FAULTY FORENSICS: BOLSTERING JUDICIAL GATEKEEPING IN GEORGIA COURTS

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Forensic evidence is widely used in criminal cases across the country and is accorded great weight by juries. But critics have begun to question its reliability. Its use has contributed to numerous wrongful convictions, and though some individuals have been exonerated, many remain incarcerated for crimes they did not commit.

This Note explores a variety of forensic science disciplines and their associated problems, the recent push for forensic reform, and the current standards governing the admissibility of forensic evidence at the federal level and in Georgia courts, highlighting the lenient standard embodied in the Georgia Code and elaborated upon in its case law. This Note ultimately recommends that Georgia courts and the Georgia General Assembly establish a new standard to govern the admissibility of scientific evidence in criminal cases—one that bolsters the gatekeeping function of trial judges by allowing them to assess the limitations of forensic science disciplines when making admissibility decisions.

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I. INTRODUCTION

John Jerome White served more than twenty-two years in a Georgia state prison for a crime he did not commit.[1] In August 1979, an intruder beat, raped, and robbed a 74-year-old woman after breaking into her home.[2] A police officer identified John as a potential suspect after seeing the composite sketch based on the victim's description of her assailant, and several weeks later, the victim identified John out of a photo array and a subsequent live lineup.[3] At trial, a lab analyst testified that pubic hairs collected from the crime scene by the Georgia Bureau of Investigation were "similar enough [to John's pubic hairs] to say they have the same origin" based on microscopic hair analysis.[4] Relying on this expert testimony and eyewitness identification, the jury found John guilty of rape, assault, burglary, and robbery and sentenced him to life in prison, despite the "lack of [] physical evidence connecting him to the crime scene" or the victim.[5] John maintained his innocence throughout his trial, sentencing, and lengthy incarceration.[6] Years later, John finally proved his innocence when modern DNA testing conclusively established that the pubic hairs collected from the crime scene and used at trial did not belong to him.[7]

Unfortunately, John's story is not unique. Faulty forensic evidence has contributed to numerous wrongful convictions in

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[1] *See Exonerees: John White*, GA. INNOCENCE PROJECT, https://www.georgiainnocenceproject.org/cases/exonerees/john-white/ (last visited Feb. 24, 2020); *The Cases: John Jerome White*, INNOCENCE PROJECT, https://www.innocenceproject.org/cases/john-jerome-white/ (last visited Jan. 9, 2020).

[2] *See Exonerees: John White*, *supra* note 1; *The Cases: John Jerome White*, *supra* note 1.

[3] *See Exonerees: John White*, *supra* note 1; *The Cases: John Jerome White*, *supra* note 1.

[4] *The Cases: John Jerome White*, *supra* note 1; *see also Exonerees: John White*, *supra* note 1 ("Microscopic analysis, the best technology available at the time, had indicated that hairs from the crime scene were 'similar enough' to provide a match.").

[5] *The Cases: John Jerome White*, *supra* note 1. The physical evidence consisted solely of pubic hairs and a skin sample taken from the crime scene. *See id.* Due to the extent of the victim's injuries, police officers and medical personnel did not collect a rape kit. *Id.*

[6] *See The Cases: John Jerome White*, *supra* note 1 ("White maintained his innocence, telling the judge: 'I know I didn't rape that lady.'"). John was at one point released on parole, but his subsequent drug possession and robbery convictions resulted in revocation of his parole and his incarceration for an additional twelve years. *Id.*

[7] *Exonerees: John White*, *supra* note 1; *The Cases: John Jerome White*, *supra* note 1. In fact, the DNA testing revealed that the actual source of the hairs and perpetrator of the crime was James Parham, who was present at the line-up where the victim identified John as her attacker. *Exonerees: John White*, *supra*. Prosecutors subsequently charged Parham with the rape. He pleaded guilty and received a twenty-year prison sentence. *The Cases: John Jerome White*, *supra*.

Georgia and across the country.[8] And while some individuals have been exonerated, many remain incarcerated for crimes they did not commit.[9]

Rule 702 of the Federal Rules of Evidence, which is largely mirrored in states' evidentiary rules, allows the admission of expert testimony, including forensic evidence, against criminal defendants and consideration of this evidence by the jury when determining guilt or innocence.[10] In fact, juries have come to expect forensic evidence at criminal trials and rely upon it heavily when making

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[8] *See, e.g.*, *Clients: William Dillon*, INNOCENCE PROJECT OF FLA., https://www.floridainnocence.org/william-dillon (last visited Feb. 11, 2020) (explaining how scent-tracking evidence was used at trial to convict William Dillon, whose sentence was vacated after DNA testing conclusively proved his innocence); *Know the Cases*, WIS. INNOCENCE PROJECT, https://law.wisc.edu/fjr/clinicals/ip/client_profiles.html (last visited Feb. 11, 2020) (profiling numerous exonerees, including Steven Avery, who was wrongfully convicted of sexual assault, attempted murder, and false imprisonment based on eyewitness testimony and microscopic hair analysis evidence); *Our Work: Sonia Cacy*, INNOCENCE PROJECT OF TEX., https://innocencetexas.org/cases/sonia-cacy (last visited Feb. 11, 2020) (detailing how forensic toxicology evidence was used to convict Cacy, though subsequent investigation revealed that the fire was not intentionally started and that the victim likely died of natural causes).

[9] *See* KELLY WALSH ET AL., NAT'L CRIM. JUST. REFERENCE SERV., ESTIMATING THE PREVALENCE OF WRONGFUL CONVICTIONS 11 (2017) ("Based on forensic, case processing, and disposition data, we estimate . . . that wrongful convictions in cases with a sexual assault component occurred at a rate of 11.6 percent . . . ." (emphasis omitted)); Virginia Hughes, *How Many People Are Wrongly Convicted? Researchers Do the Math*, NAT'L GEOGRAPHIC, https://www.nationalgeographic.com/science/phenomena/2014/04/28/how-many-people-are-wrongly-convicted-researchers-do-the-math/ (last visited Feb. 11, 2020) (citing a study that estimates 4.1% of people sentenced to death have been wrongfully convicted); *About: Our Mission*, GA. INNOCENCE PROJECT, https://www.georgiainnocenceproject.org/about/mission/ (last visited Jan. 2, 2020) (estimating that four to six percent of those imprisoned in U.S. prisons are actually innocent). Though the data varies based on methods of calculation, this information clearly demonstrates that wrongful convictions permeate throughout the U.S. criminal justice system.

[10] Rule 702 of the Federal Rules of Evidence states:

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

FED. R. EVID. 702. The U.S. Supreme Court elaborated on this standard in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), and other subsequent cases. *See infra* Section IV.A (discussing the evolution of the federal standard governing the admissibility of expert and scientific testimony).

their decisions.[11] Despite widespread use of this evidence and the weight accorded to it by juries, however, critics have questioned its validity and reliability in recent years.[12]

Part II of this Note provides an overview of forensic evidence generally and explores problems relating to the validity and reliability of various forensic science disciplines. Part III discusses the recent push for forensic reform evidenced in the National Academy of Sciences (NAS) and the President's Council of Advisors on Science and Technology (PCAST) Reports. Part IV evaluates the current framework for admitting forensic evidence at trial at the federal level and in Georgia. In particular, it explores the application of Georgia's current evidentiary rules and relevant case law and asks whether Georgia should adopt an alternative approach. This Note ultimately recommends in Part V that the Georgia courts adopt a new evidentiary standard that imposes ongoing obligations to question the reliability of forensic evidence when making admissibility decisions. Part VI concludes.

II. OVERVIEW OF FORENSIC EVIDENCE

Forensic science is "the application of sciences such as physics, chemistry, biology, computer science[,] and engineering to matters of law."[13] It encompasses multiple scientific disciplines[14] that "aim[] to glean information from a wide variety of clues and evidence

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[11] *See* Aliza B. Kaplan & Janis C. Puracal, *It's Not a Match: Why the Law Can't Let Go of Junk Science*, 81 ALB. L. REV. 895, 898 (2018) ("[J]uries place great weight on scientific-sounding evidence, disregarding all other evidence to the contrary.").

[12] *See, e.g.*, COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RES. COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 127 (2009) [hereinafter NAS REPORT] (explaining its analysis of forensic science disciplines "that have been cause for concern in court or elsewhere because their reliability has not been sufficiently established in a systematic (scientific) manner"); PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS *x* (2016) [hereinafter PCAST REPORT] ("PCAST concluded that there are two important gaps [in forensic science]: "(1) the need for clarity about the scientific standards for the validity and reliability of forensic methods and (2) the need to evaluate specific forensic methods to determine whether they have been scientifically established to be valid and reliable.").

[13] *Topics: Forensic Sciences*, NAT'L INST. OF JUST., https://www.nij.gov/topics/forensics/Pages/welcome.aspx (last visited Feb. 11, 2020).

[14] This Note focuses on friction ridge analysis, bitemark analysis, microscopic hair analysis, and analysis of impression evidence. For a critical discussion of additional forensic science disciplines, see, for example, NAS REPORT, *supra* note 12, at 127–82.

associated with a crime."[15] As such, "it deals with a broad range of tools and with evidence of highly variable quality."[16]

Many forensic science disciplines developed in response to the prevalence of particular kinds of evidence at crime scenes and the need to analyze this evidence to extract useful information about the crime.[17] Though some of these developments have a strong basis in established scientific theory, many disciplines developed heuristically—that is, "based on observation, experience, and reasoning without an underlying scientific theory, experiments designed to test the uncertainties and reliability of the method, or sufficient data that are collected and analyzed scientifically."[18]

A. FRICTION RIDGE ANALYSIS

Fingerprints, palm prints, and sole prints are used to identify individuals through "friction ridge analysis," which involves "experience-based comparisons of the impressions left by ridge structures of volar . . . surfaces"—that is, impressions left by the hands and feet.[19] Friction ridge analysis ultimately attempts to conclude that evidence comes from a single, identifiable source.[20] It relies on several key premises. First, it assumes that every print is unique.[21] Second, it assumes that prints are persistent—that they

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[15] *See id.* at 128; *see also* Kaplan & Puracal, *supra* note 11, at 899 ("Forensic evidence is used to[] prove a crime has been committed or establish key elements of a crime; place the suspect in contact with the victim or with the crime scene; establish the identity of persons associated with [a] crime; exonerate the innocent; corroborate [a] victim's testimony; and assist in establishing the facts of what occurred." (internal quotations omitted) (quoting BARRY A. J. FISHER, TECHNIQUES OF CRIME SCENE INVESTIGATION 1–4 (7th ed. 2004))).

[16] NAS REPORT, *supra* note 12, at 128.

[17] *Id.*

[18] *Id.*

[19] *Id.* at 136. This analysis is similar to other forensic disciplines involving pattern identification, like "footwear and tire impressions, toolmarks, and handwriting analysis." *Id.*

[20] *Id.* (describing this process "as a method for assessing 'individualization'").

[21] *See* Nitin Kaushal & Purnima Kaushal, *Human Identification and Fingerprints: A Review*, 2 J. BIOMETRICS & BIOSTATISTICS 1, 1 (2011) ("The first [fundamental principle] is that[] the probability of finding two people with identical fingerprints is very small. In fact, no two identical fingerprints have ever been found same."); *see also id.* at 3 ("The end result [of friction ridge formation] . . . is complete biological uniqueness, down to the structure of a single ridge."). Judicial acceptance of this assumption was "an important source in legitimating forensic fingerprint evidence." Jessica Gabel Cino, *Bad Science Begets Bad Convictions: The Need for Postconviction Relief in the Wake of Discredited Forensics*, 7 U. DENV. CRIM. L. REV. 1, 10 (2017). But this assumption has a glaring problem—it has never been proven. *See, e.g.*, *id.* ("Courts . . . accepted the claim that there were no two fingerprints in the world exactly alike," even though this claim was not "subjected to adequate scrutiny from . . . a scientific or a legal standpoint."); Clive Thompson, *The Myth of Fingerprints*,

"are permanent and remain constant throughout a person's lifetime, . . . unless otherwise affected by accidental injury or intentional mutilation."[22] Finally, it assumes that "[f]ingerprints will have general ridge characteristics that permit them to be systematically classified and examined with great efficiency and efficacy."[23]

Friction ridge analysis employs the ACE-V technique: analysis, comparison, evaluation, and verification.[24] The examiner begins by analyzing the unknown print collected from the crime scene and any known prints—those "taken from a suspect or retrieved from a database of fingerprints"—to determine whether they have sufficient detail for identification or exclusion.[25] Comparison begins after the examiner determines that both the unknown and known prints are of sufficient detail.[26] The examiner visually compares the details that correspond between the known and unknown prints.[27] After comparison, the examiner evaluates the similarities "of the friction ridge formations in the two prints and evaluates the sufficiency of the detail present to establish an identification."[28] If the process indicates sufficient disagreement between the two sources, the examiner will exclude the source.[29] Sometimes an examiner cannot identify or exclude a source, in which case the

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SMITHSONIAN MAG. (Apr. 2019), https://www.smithsonianmag.com/science-nature/myth-fingerprints-180971640/ (noting that experts were quick to tout the uniqueness of fingerprints, "even though this had never been proven, or even carefully studied").

[22] Kaushal & Kaushal, *supra* note 21, at 3.

[23] *See* Cino, *supra* note 21, at 9; *see also* Kaushal & Kaushal, *supra* note 21, at 1 ("[T]here are enough similarities in the patterns of ridges on people's fingers that can be classified.").

[24] *See* NAS REPORT, *supra* note 12, at 137.

[25] *Id.* at 138.

[26] *Id.* If the unknown fingerprint lacks sufficient detail, it is deemed "'of no value' or 'not suitable' for comparison" and "does not undergo the remainder of the process." *Id.* The quality of friction ridge prints depends on many factors, including the condition of the skin, the type of residue, the mechanics of touch, and the nature of the surface touched. *Id.* at 137; *see also* Kaplan & Puracal, *supra* note 11, at 911 ("The quality and quantity of detail in the latent print may be affected by many different factors, including the robustness of the ridge structure, the presence of oil or sweat, the mechanics of touch, and the nature of the surface touched.").

[27] *See* NAS REPORT, *supra* note 12, at 138. The examiner's ability to observe and compare details will depend on the clarity of the two prints. *Id.* Details include the overall shape of the print and of its core, the ridge flows and counts, the delta location and shape, the lengths of the ridges, pore position, crease patterns and shapes, and scar and temporary feature shapes. *Id.*

[28] *Id.* The term "identification" refers to source determination—an examiner's conclusion that, "based on his or her experience, . . . sufficient quantity and quality of friction ridge detail is in agreement between" the known and unknown prints. *Id.*

[29] *Id.*

result of the comparison is inconclusive.[30] The final step, known as verification, provides a form of peer review by requiring that another examiner repeat the analysis, comparison, and evaluation and come to the same conclusion.[31] This other examiner, however, may be aware of the first examiner's conclusions.[32]

This assessment is inherently subjective. There are no guidelines for identifying the features to compare during the analysis.[33] Nor could there be, as "feature[s] that [were] helpful during a previous comparison might not exist on the[] [current] prints or might not have been captured in the latent impression."[34] Thus, the examiner must select comparison features only after "identif[ying] which features are common to the two impressions and are clear enough to be evaluated."[35] Additionally, human interpretation of these qualities "depend[s] on an examiner's ability to discern patterns . . . and on . . . [his] experience judging the discriminatory value in those patterns."[36] In other words, the analysis depends upon "the judgment of the examiner" and is not necessarily repeatable from examiner to examiner.[37] In fact, it might not even be repeatable when using the *same* examiner.[38]

B. HAIR EVIDENCE: MICROSCOPIC ANALYSIS

Humans and animals frequently shed their hairs, which then can transfer from one person to another or from a person to a crime scene.[39] The forensic science community generally recognizes that these hairs are identifiable by their physical characteristics and

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[30] *Id.*

[31] *See id.*; *see also* Kaushal & Kaushal, *supra* note 21, at 3 (explaining that an independent examination of the prints "by a second qualified latent print examiner" serves "as a quality assurance mechanism").

[32] *See* NAS REPORT, *supra* note 12, at 138.

[33] *See id.* at 139.

[34] *Id.* ("[T]he process does not allow one to stipulate specific measurements in advance, as is done for a DNA analysis.").

[35] *Id.*

[36] *Id.* at 140.

[37] *See id.* at 139–40; Kaushal & Kaushal, *supra* note 21, at 4 ("[W]hile the verification stage has implications for the reliability of latent print comparisons, it does not assure their validity. The few tests that have been made of the validity of forensic fingerprinting have not been supportive of the method." (footnote omitted)).

[38] *See* NAS REPORT, *supra* note 12, at 139 ("[R]ecent research . . . has shown that experienced examiners do not necessarily agree with even their own past conclusions when the examination is presented in a different context some time later.").

[39] *Id.* at 155–56.

"are sufficiently different among individuals that they can be useful in including, or excluding, certain persons from the pool of possible sources of the hair."[40]

Hair analysis consists of two steps. First, an examiner examines the hair for broad features, like color, texture, length, and thickness.[41] The examiner then microscopically analyzes the hair and attempts to identify the part of the body from which the hair came.[42] This step requires the examiner to collect a known hair sample for comparison with the unknown sample, focusing on both major characteristics—like hair color and shaft form—and secondary hair characteristics—like pigment density and shaft diameter.[43] Ideally, the examiner will determine that the hair is a "match" with a known hair sample. This nomenclature is misleading, however, because a match does not identify one single person as the source of the hair.[44] Rather, a match signifies only that the hair could have come from anyone whose hair had similar microscopic characteristics.[45]

Microscopic hair analysis, like friction ridge analysis, is subjective. There are no standards governing the categorization of hair features; rather "[t]he categorization . . . depends heavily on examiner proficiency and practical experience." Additionally, there are no requirements regarding the level of agreement that must exist before an examiner can declare a match.[46] In fact, "[n]o scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population."[47] Thus, the use of "imprecise reporting terminology" (such as "match" and "associated with") could "be misunderstood to imply individualization."[48]

Examiners have increasingly lessened their reliance on microscopic hair analysis given the availability of modern DNA

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[40] *Id.* at 156.

[41] *Id.*

[42] *Id.* at 156–57 (noting that an examiner can identify the part of the body from which a hair came "based on certain definable characteristics that distinguish hairs from various body locations").

[43] *Id.* at 157.

[44] *Id.* at 156; *see also The Cases: John Jerome White*, *supra* note 1 (noting that "it is impossible to say definitively that strands of hair came from the same person based on microscopic comparison" due to the lack of adequate empirical data).

[45] NAS REPORT, *supra* note 12, at 156, 159–60.

[46] *Id.* at 160.

[47] *Id.*

[48] *Id.* at 161.

analysis, which is more specific and more reliable.[49] However, microscopic analysis still plays a role in criminal investigations, especially to "determin[e] which hairs are sufficiently similar to merit comparisons with DNA analysis and for excluding suspects and assisting in criminal investigations."[50]

C. FORENSIC ODONTOLOGY: BITE MARK COMPARISON

Forensic odontology applies dentistry principles to forensic evidence and includes several disciplines: "the identification of unknown remains, bite mark comparison, the interpretation of oral injury, and dental malpractice."[51] Though bite mark comparison is often used in criminal proceedings to compare and identify the source of a bite mark, it is the most controversial of the multiple areas of forensic odontology because "there is continuing dispute over [its] value and scientific validity."[52]

Forensic odontologists that testify at trial are often members of the American Board of Forensic Odontology (ABFO), which offers board certification to its members and sets guidelines for the collection of bite mark evidence.[53] But despite this guideline standardization, bite mark comparisons suffer from severe limitations. First, bite marks are left on malleable surfaces that are prone to distortion over time, thereby affecting the reliability of source identification.[54] Additionally, the ABFO guidelines "do not indicate the criteria necessary for using each method [of analysis] to determine whether the bite mark can be related to a person's

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[49] *Id.* at 160; *see also id.* at 40–41 ("DNA analysis—originally developed in research laboratories in the context of life sciences research—has received heightened scrutiny and funding support. That, combined with its well-defined precision and accuracy, has set the bar higher for other forensic science methodologies, because it has provided a tool with a higher degree of reliability and relevance than any other forensic technique.").

[50] *Id.* at 160.

[51] *Id.* at 173.

[52] *Id.* In fact, the use of bite mark evidence in criminal cases is so controversial that the Texas Forensic Science Commission recommended banning its use altogether "until research could show . . . that forensic dentists [actually do] know a bite mark when they see one." Joe Palazzolo, *Texas Commission Recommends Ban on Bite-Mark Evidence*, WALL ST. J. (Feb. 12, 2016, 2:41 PM), https://blogs.wsj.com/law/2016/02/12/texas-commission-recommends-ban-on-bite-mark-evidence/.

[53] *See* NAS REPORT, *supra* note 12, at 173–74 (noting that the ABFO sets standards for obtaining photographs, dental casts, overlays, computer enhancement, and serology samples of bite marks and that these standards are relatively well-established and noncontroversial).

[54] *Id.* at 174 ("Unfortunately, bite marks on the skin will change over time and can be distorted by the elasticity of the skin, the unevenness of the surface bite, and swelling and healing.").

dentition and with what degree of probability."[55] Bite mark comparisons generally lack reproducibility both between different examiners and with the same examiner over time.[56] Perhaps most problematically, examiners rarely make dental comparisons between the bite mark in question and samples from a variety of individuals.[57] Rather, examiners make comparisons between the bite mark in question and a dental cast of a subject identified by law enforcement.[58] After comparison, if the examiner cannot eliminate the suspect as a potential source of the bite, there are "no established [standards] indicating what percentage of the population . . . could also have produced the bite."[59] Finally, the fundamental principle of bite mark analysis—the uniqueness of bite marks—has not been scientifically established.[60] These problems bring into serious question the probative value that bite mark evidence actually provides in criminal prosecutions.

D. IMPRESSION EVIDENCE: SHOEPRINTS AND TIRE TRACKS

Impression or pattern evidence is a broad category of forensic evidence that arises "when an object . . . leaves an impression at the crime scene or on another object or person."[61] Most impression evidence comes in the form of shoeprints and tire tracks.[62] Impression evidence analysis aims to identify a specific source of the impression and follows a standard process.[63] First, the examiner identifies the class characteristics of the evidence—those that "result from repetitive, controlled processes that are typically mechanical, such as those used to manufacture items in quantity."[64]

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[55] *Id.*

[56] *Id.* ("Even when using the guidelines, different experts provide widely differing results and a high percentage of false positive matches of bite marks . . . .").

[57] *Id.*

[58] *Id.*

[59] *Id.*

[60] *Id.* ("No thorough study has been conducted of large populations to establish the uniqueness of bite marks; theoretical studies promoting the uniqueness theory include more teeth than are seen in most bite marks submitted for comparison."); *see also* Cino, *supra* note 21, at 6 ("The common—yet untested—assumption is that each person produces a unique bite mark, unlike any other in the world. Unlike DNA analysis, however, there is no scientific basis for the testimonial that an expert can identify a single individual based on bite mark analysis." (footnotes omitted)).

[61] NAS REPORT, *supra* note 12, at 145.

[62] *Id.*

[63] *Id.* at 146.

[64] *Id.*

By analyzing these characteristics, the examiner is able to limit the source of the impression to a select group within an overall class.[65] An examiner may, for example, narrow down the source of a shoeprint to a particular kind of boot based on his analysis of the tread design. Then, the examiner locates and compares individual, identifying characteristics, which arise during the normal use of an item and "include cuts, scratches, gouges, holes, or random inclusions that result from manufacturing."[66]

After analyzing impression evidence, an examiner will—as with fingerprint analysis—either identify or exclude a source according to the number of characteristics the evidence shares with the suspected source.[67] Importantly, there is no threshold number of matching characteristics for an examiner to make an identification.[68] Rather, the necessary number of matching characteristics largely "depends on the quality and quantity of these accidental characteristics and the criteria established by individual laboratories."[69] Furthermore, individual characteristics change over time as they are worn.[70] Thus, delay between a crime's commission and a forensic scientist's analysis and identification "can undercut the forensic scientist's certainty."[71]

III. THE PUSH FOR FORENSIC REFORM

Given the problems that permeate, at least to some degree, virtually all forensic science disciplines, it is no surprise that a growing number of advocates have begun pushing for forensic science reform in recent years. In 2005, Congress passed the Science, State, Justice, Commerce, and Related Agencies Appropriations Act.[72] Recognizing the need for "significant improvements" in forensic science, this legislation instructed the NAS to investigate and compile a report on various forensic science disciplines.[73] In carrying out this congressional order, the NAS

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[65] *Id.* at 146–47.
[66] *Id.* at 147.
[67] *Id.*
[68] *Id.*
[69] *Id.*
[70] *Id.* at 149.
[71] *Id.*
[72] Science, State, Justice, Commerce, and Related Agencies Appropriations Act of 2006, 42 U.S.C. § 2050a, 15 U.S.C. § 1513 (2018).
[73] NAS REPORT, *supra* note 12, at *xix*, 1.

established a committee composed of "members of the forensic science community, members of the legal community, and a diverse group of scientists."[74] The committee ultimately concluded that "change and advancements, both systemic and scientific, are needed in a number of forensic science disciplines—to ensure the reliability of the disciplines, establish enforceable standards, and promote best practices and their consistent application."[75]

The NAS Report made comprehensive, detailed recommendations for the most problematic areas of forensic evidence. With respect to the admission of forensic evidence in litigation, the NAS Report stated:

> There are two very important questions that *should* underlie the law's admission of and reliance upon forensic evidence in criminal trials: (1) the extent to which a particular forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyze evidence and report findings and (2) the extent to which practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias, or the absence of sound operational procedures and robust performance standards.[76]

However, the NAS Report found that "[t]he adversarial process relating to the admission and exclusion of scientific evidence is not suited to the task of finding 'scientific truth.'"[77] And there were problems within the forensic science community that even the most exacting judicial review could not remedy.[78] Specifically, the committee found that "[w]ith the exception of nuclear DNA

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[74] *Id.* at 2.

[75] *Id.* at *xix*.

[76] *Id.* at 87.

[77] *Id.* at 12 ("The judicial system is encumbered by, among other things, judges and lawyers who generally lack the scientific expertise necessary to comprehend and evaluate forensic evidence in an informed manner, trial judges (sitting alone) who must decide evidentiary issues without the benefit of judicial colleagues and often with little time for extensive research and reflection, and the highly deferential nature of the appellate review afforded trial courts' *Daubert* rulings.").

[78] *Id.* at 13 (noting the need for "more and better educational programs, accredited laboratories, certified forensic practitioners, sound operational principles and procedures, and serious research to establish the limits and measures of performance in each discipline").

analysis, . . . no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source," despite how this evidence is used in court.[79] To improve the quality of the testimony presented at trial, the NAS Report advocated for "more and better educational programs, accredited laboratories, certified forensic practitioners, sound operational principles and procedures, and serious research to establish the limits and measures of performance in each discipline."[80]

Given the gloomy picture of forensic evidence painted by the NAS Report, then-President Barack Obama appointed the PCAST to monitor the ongoing efforts targeting problems in forensic science disciplines and to address "whether there are additional steps on the scientific side . . . that could help ensure the validity of forensic evidence used in the [n]ation's legal system."[81] In 2016, PCAST released a report that focused on feature-comparison methods and ultimately concluded that there are two important gaps in the current state of forensic science: "(1) the need for clarity about the scientific standards for the validity and reliability of forensic methods and (2) the need to evaluate specific forensic methods to determine whether they have been scientifically established to be valid and reliable."[82]

The PCAST Report specifically addressed what the judiciary can do to ensure the validity of evidence presented in the courtroom. It points out, for example, that most feature-comparison methods have been assumed to be valid but have not been established as such.[83] This creates a problem for courts, which often "admit forensic feature-comparison methods based on longstanding precedents that were set before these fundamental problems were discovered."[84] While PCAST refrains from making legal conclusions about how past cases were decided, it does note that subsequent events have undermined the scientific validity of past precedent and that courts

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[79] *Id.* at 7.
[80] *Id.* at 13.
[81] PCAST REPORT, *supra* note 12, at *x*.
[82] *Id.*
[83] *Id.* at 143.
[84] *Id.*

should not be required to defer to any past precedent based on problematic science.[85]

The PCAST Report ultimately recommended that the judiciary consider two distinct scientific criteria when deciding the admissibility of forensic evidence: foundational validity and validity as applied.[86] Foundational validity requires that a scientific discipline is "repeatable, reproducible, and accurate" as evidenced by empirical studies.[87] The Report explains that without supporting empirical data, a scientific method is "useless—because one has no idea how to interpret its results."[88] Validity as applied also requires the presence of several key elements. First, the "forensic examiner must have been . . . capable of reliably applying the [scientific] method," especially when considering subjective scientific disciplines—that is, those "in which human judgment plays a central role."[89] The examiner also must have reliably applied the scientific method.[90] Second, the examiner must assert in a scientifically valid way the probability that the observed features occurred by chance.[91] This includes reporting the overall false positive rate and the random match probability and requires the examiner to refrain from "mak[ing] claims or implications that go beyond the [underlying] empirical evidence."[92]

The PCAST Report concluded by explaining its scientific findings. With respect to the subjective forensic science disciplines

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[85] *Id.* at 144. These subsequent events include: "(1) the recognition of systemic problems with some forensic feature-comparison methods . . . ; (2) the 2009 [NAS Report] . . . that found that some forensic feature-comparison methods lack a scientific foundation; and (3) the scientific review in this report by PCAST . . . finding that some forensic feature-comparison methods lack foundational validity." *Id.* (footnotes omitted).

[86] *Id.* at 145 (noting that these criteria require (1) "that testimony is the product of reliable principles and methods;" and (2) "that an expert has reliably applied the principles and methods to the facts of the case").

[87] *Id.* at 47 ("By 'repeatable,' we mean that, with known probability, an examiner obtains the same result, when analyzing samples from the same sources. By 'reproducible,' we mean that, with known probability, different examiners obtain the same result, when analyzing the same samples. By 'accurate,' we mean that, with known probabilities, an examiner obtains correct results both (1) for samples from the same source . . . and (2) for samples from different sources . . . .").

[88] *Id.* at 48.

[89] *Id.* at 56 (emphasis omitted). This ability "can be demonstrated only through empirical testing that measures how often the expert reaches the correct answer." *Id.*

[90] *Id.* This determination "requires that the procedures actually used in the case, the results obtained, and the laboratory notes [are] made available for scientific review by others." *Id.*

[91] *Id.*

[92] *Id.*

examined, only latent fingerprint analysis possessed foundational validity.[93] And despite this threshold foundational reliability, there are still significant problems with its false positive rates and the presentation of evidence at trial.[94] Additionally, fingerprint analysis raises a number of issues regarding its validity as applied, particularly the need for proficiency testing to assess an examiner's knowledge and performance in analyzing samples.[95]

IV. USE OF FORENSIC EVIDENCE IN LITIGATION

The use of scientific and forensic evidence in litigation should come as no surprise. After all, resolution of many cases requires "answers to factual questions that lie beyond the understanding and knowledge of nonscientists."[96] But the need for this evidence is made complicated by a judge's responsibility of "determin[ing] whether those answers are reliable enough to warrant their use at trial."[97] The "fundamental tension" between a court's need for this evidence and its gatekeeping function has resulted in a "fragmented approach" of varying legal standards that govern the admissibility of scientific evidence.[98]

A. FEDERAL STANDARDS OF ADMISSIBILITY

For almost a century, the *Frye* standard, also known as the general acceptance test, governed the admissibility of expert testimony in federal courts.[99] In *Frye v. United States*,[100] the trial court refused to admit expert testimony regarding the result of a systolic blood pressure deception test, a precursor to the

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[93] *Id.* at 146–49. The two objective disciplines studied—DNA analysis of complex-mixture samples through probabilistic genotyping and of single-source samples—appear to possess foundational validity, though further empirical evidence is needed with respect to the former. *Id.* at 147–48.

[94] *Id.* at 149 (noting that fingerprint analysis has "a false positive rate that is substantial and is likely to be higher than expected by many jurors based on longstanding claims about the infallibility of fingerprint analysis").

[95] *Id.*

[96] Bert Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 SCI. 1508, 1508 (1988).

[97] *Id.*

[98] *Id.*

[99] *See* Jessica G. Cino, *An Uncivil Action: Criminalizing* Daubert *in Procedure and Practice to Avoid Wrongful Convictions*, 119 W. VA. L. REV. 651, 662 (2016).

[100] 293 F. 1013 (D.C. Cir. 1923).

modern-day lie detector test.[101] The jury subsequently convicted the defendant of second-degree murder, and he appealed based on the trial court's refusal to admit the disputed expert testimony.[102] On appeal, the U.S. Court of Appeals for the D.C. Circuit affirmed the lower court's refusal to admit the lie detector test.[103] It reasoned that while expert testimony is admissible when deduced from a "well-recognized scientific principle," that principle "must be sufficiently established to have gained general acceptance in the particular field in which it belongs."[104]

The *Frye* standard "le[ft] many questions unanswered" and "became susceptible to inconsistent judicial application, manipulation, and constant recalibration of [its] elements."[105] In 1975, Congress enacted the first version of Rule 702 of the Federal Rules of Evidence in an attempt to provide more guidance regarding the admissibility of expert testimony.[106] However, ambiguity remained as to whether Rule 702 simply codified the *Frye* standard, or whether it established a new test altogether.[107] This ambiguity culminated in the *Daubert* trilogy—a series of U.S. Supreme Court decisions that elaborated on the Rule 702 standard, govern the admissibility of expert testimony in federal jurisdictions, and have been adopted in many states.[108]

Specifically, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[109] the Court held that Rule 702 superseded the *Frye* test and that when applying Rule 702, a judge should "ensur[e] that an expert's

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[101] *Id.* at 1014.

[102] *Id.* at 1013.

[103] *Id.* at 1014.

[104] *Id.*

[105] Cino, *supra* note 99, at 661. For instance, it was unclear under *Frye* "[w]ho determines the relevant scientific community?" *Id.* Given the requirement of general acceptance, "[h]ow mainstream should a theory or technique be before it becomes relevant?" *Id.* And "[m]ust the scientific community accept both the validity of an underlying theory and the reliability of the technique?" *Id.*

[106] *See id.* at 656 n.27.

[107] *See* Kaushal B. Majmudar, Daubert v. Merrell Dow*: A Flexible Approach to the Admissibility of Scientific Evidence*, 7 HARV. J.L. & TECH. 187, 188 (1993) ("Even after the Federal Rules of Evidence . . . were enacted in 1975, courts and commentators continued to debate the continued applicability of the *Frye* test and its proper role in the statutory scheme." (citing Paul C. Gianelli, Frye v. United States*—Background Paper Prepared for the National Conference of Lawyers and Scientists*, 99 F.R.D. 188, 191 (1983))).

[108] *See* Cino, *supra* note 99, at 683–85 (identifying the states that have adopted the *Daubert* standard in their own courts). However, some states—including Alabama, California, Illinois, Michigan, New York, Pennsylvania, and Washington—continue to adhere to the *Frye* standard. *See id.* at 682–83.

[109] 509 U.S. 579 (1993).

testimony both rests on a reliable foundation and is relevant to the task at hand."[110] The Court provided a non-exclusive list of factors for a judge to consider when determining whether evidence is reliable: (1) "whether it 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 the existence and maintenance of standards controlling the technique's operation"; and (4) whether the theory or technique has been generally accepted in the relevant scientific community.[111] The Court emphasized that general acceptance, while relevant, "is not a necessary precondition to the admissibility of scientific evidence."[112] In articulating its standard, the Court stressed that the inquiry should be flexible and focus "on principles and methodology, not on the conclusions [a technique] generate[s]."[113]

Two subsequent cases expanded upon the *Daubert* standard. In *General Electric Co. v. Joiner*,[114] the Court adopted abuse of discretion as the proper appellate standard of review of a trial court's ruling regarding the admissibility of expert testimony.[115] In doing so, the Court explained that "while the Federal Rules of Evidence allow district courts to admit a somewhat broader range of scientific testimony than would have been admissible under *Frye*, they leave in place the 'gatekeeper' role of the trial judge in screening such evidence."[116] The Court specifically rejected subjecting a trial court's determination "to a more searching standard of review."[117] And in *Kumho Tire Co. v. Carmichael*,[118] the Court held that the *Daubert* standard applies to all expert testimony, not just scientific testimony.[119]

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[110] *See id.* at 587, 597; *see also* Cino, *supra* note 99, at 662 (noting that *Daubert* held that the trial judge should "serve as the gatekeeper of reliability and relevance").

[111] *Daubert*, 509 U.S. at 593–94.

[112] *Id.* at 597.

[113] *Id.* at 594–95.

[114] 522 U.S. 136 (1997).

[115] *Id.* at 141.

[116] *Id.* at 142.

[117] *Id.* at 142–43.

[118] 526 U.S. 137 (1999).

[119] *Id.* at 151; *see also* Cino, *supra* note 99, at 662 (explaining the impact of *Kuhmo Tire Co.*).

B. GEORGIA'S STANDARD OF ADMISSIBILITY

After adhering to the *Frye* standard for many years, the Supreme Court of Georgia adopted a new standard to govern the admissibility of expert testimony in 1982.[120] In *Harper v. State*,[121] the trial court declined to admit testimony of a psychiatrist because the psychiatrist's use of a sodium amytal truth serum test had not been established as reliable.[122] The jury convicted the defendant of murder and sentenced him to life imprisonment, and the defendant appealed.[123] The Supreme Court of Georgia affirmed the trial court's decision to exclude the testimony.[124] In doing so, the court explicitly rejected the *Frye* standard and stated "that the *Frye* rule of 'counting heads' in the scientific community is not an appropriate way to determine the admissibility of a scientific procedure in evidence."[125] Rather, "the trial judge [should] decide whether the procedure or technique in question has reached a scientific stage of verifiable certainty."[126] Critically, the judge must "make[] this determination based on [all] the evidence available to him rather than by simply calculating the consensus in the scientific community."[127] But "[o]nce a procedure has been recognized in a substantial number of courts, a trial judge may judicially notice, without receiving evidence, that the procedure has been established with verifiable certainty."[128]

The *Harper* standard remained the statutory standard for both criminal and civil proceedings until Georgia formally adopted the *Daubert* standard for civil proceedings in its 2005 Tort Reform Act.[129] However, the Tort Reform Act left the standard and statutory authority untouched for criminal proceedings.[130] In practical terms,

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120 *See* Cino, *supra* note 99, at 670.

121 292 S.E.2d 389 (Ga. 1982).

122 *Id.* at 394.

123 *Id.* at 389, 391.

124 *Id.* at 396.

125 *Id.* at 395 (footnote omitted). The Court identified several problems with the general acceptance test. "First, the expert is selected and compensated by a party seeking to demonstrate a specific premise: that the scientific principle sought to be proved either is or is not accepted in the scientific community." *Id.* Second, "there are limits on what any one 'expert' may understand about a particular discipline." *Id.* And finally, "wide variations in intradisciplinary opinions frequently exist." *Id.*

126 *Id.*

127 *Id.* at 396.

128 *Id.*

129 *See* Cino, *supra* note 99, at 678.

130 *Id.*

this means that Georgia courts subject expert witnesses in criminal proceedings to a different common law standard and statutory evidentiary rule than those applied in civil proceedings.[131] And though the Georgia Code has been amended and the Federal Rules have been adopted since the Tort Reform Act of 2005,[132] the *Harper* test still controls in criminal proceedings because, since "the old and new statutes were 'almost verbatim,' the Georgia Legislature did not intend to supersede the standard set by *Harper*."[133]

The codified standard applicable to criminal actions is as generous as possible, providing that expert testimony in criminal proceedings "shall *always* be admissible."[134] The *Harper* formulation limits this broad scope slightly because it requires that "the judge decide[] whether or not the party's expert evidence has reached a scientific stage of verifiable certainty."[135] The judge, however, retains significant "discretion in deciding whether . . . evidence is verifiable or reliable," and the limitations imposed by *Harper* have been periodically carved back over the years through further developments in case law.[136]

For example, *Harper* "only applies to an expert's use of scientific tests, procedures, or techniques and not to an expert's application of novel or controversial scientific theories or principles to the facts of the case."[137] This suggests that novel theories are subject to less scrutiny under *Harper* than established scientific methods, "counter to *Daubert*'s reliability standard."[138] Instead, courts apply other case law to determine whether the novel theory at issue "has successfully passed through the necessary stages of inquiry, testing,

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[131] *Id.*

[132] *See* PAUL S. MILICH, GEORGIA RULES OF EVIDENCE § 1:1 (2019–2020 ed.) (describing Georgia's adoption of new evidence rules based on the Federal Rules of Evidence in 2013); Cino, *supra* note 99, at 690 ("The Georgia Code was changed and updated decades after the creation of the *Harper* standard . . . .").

[133] *See* Cino, *supra* note 99, at 690 (quoting Carlson v. State, 634 S.E.2d 410, 414 (Ga. Ct. App. 2006)); *see also Carlson*, 634 S.E.2d at 414 ("[T]he almost verbatim re-enactment . . . would seem to affirm Georgia's traditional reliance upon *Harper* in criminal matters . . . .").

[134] *See* O.C.G.A. § 24-7-707 (2013) (emphasis added); *see also* Cino, *supra* note 99, at 689 ("This language is as wide as the net can be cast. Instead of creating a standard or rule, this statute is the anti-rule.").

[135] Cino, *supra* note 99, at 689.

[136] *Id.*

[137] *Id.* (footnote omitted) (first citing Home Depot U.S.A., Inc. v. Tvrdeich, 602 S.E.2d 297, 301 (Ga. Ct. App. 2004); and then citing PAUL S. MILICH, GEORGIA RULES OF EVIDENCE § 15:9 (2016–2017 ed.)).

[138] *Id.* at 689–90.

and critical review" and is "valid, reliable, and ready to be used."[139] In making this determination, the trial judge considers relevant information and "ultimately decide[s] whether there still exists significant doubt, due to insufficient testing or debatable test results, that the theory is ready for the courtroom."[140] Ultimately, though, Georgia courts apply a lenient standard to forensic evidence and retain significant discretion that allows "weak conclusions . . . to be presented to the jury."[141]

While *Harper* sets out a standard for Georgia courts to apply to determine whether to admit or exclude expert testimony, it does little to explain how that standard actually applies. However, in 2005, the Georgia Court of Appeals shed light on the *Harper* standard's application. In *State v. Tousley*,[142] the trial court "exclude[d] evidence regarding [the defendant's] performance on the horizontal gaze nystagmus (HGN) test" because the arresting officer performed the test improperly.[143] On appeal, the appellate court explained that scientific evidence requires two initial findings to support its admissibility.[144] First, the party offering the evidence must show that "the general scientific principles and techniques involved . . . are valid and capable of producing reliable results."[145] Second, the party offering the evidence must show that "the person performing the test 'substantially performed the scientific procedures in an acceptable manner.'"[146] The court construed *Harper* as an application of the first component.[147] To interpret the second component, the court looked to a treatise, which explained:

> If the basic science and techniques used by the expert are reliable, the fact that the expert's conclusions are weak or subject to a certain margin of error usually goes to [the] weight, not admissibility. But if the expert substantially departed from principles and procedures that are the basis for the evidence's usual reliability, the evidence should be

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139 *Id.* at 690 (quoting MILICH, *supra* note 137, § 15:9 n.11).
140 *Id.* (quoting MILICH, *supra* note 137, § 15:9 n.11).
141 *Id.* at 696.
142 611 S.E.2d 139 (Ga. Ct. App. 2005).
143 *Id.* at 141.
144 *See id.* at 143.
145 *Id.* (omission in original) (quoting Johnson v. State, 448 S.E.2d 177, 179 (Ga. 1994)).
146 *Id.* (quoting *Johnson*, 448 S.E.2d at 179).
147 *Id.*

> declined . . . [because the expert] is doing something other than [the] established [procedure].[148]

After applying these components to the facts at hand, the court reversed the trial court's exclusion of the HGN test.[149] Prior precedent established HGN testing as an accepted procedure "'that has reached a state of verifiable certainty in the scientific community,' meeting the *Harper v. State* standard."[150] Due to this precedent, courts need not take evidence on the procedure's reliability, because it is presumptively reliable.[151] Despite this presumption, the court noted that the party offering the evidence must still establish that the examiner performed the procedure according to acceptable standards.[152] And in this instance, the court found that the officer had substantially complied with applicable guidelines and that any remaining issues went to the weight, rather than to the admissibility, of HGN test results.[153]

1. The Underlying Science.

As *Toulsey* notes, the *Harper* standard requires that the party offering the evidence show the validity and reproducibility of the scientific principles and procedures involved.[154] Thus, Georgia courts conduct an initial inquiry into the science underlying any

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[148] *Id.* at 143–44 (first alteration in original) (quoting MILICH, *supra* note 137, § 15:9).

[149] *Id.* at 146.

[150] *Id.* at 144 (quoting State v. Pierce, 596 S.E.2d 725 (Ga. Ct. App. 2004)).

[151] *See id.* ("Because HGN testing has reached this level of acceptance, a trial court may judicially notice, without receiving evidence, that the standardized HGN test has been established with verifiable certainty."); *see also* Walsh v. State, 811 S.E.2d 353, 359 (Ga. 2018) ("It is the examination by multiple courts, and the consequent establishment of verifiable certainty to those courts, that authorizes a trial court to take judicial notice of the reliability of [scientific] test[s]."); Harper v. State, 292 S.E.2d 389, 396 (Ga. 1982) ("Once a procedure has been recognized in a substantial number of courts, a trial judge may judicially notice, without receiving evidence, that the procedure has been established with verifiable certainty, or that it rests upon the laws of nature."); Hawkins v. State, 476 S.E.2d 803, 807 (Ga. Ct. App. 1996) ("[O]nce a procedure has been utilized for a significant period of time, and expert testimony has been received thereon in case after case, the trial court does not have to keep reinventing the wheel . . . .").

[152] *See Tousley*, 611 S.E.2d at 145. In ruling on whether procedures were properly administered, the court identified several factors to consider: (1) whether the person conducting the procedure was sufficiently trained, (2) whether the person had prior experience in administering the procedure, (3) whether the procedure was administered according to standard techniques, and (4) whether the procedure was interpreted properly. *Id.*

[153] *Id.* at 146 ("Such evidence of the *possibility* of error goes only to the weight of the test results, not to their admissibility.").

[154] *Id.* at 143.

scientific expert testimony. For example, in *Jefferson v. State*,[155] the Georgia Court of Appeals held that the state "failed to demonstrate that the fracture match analysis evidence was founded on valid scientific principles."[156] While the state's expert addressed how the procedure was performed, she "did not address the core of the *Harper* test—whether [the] analysis had reached a scientific stage of verifiable certainty."[157] The state presented no evidence of exhibits or treatises discussing fracture match analysis and cited no case law from Georgia or other jurisdictions in support of its evidence.[158] The state's reliance on only one expert's "unsupported opinion that fracture match was as definitive as DNA testimony" was insufficient to establish its validity under *Harper*.[159]

Georgia courts are steadfast once they recognize the validity of a scientific procedure under *Harper*. In *Fortune v. State*,[160] for instance, "[t]he trial court judicially noticed, without receiving any evidence, that [a] chemical field test of [] suspected cocaine residue . . . was a procedure or technique that had been established with verifiable certainty."[161] Given that such tests had been "widely accepted in Georgia courts," proper procedure was to admit the evidence and allow cross-examination as to its reliability.[162] Similarly, in *Vaughn v. State*,[163] the Supreme Court of Georgia held that "the overwhelming weight of authority demonstrates that mitochondrial DNA (mtDNA) evidence . . . is based on sound scientific theory and will produce reliable results if proper procedures are followed."[164] Thus, the conflicting expert testimony regarding heteroplasmy—the appearance of more than one type of mtDNA in a given individual—spoke to the weight of the mtDNA evidence rather than to its admissibility.[165]

This adherence to precedent comes with a recently explained caveat. In *Spencer v. State*,[166] a police officer testified that the

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155 720 S.E.2d 184 (Ga. Ct. App. 2011).
156 *Id.* at 188.
157 *Id.* at 190.
158 *See id.* at 189–90.
159 *Id.* at 191.
160 696 S.E.2d 120 (Ga. Ct. App. 2010).
161 *Id.* at 123.
162 *Id.* at 124. In fact, the officer who administered the test admitted on cross-examination that chemical field tests are not infallible. *See id.* at 124 n.3.
163 646 S.E.2d 212 (Ga. 2007).
164 *Id.* at 214 (citing Caldwell v. State, 393 S.E.2d 436 (Ga. 1990)).
165 *Id.*
166 805 S.E.2d 886 (Ga. 2017).

results of an HGN test were consistent with a particular range of blood alcohol content (BAC).[167] In finding the evidence inadmissible, the Supreme Court of Georgia acknowledged that a test might have reached verifiable certainty for one purpose but not for another.[168] Thus, while the HGN test had been accepted as a reliable indication of impairment generally, it could not be appropriately used as an indicator of a specific BAC without an independent *Harper* analysis for that purpose.[169]

2. The Procedure as Applied.

In addition to establishing the validity and reproducibility of the underlying science, the party offering the evidence must also show that "the person performing the test 'substantially performed the scientific procedures in an acceptable manner.'"[170] This allows the Georgia courts to, while assuming the reliability of the underlying scientific methods, look to the application of that method in particular cases. For example, in *Walsh v. State*,[171] a police officer who administered an HGN test testified that "the test was administered in a manner *contrary* to his training" and "that it was a 'substantial deviation' from [his] training to conduct the test while the subject was wearing glasses."[172] The Supreme Court of Georgia held that the state failed to demonstrate substantial performance of the scientific procedures of an HGN test.[173] The court emphasized that "[t]he established procedures have created th[e] reliability" under the first prong of the *Harper* standard.[174] It remained critical that tests were "done consistently with those procedures."[175]

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[167] *Id.* at 887 (noting that the officer testified that "based off [his] training and [his] expertise," a finding of "four out of six clues indicates an alcohol concentration equal to or greater than a .08").

[168] *Id.* at 888 ("[W]hether the HGN test may properly be used as evidence that a driver is impaired by alcohol is not the same question as whether the HGN test has been established as an indicator of either a specific number or a numeric range of blood alcohol content.").

[169] *Id.* at 890 ("Before any such evidence may be admitted, the proponent must satisfy the requirements established by *Harper*.").

[170] State v. Tousley, 611 S.E.2d 139, 143 (Ga. Ct. App. 2005) (quoting Johnson v. State, 448 S.E.2d 177, 179 (Ga. 1994)).

[171] 811 S.E.2d 353 (Ga. 2018).

[172] *Id.* at 357.

[173] *Id.* at 359 ("[I]t was error for the Court of Appeals to state that 'the evidence that Walsh's glasses remained on while the HGN test was administered goes to the weight of the test results, not their admissibility.'" (quoting State v. Walsh, 795 S.E.2d 202, 205 (Ga. Ct. App. 2016))).

[174] *Id.*

[175] *Id.*

Notwithstanding the *Walsh* decision, Georgia courts have demonstrated a willingness to overlook flaws in the application of a scientific procedure, thereby lessening the limitation that this second prong imposes. In *Parker v. State*,[176] for example, the Georgia Court of Appeals noted that "[a]bsent a fundamental error, . . . 'evidence of the possibility of error goes only to the weight of the test results, not to their admissibility.'"[177] In other words, Georgia courts have evidenced a willingness to overlook deficiencies in performance of a scientific procedure so long as the court finds any such errors are not fundamental. The courts have allowed these issues to be considered by the jury in assessing the weight and credibility of evidence presented at trial.[178]

V. RECOMMENDATION

Despite the serious issues regarding the reliability and quality of forensic evidence, courts "continue to rely on forensic evidence without . . . addressing the limitations of different forensic science disciplines."[179] But forensic reform seems virtually compulsory after considering the impact that forensic science has at trial relative to its reliability. Thus, Georgia should enact forensic reform and consider alternatives to its current approach to admissibility.

Georgia's *Harper* standard requires courts to conduct an initial inquiry into underlying forensic science. But it imposes no ongoing responsibility to evaluate the continuing vitality of previously accepted scientific disciplines and procedures.[180] Considering the growing body of evidence questioning the use of forensic evidence to obtain criminal convictions, this approach is exceedingly

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[176] 704 S.E.2d 438 (Ga. Ct. App. 2010).

[177] *Id.* at 443 (footnote omitted) (quoting Duncan v. State, 699 S.E.2d 341, 345 (Ga. Ct. App. 2010)); *see also* State v. Culler, 830 S.E.2d 434, 441–42 (Ga. Ct. App. 2019) (remanding for the trial court to determine "whether, if one portion of the HGN test was performed incorrectly, that fact renders the entire test unreliable").

[178] Some scholars have posited that this willingness to allow questionable evidence to be considered by the jury exists even in non-*Harper* jurisdictions. *See, e.g.*, Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 90 (2009) ("Courts policed the introduction of forensic testimony . . . in a highly deferential manner, typically trusting the jury to assess the expert testimony."). In drawing their conclusions, Garrett and Neufeld conducted an analysis of the cases of 137 exonerees convicted in a variety of jurisdictions, including Idaho, Louisiana, Massachusetts, Oklahoma, and Virginia. *See id.* at 12–13, 71, 73, 76–78.

[179] NAS REPORT, *supra* note 12, at 85.

[180] *See supra* Section IV.B.1.

problematic. Scientific disciplines—particularly forensic science disciplines—can become obsolete following advances in scientific methods and insight into the procedures and disciplines themselves. The *Harper* standard, however, avoids accounting for this obsolescence, assumes the infallibility of previously used sciences, and allows outdated and potentially unreliable evidence into Georgia courts. Georgia should instead adopt an approach to evaluating the admissibility of forensic evidence that allows courts to account for the limitations of even widely acknowledged disciplines.

Additionally, Georgia's use of a more lenient standard in criminal proceedings than in civil proceedings seems counterintuitive. Georgia's current admissibility scheme admits the most problematic evidence when there is the most at stake by admitting forensic evidence in criminal prosecutions with little to no inquiry into the surviving viability of the underlying science.[181] Applying the *Daubert* standard to both civil and criminal proceedings, as Professor Jessica Gabel Cino suggests,[182] would be a step in the right direction and would provide consistency across civil and criminal proceedings in Georgia. But the *Daubert* standard, as currently applied, likely would not correct the current state of the admissibility of forensic evidence.[183] After all, courts across the country continue to admit faulty forensics, despite the application of the *Daubert* standard to evaluate the admissibility of such testimony.[184] While the *Daubert* standard would impose a more rigorous analysis of scientific evidence than currently imposed in Georgia under *Harper*, the *Daubert* standard is flexible and, like *Harper*, allows "trial judges [to] exercise great discretion in deciding whether to admit or exclude expert testimony."[185] Furthermore, after a trial court makes an evidentiary ruling, appellate courts

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[181] *See supra* Section IV.B.1.

[182] *See* Cino, *supra* note 99, at 657 ("For better or worse, *Daubert* is the best available standard for scientific evidence. It should be uniformly adopted despite its imperfections.").

[183] *See* NAS REPORT, *supra* note 12, at 95 (noting that judicial resolution "of *Daubert*-type questions in criminal cases have been criticized by some lawyers and scholars who thought that the Supreme Court's decision would be applied more rigorously to protect the rights of accused parties").

[184] *See, e.g.*, Cino, *supra* note 21, at 2 ("Despite the[] roadblocks to admissibility [posed by *Daubert*], courts have routinely accepted much of the so-called science underlying forensic testing with little, if any, inquiry." (citing Johnson v. Commonwealth, 12 S.W.3d 258, 263–64 (Ky. 1999))).

[185] NAS REPORT, *supra* note 12, at 96–97; *see also* Cino, *supra* note 99, at 667 ("[T]he 'flexibility' of the *Daubert* factors makes them vulnerable to manipulation.").

conduct appellate review of that ruling under a highly deferential standard.[186] This flexibility coupled with a deferential appellate review can be devastating for defendants, who might not receive a full *Daubert* hearing and often lose challenges to the government's expert testimony.[187]

Rather than continuing to use the *Harper* standard, which seems fatally flawed, or adopting *Daubert*, which, despite its advantages over *Harper*, fails to address the widespread problems surrounding the admissibility of forensic evidence, this Note recommends that the Georgia General Assembly and the Georgia courts work on establishing, interpreting, and applying a new standard of admissibility that accounts for the growing criticisms of forensic science disciplines. Particularly, Georgia should bolster the gatekeeping function of its trial judges by allowing them to consider the shortcomings of each piece of forensic evidence—on the basis of both its underlying science and application—and make admissibility determinations accordingly, without reference to prior treatment of similar evidence. Additionally, Georgia courts should carefully police the presentation at trial of any admitted evidence to ensure that juries do not unwittingly place more weight on such evidence than deserved. Such a rule would support effective and efficient judicial administration by reducing the number of forensic-related appeals and would encourage forensic science disciplines to address the underlying problems with forensic evidence.

VI. CONCLUSION

Given the problems with the reliability and validity of the underlying science of forensic evidence and the potential for wrongful convictions, it is clear that Georgia courts should address the current state of forensic evidence. Georgia's *Harper* standard provides little to no practical limitation on the admissibility of faulty forensic evidence once a procedure has been approved, and

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[186] *See* NAS REPORT, *supra* note 12, at 11 ("[Trial judges'] judgments are subject only to a highly deferential 'abuse of discretion' standard of review.").

[187] *See, e.g.*, *id.* at 106–07 (noting that "*Daubert* has done little to improve the use of forensic science evidence in criminal cases" and that "courts often 'affirm admissibility citing earlier decisions rather than facts established at a hearing'" (quoting Peter J. Neufeld, *The (Near) Irrelevance of* Daubert *to Criminal Justice and Some Suggestions for Reform*, 95 AM. J. PUB. HEALTH 107, 109–10 (2005))).

adopting *Daubert* would not address fully the evidentiary problems associated with such evidence. Instead, this Note recommends that Georgia courts and the Georgia General Assembly work toward establishing a new standard of admissibility that bolsters the gatekeeping function of trial judges by allowing them to assess the limitations of forensic science disciplines when making admissibility decisions.