391 A.2d 364 (1978), the "*Frye-Reed"* test. As we explain below, we shall affirm.

FACTUAL AND PROCEDURAL BACKGROUND

The underlying facts as recited by the Court of Special Appeals in its unreported opinion are essentially undisputed:

> On July 7, 2013, at approximately 6:30 p.m., Tynise Sparks arrived at the home of [Mr. Savage], along with Joshua Sparks, her husband, and Kenneth and Belinda Sparks, Joshua Sparks's parents. . . . Tynise intended to pick up her three children, two of whom were fathered by [Mr. Savage]. Tynise and [Mr. Savage] did not have a formal custody arrangement, but, prior to the events of July 7, 2013, Tynise allowed [Mr. Savage] access to the children at his convenience. On July 7, Tynise had arranged to pick up the children with Heather Morton, [Mr. Savage's] fiancé.
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> Upon arriving at the residence, Tynise parked at the end of the

> driveway, and remained in the vehicle, along with Joshua, Kenneth, and Belinda. [Mr. Savage] was standing in the driveway repairing Heather's vehicle with Joel Hills. The [Sparks's] sat in the car for several minutes before the children exited the house. [Mr. Savage] then approached the passenger side of the Sparks's vehicle, where Joshua was sitting, and initiated the altercation that culminated in Kenneth's death.
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> [Mr. Savage] began by shouting at Joshua, informing him that he was not welcome on his property, and eventually reached into the vehicle and struck him. Joshua proceeded to exit the vehicle, followed closely by Belinda, who was seated in the rear passenger seat. [Mr. Savage] and Joshua proceeded to argue, and Belinda threw beer on [Mr. Savage]. By this time, Heather had come to the front yard, and, with Joel Hills, was attempting to restrain [Mr. Savage]. Simultaneously, Tynise and Kenneth exited the vehicle, and attempted to get Joshua and Belinda to return to the car. As Heather and Hills pulled him back towards the garage, [Mr. Savage] brandished a knife.
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> As [Mr. Savage] briefly disappeared into the house, he emerged from his house, carrying a gun. [Mr. Savage] walked down the steps of his home and began to run across the yard while firing shots at Joshua. As [Mr. Savage] was firing, Joshua ran to take cover behind his vehicle.
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> In total, [Mr. Savage] fired three shots, one of which struck Kenneth in the head, inflicting mortal injuries.
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> [Mr. Savage] then fled the scene, and surrendered himself to police on the following day. Before fleeing, he gave the handgun to Hills.

We shall recite additional facts below as they pertain to our discussion of the issues before us.

On August 5, 2013, a grand jury sitting in Wicomico County returned an indictment in 19 counts charging Petitioner with first degree murder, attempted first degree murder, and a number of related offenses arising out of the incident that took

place at his home in Delmar.[1] Petitioner pled not guilty and elected a trial by jury. Prior to trial, the court conducted a *Frye-Reed* hearing.

Frye-Reed Hearing

On January 15, 2014, Petitioner filed a pre-trial notice of intent to offer the testimony of Dr. William Garmoe ("Dr. Garmoe"), a board-certified neuropsychologist, who would "testify regarding the psychological and cognitive effects of [Petitioner's] past brain injury and trauma" due to the effects of gunshot wounds he suffered in 2003. The State responded by requesting a *Frye-Reed* hearing to address the prosecution's "significant concerns regarding the reliability and general acceptance of Garmoe's methods, and likely his opinion[.]"

At the pre-trial *Frye-Reed* hearing, the defense offered that Dr. Garmoe would specifically testify on the basis of a report that he had prepared following his interview of Petitioner and the administration of various tests. Dr. Garmoe explained in detail his method for assessing and examining Petitioner:

> In my examination I did a number of things. I reviewed his records because there was a concern about the injury he had had and what affects that injury may have had, I reviewed the medical records. And in reviewing his medical records that's where it was clear to me in the medical records that at the time he had sustained the gunshot wound to the face that there also had been an injury to his brain. And that basis came from in the records the indication that he had suffered a subarachnoid hemorrhage, a subdural hematoma, and also swelling in the brain, which are hallmark signs that there had been an injury to the brain.

[1] "Under Maryland law, murder remains a common law crime that, by statute, has been divided into two degrees." *See Mitchell v. State*, 363 Md. 130, 146–47, 767 A.2d 844, 853 (2001). *See* Md. Code (2002, 2012 Repl. Vol.), §§ 2-201 to 2-204 of the Criminal Law Article.

Following the review of Petitioner's medical records, Dr. Garmoe then decided to conduct:

> A neurophysiological battery [which is] a comprehensive assessment that looks at . . . intellect, thinking and memory, attention, processing speed, what we call executive abilities, meaning the capacity to think through complex problems or novel problems, mental flexibility and psychological well-being. And it's designed to use standardized validated measures so that it's not just my opinion that's generating these scores, but they are actually formal scores that are generated and very often, in many cases there's computer programs that translate the scores into their kind of the what we call the standard scores that help us to judge the outcome of the assessment.

With respect to the specific tests he administered, Dr. Garmoe referred the court to the list of tests set forth in his report:

> Tests Administered: Test of Premorbid Functioning (TOPF); Wechsler Adult Intelligence Scale – 4th Edition (WAIS-IV); Trails A&B; Controlled Oral Word Association Test (COWALT); Wisconsin Card Sorting Test (WCST); Rey Auditory-Verbal Learning Test (RAVLT); Wechsler Memory Scale – 4th Edition (WMS-IV) – partial; Rey-Osterrieth Complex Figure; Test of Memory Malingering (TOMM); Advanced Clinical Solutions effort measures; Personality Assessment Inventory (PAI).

Based on his testing and evaluation of Petitioner, Dr. Garmoe's conclusions set forth the view that:

> Given the residual cognitive and psychological effects of his T[raumatic] B[rain] I[njury] [("TBI")], under such conditions of chaos and stress Mr. Savage would be more likely to perceive himself to be facing an imminent threat and have greater difficulty controlling his reactions.

Dr. Garmoe's report continued that:

> Mr. Savage views the world through an untrusting and suspicious perspective, and often is hyper-vigilant to possible threats.

When the Circuit Court inquired about the purpose for which Dr. Garmoe's opinion would be admitted, defense counsel indicated Petitioner's theory of self-defense:

> [DEFENSE COUNSEL]: The testimony at the time of trial is from a board certified clinical neuropsychologist, Dr. William Garmoe. He conducted a battery of tests on the Defendant, Mr. Savage, and has reached an opinion related to Mr. Savage's psychological profile but also a brain injury and the effect that that had on Mr. Savage. It is in preparation of a potential self-defense and imperfect self-defense argument in this case. And the consistency of his findings and his assessment of the Defendant with what I believe will be the Defendant's testimony as to his perception the day of the event, if that makes sense.
>
> THE COURT: So you're saying it's relevant—if it passes the Frye-Reed test you're saying it's relevant and material with respect to imperfect self-defense.

The Circuit Court inquired, for clarification, whether Dr. Garmoe's conclusions were intended to establish a "Not Criminally Responsible" defense.[2] "It's not an NCR defense," defense counsel replied. Instead, she explained:

> It is what I expect based on his report his opinion to be is that the cognitive effects of the brain injury have affected his ability to process complex situations, I guess[.] . . . But coupled with the psychological effects of that particular injury and the circumstances of that injury, which is a different part of the testing, I believe, that he is very untrusting, suspicious and has a tendency to be hyper-vigilant to threats.

Defense counsel then elaborated on how the expected testimony would factor in establishing imperfect self-defense:

> Because imperfect self-defense relies solely on his honest and subjective belief of the situation, then it is important for the jury to perhaps understand why that might be his belief, that there is actually a physical component to

[2] *See* Md. Code (2001, 2008 Repl. Vol., 2016 Supp.), §§ 3-109 to 3-123 of the Criminal Procedure Article. We disagree with the State's argument that Dr. Garmoe's opinions are relevant to this defense, and not the imperfect self-defense theory put forth by the defense.

> the idea that he may have that honest subjective belief. If there is an actual diagnosis that explains why someone would believe that, I think it is necessary for the jury to hear that, it is important for them to understand that that is a possible honest belief on the part of the Defendant.
>
> * * *
>
> What he would say is that Mr. Savage perceived threats as imminent based on the cognitive and psychological effects of his traumatic brain injury, I believe is what he just said his opinion was.

With respect to Dr. Garmoe's qualifications as an expert, Dr. Garmoe, the sole witness at the pre-trial hearing, testified that he had been qualified as an expert in the field of neuropsychology in a number of Maryland civil and criminal cases. Although the prosecutor argued that Dr. Garmoe was not qualified to render any relevant diagnoses, such as a traumatic brain injury, his qualifications as a board-certified neuropsychologist were not in dispute, and the Circuit Court indeed qualified him as an expert in that field.

When defense counsel inquired of Dr. Garmoe whether "all of the tests [he was] going to talk about . . . [were] novel tests or . . . new[,]" Dr. Garmoe emphasized that none of the tests or measures that he employed "are novel new tests or are used outside of the way in which they would be typically used in the neuropsychological assessment." Dr. Garmoe also explained that his examination and testing approach of Petitioner "is very consistent with what [he] would typically use as well as what [his] colleagues, [his] colleague neuropsychologists would use in doing this type of assessment." When asked whether his conclusions were "accurate to any degree of scientific certainty[,]" Dr. Garmoe was confident in his assessment:

> Yes. I'm confident in that, and what would elaborate with that is one of the first things I look at when I do this kind of assessment is can I trust the data,

> are these data valid[?] . . . So we look at the tests that I'm calling the performance validity measures to see. . . . So what the testing results showed is that he is having difficulties with his processing speed, he's slower at processing information. There are ways in which he has decreased flexibility of his thinking and he has some deficits in new learning and recent memory. Very consistent with the things he reported to me in terms of the cognitive symptoms that he experiences on a day to day basis.

Dr. Garmoe explained what he considered in formulating his assessment in this case:

> What I considered for that were the things that he told me, the descriptions he gave me about his own functioning, my assessment of his current presentation as he was right in front of me, and then also what he looked like on instruments such as the PAI, so what that shows about his psychological state. Because sometimes a person will tell you one thing or they'll say they're feeling one thing but if you examine it in a less direct way you may get information that is different from what they tell you directly. Sometimes different from what they even consciously recognize of themselves.

The court again inquired of counsel what the defense sought to establish with Dr. Garmoe's testimony. Defense counsel elaborated in more detail, tracking the language in Dr. Garmoe's conclusions:

> I believe it would be the statement that he gave regarding the cognitive and psychological effects of the traumatic brain injury that under conditions of chaos and stress Mr. Savage is more likely to perceive himself to be facing an imminent threat and have greater difficulty controlling his reaction.
>
> * * *
>
> Mr. Savage views the world through an untrusting and suspicious perspective, is often hyper-vigilant to possible threats.

Following cross-examination of Dr. Garmoe by the prosecution, the Circuit Court inquired about the foundations of Dr. Garmoe's conclusions, and whether the doctor's method and its application were the subject of any professional disagreement:

THE COURT: Now I guess I'm going to go back to the same thing. How long has this technique been around, look at the medical data, then do the neuropsychological testing, then arrive at a conclusion? How long have psychologists been doing this?

THE WITNESS: Probably the strongest burst of neuropsychology came after World War II when there were lots of wounded soldiers coming back.

* * *

And traumatic brain injuries. All the brain injuries from the war, that's where the clinical discipline—the academic discipline has been around but that's when the clinical discipline most strongly developed.

If you look in terms of the judicial kind of the forensic realm, the growth of neurosurgery testifying within criminal cases over the last 15 years has been exponential.

THE COURT: And one of the tests, of the things the Judge has to do is – the thing the Judge has to do is see that this approach has been accepted by the scientific community at large, in your scientific community. Usually that's proven by peer reviews, studies, literature, but your attorney is not proffering any articles that have been written on this topic. I mean is there literature?

THE WITNESS: I would be happy, I actually have a text with me I'd be happy for us to copy the chapter for that and leave it for you that really lays that out.[3]

THE COURT: Has it even been debated at your psychological conferences?

THE WITNESS: It's debated endlessly.

* * *

But it's my opinion that the scientific evidence supports the use of neuropsychological methods within this realm. And in the particular expertise we bring, in addition to our training as psychologists, our standardized measures and measures that are there to detect whether somebody is trying to appear other than they really are.

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[3] There is no indication that any supporting material, including the text referred to by Dr. Garmoe, was proffered at the hearing. We have the advantage of reviewing academic and scholarly articles submitted by Petitioner's able appellate counsel. This literature, of course, was not mentioned by Dr. Garmoe.

Asked by the court whether Dr. Garmoe was rendering an opinion with respect to Petitioner's state of mind on the day of the events of this case, defense counsel clarified the defense's theory regarding his anticipated testimony:

> [T]he doctor is not . . . giving the jury the impression that he can predict what [Mr. Savage] was thinking at that time. The Defendant would have already testified as to what his state of mind was. All the doctor is doing is giving an opinion as to his psychological state of mind, generally, not on that particular day but in this case I think it's particularly important because the brain injury occurred prior to this event, the testing occurred after this event. The brain injury existed at the time of the event. The effects of the brain injury most likely existed at the time of the event since they existed a few months later and they occurred several years ago.

Frye-Reed Ruling and Trial Testimony

On February 3, 2014, the Circuit Court filed its opinion, ruling that the *Frye-Reed* test had not been met, and precluded Dr. Garmoe from offering the disputed opinion as to how someone reacts in a situation of "chaos and stress" at trial. The hearing judge explained in his Order:

> Dr. Garmoe has reviewed Defendant's medical records; he has interviewed Defendant; he has submitted Defendant to a battery of psychological tests from which he has derived extensive data. All of this, plus his underlying assumption that Defendant suffered a TBI in 2003, leads him to conclude how Defendant will react in a time of "chaos and stress."
>
> Neither Dr. Garmoe nor Defendant, through counsel, offers any peer review studies or other literature from the neuropsychological community to substantiate the validity of this bipodal approach. Neither Dr. Garmoe nor defense counsel has identified any circuit court in Maryland or, for that matter, any state court in the country which has accepted such a methodology to show how someone reacts in a situation of "chaos and stress." The *Frye-Reed* test has not been met.

The Circuit Court's Order specified that Dr. Garmoe would not be excluded from testifying at trial but the court cabined his testimony:

> The fact that the above-mentioned opinions of Dr. Garmoe will be excluded at trial does not mean that he cannot testify. Counsel will keep in mind that Dr. Garmoe is not competent to reconstruct [Mr. Savage's] emotions at a specific time and therefore he may not express an opinion as to what belief or intent [Mr. Savage] harbored at the time of his alleged crime.

The case went to trial, and while Dr. Garmoe was permitted to testify, his testimony was constrained by the trial court's *Frye-Reed* ruling. At trial, the following exchange took place during the doctor's testimony:

> [DR. GARMOE]: Sure. What the personality assessment inventory showed is that—well, one thing it showed is that Mr. Savage is an individual who has a higher than—he has a higher level of concern for physical functioning, higher level of focus on physical symptoms than most people would. It's not unusual to see that in an individual who has had some type of a major medical condition or a major neurological insult. There's a greater focus on the way his body is working, the physical symptoms that he's reporting than most people would have.
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> * * *
>
> What it also showed when you look at the other scales is that he is somebody who has experienced a lot of anxiety and tension on a regular basis, and that he tends to view the world in untrusting—
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> [PROSECUTOR]: Objection.
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> THE COURT: Well, the basis for the objection is what?
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> [PROSECUTOR]: Is that the opinion that was excluded by Your Honor's order of February 3, 2013?
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> * * *
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> THE COURT: Well, it was, so sustained. Ask another question.

Closing Argument – Alleged Prosecutorial Misconduct

At trial, during the State's closing argument, the prosecutor suggested that the testimony of Mr. Savage's friend, Joel Hills, defied common sense, thus undermining Mr. Savage's theory of self-defense. Specifically, Petitioner points to the following remarks:

> [PROSECUTOR]: The Defendant and Joel Hills would have you believe that Kenneth Sparks was the aggressor.
>
> * * *
>
> Joel Hills, the man that wants you to believe that Josh and Kenny Sparks were aggressive or advanced on the Defendant, remember he's the same man, ladies and gentlemen, that not once tried to take the knife or the gun or calm the Defendant. He did take him into the house, but he did nothing beyond that. Joel Hills is the same man that not once called 911, not once had anyone else call 911. He not once aided Kenneth Sparks or the Spark's family, and he didn't aid Heather getting those children into the truck.
>
> Joel Hills is the same man who aided the Defendant's escape, led the Defendant out the back, over the fence, and we know for the first time yesterday how the gun got wiped clean. The Defendant said he gave the gun to Joel Hills. Joel Hills is the one that dropped it, after he wiped it.
>
> Take your common sense back there, ladies and gentlemen. I'm going to give you a hypothetical. Diane, your Bailiff, is at her house. Debbie, the Court Reporter, is at Diane's house. They are drinking hot tea and watching soap operas. I break and enter their house. Diane shoots and kills me because I break and enter. The first time that the police hear about my breaking and entering, the first time that the police hear about Diane's defense, the defense of herself and her property and her friend Debbie, will not be at her murder trial. Why? Because that defies all logic. Because at least Debbie would have told them initially.

Defense counsel objected, reasoning that the prosecutor was "questioning the Defendant's Fifth Amendment right to remain silent." After the trial court overruled the objection, the prosecutor continued:

> [PROSECUTOR]: Because Debbie would have told the police Diane did it in self-defense. Diane did what she had to do, and Diane would have stayed. We don't have that here because that's not how it went down.

> The Defendant and Joel Hills have concocted details to aid in this theory, which is only a theory and not the reality of self-defense. You didn't hear them until yesterday.

Following his convictions by the jury and sentencing by the court. Petitioner noted a direct appeal to the Court of Special Appeals.

The Court of Special Appeals' Opinion

Petitioner took issue with the Circuit Court's *Frye-Reed* ruling and also alleged sufficiency errors with respect to his conviction for reckless endangerment and trial errors related to the State's closing argument. In rejecting Petitioner's challenge to the constraints placed on Dr. Garmoe's testimony, the intermediate appellate court first discounted Petitioner's assertion that an examination of Dr. Garmoe's opinions fell outside the scope of *Frye-Reed.* The Court of Special Appeals, citing *Chesson v. Montgomery Mutual Insurance Co.*, 434 Md. 346, 380, 75 A.3d 932, 951 (2013) and *Blackwell v. Wyeth*, 408 Md. 575, 617–18, 971 A.2d 235, 260 (2009), reasoned that "[t]he notion that medical opinion testimony is categorically immune from a *Frye-Reed* challenge is no longer the law in Maryland, if, indeed, it ever was." The intermediate appellate court then dismissed Petitioner's contention that the hearing judge had further erred on the merits of the *Frye-Reed* analysis in his conclusion that Dr. Garmoe's methodology did not satisfy *Frye-Reed*. The Court of Special Appeals addressed this contention as follows. It first summarized Petitioner's contentions:

> [Petitioner] points out that Dr. Garmoe was the only witness at the hearing, and that he testified, without refutation that:
> (1) his methodology was generally accepted in the neuropsychological community;

(2) none of the tests he used were novel or used "outside of the way in which they would be typically used in the neuropsychological assessment";

(3) he diagnosed [Mr. Savage] with Cognitive Disorder NOS, a diagnosis from the DSM-IV, and his diagnosis was generally accepted because it is recognized under the DSM-IV; and

(4) Dr. Garmoe, as a neuropsychologist, was qualified to testify about the existence and cause of Mr. Savage's brain injury.

[Mr. Savage] asserts that "[t]he admissibility of a neuropsychologist's testimony as to the existence of a brain injury is generally accepted in most jurisdictions." He concludes:

In sum, the unrefuted evidence presented at the *Frye-Reed* hearing established Dr. Garmoe's methodologies were generally accepted in the neuropsychological community. Moreover, Dr. Garmoe diagnosed Mr. Savage under the DSM-IV with Cognitive Disorder NOS, which was based on Mr. Savage's traumatic brain injury. The generally accepted methodology coupled with a DSM-IV based diagnosis satisfied the *Frye-Reed* criteria.

Dismissing these arguments as "miss[ing] the point," the Court of Special Appeals explained:

The basis of the trial court's concerns was not whether Dr. Garmoe's methodology was sound, but whether his conclusions—that a person who suffered a traumatic brain injury would (1) be more likely to perceive himself to be facing an imminent threat and have greater difficulty controlling his reactions in conditions of chaos and stress, and (2) view the world through a suspicious and hyper-vigilant perspective—were generally accepted in the scientific community.

As to that, and in response to a question from the court, Dr. Garmoe testified that the issue was "debated endlessly" at conferences of psychologists. Dr. Garmoe did not testify that the connection between traumatic brain injury on the one hand, and hyper-vigilance and similar behavioral traits on the other, was generally accepted by the practitioners of his field. To be sure, he did testify that he personally believed that the cause and effect relationship was valid but the "'*ipse dixit* of the expert'" is not a basis for admitting opinion evidence.

The Court of Special Appeals similarly rejected Petitioner's challenge to the trial court's limitation on Dr. Garmoe's trial testimony. The intermediate appellate court explained that, despite the limitations of the pre-trial Order and curtailment of some direct testimony, Dr. Garmoe was able to present extensive information before the jurors:

> We see things differently [than does Mr. Savage]. We do not agree with [Mr. Savage's] characterization of Dr. Garmoe's testimony. After the court sustained the State's objection, Dr. Garmoe continued to testify about [Mr. Savage's] performance on the PAI tests and the conclusions that he drew from them. For example, Dr. Garmoe testified that [Mr. Savage] was "mildly impaired" in terms of "the speed and efficiency with which somebody can process information," and that he "is troubled by memories of what ... he subjectively experienced as a horrible experience in that he sometimes has difficulty in managing his temper." Moreover, Dr. Garmoe testified that [Mr. Savage's] score on the paranoia scale was "clinically elevated," his scores for anxiety were "a significant factor," and that he "is an individual who has had a very short temper throughout his life and that is a form of impulse regulation [and that] he has difficulties with impulsivity," which "got worse [after] his injury."
>
> In summary, it is clear that the trial court did not restrict Dr. Garmoe from testifying about the results of the PAI tests. Instead, the court sustained the State's objection when Dr. Garmoe attempted to testify, through clear implication, that he concluded *from the tests results* alone that [Mr. Savage] "tends to view the world in untrusting [terms]," when in the *Frye-Reed* hearing, he had testified that this conclusion was based on the *combination* of [Mr. Savage's] medical history of a traumatic brain injury *and* the test results. The trial court did not abuse its discretion when it declined to permit Dr. Garmoe to recast his opinion as based solely on test results. To permit Dr. Garmoe to do so would have rendered the *Frye-Reed* hearing a meaningless exercise.

The Court of Special Appeals also dismissed Petitioner's challenge to the prosecutor's summation. The intermediate appellate court, citing to *Lee v. State*, 405 Md. 148, 162, 950 A.2d 125, 133 (2008), *Spain v. State*, 386 Md. 145, 158–59, 872 A.2d 25, 32–33 (2005), and *Lawson v. State*, 389 Md. 570, 592, 886 A.2d 876, 889 (2005), pointed

to the "latitude given to counsel in making closing arguments" to determine that the prosecutor did not venture outside the bounds of permissible closing, that the context of the remarks showed that they were essentially directed at the defense witness Joel Hill, and that her summation had not "implicated [Petitioner's] right to silence."

The intermediate appellate court affirmed in all respects, save for one of Petitioner's convictions. On January 9, 2017, we granted *certiorari*, 451 Md. 249, 152 A.3d 753 (2017), to consider the following issues, which we have reworded as follows:[4]

> 1. Did the trial court err in concluding that Dr. Garmoe's testimony about the effects of a traumatic brain injury failed to meet the *Frye-Reed* standard?

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[4] We have consolidated and rephrased the questions Petitioner presented in his Petition for Writ of Certiorari:

> 1. Did the Court of Special Appeals err when it concluded that Dr. Garmoe's neuropsychological examination and DSM-IV diagnosis based on a standard battery of tests were subject to Frye-Reed?
>
> 2. Where the unrefuted evidence presented at the Frye-Reed hearing established that Dr. Garmoe's methodology consisted of "validated measures that have scientific acceptance and approval within the community of neuropsychologists" and Mr. Savage was diagnosed under the DSM-IV, did the Court of Special Appeals err when it concluded that the defense failed to meet the Frye-Reed standard?
>
> 3. Did the Court of Special Appeals err when it affirmed the trial court's exclusion of Dr. Garmoe's conclusion that Mr. Savage "views the world through an untrusting and suspicious perspective, and often is hyper-vigilant to possible threats"?
>
> 4. Did the Court of Special Appeals err when it permitted the State in closing argument to impeach Mr. Savage's testimony based on his failure to tell the police at any time prior to trial that he acted in self-defense?

2. Did the trial court err when it permitted the State in closing argument to impeach Mr. Savage's testimony based on a witness' failure to disclose to police that Mr. Savage had acted in self-defense?

For the reasons to follow, we shall affirm.

DISCUSSION

Standards of Review

"Appellate review of a trial court's decision regarding admissibility under *Frye-Reed* is *de novo*." *Wilson v. State*, 370 Md. 191, 201 n. 5, 803 A.2d 1034, 1040 n. 5 (2002). We review the trial court's ruling on objections to closing argument for an abuse of discretion. *See Whack v. State*, 433 Md. 728, 742, 73 A.3d 186, 194–95 (2013). Where a party complains that the trial judge's action abridged a constitutional right, however, our review is *de novo*. *State v. Cates*, 417 Md. 678, 691, 12 A.3d 116, 124 (2011) (explaining that "issues of law, involving questions of constitutional rights and statutory interpretation" are reviewed *de novo*.). *See Doyle v. Ohio*, 426 U.S. 610, 96 S. Ct. 2240, 49 L. Ed .2d 91 (1976) (holding that the fact of petitioners' silence could not be used for purposes of impeachment); *see also United States v. Ramirez-Estrada*, 749 F.3d 1129, 1133 (9th Cir. 2014) (reviewing *de novo* whether *Doyle* was violated when the prosecutor used the defendant's silence during routine booking questions, after the defendant had invoked his right to remain silent, to impeach the defendant).

Introduction – Expert Opinion Testimony

In *Armstead v. State*, 342 Md. 38, 54, 673 A.2d 221, 228–29 (1996), we said:

> In Maryland, novel scientific evidence may become admissible in one of several ways. First, the evidence may be admitted by statute, if a relevant statute exists. *See* 5 L. McLain, MARYLAND EVIDENCE § 401.4(c), at

> 277–78 (1987). Second, the proponent can prove that the evidence meets the *Reed* standard of "general acceptance" in the relevant scientific community. *Reed v. State*, 283 Md. 374, 381, 391 A.2d 364, 368 (1978) (quoting *Frye v. United States*, 293 F. 1013, 1014 (D.C.Cir.1923)). This can be accomplished through expert testimony, judicial notice, or a combination of the two. *Goldstein v. State*, 339 Md. 563, 567, 664 A.2d 375, 376–77 (1995).

The "standard enunciated in *Frye v. United States* . . . and adopted by this Court in *Reed v. State* . . . makes evidence emanating from a novel scientific process inadmissible absent a finding that the process is generally accepted by the relevant scientific community." *Clemons v. State*, 392 Md. 339, 343–44, 896 A.2d 1059, 1061 (2006). Since we adopted the *Frye* standard in *Reed v. State*, we have often had the occasion to elaborate on the development and application of the *Frye-Reed* standard.

Although both the Court of Special Appeals and the Circuit Court were correct in holding that, on this record, Dr. Garmoe's conclusions were subject to *Frye-Reed*, we shall hold that his analysis did not bridge the "analytical gap" between the data available to him and his ultimate conclusions.

Scope of Frye-Reed

> The threshold question in applying *Frye*[*-Reed*] is the scope of the rule; that is, to what evidence does it apply. It would understate the problem to say that courts have veered all over the road in answering it.

22 Charles Alan Wright & Kenneth W. Graham, Federal Practice and Procedure § 5168.2 (2d ed. 2012) (footnote omitted).

Petitioner reiterates his arguments made before the Court of Special Appeals, raising a variety of challenges to the holdings of that court and the trial court. He insists that those courts misapplied the *Frye-Reed* test by ruling that Dr. Garmoe's *opinion* did

not satisfy the general acceptance test that *Frye-Reed* establishes. He contests the application of *Frye-Reed* to an "opinion" in the first place, and urges that, in any event, *Frye-Reed* should reach only the scientific underlay of an expert's opinions, and not the conclusions derived from that science. Petitioner strenuously maintains that Dr. Garmoe's diagnosis, methods and opinions—based in part on the well-respected Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)—are clearly generally accepted within the appropriate behavioral scientific discipline, especially in the valid field of neuropsychology. He trumpets Dr. Garmoe's credentials and points to the validity of the underlying tests that were administered to Petitioner.

Petitioner draws our attention to cases, both from Maryland authority and other jurisdictions, to buttress his argument that the *Frye* analysis is strictly confined to an expert's underlying methods and scientific basis. Representative of this authority is the opinion by the Court of Special Appeals in *Giddens v. State*, 148 Md. App. 407, 812 A.2d 1075 (2002), *cert*. *denied*, 374 Md. 83, 821 A.2d 370 (2003), in which that court held that the expert opinion of a pathologist with respect to the time of the victim's injury was not subject to *Frye-Reed*. Quoting from our decision in *Reed*, the intermediate appellate court explained:

> *Frye* sets forth only a legal standard which governs the trial judge's determination of a threshold issue. Testimony based on a technique which is found to have gained "general acceptance in the scientific community" *may* be admitted into evidence, but only if a trial judge also determines in the exercise of his discretion, as he must in all other instances of expert testimony, that the proposed testimony will be helpful to the jury, that the expert is properly qualified, etc. Obviously, however, if a technique does not meet the *Frye* standard, a trial judge will have no occasion to reach these further issues.

Giddens, 148 Md. App. at 415, 812 A.2d at 1080 (quoting *Reed*, 283 Md. at 389, 391 A. 2d at 372). The *Giddens* Court added:

> It is also well settled, however, that if the relevant scientific community is in general agreement that a properly conducted scientific test will produce an accurate result, the *Frye-Reed* test does not operate to exclude conflicting expert opinions based upon such a test.

Id. at 416, 812 A.2d at 1080. We discern no reason to depart from this standard in the appropriate case where it applies. The issue is whether the expert bridged the "analytical gap" between accepted science and his ultimate conclusions in a particular case.

Analytical Gap

We shall assume that Dr. Garmoe's "approach" is generally accepted by the relevant scientific community, even if it is "debated," and that he was competent to render a diagnosis of traumatic brain injury.[5] On this record, however, we are unable to conclude that Dr. Garmoe's ultimate opinion adequately reflects the data and information available to him.

As a starting point, we refer to the standard that we enunciated in *Reed v. State* that before a

> scientific opinion will be received as evidence at trial, the basis of that opinion must be shown to be generally accepted as reliable within the expert's particular scientific field. Thus, according to the *Frye* standard, if a new scientific technique's validity is in controversy in the relevant scientific community, or if it is generally regarded as an experimental technique, then expert testimony based upon its validity cannot be admitted

[5] Both the prosecutor and the trial court doubted whether Dr. Garmoe was qualified to diagnose traumatic brain injury. This view is incorrect; a neuropsychiatrist may certainly diagnose a traumatic brain injury. *See generally Bennett v. Richmond*, 960 N.E.2d 782, 788–89 (Ind. 2012).

into evidence.

Reed, 283 Md. at 381, 391 A.2d at 368. Since our opinion in *Reed*, however, our approach to assessing the threshold question of the admissibility of scientific and expert evidence has evolved.[6]

In *Blackwell v. Wyeth*, we "address[ed] the application of *Frye-Reed* to theories proffered as scientific and alleged to have been premised on scientifically accepted methodologies." *Blackwell v. Wyeth*, 408 Md. 575, 580, 971 A.2d 235, 238 (2009). That case had as its genesis an action against the pharmaceutical manufacturer Wyeth by parents of a child who had received a vaccine which "included thimerosal, an ethyl mercury derivative, as a preservative to prevent bacterial and fungal contamination in vaccines." *Id.* at 579 n. 7, 971 A.2d at 237 n. 7. The plaintiffs asserted that the presence of thimerosal in the drug caused neurological defects such as autism and mental retardation, and enlisted the opinions of experts who would opine as much.

The *Blackwell* plaintiffs' case never made it to trial. The Circuit Court in *Blackwell* entered summary judgment against the plaintiffs, concluding that the plaintiffs

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[6] Most recently, in *Rochkind v. Stevenson*, __ Md. __, __ A.3d __ (2017), where the trial court did not hold a *Frye-Reed* hearing, we held that the proffered expert testimony was inadmissible because it lacked a sufficient basis under Maryland Rule 5-702. We concluded that the witness' testimony failed to provide support for her conclusion that lead paint exposure caused Attention Deficit Hyperactivity Disorder resulting in an "analytical gap" between the evidence presented and the expert's conclusions. The focus of our analysis in *Rochkind* was whether the admission of the expert testimony was proper under Md. Rule 5-702. Because we determined that the court abused its discretion in admitting the expert testimony, we did not need to, and thus did not, reach the issue of whether the court erred in not holding a *Frye-Reed* hearing. In the case *sub judice*, the proffered expert testimony was *not* admitted; therefore, our discussion is necessarily confined to our *Frye-Reed* jurisprudence.

"had failed to demonstrate that the bases of their proffered experts' opinions, including the theory of causation and analytical framework in support thereof, were generally accepted as reliable in the relevant scientific community." *Id*. at 579, 971 A.2d at 238. The Circuit Court further held that the experts failed to qualify under Maryland Rule 5-702. *Id*. The *Blackwell* plaintiffs sought appellate review, and we granted *certiorari* prior to any proceedings in the Court of Special Appeals to address their claims.

We initially set forth the standards and purposes of applying *Frye-Reed* to expert evidence:

> If . . . a novel scientific process does achieve general acceptance in the scientific community, there will likely be as little dispute over its reliability as there is now concerning other areas of forensic science which have been deemed admissible under the *Frye* standard, such as blood tests, ballistics tests, etc.

Id. at 586–87, 971 A.2d at 242 (internal quotation marks and citations omitted).

We then began to chronicle the evolution of the *Frye-Reed* protocol in our jurisprudence. In *Blackwell*, we phrased the "essence [to be] the application of the *Frye-Reed* test to the analysis undertaken by an expert where the underlying data and methods for gathering this data are generally accepted in the scientific community but applied to support a novel theory." *Id*. at 596, 971 A.2d at 247–28. In upholding the circuit court's comprehensive analysis of the relevant science and rejection of the conclusions rendered by the plaintiffs' principal expert, we referred to the judicial scrutiny of novel scientific evidence by various federal courts, "where the underlying data may otherwise be generally accepted in the scientific community." *Id.* at 604, 971 A.2d at 253. We explained:

> Although we have not in the past had occasion to scrutinize the analytical phase of a scientific process underlying a novel scientific opinion, where the underlying data may otherwise be generally accepted in the scientific community, various federal courts have had occasion to scrutinize the *reliability* of the analytical framework utilized by an expert in formulating a novel theory of science, and to them we turn, recognizing that they utilized the *Daubert*[7] standard rather than *Frye*. We explore what they have opined, nevertheless, when they are speaking about reliability.

Id. at 604–05, 971 A.2d at 253 (footnote omitted).

The *Blackwell* court then cited to *General Electric Company v. Joiner*, 522 U.S. 136, 118 S. Ct. 512, 139 L. Ed. 2d 508 (1997), which, in recognizing that the analysis employed by an expert must be reliable, added to the language of inquiry the concept of the "analytical gap" between the evidence presented and the expert's conclusions. We observed that the *Joiner* Court, "[i]n calling attention to the 'analytical gap' between the existing data and the opinion proffered by an expert . . . admonished against reliance solely on an expert's word that his conclusion is appropriate to the underlying data and methods." *Blackwell*, 408 Md. at 606, 971 A.2d at 253. Following a discussion of the application of the "analytical gap" by various federal courts, we embraced the principle, and concluded that "[g]enerally accepted methodology, therefore, must be coupled with generally accepted analysis in order to avoid the pitfalls of an 'analytical gap.'" *Id.* at 608, 971 A.2d at 255. We discounted the conclusions of the Blackwells' principal expert because his research was not "based upon sound methodology." *Id*. at 609, 971 A.2d at 255.

In *Blackwell*, we noted the opinions of various federal and state courts that have

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[7] *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993).

addressed, and applied, the "analytic gap" analyses set forth in *Joiner*. *Blackwell*, 408 Md. at 607–08, 971 A.2d at 254–55. The hallmark of this analysis was the failure by the expert witness to bridge the gap between his or her opinion and the empirical foundation on which the opinion was derived.

Representative of these cases is the opinion by the United States Court of Appeals for the Seventh Circuit in *United States v. Mamah*, 332 F.3d 475 (7th Cir. 2003). The defendant in that case sought to introduce the testimony of two social scientists who would opine that the defendant had given a false confession and explain why. The Seventh Circuit affirmed the district court's exclusion of the disputed expert opinions:

> Mamah argues that excluding the testimony of Dr. Pellow and Dr. Ofshe was tantamount to a statement that social science can never form the basis of expert testimony. We acknowledged that social scientists frequently testify as experts, and their opinions are "an integral part of many cases." But whether social science studies can ever be a proper foundation for an expert's opinion is not the issue here. The issue is whether *these* social science studies, the research of *these* experts, sufficiently supported the expert opinions Mamah wanted to present to the jury - and they did not.
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> Whether or not Dr. Pellow and Dr. Ofshe grounded their work in sound social science principles and methods, the court still needed to satisfy itself that their work yielded facts and data sufficient to support their proposed testimony.
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> * * *
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> It is critical under Rule 702 that there be a link between the facts or data the expert has worked with and the conclusion the expert's testimony is intended to support. . . . The court is not obligated to admit testimony just because it is given by an expert. . . . The problem with the proposed testimony in this case does not lie in the quality of Dr. Pellow's and Dr. Ofshe's research. Rather, the problem is the absence of an empirical link

> between that research and the opinion that Mamah likely gave a false confession.

United States v. Mamah, 332 F.3d at 477–78 (citations omitted).

In the case before us, we conclude that Dr. Garmoe's ultimate opinions, that "under such conditions of chaos and stress" Petitioner "would be more likely to perceive himself to be facing an imminent threat and have greater difficulty controlling his reactions[,]" and that "[Petitioner] views the world through an untrusting and suspicious perspective, and often is hyper-vigilant to possible threats[,]" are conclusory. Dr. Garmoe does not articulate a connection between the performance data from the testing or explain how Petitioner's representations during the interview lead to the evaluations of hyper-vigilance to "possible threats," and an overarching "untrusting and suspicious perspective," and how these affects emerge "under such conditions of chaos and stress."

Dr. Garmoe testified at the hearing that his results were based on Petitioner's "presentation and interview" along with testing, including Petitioner's "descriptions. . . about his own functioning," as well as testing, including the results of the Personality Assessment Inventory. Dr. Garmoe recorded Petitioner's version of the events of this case, as well as the statement of charges and contrasting stories by the complainants. He also reviewed medical records from 2003, when Petitioner suffered multiple gunshot wounds to the face.

The testing showed "difficulties with [Petitioner's] processing speed," "decreased flexibility" in thinking and "deficits in new learning and recent memory." In his report, Dr. Garmoe observed that "residual effects of [Petitioner's] traumatic brain injury" as

manifest by the above deficits "fell primarily in the mild range." He reported that Petitioner "became depressed, embittered, and developed a more suspicious/untrusting view of the world[,]" and "continues to struggle with depression and anger." Petitioner told Dr. Garmoe that he has a "history of difficulties with anger management, and [that] his difficulties with emotional control did not start with the TBI, but [that] exacerbated the problems."

Petitioner admitted to a "twice weekly" marijuana habit to "take away" his anger. He also told the doctor about his struggles with depression and "increased irritability and anger." With respect to Petitioner's "Current Psychological Status," however, Dr. Garmoe related that Petitioner said that "his current mood is generally good and his 'anger meter' is low[,]" although Petitioner acknowledged a tendency to "fly off the handle easily" and had been enrolled in anger management classes while incarcerated.

Perhaps one of the most important parts of Dr. Garmoe's report is his review of Petitioner's results on the Personality Assessment Inventory ("PAI") test:

> [Petitioner] completed the PAI. He showed a tendency to endorse items which present an unfavorable view, possibly reflecting a negative view he has of himself at this time. There were significant elevations across several clinical scales, suggesting that he is in considerable psychological distress. He shows a higher concern with physical symptoms and perceived impairment from them, though it should be noted that he has a history of genuine severe medical problems. He also is experiencing high levels of anxiety and tension, which may in part being [sic] expressed through physical symptoms. Mr. Savage views the world through an untrusting and suspicious perspective, and often is hyper-vigilant to possible threats. At times he may appear to others to be aloof and even hostile. He subjectively feels a sense of confusion and difficulties with maintaining clear thought processes. Examination of critical items shows that Mr. Savage endorsed being troubled by memories and reliving a horrible experience and that his temper sometimes explodes and he loses control.

Although his methods in this case appear to be comprehensive, Dr. Garmoe does not adequately reveal, as shown by the above, how his ultimate conclusions are derived from the evidence he sets forth at the hearing and in his report. No adequate details, for example, are presented with respect to the PAI testing, and it is difficult to separate Petitioner's self-reporting from Dr. Garmoe's analysis of the presentation and interview, in our view.

The PAI appears to be a major component of Dr. Garmoe's analysis. "[T]he Personality Assessment Inventory (PAI; Morey, 2007), [is] an objective and commonly used personality inventory." Emily M. Lund & Katie B. Thomas, *Relationship satisfaction and the PAI: examining stress, psychological distress, aggression, and alcohol use*, 16 NORTH AMERICAN JOURNAL OF PSYCHOLOGY, 201, 201–10 (2014).

Commentators on the use and design of the PAI have described the protocol and its employment in detail:

> The PAI has shown to be a useful and reliable tool in a variety of clinical settings (e.g., Aikman & Souheaver, 2008; Deisinger, 1995; Morey, 1991, 2007b; Sinclair et al., 2015), including forensic and correctional settings (e.g., Archer, Buffington-Vollum, Stredny, & Handel, 2006; Douglas, Hart, & Kropp, 2001; Edens, Cruise, & Buffington-Vollum, 2001; Morey & Quigley, 2002; Wang et al., 1997; White, 1996). The PAI can yield information that assists in determining diagnosis, symptom severity, level of risk, and treatment planning, and due to its utility to assess factors salient to psycholegal decision making, the PAI has gained popularity in forensic settings. For example, the PAI can be used to assess for potential risk of aggression towards self and others, to classify offenders, and even to predict the likelihood of disciplinary action being taken against an inmate during incarceration or recidivism once an inmate is released from custody (Edens et al., 2001; Gardner, Boccaccini, Bitting, & Edens, 2015; Morey & Quigley, 2002; Reidy, Sorensen, & Davidson, 2015; Sinclair et al., 2009;

> Walters & Duncan, 2005;Walters, Duncan, & Geyer, 2003;Wang et al., 1997). Furthermore, the assessment typically only takes about an hour to complete, most items are written at about a 4th grade reading level.
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> In forensic evaluations, it is important to consider cognitive ability, discrete from psychiatric illness, as many times impaired cognitive ability co-occurs with a mental health diagnosis (e.g., Roesch, Zapf, Golding, & Skeem, 1999; Ryba & Zapf, 2011).
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> * * *
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> The PAI consists of 22 non-overlapping validity, clinical, and supplemental scales. The clinical scales include Somatic Complaints (SOM), Anxiety (ANX), Anxiety-Related Disorders (ARD), Depression (DEP), Mania (MAN), Paranoia (PAR), Schizophrenia (SCZ), Borderline Features (BOR), Antisocial Features (ANT), Alcohol Problems (ALC), and Drug Problems (DRG) (Morey, 1991, 2007b). Ten of the full scales contain subscales to assist in further interpretation of complex clinical constructs, such as Antisocial Features (broken down into antisocial behavior, egocentricity, and stimulus-seeking) and Anxiety and Depression (each containing physiological, cognitive, and affective subscales). Though for the present study, only the validity scales (Infrequency [INF], Inconsistency [INC], Positive Impression [PIM], Negative Impression [NIM]) were examined. The reliability and validity of this measure are well established, including in correctional and forensic populations (e.g., Douglas et al., 2001; Edens et al., 2001; Morey, 1991, 2007b; Morey & Quigley, 2002).

Tatiana M. Matlasz et al., *Cognitive status and profile validity on the Personality Assessment Inventory (PAI) in offenders with serious mental illness*, 50 INT'L J.L. & PSYCHIATRY 38, 38–41 (2017) (some citations omitted). *See also*, *e.g.*, Thomas W. Frazier et al., *Psychometric Adequacy and Comparability of the Short and Full Forms of the Personality Assessment Inventory*, 18 PSYCHOLOGICAL ASSESSMENT, 324, 324–333 (2006); George J. Demakis et al., *The Personality Assessment Inventory in individuals with Traumatic Brain Injury*, 22 ARCHIVES OF CLINICAL NEUROPSYCHOLOGY 123, 123–24 (2007) ("Practically speaking, the PAI is now widely administered for general clinical

purposes (Piotrowski, 2000) and a recent survey of forensic psychologists considered it 'acceptable' for use in a wide range of forensic issues such as malingering and competency to stand trial evaluations (Lally, 2003)."). Although Professor Demakis and others were comparing results of the PAI tests across different groups of patients, the following illustration of the testing protocol and analysis of PAI results is instructive:

> Second, a profile or cluster was obtained from each participant and compared to those described by Morey (1991) from his clinical sample of participants (Table 3). More specifically, the configural profile was obtained by (a) obtaining a mean T-score elevation on all of the eleven clinical scales, (b) subtracting the T-score of each clinical scale from the overall mean to obtain deviation scores, and (c) adding up the deviation scores and computing how far the deviation scores are from clusters presented by Morey (1991). The participant's profile is then assigned to the profile with which it is most similar. Intercorrelations between all the clinical scales were next completed (Table 4). Finally, exploratory factor-analyses were completed on the eleven clinical scales of the PAI: Somatic Complaints, Anxiety, Anxiety Related Disorders, Depression, Mania, Paranoia, Schizophrenia, Borderline Features, Antisocial Features, Alcohol Problems, and Drug Problems (Table 5). Principal components extraction followed by varimax (orthogonal) rotation was performed; only factors with an eigen value of 1.00 or higher were retained for the final solution. This factor analytic approach is similar to Morey's (1991) approach as detailed in the PAI test manual.

George J. Demakis et al., *supra*, at 125.

We advert to these overviews of the PAI to demonstrate the rigorous analysis the results of this test requires. By presenting his opinion about Petitioner, Dr. Garmoe did not reveal any similar analytics in the requisite detail so as to build a connection between his methods and observations, especially in the PAI, and his ultimate conclusion. This is not to say that Dr. Garmoe was not able to do so, or that he neglected to engage in a more detailed presentation of the steps he took to get from Petitioner's test performance to the

doctor's opinions. These analytics, if they existed, were left at the courthouse door. Indeed, defense counsel promised that more detail would be forthcoming at trial, but this defeats the purpose of the crucial "gatekeeping" function of the court. When outlining what the defense expected from Dr. Garmoe, defense counsel said:

> And I would expect honestly at the hearing at trial to get into the substance of why he came to that conclusion. I don't – as far as the description of the trauma that occurred before and why that psychologically affected him, which I think is not necessarily relevant to the *Frye-Reed* hearing because at today's hearing we're only addressing the scientific measures that he used to come to his conclusions and whether those are scientifically reliable. And I think his testimony has certainly established that. I haven't gotten into all of the details as to why he came to that conclusion certainly, but I do think that would probably be relevant for them to understand.

Contrary to defense counsel's representation, the "details" are exactly pertinent to the *Frye-Reed* gatekeeping function, and were due to be presented at the *Frye-Reed* hearing. An expert should not be expected to connect the dots before a jury. *Cf. Flanagan v. State*, 625 So. 2d 827, 828 (Fla. 1993) (instructing that "a courtroom is not a laboratory, and as such it is not the place to conduct scientific experiments. If the scientific community considers a procedure or process unreliable for its own purposes, then the procedure must be considered less reliable for courtroom use.") (citation, brackets and internal quotation marks omitted).

We are mindful, as Petitioner's appellate counsel has admirably demonstrated both in argument and the supplemental material, that Petitioner suffers from a traumatic brain injury, that the DSM-IV diagnosis of a "cognitive disorder – not otherwise specified"

embraces traumatic brain injury,[8] and that the literature shows that the sequelae of this condition can include vigilance, paranoia, and aggression. On the record before us, however, we are unable to conclude that Dr. Garmoe adequately "connected the dots" between the empirical foundation from his study of Petitioner and the doctor's ultimate opinions. We emphasize that, in passing on whether there exists an "analytical gap" between the data and the expert's conclusions, we may take as given the general acceptance of the expert's methods.

Petitioner's attempts to distinguish our decisions in *Blackwell* and *Chesson* are unavailing. He maintains that, unlike the present case, neither of those cases "involved psychological or psychiatric testimony based on a standard battery of tests with a DSM diagnosis[,]" and that the science in those cases was the subject of expert dispute. We do not share Petitioner's attempt to narrow the reach of these cases. In *State v. Baby*, 404 Md. 220, 270, 946 A.2d 463, 492–93 (2008), we pointed out that "[w]e have reaffirmed the importance of *Frye-Reed* analysis in determining the validity and reliability of a wide variety of scientific methodologies and conclusions, including various syndromes." Our conclusion, based in part as it is on our decision in *Blackwell*, militates against Petitioner's argument. The presence of an "analytical gap" between the information available to him and Dr. Garmoe's ultimate opinion undermines the validity of this

[8] "Postconcussional disorder: following a head trauma" is an example of "Cognitive Disorder Not Otherwise Specified" in the DSM-IV. American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV), 294.9 at 163 (4th ed. 1994). *See also* "Major or Mild Neurocognitive Disorders Due to Traumatic Brian Injury[.]" American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V) at 624–27 (5th ed. 2013).

evidence, regardless of whether the tests he administered and the DSM-IV diagnosis were the appropriate methodology.

We next turn to Petitioner's contention that because Dr. Garmoe was the sole witness at the *Frye-Reed* hearing, and thus not contradicted, the Court of Special Appeals erred by upholding the trial court's *Frye-Reed* ruling. We must disagree. The fact that an expert's opinion is not contradicted does not require its admission. To so hold would abrogate the gatekeeping obligation of the trial court, which must inquire into the admissibility under *Frye-Reed* of even uncontradicted evidence. We also remind Petitioner that in *Frye* itself, the sole evidence at issue was the "uncontradicted" systolic blood pressure deception test. The *Frye* court was not troubled by the fact that the United States failed to submit conflicting scientific evidence. Nor is this Court bound by Dr. Garmoe's opinion because the State failed to respond with science and argument that contradicts his conclusions. It is the proponent's burden of satisfying *Frye-Reed* by a preponderance of the evidence, and to do so at the initial pre-trial stage.

Our holding that the Circuit Court did not err by precluding the specific opinions in question at the pre-hearing stage applies with equal force to the trial judge's decision to limit Dr. Garmoe's trial testimony. The pre-trial Order limits Dr. Garmoe's opinions with respect to how someone would react in a situation of chaos and stress. Although the pre-trial Order does not mention "hyper-vigilance," mistrust or suspicion, we are satisfied that the Order embraces those aspects of Dr. Garmoe's opinions. We discern neither error nor an abuse of discretion on the part of the trial judge in this regard.

Closing Argument

Finally, we reach Petitioner's assertion that the Court of Special Appeals erred by upholding the trial court's denial of Petitioner's objection to improper closing argument by the prosecutor.

"The Fifth Amendment, as applied to the states by the Fourteenth Amendment, guarantees an accused the right to invoke his privilege against self-incrimination." *Coleman v. State*, 434 Md. 320, 333, 75 A.3d 916, 923 (2013). "[T]he procedural safeguards outlined in *Miranda v. Arizona*, 384 U.S. 436, 444–45, 86 S. Ct. 1602, 1612, 16 L. Ed. 2d 694, 706–07 (1966), commonly referred to as the *Miranda* warnings, provide practical reinforcement for the right against compulsory self-incrimination." *Id.* at 333, 75 A.3d at 924 (citations and internal quotation marks omitted).

The United States Supreme Court has emphasized the central importance of an accused's right to remain silent after being advised of his or her right to that silence. The Court pointed out in *Doyle v. Ohio*:

> The warnings mandated by [*Miranda v. Arizona*, 384 U.S. 436, 86 S. Ct. 1602, 16 L. Ed. 2d 694 (1966)], as a prophylactic means of safeguarding Fifth Amendment rights, *see Michigan v. Tucker*, 417 U.S. 433, 443–44, 94 S. Ct. 2357, 2363–2364, 41 L. Ed. 2d 182 (1974), require that a person taken into custody be advised immediately that he has the right to remain silent, that anything he says may be used against him, and that he has a right to retained or appointed counsel before submitting to interrogation. Silence in the wake of these warnings may be nothing more than the arrestee's exercise of these Miranda rights.

Doyle v. Ohio, 426 U.S. 610, 617–18, 96 S. Ct. 2240, 2244, 49 L. Ed. 2d 91, 97 (1976).

In *Doyle*, the defendants testified at their respective trials that they had been "framed," although they did not tell this to police at the time of their arrests. This story tended to undermine their prosecution:

> Petitioners' explanation of the events presented some difficulty for the prosecution, as it was not entirely implausible and there was little if any direct evidence to contradict it. As part of a wide-ranging cross-examination for impeachment purposes, and in an effort to undercut the explanation, the prosecutor asked each petitioner at his respective trial why he had not told the frameup story to Agent Beamer when he arrested petitioners.

Id. at 613, 96 S. Ct. at 2242, 49 L. Ed. 2d at 95.

The Supreme Court reversed the convictions in both instances. The Court, quoting from an earlier opinion, was emphatic:

> [W]hile it is true that the *Miranda* warnings contain no express assurance that silence will carry no penalty, such assurance is implicit to any person who receives the warnings. In such circumstances, it would be fundamentally unfair and a deprivation of due process to allow the arrested person's silence to be used to impeach an explanation subsequently offered at trial. Mr. Justice White, concurring in the judgment in *United States v. Hale*, *supra*, at 182–183, [95 S. Ct. 2133, 45 L. Ed. 2d 99,] put it very well:
>
> "When a person under arrest is informed, as *Miranda* requires, that he may remain silent, that anything he says may be used against him, and that he may have an attorney if he wishes, it seems to me that it does not comport with due process to permit the prosecution during the trial to call attention to his silence at the time of arrest and to insist that because he did not speak about the facts of the case at that time, as he was told he need not do, an unfavorable inference might be drawn as to the truth of his trial testimony. . . . Surely Hale was not informed here that his silence, as well as his words, could be used against him at trial. Indeed, anyone would reasonably conclude from *Miranda* warnings that this would not be the case."
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> We hold that the use for impeachment purposes of petitioners' silence, at the time of arrest and after receiving *Miranda* warnings, violated the Due Process Clause of the Fourteenth Amendment.

Id. at 618–19, 96 S. Ct. at 2245, 49 L. Ed. 2d at 98 (footnote omitted).

Turning to the case before us, however, we agree with the Court of Special Appeals that the prosecutor's summation was effectively directed at the conflicting

stories told by Mr. Hill. We understand that the prosecutor referred to "them" when she told the jurors of this change in Mr. Hill's stories. Mindful that, despite the latitude granted counsel in closing argument in most instances, there is no discretion with regard to a summation that abridges a defendant's constitutional right to remain silent. Here the prosecutor's focus was primarily on Mr. Hill's testimony. The prosecutor suggested to the jury that Mr. Hill was not a credible witness. Secondarily, the prosecutor commented upon Mr. Savage's testimony to the extent that Mr. Savage's testimony mirrored that of Mr. Hill's and should not be believed under the circumstances. Accordingly, we see no *Doyle* error in the summation before us.

JUDGMENT OF THE COURT OF SPECIAL APPEALS AFFIRMED. PETITIONER TO PAY COSTS IN THIS COURT.

Circuit Court for Wicomico County
Case No.: 22-K-13-000535
Argued: April 4, 2017

IN THE COURT OF APPEALS

OF MARYLAND

No. 82

September Term, 2016

EDDIE LEE SAVAGE, JR.

v.

STATE OF MARYLAND

Barbera, C.J.
Greene
Adkins
McDonald
Watts
Hotten
Getty,

JJ.

Concurring Opinion by Adkins, J., which
Barbera, C.J., and McDonald, J., join.

Filed: August 4, 2017

Most respectfully, I concur with the Majority decision. I agree that Dr. Garmoe's testimony was properly excluded, however, I would explicitly adopt the *Daubert* approach to the admissibility of scientific expert testimony rather than applying *Frye-Reed*.

The lack of evidence presented during the *Frye-Reed* hearing connecting Dr. Garmoe's methodology to his ultimate conclusion stems from the confusion our jurisprudence has created regarding the *Frye-Reed* standard. The issues presented in this case provide an opportunity for us to revisit our approach to scientific testimony and evaluate how our *Frye-Reed* analysis interacts with Maryland Rule 5-702.[1] With this goal in mind, I begin with a brief overview of the evolution of *Frye-Reed*, both in Maryland and the federal courts.

The Federal Evolution of *Frye*

As the Majority explains, this Court adopted the *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), general acceptance test for evaluating scientific expert testimony in *Reed v. State*, 283 Md. 374 (1978). We explained that "before a scientific opinion will be received as evidence at trial, the basis of that opinion must be shown to be generally

[1] Although neither party asks us to adopt *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), we should exercise our discretion under Maryland Rule 8-131(a) to do so. Acknowledging our implicit adoption of *Daubert* would not only be "desirable to guide the trial court" in this case but would also provide clarity to Maryland courts. *See* Md. Rule 8-131(a). Furthermore, unlike *Rochkind v. Stevenson,* No. 76, 2017 WL 2952984 (Md. July 11, 2017), our most recent case addressing the admissibility of scientific expert testimony, we can only dispose of the case at hand by applying *Frye-Reed*. In *Rochkind*, we declined to address the parties' arguments regarding *Frye-Reed* and instead held that the expert testimony was inadmissible under Rule 5-702 because the petitioner had appealed the trial court's determination as to both standards. *Id.* at *8. Here, Savage only challenges the exclusion of Dr. Garmoe's testimony under *Frye-Reed*.

accepted as reliable within the expert's particular scientific field." *Id.* at 381. We continued, "[I]f a new scientific technique's validity is in controversy in the relevant scientific community, or if it is generally regarded as an experimental technique, then expert testimony based on its validity cannot be admitted into evidence." *Id.* We made clear that the *Frye-Reed* analysis should be conducted as a threshold question before the trial court evaluates expert testimony under the criteria now codified in Rule 5-702. *Id.* at 389.

Twenty-five years later, the U.S. Supreme Court addressed *Frye*'s general acceptance standard in light of the Federal Rules of Evidence ("the FRE"), which were enacted after *Frye* was decided. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), involved the admissibility of expert testimony that a prescription antinausea drug caused the plaintiffs' birth defects. *Id.* at 582–83. The Court acknowledged that Rule 702 of the FRE ("FRE 702"), which governs expert testimony in federal courts, does not "establish[ ] 'general acceptance' as an absolute prerequisite to admissibility." *Id.* at 588. At the time, FRE 702 provided:[2]

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to

[2] In 2000, the Federal Rules of Evidence ("the FRE") were amended to reflect the U.S. Supreme Court's jurisprudence in the wake of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Fed. R. Evid. 702 advisory committee's note. They were restyled in 2011 without substantive change. FRE 702 now 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:

> 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.

Id. Holding that FRE 702 superseded *Frye*'s general acceptance test, the *Daubert* Court explained that the proper standard for the admissibility of scientific evidence comes from the language of the Rule. *Id.* at 588–89. It reasoned that "the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability." *Id.* at 590. Before admitting scientific expert testimony, the Court explained, trial courts must determine "whether the reasoning or methodology underlying the testimony is scientifically valid." *Id.* at 592–93.

Providing "general observations" about how the trial court should assess the validity and reliability of scientific expert testimony, the Court set forth four factors that a judge may consider: (1) whether the theory or technique "can be (and has been) tested"; (2) "whether the theory or technique has been subjected to peer review and publication"; (3) "the known or potential rate of error"; and (4) "general acceptance." *Id*. at 593–94. The Court clarified that this reliability assessment "does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community." *Id.* at 594 (citation omitted).

> (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.

The Court explained that the *Daubert* approach to FRE 702 is "a flexible one," but emphasized that the focus "must be solely on principles and methodology, not on the conclusions that they generate." *Id.* at 594–95.

In *General Electric Co. v. Joiner*, 522 U.S. 136 (1997)—which we drew from in *Blackwell v. Wyeth*, 408 Md. 575 (2009), as part of our *Frye-Reed* analysis—the Supreme Court elaborated on *Daubert*. It held that a trial court properly excluded expert testimony opining that the plaintiff's exposure to polychlorinated biphenyls caused his lung cancer. *Id.* at 146–47. The Court rejected the argument that *Daubert* only permits a trial court to evaluate the methodology of the studies and not the experts' conclusions. Clarifying *Daubert*, the Court explained, "Trained experts commonly extrapolate from existing data. But nothing in [ ] *Daubert* . . . requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert." *Id.* at 146. Rather, the Court reasoned that a "court may conclude that there is simply too great an analytical gap between the data and the opinion proffered." *Id.*

In *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), the Supreme Court again clarified the reach of *Daubert*. In considering whether an engineer's testimony about the cause of a tire blowout was subject to *Daubert*'s reliability analysis, the Court held that *Daubert*'s "gatekeeping" standard applied to all testimony governed by FRE 702—"scientific," "technical," and "other specialized" testimony. *Id.* at 147–49. The Court did not find "a convincing need" to distinguish between scientific and other types of specialized testimony. *Id.* at 148. It explained that no matter the precise type of specialized testimony, the trial court's effort to assure that it is "reliable and relevant" will help the

jury evaluate its value. *Id.* at 149. The Court also emphasized that "the trial judge must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable." *Id.* at 152. Accordingly, it held that a trial court is not required to consider any or all of the *Daubert* factors in making its reliability determination—they were "meant to be helpful, not determinative." *Id.* at 151.

Since *Daubert* was decided, the majority of states have departed from the *Frye* standard in favor of the Supreme Court's more flexible approach.[3] *See generally* Alice B.

[3] Thirty-eight states have either explicitly adopted *Daubert* or held that its factors are persuasive in evaluating expert witness testimony. Ga. Code Ann. § 24-7-702(f) (West 2013); *Colbert Cty. Nw. Alabama Health Care Auth. v. RegionalCare Hosp. Partners, Inc*., 195 So. 3d 948, 960 (Ala. Civ. App. 2015); *State v. Coon*, 974 P.2d 386, 394–95 (Alaska 1999); *State v. Bernstein*, 349 P.3d 200, 203 (Ariz. 2015); *Farm Bureau Mut. Ins. Co. of Ark., Inc. v. Foote*, 14 S.W.3d 512, 519 (Ark. 2000); *People v. Shreck*, 22 P.3d 68, 77 (Colo. 2001); *State v. Porter*, 698 A.2d 739, 746 (Conn. 1997); *M.G. Bancorporation, Inc. v. Le Beau*, 737 A.2d 513, 521–22 (Del. 1999); *State v. Vliet*, 19 P.3d 42, 53 (Haw. 2001); *Weeks v. Eastern Idaho Health Servs.*, 153 P.3d 1180, 1184 (Idaho 2007); *Malinski v. State*, 794 N.E.2d 1071, 1084 (Ind. 2003); *Leaf v. Goodyear Tire & Rubber Co*., 590 N.W.2d 525, 533 (Iowa 1999); *State v. Sasser*, 391 P.3d 698, 708 (Kan. 2017); *Toyota Motor Corp. v. Gregory*, 136 S.W.3d 35, 39 (Ky. 2004), *as amended* (June 14, 2004); *Cheairs v. State Dep't of Trans. & Dev.*, 861 So. 2d 536, 540–43 (La. 2003); *Commonwealth v. Lanigan*, 641 N.E.2d 1342, 1349 (Mass. 1994); *Gilbert v. DaimlerChrysler Corp.*, 685 N.W.2d 391, 408 (Mich. 2004); *Watts v. Radiator Specialty Co.*, 990 So. 2d 143, 147 (Miss. 2008); *State Bd. of Registration for Healing Arts v. McDonagh*, 123 S.W.3d 146, 155 (Mo. 2003) (en banc); *State v. Price*, 171 P.3d 293, 298 (Mont. 2007) (applying *Daubert* only to "novel scientific evidence"); *Schafersman v. Agland Coop*, 631 N.W.2d 862, 876 (Neb. 2001); *Higgs v. State*, 222 P.3d 648, 659 (Nev. 2010); *Baxter v. Temple*, 949 A.2d 167, 173 (N.H. 2008); *State v. Alberico*, 861 P.2d 192, 203 (N.M. 1993); *State v. McGrady*, 787 S.E.2d 1, 5 (N.C. 2016); *Miller v. Bike Athletic Co.*, 687 N.E.2d 735, 740–42 (Ohio 1998); *Christian v. Gray*, 65 P.3d 591, 600 (Okla. 3003), as corrected (Feb. 24, 2003); *State v. O'Key*, 899 P.2d 663, 680 (Or. 1995); *DiPetrillo v. Dow Chem. Co.*, 729 A.2d 677, 686 (R.I. 1999); *Kostel v. Schwartz*, 756 N.W.2d 363, 387 (S.D. 2008); *McDaniel v. CSX Transp., Inc.*, 955 S.W.2d 257, 265 (Tenn. 1997); *E. I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 556 (Tex. 1995); *Gunn Hill Dairy Properties, LLC v. Los Angeles Dep't of Water & Power*, 269 P.3d 980, 990 (Utah App. 2012); *State v. Brooks*, 643 A.2d 226, 229 (Vt. 1993); *Hasson v. Commonwealth*, No. 0403-05-4, 2006 WL 1387974, at *10 (Va. Ct. App. May

Lustre, *Post-Daubert Standards for Admissibility of Scientific and Other Expert Evidence in State Courts*, 90 A.L.R.5th 453 annots. (2001) (collecting cases). A small minority of states either adhere to the traditional *Frye* standard or implement a modified *Frye* test.[4]

Maryland's Recent *Frye-Reed* Jurisprudence

Despite other jurisdictions' adoption of *Daubert*, we have continued to use the *Frye-Reed* standard to evaluate expert testimony based on a scientific method or technique. The Committee Note to Maryland Rule 5-702, which was adopted one year after the Supreme Court decided *Daubert*, explains that the Rule "is not intended to overrule" *Frye-Reed*. It further states, "The required scientific foundation for the admission of novel scientific techniques or principles is left to development through case law." A review of our recent case law demonstrates that we have modified our application of *Frye-Reed* such that our

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23, 2006); *Wilt v. Buracker*, 443 S.E.2d 196, 203 (W.Va. 1993); *Bayer ex rel. Petrucelli v. Dobbins*, 885 N.W.2d 173, 180 (Wis. App. 2016); *Bunting v. Jamieson*, 984 P.2d 467, 471 (Wyo. 1999); *see also* H.B. 153, 99th Gen. Assemb., 1st Reg. Sess. (Mo. 2017) (adopting expert witness rule identical to FRE 702). Maine and South Carolina apply factors similar to *Daubert*'s in interpreting their expert witness rules. *Searles v. Fleetwood Homes of Penn., Inc.*, 878 A.2d 509, 516 (Me. 2005); *State v. Council*, 515 S.E.2d 508, 518 (S.C. 1999).

[4] Eight states apply a traditional or modified *Frye* test. Ill. R. Evid. 702; *People v. Leahy*, 882 P.2d 321, 331 (Cal. 1994) (rejecting *Daubert* standard in favor of "more 'conservative' *Frye* approach"); *Marsh v. Valyou*, 977 So. 2d 543, 546–51 (Fla. 2007) (adhering to *Frye*); *Doe v. Archdiocese of St. Paul, Minneapolis*, 817 N.W.2d 150, 168 (Minn. 2012) (conducting both *Frye* and reliability analyses); *State v. Chun*, 943 A.2d 114, 136 (N.J. 2008) (applying *Frye* in criminal cases); *Cornell v. 360 W. 51st St. Realty, LLC*, 9 N.E.3d 884, 898–901 (N.Y. 2014) (applying *Frye* to both scientific methods and conclusions); *Commonwealth v. Puksar*, 951 A.2d 267, 274–77 (Pa. 2008) (analyzing expert testimony under *Frye*); *Anderson v. Akzo Nobel Coatings, Inc.*, 260 P.3d 857, 861–62 (Wash. 2011) (adhering to *Frye*). North Dakota does not use *Frye* or *Daubert* to interpret its rule regarding expert witness testimony. *State v. Hernandez*, 707 N.W. 2d 449, 462 (N.D. 2005) (Crothers, J., concurring).

analysis has gradually moved towards the federal *Daubert* approach. We have adjusted our application of *Frye-Reed* in two main ways.

First, we have liberally applied the *Frye-Reed* analysis to testimony based on any scientific principle—new or old. In *Clemons v. State*, 392 Md. 339 (2006), after setting forth the *Frye-Reed* standard as one "which makes evidence emanating from a **novel scientific process** inadmissible absent a finding that the process is generally accepted by the relevant scientific community," we applied it to comparative bullet lead analysis, which, as we explained, was first created over 40 years earlier. *Id.* at 343, 365 (emphasis added). In *State v. Baby*, 404 Md. 220 (2008), we held that testimony regarding rape trauma syndrome was subject to *Frye-Reed* after noting that the syndrome was first recognized in 1974. *Id.* at 271, 267. Thus, like *Daubert*, we have implicitly recognized that a trial judge's gatekeeping function should not be limited to new scientific theories—old "junk science" should be kept out of our courts as well.

We have also suggested that **all** testimony based on scientific techniques is subject to *Frye-Reed* by encouraging trial courts to take judicial notice when a scientific method is well-established in the relevant community, rather than skipping *Frye-Reed* because the method is not novel. *See, e.g.*, *Montgomery Mutual Insurance Co. v. Chesson (Chesson I)*, 399 Md. 314, 327 (2007); *Wilson v. State*, 370 Md. 191, 201 (2002) ("Where the validity and reliability of a scientific technique is so broadly and generally accepted within the scientific community, as is the case of ballistic tests, blood tests, and the like, a trial court may take judicial notice of its reliability." (citation omitted)). In *Dixon v. Ford Motor Co.*, 433 Md. 137 (2013), for example, we stated that a *Frye-Reed* analysis is required "only

when the proposed expert testimony involves a 'novel scientific method.'"[5] *Id.* at 149–50. Subsequently, however, we took judicial notice of the scientific principle's general acceptance:

> We may take judicial notice from our own decisions that the scientific community accepts the proposition that exposure to asbestos may cause mesothelioma. That is not a novel scientific principle. More than 20 years ago, in *Eagle–Picher v. Balbos*, 326 Md. 179, 194 n.7 (1992), based on evidence in the case, we flatly rejected the assertion that mesothelioma cannot be caused by exposure to chrysotile asbestos. Thus, [the expert's] opinion that exposure to chrysotile asbestos in Ford brakes may cause mesothelioma also is not a novel scientific principle.

Id. at 150 (footnote omitted).

Second, we have modified the reach of *Frye-Reed*—inching closer to the federal *Daubert* standard—by using it not only to evaluate scientific methods, but also to assess scientific conclusions. In *Wilson v. State*, we applied the *Frye-Reed* analysis to expert testimony opining that there was a one-in-four-million chance that both the defendant's children had died from Sudden Infant Death Syndrome ("SIDS"). 370 Md. at 200. Although the expert witness had used the product rule—a well-established method for

[5] Despite our repeated assertions that *Frye-Reed* applies only to **new** scientific methods, we have never defined what constitutes a new or novel scientific method. *See Montgomery Mut. Ins. Co. v. Chesson*, 399 Md. 314, 327 (2007) (explaining that *Frye-Reed* requires a party to "establish first that any novel scientific method is reliable and accepted generally in the scientific community before the court will admit expert testimony based upon [it]" (citation omitted)); *Clemons v. State*, 392 Md. 339, 363 (2006) (explaining that *Reed* adopted a standard for the admission of "novel scientific techniques"); *Wilson v. State*, 370 Md. 191, 201 (2002) ("[P]rior to the admission of expert testimony based on the application of new scientific techniques, it must be first established that the particular scientific method is itself reliable." (citation omitted)). We have never held that a scientific method is not subject to *Frye-Reed* because it is not new.

calculating probability among independent events—we held that his testimony did not pass muster under *Frye-Reed* because "there is not general agreement in the medical community that multiple SIDS deaths in a single family" are independent. *Id*. at 209. In conducting our analysis, we sought to determine whether there was "general agreement in the scientific community as to the relationship between SIDS deaths within a single family." *Id.* In other words, we sought to determine whether the expert's intermediary conclusion—which then led him to use the product rule—was generally accepted.

In *Chesson I*, we held that *Frye-Reed* applied to medical opinion testimony describing a causal link between mold exposure and certain health effects. 399 Md. at 328. We disagreed with the Court of Special Appeals, which had concluded that a "doctor's opinion as to the etiology of his patient's arthritis is simply not the type of thing contemplated by the phrase 'new and novel scientific technique.'" *Id.* at 324 (citation omitted). Emphasizing the similarity between this case and *Wilson*, we explained that because "the expert witness offered a medical opinion that was based on an underlying scientific principle," his testimony was subject to *Frye-Reed*. *Id.* at 330–31. Accordingly, we held that the trial court erred in admitting the expert testimony without conducting a *Frye-Reed* analysis and remanded for the trial court to hold a *Frye-Reed* hearing. *Id.* at 333. To support our conclusion, we cited to a number of state and federal court cases applying the *Daubert* factors to evaluate expert testimony regarding mold exposure. *Id* at 330–31.

In *Blackwell*, we conducted a *Frye-Reed* analysis but drew extensively from case law stemming from *Daubert* in doing so. We explained that the strength of a scientific

theory depends on "the *reliability* of the analytical framework utilized by [the] expert." *Id.* at 605 (emphasis in original). Adopting language from *Joiner*, we described an "analytical gap" between the expert's data and his conclusions. *Id.* at 606–10. We reasoned that *Frye-Reed* requires the expert to have drawn **a conclusion** "appropriate to the underlying data and methods," and thus broadened the reach of the *Frye-Reed* standard beyond methodology. *Id*. at 606 (citation omitted). Quoting *Joiner*, we emphasized that even when an expert's data was collected through a generally accepted methodology, which would otherwise satisfy *Frye-Reed*, a trial court is not required to "*admit opinion evidence that is connected to existing data only by the ipse dixit of the expert.*" *Id.* (emphasis in original).

Our discussion of *Frye-Reed* in *Blackwell*—just like the Majority's analysis of Dr. Garmoe's opinion here—demonstrates the overlap between *Frye-Reed* and Maryland Rule 5-702, which governs the admissibility of all expert testimony. As we explained in *Reed*, our *Frye-Reed* test serves as only a threshold inquiry for certain types of scientific testimony. That testimony must also pass through Rule 5-702, which provides:

> Expert testimony may be admitted, in the form of an opinion or otherwise, if the court determines that the testimony will assist the trier of fact to understand the evidence or to determine a fact in issue. In making that determination, the court shall determine (1) whether the witness is qualified as an expert by knowledge, skill, experience, training, or education, (2) the appropriateness of the expert testimony on the particular subject, and **(3) whether a sufficient factual basis exists to support the expert testimony.**

(Emphasis added.) The third prong of this analysis—sufficient factual basis—has been interpreted to include two subfactors: an adequate supply of data and a reliable methodology. *Roy v. Dackman*, 445 Md. 23, 42–43 (2015) (citation omitted); *see also*

Exxon Mobil Corp. v. Ford, 433 Md. 426, 478 (2013). To satisfy Rule 5-702(3), "an expert opinion must provide a sound reasoning process for inducing its conclusion from the factual data and must have an adequate theory or rational explanation of how the factual data led to the expert's conclusion." *Ford*, 433 Md. at 481 (citation and internal quotation marks omitted).

In *Blackwell*'s *Frye-Reed* discussion, we acknowledged that "reliability . . . affect[s] whether a scientific theory is accepted in the field in which it is offered." 408 Md. at 584. We turned to federal case law to define the contours of this term because of *Daubert*'s emphasis on reliable expert testimony. *Id.* at 604–07. We concluded that the expert's testimony was inadmissible under *Frye-Reed*, in part, because his research was not "based upon sound methodology." *Id.* at 609. Thus, our evaluation of whether a conclusion was generally accepted included inquiry as to whether the methodology used was reliable—one of the 5-702(3) subfactors. *See Roy*, 445 Md. at 42–43. Accordingly, to determine the admissibility of expert testimony under our direction in *Blackwell*, a trial court may have to analyze the reliability of an expert's methodology twice—once under *Frye-Reed* and again under Rule 5-702(3). Adopting the *Daubert* approach and confining our evaluation of scientific expert testimony to the requirements of Rule 5-702 would eliminate this repetition.

Legal scholars have widely debated the advantages and drawbacks of both the *Frye* and *Daubert* standards. *See, e.g.*, Edward K. Cheng & Albert H. Yoon, *Does* Frye *or* Daubert *Matter? A Study of Scientific Admissibility Standards*, 91 Va. L. Rev. 471 (2005); Edward J. Imwinkelried, *The Epistemological Trend in the Evolution of the Law of Expert*

Testimony: A Scrutiny at Once Broader, Narrower, and Deeper, 47 Ga. L. Rev. 863 (2013); Henry G. Miller, *The* Daubert *Debacle*, 77 N.Y. St. B.J., Mar.–Apr. 2005, at 24. Neither standard is perfect. But I am not convinced that Maryland judges will be any less diligent in excluding unreliable expert testimony from the courtroom under *Daubert*. Indeed, some commentators have concluded that trial judges applying *Daubert* have excluded more expert testimony by "scrutiniz[ing] scientific evidence more closely." Cheng & Yoon, *Does Frye or Daubert Matter?*, *supra*, at 472 (citing Lloyd Dixon & Brian Gill, Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases Since the *Daubert* Decision, xv (2001); Carol Krafka et al., *Judge and Attorney Experiences, Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials*, 8 Psychol., Pub. Pol'y & L. 309, 330–31 (2002)). I am confident that *Daubert*'s more flexible approach will aid trial courts in their gatekeeping function without tipping the scales in favor of either plaintiffs or defendants.

I am persuaded in part by the recent opinion of the D.C. Court of Appeals, which departed from its longstanding application of *Frye* in favor of the *Daubert* standard. *Motorola Inc. v. Murray*, 147 A.3d 751, 757 (D.C. 2016). In adopting the text of FRE 702, the court reasoned that the "ability to focus on the reliability of principles and methods, and their application, is a decided advantage that will lead to better decision-making by juries and trial judges alike."[6] *Id*. The D.C. Court of Appeals acknowledged that *Daubert*'s

[6] In the absence of legislative action, the D.C. Court of Appeals "is the final authority for establishing the evidentiary rules for the Superior Court of the District of Columbia." *Motorola Inc. v. Murray*, 147 A.3d 751, 752 n.2 (D.C. 2016) (quoting *Laumer v. United States*, 409 A.2d 190, 195 n.7 (D.C. 1979) (en banc)).

flexible standard will inevitably produce "[s]ome inconsistency," but explained that it will more accurately distinguish "good science" from "bad science" than *Frye*'s general acceptance test. *Id.* at 756. As another court reasoned when it adopted the *Daubert* standard, focusing only on general acceptance is "both unduly restrictive and unduly permissive." *State v. Coon*, 974 P.2d 386, 394 (Alaska 1999). "[I]t excludes scientifically reliable evidence which is not yet generally accepted, and admits scientifically unreliable evidence which although generally accepted, cannot meet rigorous scientific scrutiny." *Id.* at 393–94. I agree. Additionally, I believe that conforming our approach to that taken by the majority of jurisdictions will allow Maryland courts to draw from and contribute to the broad base of case law grappling with scientific testimony. *See Motorola*, 147 A.3d at 757 (noting that adopting *Daubert* will allow D.C. courts to "learn from the decisions of other courts which apply [FRE] 702 or its state counterparts").

The evolution of our *Frye-Reed* doctrine to both maintain the general acceptance test and include a check for an "analytical gap" has muddied our approach to expert testimony. *See* Nancy E. Bonifant, Note, Blackwell v. Wyeth*: It's Our Courtroom and We'll* Frye *(Only) If We Want To—The Maryland Court of Appeals's Unstated Adoption of* Daubert, 69 Md. L. Rev. 719 (2010). The Majority opinion continues this trend by first laying out our *Frye-Reed* standard but then applying the "analytical gap" analysis from the Supreme Court's *Daubert* jurisprudence. Maj. Slip. Op. at 20, 22–32. In my view, we should follow the majority of states and acknowledge our implicit adoption of *Daubert*. I would do away with *Frye-Reed* and hold that the *Daubert* factors used to interpret FRE

702 are persuasive in interpreting Rule 5-702.[7] Rule 5-702(3) serves as a sufficient bulwark for preventing shoddy scientific testimony from flooding our courtrooms. *See Rochkind v. Stevenson*, No. 76, 2017 WL 2952984, at *4–8 (Md. July 11, 2017) (holding that expert testimony was inadmissible under Rule 5-702(3) due to an "analytical gap").

In reaching this conclusion, I am mindful of the principle of stare decisis, which "promotes the evenhanded, predictable, and consistent development of legal principles, fosters reliance on judicial decisions, and contributes to the actual and perceived integrity of the judicial process." *Conover v. Conover*, 450 Md. 51, 64 (2016) (quoting *Livesay v. Balt. Cty.*, 384 Md. 1, 14 (2004)). We have acknowledged, however, that stare decisis "is not an inexorable command." *Id.* at 65 (quoting *Bozman v. Bozman*, 376 Md. 461, 493–94 (2003)). Rather, we have recognized two circumstances in which it is appropriate to depart from stare decisis: "(1) when the prior decision is clearly wrong and contrary to established principles[;] or (2) when the precedent has been superseded by significant changes in the law or facts." *Id.* (internal quotation marks omitted) (quoting *DRD Pool Serv., Inc. v. Freed*, 416 Md. 46, 64 (2010)). Here, I would find that the second circumstance applies. The federal courts' adoption of *Daubert*, coupled with our own jurisprudential drift towards the *Daubert* standard, supports our departure from *Frye-Reed*.

Chief Judge Barbera and Judge McDonald authorize me to state that they agree with the views expressed in this concurring opinion.

[7] As the Court of Special Appeals has already acknowledged, Rule 5-702 and our interpreting decisions are consistent with the language of FRE 702. *Wood v. Toyota Motor Corp.*, 134 Md. App. 512, 523 n.13 (2000).