

# Friction Ridge Opinion Evidence after *Daubert* and the NAS Report

## Introduction

### *Daubert*

In *Daubert v. Merrell Dow Pharmaceuticals* [1], the US Supreme Court rejected the “general acceptance” test of *Frye v. United States* [2], and mandated determinations of the “scientific reliability” of expert opinion evidence using the following mechanism:

Faced with a proffer of expert scientific testimony, then, the trial judge must determine . . . whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue. [1, p. 592]

Trial courts were advised to consider the following factors in ruling on the admissibility of proffered expert opinion testimony: (i) whether the type of evidence can be and has been tested by a scientific methodology; (ii) whether the underlying theory or technique has been subjected to peer review and has been published in the professional literature; (iii) how reliable the results are in terms of a potential error rate; (iv) the existence and maintenance of standards controlling the technique’s operation; and finally (v) a consideration of general acceptance [3].

In *Daubert*, the Court noted that “it would be unreasonable to conclude that the subject of scientific testimony must be ‘known’ to a certainty; arguably, there are no certainties in science.” [1, p. 590] This recognition of uncertainty in science is inconsistent with the expressions of absolute certainty used by some fingerprint examiners and may have prompted the admissibility challenges to friction ridge examiners following the *Daubert* decision [4].

### *NAS Report*

In 2006, the United States Congress commissioned the National Research Council of the National Academy of Sciences (NAS) to review the provision of forensic science services. A duly-appointed committee (the Committee on Identifying the Needs of the Forensic Science Community) of professionals from the legal, forensic science, and academic communities met throughout 2007 and 2008. The report (hereinafter “NAS Report”) was published in February 2009 [5]. In addition to the noncontroversial recommendations of increased funding and training, the NAS Report included statements about various forensic science disciplines suggesting that some current techniques and common expert opinions were inadequately grounded in science. In particular, the NAS Report found little support in science for “individualization” [5, pp. 141–142] testimony offered in some forensic science disciplines, including friction ridge comparisons:

“With the exception of nuclear DNA 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.” [5, p.7]

While recognizing that some well-established forensic science techniques used in crime laboratories are based on solid scientific principles and supporting research, other techniques:

“have been developed heuristically. That is, they are based on observation, experience, and reasoning without an underlying scientific theory, experiments designed to test the uncertainties and reliability of method, or sufficient data that are collected and analyzed scientifically.” [5, p.7]

After a description of the field of friction ridge analysis, the NAS Report discussed the method of data collection and analysis (ACE-V: analysis, comparison, evaluation, and verification) [6], methods of interpretation, and the reporting of results [5, pp. 137–142]. Throughout the discussion, the “intrinsic subjectivity” and variability of the examinations was repeatedly noted [7]. The report concluded with a summary assessment that:

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“Historically, friction ridge analysis has served as a valuable tool, both to identify the guilty and to exclude the innocent. Because of the amount of detail available in friction ridges, it seems plausible that a careful comparison of two impressions can accurately discern whether or not they had a common source. Although there is limited information about the accuracy and reliability of friction ridge analyses, claims that these analyses have zero error rates are not scientifically plausible.” [5, p. 142]

Error rate, and the assertion of some examiners that the ACE-V method has a zero error rate, was discussed in more detail with the NAS concluding that “[c]learly, this assertion is unrealistic, and, moreover, it does not lead to a process of method improvement.” [5, p. 143] The NAS Report was equally dismissive of representations of ACE-V as a validated scientific method:

“[ACE-V] is not specific enough to qualify as a validated method for [conducting friction ridge analysis]. ACE-V does not guard against bias; it is too broad to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results. For these reasons, merely following the steps of ACE-V does not imply that one is proceeding in a scientific manner or producing reliable results.” [5, p. 142]

The NAS Report concluded its assessment of friction ridge analysis with a litany of areas where additional research is needed: variability of features, ridge flow and crease pattern distribution, discriminating value of the various ridge formations and clusters of formations, and factors affecting the quality of latent prints [5, p. 144–145].

After this less than enthusiastic endorsement of the reliability of friction ridge analysis methodologies and opinions, the forensic science and legal communities waited for the judicial response.

### Response from the Courts

#### *Post-Daubert (1993–2009)*

While *Daubert* determined the applicable admissibility standard only for cases in federal courts, many states adopted evidence codes based on the Federal Rules of Evidence and the *Daubert* factors

for determining admissibility of expert testimony. However, challenges to the admission of friction ridge opinion evidence, which is widely used in criminal cases in state and federal courts, did not arise immediately after the 1993 *Daubert* ruling [8]. It was almost 10 years later that the challenges began in earnest and the first published decisions began to address the scientific reliability of friction ridge analysis under *Daubert* [9]. The court decisions varied in the particular areas of alleged weaknesses discussed: documentation deficiencies [10], inadequate research supporting testing procedures [11], minimal standards [12], or unknown error rates [13]. However, with a few exceptions [14], all the decisions supported the unrestricted admission of friction ridge opinion evidence, including opinions of individualization expressed as an absolute certainty [15]. Although friction ridge analysis evidence continued to be admitted without limitation, the objections and assertions that the techniques lacked sufficient supporting scientific research were noticed in the forensic and legal communities. In addition to legal commentary and scientific journal articles, the challenges were cited in the NAS Report [5, p. 143].

#### *Post-NAS Report (2009–2013)*

In many ways, the NAS Report mirrored the concerns raised in the post-*Daubert* cases about the scientific reliability of friction ridge analysis, but concentrated the focus to two primary areas: the scientific validity of the ACE-V methodology and the lack of an identifiable error rate. These two areas have also been the focus for the majority of admissibility challenges in the post-NAS Report cases. Although some courts expressed less deference to friction ridge opinion evidence [16], the post-NAS Report cases continued to admit such evidence with the observation that any issues concerning the limitations of the methodology should be explored on cross-examination [17]. Perhaps in recognition of the minimal chances of success of complete exclusion, more recent challenges have narrowed the focus to admission of friction ridge opinion evidence “insofar as it asserts that a particular latent print can be matched to a known individual’s print to the exclusion of all other individuals.” [18] This “absolute certainty” challenge is supported by the conclusions of forensic science professional organizations that the ability to individualize a single latent print *to the exclusion of all other*

*persons* is not supported by current research. The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) [19] revised its definition of “individualization” to remove the absolute certainty language from its protocols:

“Individualization is the decision by an examiner that there are sufficient features in agreement to conclude that two areas of friction ridge impressions originated from the same source. Individualization of an impression to one source is the decision that the likelihood the impression was made by another (different) source is so remote that it is considered as a practical impossibility.” [20]

A 2012 report from the Expert Working Group on Human Factors in Latent Print Analysis [21] also concluded that the claim that a latent print was “identified to one finger of a specific individual to exclude every other potential source in the universe” was “needlessly strong, not yet adequately supported by fundamental research, and impossible to validate solely on the basis of experience.” [22] The Working Group recommended:

“Because empirical evidence and statistical reasoning do not support a source attribution to the exclusion of all other individuals in the world, latent print examiners should not report or testify, directly or by implication, to a source attribution to the exclusion of all others in the world.” [22, Recommendation 3.7]

This narrower argument against absolute certainty in individualization testimony (“to the exclusion of all others”), supported by revised standards issued by the forensic science community, has been embraced by some courts [18,23]. Similarly, challenges to expressions of “zero error rate” also have the support of the forensic science community [22, Recommendation 6.3] and it is highly likely that the courts will also disallow testimony that errors “are inherently impossible” or that the ACE-V method has a “zero error rate.”

## Conclusion

The *Daubert* decision and the NAS Report were seminal events within the legal and forensic science communities. In response to these events, admissibility challenges were raised to friction ridge opinion

evidence. Once unheard of with respect to “the gold standard” of forensic science [24], these admissibility hearings opened discussions of the underlying methodologies and research supporting the fundamental assumptions of the expert testimony. Friction ridge analysis is based on three assumptions: the uniqueness of friction ridge patterns; the persistence of friction ridge pattern; and the transferability of the uniqueness of a friction ridge pattern to another surface. The final assumption concerning transferability has been the focus of most challenges regarding the scientific reliability of the identification of an individual based on a partial latent crime scene impression. After years of challenges to the ACE-V methodology itself, the most recent challenges narrowed the focus to individualization testimony with expressions of absolute certainty. These challenges were supported by revised standards within the forensic science community that prohibited examiners from reporting or testifying “directly or by implication” that a source attribution opinion is “to the exclusion of all others in the world.” [22, Recommendation 3.7] In recognition of the revised standards within the forensic science community, some courts have barred absolute certainty individualization testimony.

Using the milestones of *Daubert* and the NAS Report, the evolving legal landscape of friction ridge opinion evidence is apparent. As the forensic science community continues research in the areas identified by the NAS Report [5, pp. 144–145] and other areas to improve the practice of friction ridge analysis, more refined challenges – such as to expressions of error rate – are expected to be addressed by the courts in turn.

## References

- [1] 509 U.S. 579 (1993).
- [2] 293 F. 1013 (D.C. Cir. 1923).
- [3] The Court noted that the test did not have a controlling factor and other factors could be considered. 509 U.S. at 592–594.
- [4] Fingerprint evidence has been admitted in courts in the United States for over a century. The Illinois Supreme Court published the first appellate decision affirming the admission of fingerprint evidence. *People v. Jennings*, 96 N.E. 1077 (Ill. 1911). The appellate court relied heavily on the admission of fingerprint evidence in England (“the great success of the system in England”) where “experience has shown [fingerprint identification] to be reliable.” 96 N.E. at 1081. The court upheld

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- the admission of the identification evidence holding “that there is a scientific basis for the system of fingerprint identification, and that the courts are justified in admitting this class of evidence; that this method of identification is in such general and common use that the courts cannot refuse to take judicial cognizance of it.” 96 N.E. at 1082.
- [5] Committee on Identifying the Needs of the Forensic Science Community, National Research Council of the National Academies (2009). *Strengthening Forensic Science in the United States: A Path Forward*, The National Academies Press, Washington D.C.
- [6] ACE-V stands for “Analysis, Comparison, Evaluation, and Verification” and refers to a comparative analytical procedure used for several pattern comparison disciplines, including friction ridge analysis. Committee on Identifying the Needs of the Forensic Science Community, National Research Council of the National Academies, *Strengthening Forensic Science in the United States: A Path Forward*, The National Academies Press: Washington D.C., 2009 at pp. 137–140 (discussing ACE-V methodology as used in fingerprint comparison analysis); see also Scientific Working Group on Friction Ridge Analysis, Study and Technology, “Document #10: Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0,” (issued March 13, 2012) (available at: [www.swgfast.org](http://www.swgfast.org))
- [7] Committee on Identifying the Needs of the Forensic Science Community, National Research Council of the National Academies, *Strengthening Forensic Science in the United States: A Path Forward*, The National Academies Press: Washington D.C., 2009 at p. 139 (noting recent research that showed “experienced examiners do not necessarily agree with even their own past conclusions when the examination is presented in a different context some time later.”)
- [8] Commentators, both scientists and legal professionals, were critical of the “absolute certainty individualization” testimony of some fingerprint examiners even before the *Daubert* decision. See, e.g., W.N. Robertson, *Fingerprints, Relevance and Admissibility*, 2 New Zealand Recent Law Review 252 (1990); David A. Stoney, *What Made Us Ever Think We Could Individualize Using Statistics?*, 31 J. For. Sci. Soc. 197 (1991).
- [9] In *United States v. Sherwood*, 98 F.3d 402, 408 (9th Cir. 1996), the court relied on the defendant’s acknowledgment that “fingerprint comparison has been subjected to peer review and publication” to uphold the trial court’s decision to admit fingerprint evidence without holding a *Daubert* hearing.
- [10] See, e.g., *State v. Langhill*, 157 N.H. 77, 89–90, 945 A.2d 1, 11–12 (2008).
- [11] See *United States v. Collins*, 340 F.3d 672, 683 (8th Cir. 2003) (“While such evidence may not always satisfy a *Daubert* challenge due to deficiencies in test procedures . . . .”); *United States v. Crisp*, 324 F.3d 261, 267 (4th Cir. 2003) (“While the principles underlying fingerprint identification have not attained the status of scientific law . . . .”); *United States v. Baines*, 573 F.3d 979, 990 (10th Cir. 2009) (“this record does not show that the technique has been subject to testing that would meet all the standards of science”).
- [12] See *United States v. Mitchell*, 365 F.3d 215, 241 (3rd Cir. 2004) (“these [standards] are insubstantial in comparison to the elaborate and exhaustively refined standards found in many scientific and technical disciplines.”); *United States v. Havvard*, 260 F.3d 597, 599 (7th Cir. 2001) (noting that while uniform standards may not exist, “the unique nature of fingerprints is counter-intuitive to the establishment of such a standard.”)
- [13] See *United States v. Llera Plaza*, 188 F. Supp. 2d 549, 565 (E.D. Pa. 2002) (internal proficiency tests were “less demanding than they should be”); *United States v. Mitchell*, 365 F.3d 215, 239–240 (3rd Cir. 2004); *United States v. Crisp*, 324 F.3d 261, 268 (4th Cir. 2003) (“[proficiency] tests may not in and of themselves establish a low error rate, since a fingerprint used for testing purposes may be clearer and more complete than a print harvested from a crime scene.”)
- [14] The exceptions include a federal district court decision that was later withdrawn. *United States v. Llera Plaza*, 179 F. Supp. 2d 492 (E.D. Pa.), *vacated, withdrawn from publication, and superseded on reconsideration*, 188 F. Supp. 2d 549 (E.D. Pa. 2002). Another notable exception was a state trial court decision, *State v. Rose*, No. K06-0545 (Cir. Ct. Baltimore MD, October 19, 2007), which was at odds with a later federal court decision against the same defendant based on the same evidence, *United States v. Rose*, 672 F. Supp. 2d 723 (D. Md. 2009). In other cases, state appellate courts barred the admission of a conclusion that impressions were “simultaneously deposited,” *Commonwealth v. Patterson*, 840 N.E.2d 12 (Mass. 2005), and found admission of the friction ridge opinion evidence in error when the examiner failed to describe any common characteristics between the prints that supported his conclusion. *People v. Stafford*, 392 Ill. App. 3d 212, 910 N.E.2d 143 (2009).
- [15] Federal Judicial Center, *Reference Manual on Scientific Evidence* 3rd, The National Academies Press: Washington D.C., 2011, p. 82 n. 170 (and the cases cited therein); see also *United States v. Havvard*, 260 F.3d 597, 601 (7th Cir. 2001)
- [16] See *United States v. Aman*, 748 F. Supp. 2d 531, 542 (E.D. Va. 2010) (“In sum, the ACE-V method, although perhaps not worthy of the pedestal on which it has been historically placed, is sufficiently reliable to overcome *Daubert*’s bar to admissibility.”); *United States v. Love*, 2011 U.S. Dist. LEXIS 58390, \*17–18 (S.D. Cal. 2011) (“It is not disputed that the ACE-V method leaves much room for subjective judgment.”); *United States v. Herrera*, 704 F.3d 480, 486–487 (7th Cir. 2013) (equating fingerprint evidence with opinions offered by art experts on whether an unsigned painting was painted by a known painter of another painting and concluding that “[m]atching evidence of the kinds that we’ve just described, including fingerprint evidence,

- is less rigorous than the kind of scientific matching involved in DNA evidence,” but is admissible evidence) *Cf.* *United States v. Council*, 777 F. Supp. 2d 1006, 1012 (E.D. Va. 2011)(describing the objections to admissibility as “overstated” and “overblown”).
- The court in *Council* apparently failed to recognize any difference in the scientific reliability needed to admit “individualization” fingerprint evidence and the reliability of investigative methods used to exclude suspects. The court commented that barring admission of friction ridge analysis would effectively disallow a method that also “excludes the owner of a known print as the owner of a latent print, a result that in turn prevents an innocent individual from standing trial for a crime he did not commit.” 777 F. Supp. 2d at 1013. Barring the admission of the results of an analytical technique at trial clearly does not prohibit the technique from being used in an investigation - a fact readily observed with polygraph examinations which are generally inadmissible in criminal prosecutions but are commonly used in criminal investigations. *See United States v. Pavlenko*, 845 F. Supp. 2d 1321 (S.D. Fla. 2012).
- [17] *See United States v. Aman*, 748 F. Supp. 2d 531, 541 (E.D. Va. 2010) (“the issues defendant raises concerning the ACE-V method are appropriate topics for cross-examination, not grounds for exclusion”); *United States v. Love*, 2011 U.S. Dist. LEXIS 58390, \*30 (S.D. Cal. 2011) (“Of course, [the fingerprint examiner] will be subject to cross-examination about her background, methods, analysis, conclusions, and latent fingerprint analysis generally.”); *United States v. Stone*, 2012 U.S. Dist. LEXIS 8973, \*14 (E.D. Mich. 2012) (“Defendants’ criticisms of the ACE-V procedure and concerns about the risks of error such as false positive identifications go to the weight of the evidence and can be explored on cross-examination and/or through presentation of competing evidence.”); *United States v. Campbell*, 2012 U.S. Dist. LEXIS 86799, \*17–18 (N.D. Ga. 2012)(same). *See also* Memorandum Opinion and Order, *United States v. McCluskey*, Case 1:10CR02734-JCH (D. NM. July 22, 2013) at p. 15 (“While the Brandon Mayfield case, along with other weaknesses in fingerprint testing may provide fertile ground for cross-examination of the Government’s fingerprint identification expert, it alone does not outweigh the testing that has been conducted in this area.”)
- Even in jurisdictions that follow different standards of admissibility, challenges to the admission of friction ridge opinion evidence have been uniformly rejected. *See, e.g., State v. Luna*, 2013 IL. App. (1st) 072253, 2013 Ill. App. LEXIS 259 (2013) (affirming the admission of palm print evidence under the *Frye* general acceptance standard); *State v. Dixon*, 822 N.W.2d 664, 674–675 (Minn. Ct. App. 2012)(affirming the admission of fingerprint evidence under the *Frye–Mack* standard).
- [18] Memorandum Opinion and Order, *United States v. McCluskey*, Case 1:10CR02734-JCH (D. NM. July 22, 2013) at p. 12.
- [19] [www.swgfast.org](http://www.swgfast.org)
- [20] Scientific Working Group on Friction Ridge Analysis, Study and Technology, “Document #10: Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0,” (issued March 13, 2012) (available at: [www.swgfast.org](http://www.swgfast.org)) at p. 4. *See also* Scientific Working Group on Friction Ridge Analysis, Study and Technology, “Document #103: Individualization/Identification Position Statement (Latent/Tenprint) (issued September 11, 2012) (available at: [www.swgfast.org](http://www.swgfast.org)) (“SWGFAST recognizes that individualization has been used within the latent print community to mean ‘to the exclusion of all others.’ The ability of a latent print examiner to individualize a single latent impression, with the implication that they have definitely excluded all other humans in the world, is not supported by research and was removed from SWGFAST’s definition of individualization.”)
- [21] Supported by the Department of Justice, the Working Group was organized by the National Institute of Standards and Technology and the National Institute of Justice in 2008 to conduct a scientific assessment of the effects of human factors on latent print analysis. The Working Group was composed of 34 experts from the forensic science community, statisticians, psychologists, engineers, legal professionals, and representatives from professional organizations. The Working Group met nine times over 2½ years to hear presentations from other experts to make recommendations to reduce the risk of error and improve the practice of latent print analysis. The final report, issued in February 2012, contained over 30 individual recommendations on analytical procedures, reporting and testifying, training and education, facilities and equipment, and research.
- [22] Expert Working Group on Human Factors in Latent Print Analysis. *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach*. U.S. Department of Commerce, National Institute of Standards and Technology. 2012, at p. 197.
- [23] *See Commonwealth v. Gambora*, 457 Mass. 715, 933 N.E.2d 50 (2010) (finding any error in admitting the fingerprint evidence to be harmless, but commenting that “[t]estimony to the effect that latent print matches, or is “individualized” to, a known print, if it is to be offered, should be presented as an opinion, not a fact, and opinions expressing absolute certainty about, or the infallibility of, an “individualization” of a print should be avoided.”); *United States v. Cerna*, 2010 U.S. Dist. LEXIS 144424, \*22 (N.D. Ca. 2010) (fingerprint expert not allowed “to testify that her finding of a match is to the exclusion of all other people in the world”).
- [24] Federal Judicial Center (2011). *Reference Manual on Scientific Evidence*, 3rd Edition, The National Academies Press, Washington D.C., p. 73.

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