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North Carolina State University and the Forensic Technology Center of Excellence Two-Part Virtual Workshop Series: Qualifications of an Expert Witness for Legal Professionals—The Daubert and Frye Standards

Jaclynn McKay, Mikalaa Martin, Micaela Ascolese, and Gabby DiEmma, Editors

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Abstract

The Forensic Technology Center of Excellence, a program of the National Institute of Justice, in collaboration with North Carolina State University, hosted a two-part virtual workshop series on the Qualifications of an Expert Witness for Legal Professionals. The workshop series included topics relevant to qualifications of expert witnesses in forensic disciplines, with the first workshop occurring on August 2, 2023, and centering around the Daubert standard. The second workshop occurred on October 25, 2023, and focused on the Frye standard. The workshops brought together over 800 criminal justice professionals to explore the historical basis for the Frye and Daubert standards, the issues surrounding qualifying expert witnesses, the effect of the standards on the admission of expert testimony in the courts, and the future of forensic testimony with the December 2023 revisions to Federal Rule of Evidence 702. The workshops included presentations from a diverse panel of speakers spanning the breadth of legal practitioners—including trial attorneys, professors, attorney generals, and postconviction litigators—and provided a platform for attendees to discuss legal issues related to forensic science.

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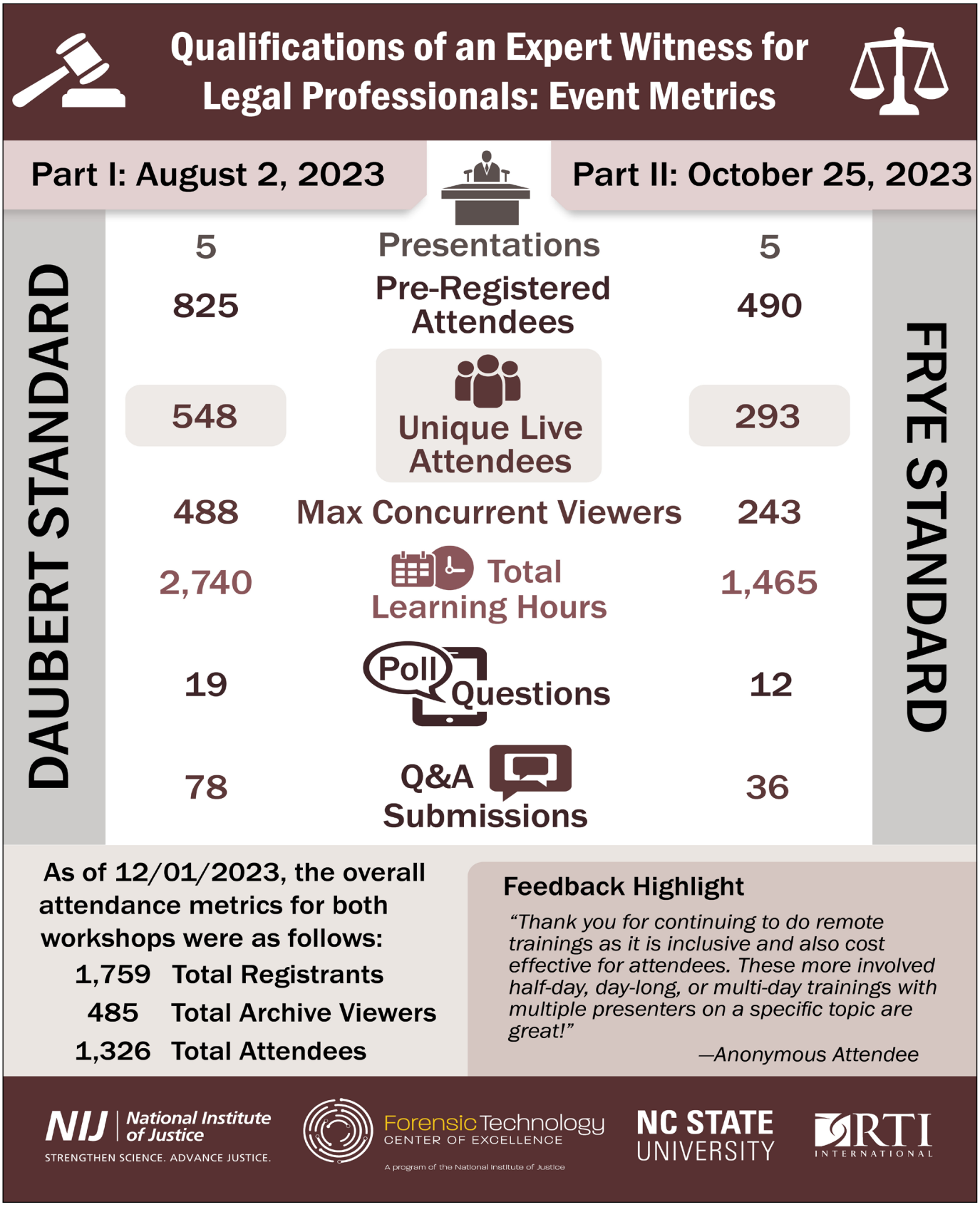
Qualifications of an Expert Witness for Legal Professionals: Event Metrics
Part I: August 2, 2023
Part II: October 25, 2023
DAUBERT STANDARD
FRYE STANDARD
5
Presentations
5
825
Pre-Registered Attendees
490
548
Unique Live Attendees
293
488
Max Concurrent Viewers
243
2,740
Total Learning Hours
1,465
19
Poll Questions
12
78
Q&A Submissions
36
As of 12/01/2023, the overall attendance metrics for both workshops were as follows:
1,759 Total Registrants
485 Total Archive Viewers
1,326 Total Attendees
Feedback Highlight
"Thank you for continuing to do remote trainings as it is inclusive and also cost effective for attendees. These more involved half-day, day-long, or multi-day trainings with multiple presenters on a specific topic are great!"
—Anonymous Attendee
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Introduction

This introduction is intended to serve as a synopsis of key court cases, Federal Rule of Evidence (FRE) 702 adoption and amendments over time, and landmark documents discussed by multiple presenters within this virtual two-part workshop series. The court cases discussed herein led to the development and evolution of both the Frye and Daubert standards, which include *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993), and *Kumho Tire v. Carmichael*, 526 U.S. 137 (1999). Additionally, a brief history of the FRE 702 Testimony by Expert Witness and its evolution from adoption in 1975, its amendment in 2000, and the revisions that took effect on December 1, 2023, is discussed as it relates to admitting expert testimony for both civil and criminal cases. A discussion dedicated to two key reports within the forensic community that have impacted the admittance of forensic evidence and testimony within the courts is also included. The reports discussed consist of the National Academy of Sciences (NAS) Committee on Identifying the Needs of the Forensic Science Community's 2009 report entitled *Strengthening Forensic Science in the United States: A Path Forward* (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2009) and the President's Council of Advisors on Science and Technology's (PCAST's) 2016 report entitled *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (PCAST, 2016). For both reports, a high-level background, reception upon publication, and impact on both the legal and forensic science communities is provided. Finally, a brief discussion on the United States Department of Justice's (DOJ's) Uniform Language for Testimony and Reports (ULTR) guidance documents is included as a helpful resource for forensic practitioners preparing reports or providing expert testimony (Office of Legal Policy, 2023).

Timeline of Key Court Cases, Important Changes, and Landmark Reports

1923 — *Frye v. United States,* 293 F. 1013 (D.C. Circ. 1923)

Established the Frye standard, which states that expert opinion based on a novel scientific technique is admissible when the technique is "generally accepted as reliable in the relevant scientific community."

1975 — Federal Rule of Evidence (FRE) 702 Adopted

1993 — *Daubert v. Merrell Dow Pharmaceuticals Inc.,* 509 U.S. 579 (1993)

Established the Daubert standard, which lists five factors: "1) Whether the theory or technique can be, and has been tested; 2) Whether it has been subjected to publication and peer review; 3) Its known or potential error rate; 4) The existence and maintenance of standards controlling its operation; and 5) Whether it has attracted widespread acceptance within a relevant scientific community."

1999 — *Kumho Tire v. Carmichael,* 526 U.S. 137 (1999)

Held that FRE 702 and Daubert apply to all scientific, technical, or other specialized expertise, but the Daubert factors may not be applicable in all cases (i.e., they are not a definitive checklist).

2000 — FRE 702 Amended Following the Daubert Decision

2009 — National Academy of Sciences' (NAS') Committee on Identifying the Needs of the Forensic Science Community Report[1]

This report presented 13 recommendations intended to address deficiencies and improve the quality and interpretation of forensic evidence.

2016 — President's Council of Advisors on Science and Technology (PCAST) Report[2]

This report ascertained that only three feature-comparison forensic disciplines met PCAST's standard for demonstrating foundational validity.

2023 — FRE 702 Amendment (Effective December 1, 2023)

[1] Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council. (2009, August). *Strengthening forensic science in the United States: A path forward* (Report no. 228091). National Academies Press.
[2] President's Council of Advisors on Science and Technology (PCAST). (2016, September). *Forensic science in criminal courts: Ensuring scientific validity of feature-comparison methods.* Executive Office of the President.

Frye v. United States, 293 F. 1013 (D.C. Cir. 1923)

The defendant in this criminal case, James Alphonzo Frye, was charged with second-degree murder. At the trial, Frye's legal counsel sought to introduce expert testimony related to a systolic blood pressure test that the expert administered to the defendant following the crime, intending to show the court whether the defendant was deceitful during his testimony. The trial court rejected the introduction of the expert testimony, and Frye was convicted. Following his conviction, Frye appealed the court's ruling. Upon appeal, the court ruled that when a test—in this case a systolic blood pressure test—has not gained significant scientific recognition from the relevant field to which it belongs, expert testimony regarding the test results is inadmissible in the court of law. This court case brought forth what is known as the Frye standard.

The Frye Standard

Expert testimony must be grounded in a science that *"must be sufficiently established to have gained general acceptance in the particular field in which it belongs."*

See *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923)

The Frye standard, as it applies to the admission of expert testimony and physical evidence, charged the court with deciding whether the methodologies employed by the proffered expert witness have gained general acceptance within the relevant scientific field of practice for that proffered expert witness to be admitted by the court. Although all states and federal courts adopted the Frye standard for use at the time of its introduction, it is now only used as the standard for admission of evidence and expert testimony in California, Illinois, Minnesota, New York, New Jersey, Pennsylvania, and Washington.

Daubert v. Merrell Dow Pharmaceuticals Inc., 509 U.S. 579 (1993)

The petitioners in this civil case, William Daubert et al., claimed that their children had limb reduction birth defects caused by ingesting a prescription drug manufactured by the respondent, Merrell Dow Pharmaceuticals Inc., during the time of pregnancy. An expert conducted a scientific literature review and concluded that the prescription drug in question had not been linked to causing birth defects; this summary was put forth as evidence by the respondent in the case as granted by the district court. The petitioners sought the testimony of eight experts who concluded the opposite—that the prescription drug in question can cause birth defects; however, the district court determined that this evidence did not meet the general acceptance standard for the admission of expert testimony. The petitioners appealed, though the court of appeals upheld the district court's ruling citing the ruling of *Frye v. United States*. It was held by the court that FRE 702 is the standard for expert testimony admission in a federal trial and not Frye. In this case, FRE 702 superseded Frye's general acceptance test.

The Daubert Factors

"1. Whether the theory or technique in question can be and has been tested;
2. Whether it has been subjected to publication and peer review;
3. Its known or potential error rate;
4. The existence and maintenance of standards controlling its operation; and
5. Whether it has attracted widespread acceptance within a relevant scientific community."

See *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993)

After the ruling in *Daubert v. Merrell Dow Pharmaceuticals Inc.*, a critical eye was turned to the Frye standard due to a belief that it was too restrictive in admitting expert testimony. As a result, this case brought forth what is known as the Daubert standard, which grants authority to trial judges to admit expert testimony whereby they assume the role of a gatekeeper. In this role, the trial judge measures and determines admittance of expert testimony through whether it satisfies the five Daubert factors, including determining the relevance and reliability of a scientific methodology employed by the expert. The Daubert standard allows for more flexibility in admitting proffered

expert testimony than the Frye standard. Additionally, the Daubert standard is currently used in all federal jurisdictions and has been adopted for use in nearly all states with the exception of the six states still employing the Frye standard.

Kumho Tire v. Carmichael, 526 U.S. 137 (1999)

Patrick Carmichael was driving his vehicle when one of his tires blew out, causing an accident that led to the death of one passenger and inflicted injuries on others. In this tort suit, Carmichael, the other survivors, and a representative of the decedent, sued Kumho Tire, maker and distributor of the tire, claiming the tire was defective. In support of their case, they proffered an expert in tire failure analysis who conducted visual and tactile inspections of the tire and concluded that a defect caused the thread of the tire to separate thereby leading to the cause of the accident. Kumho Tire moved to exclude the expert testimony stating that the methodology of analysis did not satisfy FRE 702. The District Court agreed, citing reliability considerations under *Daubert v. Merrell Dow Pharmaceuticals Inc.*; however, the decision was later reversed in the Court of Appeals as it was thought that the Daubert factors did not apply to a non-scientific expert. The Supreme Court disagreed with the Court of Appeals' decision and advised that the judge's gatekeeping function, as identified in the Daubert standard, applies to all expert testimony, including that which is not scientific in nature, thereby bringing forth the concept of technical expertise. Additionally, this case clarified that the Daubert questions can be applied flexibly as their use may not always be appropriate. In the specific case at hand, the Supreme Court agreed with the District Court's decision to exclude the tire failure expert testimony as it relied heavily on experience-based observations that did not satisfy Daubert. Regardless of subject or characterization, it is the role of the trial judge to act as a gatekeeper and decide if expert testimony has been demonstrated to be relevant and reliable in order to be admissible.

Federal Rule of Evidence 702 Testimony by Expert Witness

The FRE consist of 11 articles in total, each addressing different aspects of evidence, that govern the admissibility of evidence in all federal courts for both civil and criminal proceedings. Although the FRE serve to create a uniform system among all federal courts, states model their own evidence admissibility rules on the FRE.

Of interest to the forensic science community, and specifically this virtual workshop series, is FRE 702 Testimony by Expert Witness. FRE 702 sets forth the criteria or conditions an individual must meet to be recognized by the court as an expert witness. The first version of FRE 702 was adopted for use in 1975, over half a century after the Frye ruling. FRE 702 became used more broadly because it was seen to be more flexible than the Frye standard, since it did not strictly require general acceptance to be demonstrated.

In 2000, FRE 702 was amended in response to the Daubert ruling and its progeny. Since then, the United States Supreme Court has approved further changes and transmitted the proposed edits to the United States Congress in April 2023. This new amendment took effect on December 1, 2023, and aims to

further clarify expert testimony standards to assist courts in their evaluations of expert witness qualifications. In anticipation of these changes, there have been large discussions about how the new language may impact how (federal) courts interpret the standard and influence decision-making.

FRE 702 Testimony by Expert Witness (2023)

"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 the proponent demonstrates to the court that it is more likely than not that:

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's opinion reflects a reliable application of the principles and methods to the facts of the case."

See Federal Rule of Evidence 702 Testimony by Expert Witness

*2023 *language changes denoted by underlined text.*

Strengthening Forensic Science in the United States: A Path Forward (2009)

In August 2009, the NAS Committee on Identifying the Needs of the Forensic Science Community published a report entitled *Strengthening Forensic Science in the United States: A Path Forward* (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2009). Directed by a congressional charge, this NAS committee completed a study of the critical systemic and scientific issues faced by the forensic science community and the medical examiner/coroner system in the United States. Informed by this study, the NAS committee produced recommendations on policy initiatives to improve the practice of forensic disciplines and overcome issues ranging from backlogs created from a lack of resources to variability present in education, training, and standards. In total, the 2009 NAS Report presented 13 recommendations intended to address deficiencies, unify the forensic science community, and improve the quality and interpretation of forensic evidence.

A chapter within the 2009 NAS Report was dedicated to explaining the dynamic between the legal system and its reliance on forensic science evidence for criminal proceedings. The NAS committee's examination of this relationship found that courts rely heavily on forensic evidence, but they do not fully understand the limitations of the forensic disciplines that generate evidence admitted for trial proceedings. As such, the NAS committee urged for restraint in admitting forensic science methodologies and techniques before they have been properly studied for their scientific foundational validity and verified for their accuracy and reliability. Furthermore, the 2009 NAS Report discussed the dangers of expert testimony based upon forensic testing and

analysis that has not undergone rigorous verification for its validity, accuracy, and reliability and how the courts may give inappropriate weight to evidence and testimony within the context of criminal proceedings. The dangers of exaggerated or imprecise expert testimony and how this can mislead the courts were also discussed. The 2009 NAS Report stressed how both dangers may compound on one another and contribute to wrongful convictions that severely harm society, including those directly or indirectly impacted by the crime.

The first recommendation set forth by the NAS committee called upon Congress to establish and appropriate funds to an independent federal entity that would oversee all forensic disciplines and functions within the United States. This entity, the National Institute of Forensic Science (NIFS), was proposed to desegmentize the forensic science system, with some of its core focuses centered upon establishing and enforcing best practices and standards, developing strategies to improve forensic science research and education, and allocating available funding to advance the credibility and reliability of forensic science. Although the NAS committee called upon NIFS as the responsible entity for completing the charge, the NAS committee encouraged that the principles of these recommendations should be pursued even if the development of NIFS did not occur. The spirit of other recommendations set forth centered around standardization of terminology and reporting, improving and increasing the quality of forensic science research, the importance of developing and enforcing best practices and standards, quality assurance/quality control, and improving training and education offerings available to (aspiring) forensic professionals.

The release of the 2009 NAS Report was met with a mixed bag of full-fledged support and dissenting views from members of the forensic science and legal communities.* Regardless of community reception, the 2009 NAS Report undoubtedly marked a pivotal point within forensic science—a point at which the reliability and validity of a multitude of forensic science techniques, methodologies, and disciplines were called into question. Since its publication, it has had a significant lasting impact within the forensic science and allied criminal justice communities and is often cited as the crux of what sparked reinvigorated efforts for forensic science reform and a framework for achieving enhanced progress and field-wide improvement.

Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods (2016)

In 2015, the United States government questioned PCAST on whether any additional scientifically grounded steps were needed to address the findings, conclusions, and recommendations set forth in the 2009 NAS Report. In response, PCAST launched a study that culminated in a report entitled *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (PCAST, 2016).

* For a literature review of forensic science and legal community reception to the 2009 NAS Report see Giannelli (2012).

PCAST specifically investigated feature-comparison disciplines, including DNA, bitemarks, latent fingerprints, firearms, footwear, and hair. In the course of their study, PCAST found that scientific standards for establishing the validity and reliability of forensic methods required clarification and that the scientific foundation of certain forensic methods should be evaluated. To assist in strengthening the scientific foundation of forensic disciplines and their use within the courts, PCAST proposed several recommendations calling on entities such as the National Institute of Standards and Technology, the White House Office of Science and Technology, the Federal Bureau of Investigation Laboratory, the United States Attorney General, and the United States Judiciary.

Underpinning the contents of the 2016 PCAST Report was the role of scientific validity within the legal system and the criteria through which the scientific validity of forensic methods, specifically within feature-comparison methods, can be determined to strengthen forensic evidence admitted for criminal proceedings. PCAST delineated two distinct types of scientific validity—*foundational validity*, which focuses on forensic evidence itself, and *validity as applied*, which focuses on an expert's application of principles and methods to evidence examination or production.

Similar to the 2009 NAS Report, the release of the 2016 PCAST Report was met with an influx of mixed responses from organizations and individuals throughout the forensic science and legal communities.† Two of the aspects of the 2016 PCAST Report that faced the largest backlash from both the forensic science and legal communities included (1) PCAST's explanation of the sole vessel through which scientific validity can be established (i.e., black box studies) and (2) the lack of forensic scientist involvement on PCAST and lack of recognition for involving practitioners in the scientific evaluations called for within the report.

A notable impact of the 2016 PCAST Report was the definitions and guidelines it set forth for foundational validity. Importantly, PCAST ascertained that only three forensic disciplines met the standard they put forth for demonstrating foundational validity. These disciplines included latent fingerprints, DNA analysis of single-source DNA profiles, and DNA analysis of DNA mixtures from two contributors. In June 2022, the National Institute of Justice's National Center on Forensics (NCF) launched the *Post-PCAST Court Decisions Assessing the Admissibility of Forensic Science Evidence* database to compile court decisions that cite or relate to the findings and claims put forth in the 2016 PCAST Report (NCF, 2022). This database is an invaluable tool for measuring the impact the 2016 PCAST Report has had on the admissibility of forensic disciplines.

† For examples of forensic science and legal community reception to the 2016 PCAST Report see PCAST (n.d.).

The Uniform Language for Testimony and Reports Guidance Documents

The DOJ has published guidance documents for forensic experts to prepare reports and provide expert witness testimony for a variety of forensic disciplines. Although intentionally designed to provide guidance to DOJ forensic examiners drafting reports or preparing to testify on behalf of the DOJ, the ULTR guidance documents are publicly available and may help facilitate the use of uniform language throughout the forensic science community (Office of Legal Policy, 2023). There are currently 17 approved ULTR guidance documents that address the following disciplines: forensic anthropology, general forensic chemistry and seized drug examinations, forensic document examination, autosomal DNA with probabilistic genotyping, mitochondrial DNA, Y-STR DNA, fracture examination, pattern examination, footwear, forensic geology, forensic glass, forensic hair, latent prints, forensic metallurgy, forensic serology, forensic textile fiber, and forensic tire.

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President's Council of Advisors on Science and Technology (PCAST). (n.d.). *Published statements in response to the PCAST report on forensic science in criminal courts*. https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf

PART I: THE DAUBERT STANDARD
AUGUST 2, 2023

The History and Admissibility of Forensic Expert Testimony

Jim Agar

Defense Contract Management Agency

Abstract

Many modern forensic practitioners are puzzled by how Federal Rule of Evidence (FRE) 702 Testimony by Expert Witness and the United States Supreme Court Daubert decision (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]) affect the admissibility of expert witness testimony. Several lawyers also struggle with understanding the admissibility of expert witness testimony. This presentation dove into the five Daubert factors and examined the applicability of FRE 702, including the newly revised version of FRE 702, and discussed the impact on forensic examiners seeking to testify in court. This presentation compared FRE 702 and the Daubert standard for admissibility versus the older Frye (general acceptance) test (see *Frye v. United States*, 293 F. 1013 [D.C. Cir. 1923]) while identifying which states still follow the Frye test. Contemporary challenges to forensic examiner testimony were discussed, including what judges consider in determining whether to accept a forensic examiner as an expert witness and limitations on testimony. The presentation examined attributes needed to succeed as an expert witness and potential areas of concern when testifying. Several case studies were also discussed to illustrate how the court may find a forensic examiner is not qualified to testify as an expert witness, determine whether an examiner has "over-testified" regarding their conclusions, and whether their opinion is even admissible in court.

Synopsis of Presentation

This presentation provided a foundational overview of the legal standards within the United States, highlighting the two standards for admissibility: Frye and Daubert. A background on the Frye test and FRE 702 was presented with a discussion of the Daubert test, the five Daubert factors, and what courts look for when qualifying an expert witness.

The presentation walked attendees through three case studies. The first, *United States v. Cloud*, 576 F. Supp. 3d 827, 842–43 (E.D. Wash. 2021), found a latent print examiner was not qualified to testify in the case because of a prior casework error, a recently failed proficiency test, a corrective action review, poor performance reviews, and issues surrounding the examiner's integrity. The second, *Williams v. United States*, 210 A.3d 734 (D.C. Ct. App. 2019), found a firearm examiner qualified as an expert witness in this case over-testified by claiming absolute certainty that bullets recovered from a firearm were fired from that specific firearm to the exclusion of all other firearms. The third, *Abruquah v. State of Maryland*, 2023 Md. LEXIS 297 (20 June 2023), highlighted an example of court intervention where the court cited an "analytical gap" in firearm evidence leading to the defendant's conviction being overturned for a third time.

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Best practice considerations for those qualified as an expert witness were highlighted, including (1) knowing the limits of your testimony and the importance of "staying in your lane"; (2) testifying within the scientific bounds of the discipline; (3) admitting mistakes in testimony and correcting those mistakes as soon as possible; (4) staying truthful; and (5) embracing the phrase "I don't know" when you do not have the answer or would be placed in a situation requiring speculation.

The presentation concluded by discussing changes that are on the horizon including the revised FRE, which became effective on December 1, 2023, and the United States Department of Justice's (DOJ's) Uniform Language for Testimony and Reports (ULTR) guidance documents that serve to unify language used by forensic scientists in their reports and testimony (Office of Legal Policy, 2023).

The presenter advised that it is good practice for all parties to be aware of and well-versed in the DOJ's ULTR guidance documents as these can be used for direct and cross examination. Although jurors do not need to be extremely familiar with these documents, in some instances such as in federal courts, jurors will be briefed on what limitations are imposed on the expert's testimony as they are presented in the DOJ's ULTR guidance documents. Additionally, some judges may write what the expert witness can and cannot testify to within jury instructions.

With the upcoming amendments to FRE 702, there is not much anticipated change at the state level; however, at the federal level, FRE 702 is a uniform standard and requirement. The FRE 702 amendments will open the door for courts to inquire more on how the expert reached their conclusion and limit the scope of what they are able to testify to, thereby ensuring experts stay within their lane.

A large discussion was prompted regarding the use of "identification" conclusion language. Although this term has served as the basis for most comparisons in feature-comparison disciplines, DNA opinions are relayed in the form of a statistic whether that be using random match probabilities or probabilistic genotyping software. Other disciplines such as latent prints and firearms/toolmarks do not provide statistical support for an opinion or conclusion reached by an examiner, which may render it somewhat suspect. Although there is no statistic provided, the presenter advised that the methods employed in these disciplines to reach conclusions have been demonstrated to be relatively reliable with low false positive error rates.

The terms "identification" and "individualized" may resonate differently or carry different weight. "Individualized" may imply something is unique to that individual to the exclusion of all others, whereas "identification" may not imply this assumed uniqueness and does not present itself as being exclusive to one person. "Identification" leaves the door open for it to be another individual who fired a firearm or left a fingerprint at the scene while "individualized" does not.

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The presenter expanded on the discussion with regards to the term "inconclusive" and why it may be used so frequently: Is the examiner unsure? Does the examiner lack expertise? Are there insufficient data to conduct the examination? A large percentage of conclusions reached and presented in court use this term, and use of this term could be a way to avoid falsely identifying someone that could ultimately lead to a miscarriage of justice.

The discussion was concluded by stressing the importance of using caveats to accompany scientific results and conclusions. The use of caveats alerts to the fact that there are other possible explanations or limitations. Additionally, the use of caveats contributes to maintaining honesty and integrity and stresses the importance of discussing both the strengths and pitfalls of the discipline, providing all the necessary context, letting the jury decide based on all the information, and accepting their verdict. An informed jury is better able to give whatever weight they determine as reasonable to an expert's testimony and conclusion based on all other information and evidence provided in the case.

Reference

Office of Legal Policy. (2023). *Uniform language for testimony and reports*. United States Department of Justice. https://www.justice.gov/olp/uniform-language-testimony-and-reports

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Best Practices for Getting Experts Admitted Under Daubert

Abstract

This presentation discussed the basics of FRE 702 and the Daubert standard (see *Daubert v. Merrell Dow Pharmaceuticals Inc*., 509 U.S. 579 [1993]) and best practices for admitting experts under Daubert and its progeny. This presentation included a discussion on how to establish the reliability of expert evidence to satisfy the three prongs of FRE 702, ensure testimony is based upon sufficient facts or data, verify that testimony is the product of reliable principles and methods, and demonstrate that the witness has applied the principles and methods reliably to the facts of the case. This presentation also discussed how an expert and an expert's report can be criticized and what fundamental questions can prove an expert's reliability to the court. Furthermore, this presentation discussed tactical decisions around expert testimony, including voir dire and predicate questioning for experts, and how to ensure that applicability does not become a critical appellate issue.

Boz Zellinger

North Carolina Department of Justice

Synopsis of Presentation

This presentation highlighted FRE 702 and, more specifically, its language within the North Carolina General Statutes (see G.S. 8C-702). Although 90% of attendees assumed that satisfying the requirements of the "three-prong test" of FRE 702—which includes that (1) the testimony is based upon sufficient facts or data; (2) the testimony is the product of reliable principles and methods; and (3) the expert witness has applied these principles and methods reliably to the facts of the case—would automatically ensure admissibility of an expert witness' testimony, the presenter advised that these alone do not warrant admissibility, highlighting that all other rules and requirements such as FRE 403 Excluding Relevant Evidence for Prejudice, Confusion, Waste of Time, or Other Reasons and the relevant Daubert factors (in Daubert states) must be met to admit expert testimony.

During the presentation, attendees walked through two case studies. The first was a North Carolina homicide case that the presenter was involved in during his time with the Wake County District Attorney's Office. Evidence admitted into court for this case included the defendant's shoes, which presented red clay that was found to contain mica. A geologist was admitted as an expert witness and testified on the red clay present on the defendant's shoes. This expert found that the red clay was consistent with the red clay located in the North Raleigh area and inconsistent with the red clay located in the South Raleigh area, which is where the defendant resided. This case example presents just one of the many North Carolina cases that have made use of unique expert witnesses, in this case, a geologist.

The second case, the Cooper Homicide, occurred in Cary, North Carolina, in 2008. This case included digital evidence in the form of files found on the

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defendant's computer. On this computer, it was found that the defendant had looked at the area where the victim's body was located on Google Maps prior to the commission of the crime. This search history was stored in the computer's cache as tile images. At the time of this case, digital evidence was just emerging in the North Carolina court system. A forensic digital evidence specialist was brought into the case to provide expert testimony and break down the files that were found on the defendant's computer in a way that could be easily understood by the jury. During the discussion of this case study, the presenter emphasized the importance of qualifying an expert in the correct field—the individual should be able to truly be deemed as an expert in that field and that expert qualification must be relevant to the case at hand.

Through both case studies, the importance of making an expert witness' testimony as interesting and palatable as possible was emphasized. Juries can comprise individuals ranging in educational attainment and knowledge in various topics ranging from novice to expert. As such, it is important that the expert's testimony is presented in such a way that a large array of individuals coming from various backgrounds can understand and that the use of heavily technical language should be avoided because this can be perceived as jargon by those unfamiliar with the topic area. One way to accomplish this is through using demonstratives. A second way to accomplish this is by holding a mock trial with the expert before the trial to ensure the expert is speaking at a level that can be universally understood and that information is provided in bite-size chunks to the jury during examination of the expert. The presenter advised that it is common that not all jurors will follow the information presented by the expert, even when presented simply. However, if some jury members can follow the testimony, they can explain it to their fellow jurors during their deliberations.

Discussion also led to the importance of the jury selection process. If given the opportunity to select the jury, it is important to ensure those selected will not be resistant to the expert testimony. For example, identifying any preconceived notions jurors may hold is critical because this may impact the presentation of scientific evidence.

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Issues Surrounding Qualifications of an Expert Witness for Forensic Disciplines (Defense Perspective)

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Abstract

Firearm examiners make subjective decisions about whether spent ammunition was fired from the same firearm. For decades, this testimony was admitted with few limitations. The examiner was proffered and qualified as an expert in firearm comparisons, testified to the work they did, and opined on source attributions with absolute certainty or to a "reasonable degree of certainty." By and large, firearm examiners are also proffered as expert witnesses at admissibility hearings to explain the discipline's scientific validity, which is required for evidentiary reliability and thus admissibility. The qualifications necessary to perform a firearm examination are not the same needed to assess the discipline's validity and address the Daubert factors (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]), which track the scientific method. Judges routinely admitted firearms examination based on the practitioner's opinion that the method they used is valid. In the United States criminal legal system, judges may only consider what is before them. In most cases, this was solely the testimony of forensic examiners whose livelihood depended on the discipline's viability. They pointed to studies reporting a zero percent (or close to zero percent) error rate but were not qualified to explain these studies to the court. In recent years, a growing number of conflict-free research scientists have begun to analyze the existing foundational studies being held up to validate the method. There is now a debate within the broader scientific community about the foundational studies conducted to demonstrate the scientific validity of pattern matching disciplines—that is, whether the methods are accurate, repeatable, and reproducible. The scientific discourse has revealed flaws in the studies that demonstrate there is no known accurate error rate for the field. Once judges began to hear from these qualified research scientists as experts, court outcomes were different; judges began to limit testimony to what the science has demonstrated is reliable and preclude any source attributions beyond those limits. This presentation examined the qualifications necessary to speak to a method's scientific validity and address the Daubert factors to courts. The presentation also considered the importance of having conflict-free research scientists review the foundational studies of forensic disciplines to explain them to courts. In doing so, this raises the question of whether forensic practitioners should have a high level of education in science, technology, engineering, or math to be qualified as experts who can explain a discipline's validity to a judge or jury.

Synopsis of Presentation

This presentation highlighted scientific reliability as a keystone for admissibility of expert testimony. The 2016 President's Council of Advisors on Science and Technology (PCAST) Report (PCAST, 2016) laid the foundation for several criterion for studies to establish scientific validity. In taking on these types of scientific assessments, the need for the "relevant scientific community" to be

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expanded from only forensic practitioners to also include multidisciplinary research scientists was emphasized. Although the goals, aims, and skillsets of forensic practitioners and multidisciplinary research scientists are different, both are critical for completing these types of assessments successfully.

When examining the court's role in issues surrounding the admissibility of forensic opinions, there has historically been a failure of courts to limit testimony to that which is scientifically defensible; courts have presumed reliability rather than there being a true establishment of reliability. In many cases, methods have been admitted into court because of their history of admittance, as based on precedent; however, admittance does not directly mean these methods have undergone scientific scrutiny. As an interesting example, in the United States, judges and lawyers typically do not have a background in science; however, in comparison, for a judge in South Korea to preside over a case with science as an issue, that judge must have an expertise in that science.

Furthermore, the long-standing tension between science and law was highlighted. The law depends on precedents whereas science is forward-thinking. Given forensic science is always evolving, there is a need to examine how changes to the science will impact what is admitted into the courtroom. As such, assessments into the scientific validity of forensic science methods assist the courts in their determination of scientific reliability and validity and help them fulfill their duty as informed judicial gatekeepers. The presenter stressed the importance for a portion of forensic science practitioners' workdays to be allocated toward staying abreast of emerging research and technology.

Practice tips for forensic science practitioners and expert witnesses were presented. First, the importance of documentation was highlighted, including how it should be made equally accessible to both parties to enable a nonpartisan understanding of the forensic work completed in a case and to promote transparency. Robust documentation taken contemporaneously to the work that is completed enables those not involved in the forensic work to develop an understanding of how and why a conclusion was reached. Additionally, the importance of logging communication records was emphasized, including what information a practitioner had access to during their examination. Although a disconnect between constitutional rights and issues of practicality in operational laboratories was noted, the presenter urged for laboratories to develop and promote a practice of turning everything over to the courts and letting them decide what to do with the information. Second, the importance of developing greater focus on cognitive bias was stressed. The presenter advised that everyone should be educated on the sources of cognitive bias and the impact they may have on conclusions reached. This knowledge enables individuals to acknowledge the limitations of their work and take steps to mitigate the impact cognitive bias may have on their decision-making process and work products. The presentation emphasized that forensic laboratories are beginning to recognize the importance of incorporating cognitive bias into their training and highlighted recent research, resources, and publications that have unified the study of cognitive bias within various forensic science disciplines (Butler et al., 2021; Kunkler & Roy, 2023; Spellman et al., 2022). Employing a

systems approach in forensic science research, which will ultimately enable the development of data-driven standards and empirically based solutions within forensic laboratories and the courtroom, is crucial. In discussion of human factors in forensic science, 49% of attendees said they were comfortable with identifying sources of cognitive bias in their work and 52% of attendees felt there is adequate education and resources available related to identifying sources of cognitive bias in forensic science work.

Discussion also centered around the adversarial nature of the United States criminal justice system, to which the presenter emphasized that no one piece of evidence or witness is meant to make or carry the case. Expert witnesses are offering their expertise, and it is okay if that expertise is narrow. Furthermore, over 40% of attendees indicated they sometimes encounter experts being qualified or asked to opine beyond their expertise, demonstrating a disconnect within the courts and the importance for experts to stay within their lane.

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An Overview of Admissibility Decisions After the President's Council of Advisors on Science and Technology Report

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Abstract

In September 2016, PCAST issued a report to then-President Barack Obama assessing several forensic science disciplines for "foundational validity" (PCAST, 2016). PCAST concluded that certain disciplines met its standard; however, PCAST opined that "current evidence" supporting others, including firearms/toolmarks, "falls short of the scientific criteria for foundational validity." The National Association of Attorneys General, and later the National Center on Forensics (NCF; a program of the National Institute of Justice), has endeavored to track "PCAST decisions"—that is, post–September 2016 court decisions that address the admissibility of forensic science evidence (NCF, 2022). Most of these decisions were issued through written opinions and almost all of them cite the previously mentioned 2016 PCAST Report, typically because the party seeking to exclude or limit forensic science evidence cited the report. This presentation provided a snapshot of approximately 100 PCAST decisions that address the admissibility of forensic science evidence.

Synopsis of Presentation

Upon examining the database results of the NCF's *Post-PCAST Court Decisions Assessing the Admissibility of Forensic Science Evidence*, decisions related to the firearms/toolmarks, DNA, and latent fingerprint disciplines were the most prevalent, in that order. Less common disciplines included bitemarks, footwear, and ink dating. In cases where no exclusions were administered based on PCAST, the court could order expert witnesses to abide by certain limitations, or a consensus could be reached for experts to employ the DOJ's ULTR guidance documents (Office on Legal Policy, 2023). There is an increasing push for the forensic community to develop more standards related to the use of uniform language when drafting reports or testifying to results to reduce the variability in language used within and between forensic disciplines, forensic laboratories, and forensic scientists.

Regarding challenges to computer software programs used to reach decisions or form opinions on evidence identifications, discussion revealed that there tends to be challenges to the underlying data and source materials more so than the opinion or decision reached using these software programs. Courts have been hesitant to require litigants to submit the data. When litigants do request and acquire that information, it is often not used because combing through these data is challenging and time consuming.

Since the database currently only represents cases through fall 2022, the presenter recommended further expansion of the database, noting that cases after fall 2022 mostly involved firearms analysis. Although there is no ground-truth evidence for why firearm cases may be most likely to be challenged, it

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may be because this discipline was questioned in federal courts before PCAST or simply because of the high number of firearm cases in general. According to the presenter, comparative disciplines may be subject to more scrutiny than analytical disciplines, which was true for the 2016 PCAST Report as it solely examined comparative disciplines. As an attendee pointed out, the 2009 National Academy of Sciences (NAS) Report (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2009) resulted in disciplines such as firearms/toolmarks, latent fingerprints, and blood spatter being highly criticized because they were working in silos and not attached to research institutes or universities. Although it could not be verified whether there is still a disconnect between these disciplines attaching themselves to larger-scale studies, there has been a push for large-scale black box studies by litigants and the courts. The presenter advised that there are still challenges coming where the PCAST Report is being directly cited and that it is possible additional large-scale black box studies could be on the horizon in the coming years.

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The Impact of Daubert on Forensic Anthropology Expert Witness Evidence: Challenges, Exclusions, and the Influence on Research

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Abstract

Forensic anthropology exists within the medicolegal framework to assist law enforcement in the recovery, identification, and analyses of human skeletal remains. As a result, forensic anthropologists are often called upon to present the results of their work within a court of law as expert witnesses. In response to the 1993 United States Supreme Court Daubert decision (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]) and the 2009 NAS Report (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2016), many forensic anthropologists anticipated significant impacts and voiced concerns over the possibility of their expert witness testimony being excluded. This reaction included notable calls for the field to shift away from "subjective" or qualitative methods and focus on developing methods that relied on "objective" or quantitative data. This presentation examined the impact of Daubert on the field of forensic anthropology from three perspectives. First, published judicial opinions that referenced forensic anthropologists as expert witnesses were examined to determine how frequently such experts have been the subject of Daubert-type motions to exclude. Second, articles published in the *Journal of Forensic Sciences* were used to evaluate whether forensic anthropology research had shifted toward more "objective" or quantitative data in the decades since the Daubert ruling, as called for and predicted by multiple scholars in the field. Finally, qualitative thematic analyses were undertaken using the same dataset of articles published in the *Journal of Forensic Sciences* to better understand why forensic anthropology authors referenced Daubert in their research. Cumulatively, this research demonstrates the following: (1) although there has been an overall increase in the introduction of forensic anthropological expert witness evidence, Daubert-type challenges are exceedingly rare; (2) despite calls for a paradigm shift to more objective and quantitative methods, biological profile research has not seen the predicted shift; and (3) although many forensic anthropologists reference Daubert within their published research, there seems to be a fundamental misunderstanding of the Daubert decision and its impact on the field.

Synopsis of Presentation

This presentation focused more on how forensic anthropology has been impacted by Daubert and admissibility challenges than on the processes themselves. When analyzing pre-Daubert and post-Daubert data, no change in the frequency of admissibility challenges was observed. One may assume that skeletal trauma analysis and the estimation of postmortem interval (PMI) would be the most challenged forensic anthropology topics considering they are topics anthropologists testify on most frequently; however, photographic comparisons and foot/shoeprint comparisons had the highest number of challenges. Although anthropologists still might testify on photographic comparisons

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and foot/shoeprint comparisons, such as Dr. Louise Robbins in *Buckley v. Fitzsimmons*, 509 U.S. 259 (1993), these topics are not often considered as within the realm of a forensic anthropologist's role and may be deemed fringe topics to the discipline. Photographic comparisons were also clarified as requests to compare a defendant to closed-circuit television (CCTV) video footage for identification.

Following the establishment and adoption of the Daubert standard, the publication of the 2009 NAS Report, and because skeletal trauma analysis and the estimation of PMI are more qualitative in nature, there was an over-corrective push to quantify data, making "biological profile" the most published topic in the *Journal of Forensic Sciences* from 1972 and 2020. Additionally, potential reasons for the 10-year gap between the Daubert standard and the first forensic anthropology publication citing Daubert may be because only change to *Journal of Forensic Sciences* articles were searched, and the first publication came after *United States v. Llera Plaza*, 188 F. Supp. 2d 549 (E.D. Pa. 2002), a notable case on fingerprint admissibility.

Overall, the presentation showcased that forensic anthropology research should focus on the principles of reliable science rather than simply aiding admissibility, since the Daubert factors are not mandatory criteria to be met. The presenter further advised that it is important to steer away from justifying research solely because of Daubert and seeing the value in learning from case studies, observations, and error studies. Hopefully, the balance between qualitative and quantitative methodology reflected in the field can also shift back to a midpoint.

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PART II: THE FRYE STANDARD
OCTOBER 25, 2023

Establishing the Frye Standard: A Brief History of Scientific Expert Admissibility

Abstract

Established in 1923, the Frye standard (see *Frye v. United States*, 293 F. 1013 [D.C. Cir. 1923]), which centers around "general acceptance in the relevant scientific community," was the primary standard courts used to determine if purported scientific evidence should be admitted at trial through an expert witness. Although the Supreme Court's Daubert decision in 1993 (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]) dramatically changed the way federal judges were required to consider proffers of scientific evidence, variations of the Frye standard remain in use in some of the populous states in the country, including New York and California. This presentation discussed the history of the Frye standard and how its interpretation has led to the introduction of unreliable forensic sciences in the courtroom.

M. Chris Fabricant

Innocence Project

Synopsis of Presentation

This presentation discussed the background of *Frye v. United States* and how an increase in civil litigation paved a path for unreliable science to enter the United States court system, ultimately leading to the Daubert ruling. The Frye standard arose out of an early challenge to the use of a lie detector test. Up until that point, there had not been a need for a standard admission of scientific evidence in courts. With the Frye ruling, the court ultimately set the precedent that the courts will admit testimony so long as it is deduced from well-recognized scientific principles that have general acceptance by the scientific authorities related to the field of testimony.

In the 1970s and 1980s, the United States had an explosion of civil litigation cases, including personal injury, product liability, and medical malpractice. Expert witnesses became so common and widely used that many individuals no longer working in the scientific fields were serving as professional expert witnesses. Some of the information presented in expert testimony was valid, while some of it was not. In response, the corporate bar complained that the relevant scientific community was being defined by experts whose livelihoods depended on the continued acceptance of whatever field, technique, or discipline on which they were testifying.

In 1991, Peter Huber published *Galileo's Revenge: Junk Science in the Courtroom* (Huber, 1991), which was an attack on the use of "junk science" in civil litigation and is credited with coining the term junk science. The junk science debate became a part of a large corporate effort toward tort reform to set a new standard for judges to make independent judgments about the reliability of science presented in court. Particularly in the 1990s, interpretations of Frye and the junk science debate were much more prolific in the civil community than the criminal community. This was evident by the poll question posed to

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attendees on whether they were aware that the Frye standard was expanded due to an increase in civil litigation, to which 85% of attendees responded no.

The presentation also discussed how the junk science debate was brought over to the criminal side of litigation in the post-Daubert era and how this has played into a contemporary interpretation of the Frye test. Ten years after the 1993 Daubert decision, civil litigation saw a 40% increase in exclusion of plaintiffs' experts. Although many states across the country began adopting this new standard, some states retained Frye; nonetheless, it created a conversation regarding scientific evidence in criminal litigation. In 2006, after taking notice of wrongful convictions and some issues with forensic techniques, Congress asked the NAS to examine the state of forensic science. This congressional charge led to the junk science debate being brought to criminal litigation.

Previous interpretations of Frye would argue that a Frye hearing is unwarranted absent a novel or experimental scientific theory, yet familiarity does not always breed accuracy as there are ever-evolving views and opinions in the scientific community that may require a Frye hearing with respect to a familiar technique. This is evident in *People v. Williams*, NY Court of Appeals (2020) and *People v. Foster-Bey,* NY Court of Appeals (2020). Additionally, admissibility even after a general acceptance through a Frye hearing is not always automatic as seen with previously accepted techniques like hair comparisons and bitemark matching, which have long been accepted in their relevant scientific communities but have recently come into question. Courts cannot use novelty as the only rule of whether a hearing is granted because jurisprudence would say all these previously accepted techniques are valid and reliable. In defining the relevant scientific community, modern Frye jurisprudence from cases like *People v. Williams, People v. Foster-Bey*, *Commonwealth v. Ross*, No. 1738 WDA 2018, 14 (Pa. Super. Ct. 2019), and *People v. Coy*, 669 N.W.2d 831, 838 (Mich. Ct. App. 2003) would suggest that those with no professional or financial interest in the matter must be supportive in a discipline's acceptance. Although these decisions usher in a new interpretation, they are in line with the original Frye case in "physiological and psychological authorities" in evaluating lie detector tests.

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General Acceptance and Scientific Reliability: Does One Ensure the Other?

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Abstract

This presentation explored the intersection of Frye's general acceptance standard with scientific reliability. Reliability is a critical property of any analytical science; we cannot trust the results of a test if that test is not reliable. Reliability is defined by several scientific standards and is proven initially through a validation study. After completing a validation study, reliability is monitored and maintained through a properly designed quality control program. When a scientific result comes before the court, the judge must determine if the underlying test and the results produced from the test are generally accepted as reliable in the relevant scientific community. However, the individual offering the test result will be the individual who defines the scientific community. This can lead to an improper conflation of general acceptance and scientific reliability. This presentation evaluated this issue through examining breath alcohol testing.

Synopsis of Presentation

The definition of scientific reliability as it pertains to forensic science incorporates aspects of multiple definitions wherein accuracy of a measurement is important, but precision is essential so that a forensic scientist can trust that their instrument is consistently providing accurate results over time. This was demonstrated with the classic broken clock example in which the clock accurately reflects the time twice a day, but one cannot consider it to be precise and therefore cannot trust its reliability. Forensic scientists must be able to trust that their measurements and testing processes are capable of reliably producing accurate results because the true value is not known.

The International Organization for Standardization (ISO) 17025:2017 *General requirements for the competence of testing and calibration laboratories* is a fundamental standard for good quality analytical and measurement science across all fields albeit not specific to forensic science (ISO, 2017). The ANSI National Accreditation Board (ANAB) ISO/International Electrotechnical Commission (IEC) 17025 Forensic Testing Laboratory accreditation requirements (ANAB, n.d.), formerly through the American Society of Crime Laboratory Directors (ASCLD), are intended for quality assurance in forensic science testing and calibration laboratories. Additionally, consensus-based forensic science standards are produced and published through the American Academy of Forensic Science (AAFS) Academy Standards Board (ASB) and the National Institute of Standards and Technology's (NIST's) Organization of Scientific Area Committees for Forensic Science (OSAC) Registry to establish best practice recommendations and guidelines for consistency across forensic laboratories. Although the auditing of certain forensic disciplines by accrediting organizations can increase reliability, it does not by itself guarantee general acceptance, which is often viewed as a totality of circumstances approach. The presenter also emphasized the importance of careful jury selection (i.e.,

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choosing jury members who are more likely to be receptive to the arguments in a particular case).

To demonstrate scientific reliability, there must be validation studies to show that a technique is fit for purpose; standard operating procedures for the proper, consistent use of an instrument or method; traceable reference materials as forensic analyses involve the comparison of unknowns to knowns to reach conclusions; quality control programs incorporated into all levels of the laboratory workflow to monitor and document performance; uncertainty of measurement determinations to account for the range of potential values given a method's accuracy and precision across repeated measurements; and documented procedures for the proper upkeep of equipment and instruments to ensure they are functioning as intended and within the predetermined specifications. A scientifically reliable method can produce an estimate of the true value with a reported uncertainty of measurement to establish the range of acceptable values in which the true value is likely to fall within some level of confidence.

Unlike the scientists who use the scientific method to determine reliability, judges do not conduct their own evaluations and must instead rely on experts to rule on the admissibility of the evidence or testimony. The proponent of the evidence defines and speaks for the relevant scientific community, but in doing so, it is possible to establish a consensus through the opinions of a narrow field of experts who may or may not have a personal vested interest in the outcome. If there are contradictions, the guidance of the broader community should take precedence over the narrower scientific community or standards. As an example, the presenter described a tarot card reader testifying to the reliability and admissibility of tarot card reading (i.e., their livelihood). The presenter cautioned that if the relevant scientific community does not include a proponent offering a conflicting view, it is possible for "junk science" to enter the courtroom, indicating that general acceptance does not necessarily equate to scientific reliability. There may not always be an opponent testifying opposite to the proponent of the evidence as there are costs associated with hiring an expert, but there is the opportunity for cross-examination by the opposing counsel and judge. As a practical example, attendees were asked to consider the relevant scientific community and evidence of reliability for bitemark testimony for comparison purposes, which does not meet current forensic standards for admissibility according to the Texas Forensic Science Commission (2016).

Attendees were walked through an example of breath alcohol testing using the Intoxilyzer 9000, a scientific technique that is being operated mainly by nonscientists. At first glance, breath alcohol testing appears scientifically reliable because it displays many elements of proper metrology (e.g., infrared spectrometry, calibrations, performance verifications, traceable solutions with defined tolerance ranges, a defined analytical range that covers the full range of possible readings). However, upon inspection of Intoxilyzer 9000 reports, the results are presented without reference to an uncertainty of measurement. As stated in ISO 17025:2017 (standard 7.8.3, section c), the measurement

uncertainty should be reported if "it is relevant to the validity or application of the test results" and "the measurement uncertainty affects conformity to a specification limit" (ISO, 2017). In breath alcohol testing, uncertainty is an important part of the test result, especially if the range of possible values brackets the common per se limit of 0.08 g/210 L. Based on the metrological requirements discussed, a breath alcohol result would not be scientifically reliable without its uncertainty reported, but it would be generally accepted by the law enforcement community called to testify as the administrators of the breath alcohol test in the field. This topic was revisited at the conclusion of the discussion where the presenter argued that it is time to demand the same testing and reporting requirements in breath alcohol testing as is required of the blood alcohol testing counterpart, namely reporting the result with the associated measurement uncertainty as is standard practice in metrological science.

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Scientific Controversies: Frye Standard

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Abstract

Scientific controversies? Why are there scientific controversies in forensic science disciplines with robust supporting data? In this presentation, the attendees explored why these controversies exist when forensic evidence is challenged under the Frye legal admissibility test (see *Frye v. United States*, 293 F. 1013 [D.C. Cir. 1923]). The question under Frye is simple: Is this forensic science evidence generally accepted as reliable in the relevant scientific community? Judges are not expected to become experts in various scientific disciplines. Instead, the courts look to the scientists for their view of the science. Looking deeper into the Frye standard reveals where the controversy lies—who is the relevant scientific community? Depending on the party in the litigation, the definition for the relevant scientific community varies greatly. Using the example of forensic disciplines that are routinely challenged under the Frye test, this presentation highlighted the crux of the controversy and where courts land in defining the relevant scientific community.

Synopsis of Presentation

The role of the United States Attorney, as described in *Berger v. United States*, 295 U.S. 78 (1935), is not to win a case, but to ensure that justice shall be done using only legitimate means and refraining from all improper methods that may lead to a wrongful conviction. Additionally, American Bar Association Standard 4-1.2(b) Functions and Duties of Defense Counsel states that the defense counsel should be "loyal and zealous advocates for their clients," which means that they may challenge the evidence or technique used in one case and champion it in another (American Bar Association, 2017). The presenter reiterated the basic premise of the Frye standard and cited the *Matter of State of NY v. Hilton C.*, 158 A.D.3d 707 (2nd Dept. 2018) ruling that "scientific evidence need not receive the unanimous endorsement" but should be "generally acceptable as reliable," keeping with the sentiments expressed in Frye. The presenter asked the audience what percentage constitutes "general acceptance" in their opinion; the poll received a wide range of responses with most agreeing that it should be at or above 50%.

Judges are not expected to become amateur scientists, so they must instead rely on the expert testimony of those within the relevant scientific community. The presentation demonstrated the importance of understanding and defining the relevant scientific community with several pointed questions and examples, including the following: Would you hire a cardiologist to conduct a root canal or an electrical engineer to build a bridge? Would you trust matters of contract law to a prosecutor or a transactional lawyer who specializes in it? To define the relevant scientific community for expert testimony, the presenter described the levels using a tiered cake analogy. The bottom three tiers include everyone

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with a Bachelor of Science degree, anyone with a Doctor of Philosophy, and all practicing scientists. These levels are beyond the scope of the relevant scientific community, and it is only the top three tiers—research scientists in the field, forensic oversight bodies, and the practitioners who use the scientific technique every day—that should be considered the relevant scientific community in expert testimony.

However, the defense will often argue for a wider scope of individuals to be included in the relevant scientific community. Looking at the situation strategically, the goal of the defense is to present arguments within a Frye hearing to preclude or limit any forensic evidence that could potentially incriminate their client. In situations where the true relevant scientific community accepts and approves of a technology or technique, the defense must search from a broader pool to find a naysayer. As such, the defense believes that the relevant scientific community must include multidisciplinary research scientists who know quantitative methods, statistics, psychology, human judgment, and neuroscience, or those who consider themselves "anti-expert experts." The presenter opined that "anti-expert experts" are accomplished individuals in other fields, but they are not "relevant" experts with knowledge of the forensic discipline in question that they are being hired to criticize. In *United States v. Porter*, 618 A.2d 629 (D.C. 1992), 1 year prior to the Daubert decision, it was stated that a consensus must be reached by a group consisting of those "whose scientific background and training are sufficient to comprehend and understand the process and form a judgment about it." In a more recent case, *People v. Brito Vasquez* (Ind. 2203/19 NY Supreme Ct.),§ the decision criticized the "elitist view of applied science as a poor relation of pure science" that is often purported by the defense in an attempt to "articulate a scenario in which general acceptance can be called into doubt."

In recent years, Frye challenges on the impression and pattern matching disciplines, such as firearms/toolmarks, have surpassed DNA in frequency. For a wider view of Frye and Daubert cases, challenges, and decisions, the National Center on Forensics (NCF) resource entitled *Post-PCAST Court Decisions Assessing the Admissibility of Forensic Science Evidence* was offered as a good starting point (NCF, 2022). This user-friendly resource compiles the relevant cases and their outcomes in a searchable list. However, the audience was cautioned that uncharacteristic decisions are published more often than common decisions. The presenter concluded with a quote from the National Research Council (NRC) report entitled *The Evaluation of Forensic DNA Evidence* that states "a wrongly accused person's best insurance against the possibility of being falsely incriminated is the opportunity to have the testing repeated" (NRC, 1996). This quote serves as a reminder that the ability to retest evidence is an important part of the United States' adversarial criminal justice system. However, in the presenter's 20 years as a prosecutor, they could not think of any case where there was a request to retest a fingerprint or firearm/toolmark from the defense in an active case (i.e., not postconviction litigation) and that these types of requests are generally rare.

§ This case opinion is unpublished.

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Out of the Frye Pan and Into the Fire: How to KISS Your Judge and Defend Your Forensic Technology in Court

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Abstract

Prosecutors and laboratory managers face challenges to even the most well-established forensic evidence. Defense lawyers routinely claim that tried-and-true forensic techniques should be precluded because these techniques are not generally accepted as reliable in the relevant scientific community (see *Frye v. United States*, 293 F. 1013 [D.C. Cir. 1923]) or because the techniques are not based on sufficient facts or data and the proposed testimony is therefore not the product of reliable principles and methods (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]). These attacks are made even though the same disciplines sometimes aid in the exoneration of suspects in both pretrial and postconviction settings. Frye and Daubert challenges are routinely made to DNA testing, probabilistic genotyping software, serology testing, gunshot triangulation software, cell phone and cell tower location data, facial recognition software, breathalyzer and gaze nystagmus tests, latent fingerprint comparisons, and firearm/toolmark comparisons, among many other types of forensic evidence and techniques. Laboratories and prosecutors must work together when faced with these challenges to scientific evidence. Together, laboratories and prosecutors must create an educational package with one student in mind—the judge who will decide whether the jury will ever hear results from the forensic testing on which laboratories have spent an enormous number of resources. This educational package will have to be comprehensive yet simple enough so that a judge can understand it, following the "Keep It Simple, Stupid" rule of thumb. Sometimes this challenge can be met on paper whereas sometimes it will have to be battled out on the witness stand.

Based on facing many Frye challenges in New York City, this presentation provided suggestions for the best ways to prepare and present complex scientific evidence, including the use of accreditation standards; recommendations made by the Scientific Working Group on DNA Analysis Methods, NIST, and international bodies; peer-reviewed articles; conference presentations and workshops; validations; adoption of disciplines and technology by other laboratories and agencies; and the problems that use of technology can help avoid. An important aspect of these scientific admissibility hearings focuses on what to expect from experts. Because the United States operates in an adversarial system, lawyers on both sides of admissibility hearings can be expected to research expert witnesses and vigorously challenge them based on expertise, bias (financial or otherwise), and whether they are truly members of the relevant scientific community or represent outliers making a living by testifying against particular disciplines.

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Synopsis of Presentation

This presentation discussed how to defend a Frye challenge. Although Frye challenges are not new and typically do not focus on novel technologies other than probabilistic genotyping, the types of attacks courts are seeing now are new and related to government reports reportedly questioning forensic science, like the 2009 NAS Report (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2009) and the 2016 President's Council of Advisors on Science and Technology (PCAST) Report (PCAST, 2016). Instead of arguing that an entire discipline is unreliable, modern Frye hearings are centering on limiting an expert's testimony, like arguing an error rate is too low or that there is no minimum number of minutiae points required to make an identification. There is a legitimate concern regarding testifying to 100% certainty or that a match is a match to the exclusion of all others; however, the United States Department of Justice (DOJ) Uniform Language for Testimony and Reports (ULTR) guidance documents provide reasonable limitations that do not dilute testimony (Office of Legal Policy, 2023).

The presenter recommended teaching judges about the science so that it is clear and so that they can use a forensic scientist's testimony and written documentation in their own decisions on which other judges can rely. Using visual aids was suggested to help the court understand the science. Forensic laboratories should invite lawyers into their laboratories and show them the instrumentation, equipment, and workflows and to discuss the specific protocols like audits, inspections, and quality assurance. Having this first-hand knowledge will allow prosecutors to become better advocates in court. When posed the question of whether this should be an ongoing collaboration or just in preparation for a specific case, the presenter discussed that the New York City District Attorney's Office would have regular customer working group meetings with the two laboratory systems. This sort of collaboration helps ensure the prosecution accurately states what the evidence is and does not overstate conclusions or misinform the court or jury.

In an effort to demonstrate general acceptance of a technology, building a deck of peer-reviewed journal articles or presentations would be beneficial. Presentations, especially at professional conferences, are relevant here as they target an audience of subject matter experts generating conversation and debate. In response to the 2016 PCAST Report, the DOJ published a statement specifically regarding feature-comparison disciplines (DOJ, 2021). In this report, a variety of studies can be found describing low error rates, and this is a good resource to use as a starting point for gathering this documentation.

Lastly, the presenter discussed some of the reports that critics of forensic science may use to target the foundational validity of certain disciplines. In addition to the 2009 NAS Report and the 2016 PCAST Report, the 2008 NRC *Ballistic Imaging* Report (NRC, 2008) and NIST's *DNA Mixture Interpretation: A Scientific Foundation Review* (Butler et al., 2021) were mentioned. It is important to note the intention of the documents and how to respond if a motion cites these documents.

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Case Studies on Admissibility of Expert Witness Testimony Under Daubert and Frye

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Abstract

The 2003 science editorial "Forensic science: Oxymoron?" introduced the Daubert ruling (see *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 [1993]) to the scientific community and culminated in a congressional hearing that charged the NAS with reviewing the praxis of forensic evidence such as fingerprints, hair samples, bullet markings, and DNA (Kennedy, 2003). The 2009 NAS Report concluded that only DNA analysis met the scientific rigor to connect the evidentiary sample to a specific individual (Committee on Identifying the Needs of the Forensic Sciences Community & National Research Council, 2009). Although forensic anthropology was not directly mentioned in the 2009 NAS Report, the response by the discipline has been to frame research to address both the 2009 NAS Report and Daubert ruling to satisfy potential admissibility issues. To date, most states have adopted the Daubert standard or at least some form of Daubert. However, there are still a handful of states that have not. In this presentation, differences in expert witness testimony admissibility, including issues of allowing "junk science" into the courtroom, were explored through case examples in states such as Florida and North Carolina prior to and after their adoption of the Daubert standard.

Synopsis of Presentation

This presentation discussed case studies under various evidence laws from the perspective of an expert witness in forensic anthropology. The first case study was the Casey Anthony case, which occurred in Florida in 2011 under the Frye standard. The forensic evidence included human hair that only presented mitochondrial DNA, decomposition odor, positive chloroform test results, and insect activity found in the trunk of Anthony's car as well as duct tape found close to the human remains discovered in the woods. A poll question was posed to the attendees on whether they thought the forensic evidence introduced in the case would be admissible under Daubert and 52% said no. Ultimately, Casey Anthony was found not guilty of first-degree murder, aggravated child abuse, and aggravated manslaughter of a child. When asked whether this was the result of lack of education in the jurors or the over-exaggeration of the weight of the evidence, the presenter deemed that the latter was likely true.

The second case study involved a missing woman in North Carolina who was found decapitated a month after being reported missing. North Carolina was a Frye state until 2014. Experts disagreed about the victim's estimated postmortem interval (PMI), and one expert was ultimately barred from testifying in front of the jury. This was due to the barred expert using research that was not scientifically validated or accurate to estimate the victim's PMI. The victim's husband ended up being found guilty and was sentenced to death in 2014;

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however, the death penalty was vacated in 2018 by the North Carolina Supreme Court.

The third case study involved the death of a child in Virginia, which does not operate under the Frye or the Daubert standard. A Smithsonian Institution anthropologist who was not board-certified or even a member of AAFS used baby pictures to claim that the child suffered from severe malnutrition. Ultimately, the court could not prove that the child's parents were guilty of killing their son.

The last case study discussed took place in Ohio, a Daubert state, where there was a battle of experts in a death investigation where a woman was found deceased in the woods in a partially suspended kneeling position. A well-known strangulation expert for the prosecution concluded that the victim was strangled, and her death was staged as a suicidal hanging; however, defense experts—including a board-certified anthropologist–refuted these claims, indicating hanging could not be ruled out based on the victim's medical history. The victim's husband was on trial for her death and was ultimately found not guilty because of the largely circumstantial nature of the case.

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