

**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA**

UNITED STATES OF AMERICA

v.

Cr. No. 98-362-10, 11, 12

CARLOS IVAN LLERA PLAZA,
WILFREDO MARTINEZ ACOSTA,
and
VICTOR RODRIGUEZ

OPINION

Pollak, J.

January 7, 2002.

Currently before the court is defendants' Motion to Preclude the United States from Introducing Latent Fingerprint Identification Evidence,¹ in which defendants contend that evidence relating to fingerprints fails to conform to the standard for admitting expert testimony under Federal Rule of Evidence 702, as interpreted by the United States Supreme Court in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993) and Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137 (1999). The United States has responded to defendants' motion by submitting a Combined Motion in Limine to Admit Latent Print

¹ This motion was initially submitted only by defendant Martinez Acosta, but was subsequently adopted by defendants Llera Plaza and Rodriguez.

Evidence and Response to Defendant Acosta’s Motion to Preclude the Introduction of Latent Fingerprint Identification Evidence. In this combined motion and response, the government has moved the court to (1) admit fingerprint evidence at trial and (2) take judicial notice of the uniqueness and permanence of fingerprints. Defendants have submitted a Reply Memorandum of Law in Support of Mr. Acosta’s Motion to Exclude the Government’s Latent Fingerprint Identification Evidence. In support of their respective positions, the defendants and the government have agreed by stipulation to rely on the testimony regarding fingerprint evidence that was presented to my colleague Judge Joyner in 1999 in United States v. Mitchell, Cr. No. 96-407 (E.D. Pa.). The testimony that is referred to in the remainder of this opinion is drawn from the Mitchell hearing.²

I. Background: Fingerprints and Their Identification

The defendants’ and government’s motions bring into question (1) whether each individual has a unique set of fingerprints and, if so, whether these unique fingerprints are permanent, and (2) whether latent prints—fragments of fingerprints “lifted” from a surface touched by an unidentified person—can accurately be matched to “rolled” prints—complete fingerprints that are obtained from an identified person through established fingerprinting

² Listed among the government’s potential witnesses in the case at bar are four FBI fingerprint examiners: Linda A. Hileman, James N. Hudson, Lashawn Sims, and Kim Decarla Smith. Also listed is FBI unit chief Stephen Meagher, a supervisory fingerprint specialist. Mr. Meagher was a government witness at the Mitchell hearing.

procedures. These questions warrant a preliminary examination of what fingerprints are, what the basic premises of fingerprint identifications are, and how fingerprints are identified.

A. What Fingerprints Are

At the Mitchell hearing, government witness Dr. William Babler, a former President of the American Dermatoglyphics Association,³ professor of gross anatomy, and embryologist, gave testimony on his research on the prenatal development of fingerprints. According to Dr. Babler, friction ridges—in simple terms, the lines on the ends of fingers that are arranged in patterns—start forming when the fetus is in the ninth or tenth week of development. Test. Babler, Tr. July 7, 1999, at 35–36.⁴ He described these early formations

³ Dr. Babler described dermatoglyphics:

[B]asically the configurations and the patterns that are found on the surfaces of the hands and feet, not only humans, but also primates. . . . The people who study it basically are physical anthropologists, medical geneticists, biologists, populational geneticists, a variety of people whose study—who study these configurations of what we call friction ridges, from the aspect of looking at specific populational genetic components, looking at the relationships of these configurations for determining predictability for, say, a medical condition or for a variety of related situations.

Test. Babler, Tr. July 7, 1999, at 12–13. The American Dermatoglyphics Association has approximately 200 members. Id. at 13.

⁴ Dr. Babler provided a more detailed description of what friction ridges are:

[T]he basal layer of the epidermis will produce new cells These cells then move toward the surface. As they do so, they change their shape. And there are different zones and I won't go into that.

As they get to the surface, they start to basically be cornified, that means that they release keratin. That's the horny outer covering of the skin,

as primary friction ridges, which develop “deep to the surface of the skin.” Id. at 40. At about fourteen weeks, sweat glands or sweat ducts begin to form, “start[ing] out as proliferations from the primary ridge. They grow down into the dermis and they ultimately mature into a duct and into a gland.” Id. at 44. The deep, primary ridges proliferate until sometime between the fetus’s fifteenth and seventeenth weeks of development, when primary ridges stop proliferating and secondary ridges begin to form. These secondary ridges, which begin to appear on the skin surface at about week seventeen, mature from weeks seventeen through twenty-four. According to Dr. Babler:

[T]his interface between the epidermis and the dermis really provides a template of the configuration of the friction ridges on the surface. And this template tends to be permanent. It does not change. Unless it gets injured, and it would take a deep injury. It would take an injury that would pierce through that interface such as a deep knife wound, or a deep burn to actually distort this template at the epidermal, dermal interface.

Id. at 47. In sum, “at the stage of 17 weeks then, we see that the friction ridge basically has become permanent and fixed on the surface of the skin. And it does not change thereafter.”

Id. at 50.

the covering of the skin.

Ultimately, they die and they are shed off. But since the cells that produce the skin are deep to the surface at the interface of the dermis and epidermis, the fact is that they will continue to grow because that layer keeps producing what the template holds and moves it up to the surface.

So you can keep on brushing away your skin. And indeed, it’s why it’s called friction ridge because there’s a lot of friction. You’re going to rub away cells.

Test. Babler, Tr. July 7, 1999, at 70.

Dr. Babler also discussed factors that may affect the arrangement of friction ridges, including genetics, environmental factors, chemicals, disease, and perhaps the shape of the volar pad (end of the finger):

[T]here are many different factors, many, many different factors that influenced the development of the friction ridge and ultimately the development of its secondary characteristics, the minutiae, the actual shape of the ridge itself. All these are so numerous and so individual that they—that I cannot conclude anything but that each and every friction ridge and their arrangements are individual and specific.

Id. at 63.⁵

Fingerprint examiners refer to three levels of detail that can be observed on mature fingerprints. At the first level of detail, an examiner looks at the overall pattern of a fingerprint. These overall patterns are described as whorl patterns, loop patterns, and arch patterns. See, e.g., id. at 53. According to the testimony of Sergeant David Ashbaugh, a fingerprint specialist of the Royal Canadian Mounted Police, level two detail consists of “a path of ridges,” which are islands (a group “of individual ridge units fused together”), or bifurcations (“friction ridges splitting into two”). Test. Ashbaugh, Tr. July 7, 1999, at 99–101. Stephen Meagher, an FBI unit chief and supervisory fingerprint specialist whom the government has listed as a witness in the case at bar,⁶ testified in Mitchell that when

⁵ On cross examination, Dr. Babler acknowledged that his research “did not examine statistically the frequency within which any given human being in a particular population group would have, say, for level two minutia in common,” and that he “didn’t examine whether they would have four, six, or any particular number in common.” Test. Babler, Tr. July 7, 1999, at 75.

⁶ See supra note 2.

fingerprint examiners look at level two detail, they often look for points (referred to as “Galton points”) on the ridges that the latent and rolled prints have in common. Test. Meagher, Tr. July 8, 1999, at 79, 83.⁷ The most intricate level of detail—level three detail—consists of “minutiae,” including sweat pores and their structures. *Id.* at 74.⁸

B. The Two Premises of Fingerprint Examination: Uniqueness and Permanence

The process of examining fingerprints is based on two premises—that each person’s fingerprints are unique and that they are permanent. The government’s contention that fingerprints are unique is supported in part by Dr. Babler’s testimony that the prenatal development of fingerprints is affected by “many different factors.” Test. Babler, Tr. July 7,

⁷ According to Sergeant Ashbaugh, Galton points are “almost less than level two, because you just look at where the ridge ends as opposed to where the ridge goes.” Test. Ashbaugh, Tr. July 7, 1999, at 130.

⁸ It appears that, at one time, there was disagreement among fingerprint specialists about the utility of examining sweat pores. According to a 1972 FBI publication that was quoted at the Mitchell hearing:

Writers on fingerprints quite frequently mention the value of poroscopy in affecting [sic] identifications where only a few characteristics are present. FBI technicians know of no case in the United States in which pores had been used in the identification of fragmentary impression. To the contrary, our observations on pores have shown that they are not reliably present and that they can be obliterated or altered by pressure, fingerprint ink, or developing media.

Test. Ashbaugh, Tr. July 7, 1999, at 213–14 (quoting FBI, *An Analysis of Standards and Fingerprint Identification* (1972)). Sergeant Ashbaugh stated that he disagreed with this analysis. *Id.* at 214. This dispute may now be a thing of the past: Mr. Meagher, the FBI fingerprint specialist, described the examination of level three detail, including pores. Test. Meagher, Tr. July 8, 1999, at 74–75, 84.

1999, at 63. The government also relies on a survey directed by Mr. Meagher, in which he sent the latent fingerprints and ten-print card (rolled fingerprints) of Byron Mitchell, the defendant in Mitchell, to law enforcement agencies in all fifty states. The state fingerprint examiners were asked, inter alia, whether the rolled prints matched any prints in their repositories.⁹ Except for West Virginia, which did not have sufficient technological capabilities, the state agencies used automated or computer-run programs to compare Mr. Mitchell's ten-print card with the records in their repositories. The only state that had a "hit" was Pennsylvania, the state in which Mr. Mitchell was incarcerated. Test. Meagher, Tr. July 8, 1999, at 126.

The government also bases its claim of uniqueness on an algorithmic study, dubbed the 50k x 50k study, in which 50,000 fingerprints, all in loop arrangements and taken from white males, were compared with each other. The goal of this study, which was comprised of two separate tests, was to determine the probability that fingerprints of two people could be identical. Id. at 157–58. Donald Ziesig, an algorithmist at Lockheed Martin Information Systems who played an important role in developing the FBI's computer-based fingerprint system (the Automatic Fingerprint Identification System, or AFIS), Test. Ziesig, Tr. July 9, 1999, at 32–39, was a developer of the 50k x 50k study and explained in detail how it operated. Id. at 50–80. The result of the first test, in which full-sized, one inch fingerprints

⁹ Examiners were also asked if Mr. Mitchell's rolled prints matched the latent prints. See infra, Part V.C.1.b.

were compared with each other, was that the probability of finding two people with identical fingerprints was one in ten to the ninety-seventh power. *Id.* at 68, 73. In the second test, the rolled prints were artificially cropped to the average size of latent prints so that only the center 21.7% of the rolled prints was analyzed, with the resultant conclusion that the probability of finding two different, partial fingerprints to be identical was one in ten to the twenty-seventh power. *Id.* at 73–74.

The government also contends, based on Dr. Babler’s testimony, that fingerprints do not change over time, but are permanent. In particular, Dr. Babler testified that “at the stage of 17 weeks then, we see that the friction ridge basically has become permanent and fixed on the surface of the skin. And it does not change thereafter.” Test. Babler, Tr. July 7, 1999, at 50. These two premises—uniqueness and permanency—provide the basis for associating a particular fingerprint with a particular individual, and for matching latent fingerprints with rolled fingerprints.

C. Examination of Fingerprints

A fingerprint examiner’s job consists of comparing latent and rolled fingerprints to determine if the person who left the latent prints can be identified. The FBI describes latent prints in a training manual:

[T]he ridges of the fingers and palms are in intermittent contact with other parts of the body, such as the hair and face, and with various objects, which may leave a film of grease or moisture on the ridges. In touching an object, the film of moisture and/or grease may be transferred to the object, thus leaving an outline of the ridges of the fingers or palm thereon. This print is called a

latent impression, the word “latent” meaning hidden, that is, the print many times is not readily visible.

U.S. Dep’t Justice, Fed’l Bur. Investigation, *The Science of Fingerprints: Classification and Uses* 170, reproduced at Def. Mot. Ex. 9.

According to the testimony of Mr. Meagher, latent prints are usually incomplete—the average size of a latent print is 21.7% the average size of a rolled print, Test. Meagher, Tr. July 8, 1999, at 162–63—and are often distorted. Distortion is due to the manner in which the finger comes into contact with the surface, the nature of the surface on which the print is left, and the property of the material and/or medium that is used to “lift” the latent print. Test. Ashbaugh, Tr. July 7, 1999, at 160. Rolled fingerprints, by contrast, are obtained from known persons and are taken under controlled circumstances. The average size of a rolled fingerprint is one square inch. *Id.* at 98.

In comparing latent and rolled prints, fingerprint examiners employ a process known as “ridgeology”¹⁰ or ACE-V, an acronym for “analysis,” “comparison,” “evaluation,” and “verification.” Sergeant Ashbaugh testified that, during the analysis stage, examiners look at the unknown, or latent, print and note both the “anatomical aspects” of the fingerprint and the clarity of the print. He described the analysis stage in some detail:

¹⁰ “Ridgeology” is a term that was frequently mentioned during the Mitchell hearing. Sergeant Ashbaugh testified that he invented this term; he defined “ridgeology” as “the study of the uniqueness of the friction ridges and the use of that information for personal identification.” Test. Ashbaugh, Tr. July 7, 1999, at 136.

Does it have first, second and third level detail or a combination?

What is the clarity of the print? We would then look at all the ridge paths, all the ridge arrangements. We'd explore ridge shapes and we would note any red flags.

Red flags—I'll be very brief with this because it is a very large area—we would look for any lines running in the print that could have been caused by pressure, substraight [sic] or matrix smears. We would look for areas of fat ridges, possibly that could be caused by overlapping ridges. We'd look for differing amounts of pressure. We'd look for similar ridge characteristics close to each other. This could mean a double tap, two pressures and a [sic] again, an overlapping print. We'd look for shadows, shadow ridges in the furrows, which also could mean two prints deposited.

We'd look for misaligned ridges protruding into the furrow. We'd look for cross-over ridges running through the furrow and, of course, we'd look for inappropriate print outline.

Id. at 113–14. After analysis:

[W]e move on to comparison, and comparison is carried out in sequence or systematically and we start—first of all, we would look at first level detail, is the overall pattern configuration in agreement. And then we would look at—start at an area that is common to both the unknown and the known print. And we would start at a common area and we start systematically comparing all the various friction ridge arrangements and friction ridge shapes, including relative pore position, if it's at all possible.

The comparison is something that is very objective. We're dealing with physical evidence and if I discuss something in the ridge arrangement, I should be able to point to it, so it's a very objective process.

Once the comparison is complete, and we recommend that the whole print be compared, the next thing that we would do is then evaluate what we saw during comparison as far as agreement of the various ridge formations. And I break it down into actually two separate areas. The first area is, do I have agreement? If you say yes to that, if you form the opinion you have agreement, then you have to ask yourself, is there sufficient unique detail present to individualize?

That final decision is a subjective decision. It's based on your knowledge and experience and your ability. And that, if you say yes, I feel there's enough to individualize, then you formed an opinion of identification.

The conclusions that we recommend that are available to you at the end of identification, would be elimination, which usually would start very early

in the identification process, identification, a situation where you have sufficient volume of unique details to individualize. And a situation where you have agreement, but you're unable to individualize or eliminate. And, in other words, you can't differentiate from others. And those are the three conclusions that we recommend that you can form.

From there we move into the very last box, which deals with the verification, which is a form of peer review, and it is part of the scientific process. From this point the person actually starts right at the beginning and goes through the whole identification process again individually.

Id. at 114–16.

In some state jurisdictions in the United States, and in some foreign jurisdictions, fingerprint examiners must find a minimum number of Galton points (characteristics on the fingerprint ridges) in common before they can declare a match with absolute certainty. Id. at 143–45. The FBI switched from relying on a mandatory minimum number of points to no minimum number in the late 1940s. Test. Meagher, Tr. July 8, 1999, at 105.¹¹ Testifying in

¹¹ The FBI does use a “12-point quality assurance” process, as explained by Mr. Meagher:

There have certainly been a number of points requirement in terms of a quality assurance effort. We have today what's referred to as a 12-point quality assurance issue. And that is, generally speaking, at the level two information. That is saying when you start to go below that, that requires a close scrutiny by a supervisory examiner or more senior examiner, simply as a quality assurance mechanism. It has nothing to do—

A: Would that be in addition to the normal verification that you talked about or that has been talked about?

A: Yes. It is, as I implied, a quantity—a quality assurance measure that we have implemented. It does not—it did by no means imply that you cannot individualize on less.

Test. Meagher, Tr. July 8, 1999, at 104–05. In a previous part of his testimony, Mr. Meagher referred to the point system as “a simplistic way of explaining the identification

United States v. Havvard, 117 F. Supp. 2d 848 (S.D. Ind. 2000), aff'd 260 F.3d 597 (7th Cir. 2001), Mr. Meagher discussed the absence of a uniform standard prescribing a minimum number of points in common as a precondition of finding a match. Judge Hamilton, in his opinion holding fingerprint identification testimony admissible, referred to Mr. Meagher's testimony, which he found persuasive:

Meagher testified that there is no single quantifiable standard for reaching an identification opinion because of differences in both the quantity of characteristics shown in the latent print and the quality of the image. For example, if a latent print shows a relatively small portion of a fingerprint but has a very clear image—one that allows clear identification of level three detail such as the shapes of ridges, locations of pores, and the like, a reliable identification may still be possible even with relatively few level two “points.”

Meagher's explanation makes sense, and the court credits it. See also Moenssens, *et al.*, *Scientific Evidence in Civil and Criminal Cases* at 514–16 (by tradition, latent print examiners in the United States have required a match of at least six to eight characteristics to show identity, but most experts prefer at least ten to twelve; in English courts 14 to 16 matches are required for identity). Professor Moenssens also reports the results of study conducted for the International Association for Identification, which concluded that there was no valid basis for requiring a predetermined minimum number of ridge characteristics, and that an identification opinion must take into account other factors, including the quality and clarity of the impressions. *Id.*

117 F. Supp. 2d at 853.

To aid them in deciding whether a latent fingerprint and a rolled fingerprint were deposited by the same individual, FBI fingerprint examiners are trained in the “quantitative/qualitative process.” Test. Meagher, Tr. July 8, 1999, at 78. This process

process to the jury.” *Id.* at 99.

denotes an inverse relationship whereby the more quantity of detail that can be matched, the less clear the print has to be, and vice versa:

For example, if a print has a large number of level two information of Galton details, the quality does not have to be there present to provide level three information.

He can make an identification and individualize strictly based on level two information.

However, the contrary is that if he has small numbers of the level two information, he must then rely on the quality of the image to present additional information which might be present in the level three.

Id. at 79.

After utilizing the ACE-V and quantitative/qualitative processes, an examiner is ready to make a determination with respect to the latent print in question. The three options that the examiner has are described in one of two ways: (1) identification, elimination, or “agreement but not enough to individualize—not enough to eliminate,” Test. Ashbaugh, Tr. July 7, 1999, at 154, or (2) “absolutely him, absolutely not him, and absolutely I don’t know,” id. at 154–55. Whichever terminology is used, the result is the same—an examiner who makes a positive identification is determining that the latent fingerprint necessarily came from the individual in question, “to the exclusion of all other fingers in the world.” Id. at 191.

II. Court Decisions Regarding the Admissibility of Fingerprint Testimony

Several courts have addressed the issue of whether fingerprint identifications are admissible as expert testimony under Federal Rule of Evidence 702, and, since the Supreme Court’s Daubert ruling, all have come to the conclusion that fingerprint testimony should be

admitted.¹² In the Eastern District of Pennsylvania, fingerprint testimony has been considered and admitted in two cases, United States v. Mitchell, Cr. No. 96-407 (E.D. Pa. Sept. 13, 1999), and United States v. Ramsey, Cr. No. 01-5-4 (E.D. Pa. Sept. 21, 2001). In Mitchell, my colleague Judge Joyner took judicial notice of the uniqueness and permanence of friction ridges, permitted fingerprint examiners to testify as experts, and reserved for the jury the issue of “whether or not there’s been a positive identification pursuant to whatever standards are applicable.” Mitchell, Cr. No. 96-407, at 4–5. In Ramsey, my colleague Judge Yohn held that fingerprint identification techniques are scientifically reliable and that fingerprints are unique and permanent. Ramsey, Cr. No. 01-5-4, at 5–6, 12.

Courts in other circuits have also concluded that fingerprint testimony is sufficiently scientific and reliable to be admitted under Rule 702. Published opinions applying Rule 702 prior to its December 2000 amendment are: United States v. Sherwood, 98 F.3d 402, 408 (9th Cir. 1996) (finding that the district court did not err in admitting fingerprint testimony); United States v. Havvard, 117 F. Supp. 2d at 855 (stating that “latent print identification is

¹² Courts that have addressed the admissibility of fingerprint evidence have generally analyzed the proposed testimony in terms of whether it constitutes “scientific” knowledge within the meaning of Rule 702. In the present case, too, submissions before this court address the “scientific” validity of fingerprint evidence. But it is to be borne in mind that Daubert’s analysis of Rule 702’s treatment of “scientific” knowledge was extended by Kumho Tire to Rule 702’s treatment of “technical or other specialized knowledge” as well. 526 U.S. at 141. The Court observed in Kumho Tire that “[w]e do not believe that Rule 702 creates a schematism that segregates expertise by type while mapping certain kinds of questions to certain kinds of experts. Life and the legal cases that it generates are too complex to warrant so definitive a match.” Id. at 151.

the very archetype of reliable expert testimony”), aff’d 260 F.3d 597 (7th Cir. 2001) (reviewing the district court’s determination de novo and finding that the district court did not err in its consideration of the Daubert factors as they apply to fingerprint techniques); United States v. Cooper, 91 F. Supp. 2d 79, 82 (D.D.C. 2000) (declining to hold a pre-trial Daubert hearing and finding that fingerprint identification techniques are “well-established principles”). Published opinions applying Rule 702 as amended are: United States v. Reaux, 2001 WL 883221, *2 (E.D. La. July 31, 2001) (relying on the Seventh Circuit’s opinion in Havvard and admitting fingerprint testimony); United States v. Martínez-Cintrón, 136 F. Supp. 2d 17 (D.P.R. 2001) (admitting fingerprint examination testimony); United States v. Joseph, 2001 WL 515213, *1 (E.D. La. May 14, 2001) (finding that fingerprint analysis is “scientific knowledge”).

III. Judicial Notice of the Uniqueness and Permanence of Fingerprints

The government requests that this court take judicial notice of the uniqueness and permanence of fingerprints (friction ridges and friction ridge skin arrangements). Gov’t Mot. & Resp. at 113. Federal Rule of Evidence 201(b) lays down the types of facts for which judicial notice is appropriate.

A judicially noticed fact must be one not subject to reasonable dispute in that it is either (1) generally known within the territorial jurisdiction of the trial court or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned.

Fed. R. Evid. 201(b). Under some circumstances, the trial judge must take judicial notice of adjudicative facts: “A court shall take judicial notice if requested by a party and supplied with the necessary information.” Fed. R. Evid. 201(d). Even when not required to do so, trial judges may take judicial notice of an adjudicative fact as a matter of discretion: “A court may take judicial notice, whether requested or not.” Fed. R. Evid. 201(c). Judicial notice under either the mandatory or discretionary subsection is only appropriate when “particular facts are outside the area of reasonable controversy A high degree of indisputability is the essential prerequisite.” Fed. R. Evid. 201(a), advisory committee note. The government contends that this court should take judicial notice of both the uniqueness and the permanence of fingerprints under the mandatory subsection of Rule 201. Gov’t Mot. & Resp. at 113.

With respect to the uniqueness of fingerprints, both Dr. Babler and Mr. Ziesig testified, essentially, that their work provides a basis for concluding that fingerprints are unique. Dr. Babler testified that because multiple factors affect the prenatal development of fingerprint ridges, they must be unique. Test. Babler, Tr. July 7, 1999, at 63. While this assertion makes intuitive sense, Dr. Babler did not actually compare fingerprint ridges to determine whether the assertion was factually correct. Mr. Ziesig, however, did undertake such a comparison. As described above, Mr. Ziesig’s 50k x 50k study found the probability to be one in ten to the ninety-seventh power that two rolled fingerprints (whether taken from fingers of two different people or from two fingers of the same person) would be identical.

Test. Ziesig, Tr. July 9, 1999, at 68, 73. Mr. Ziesig’s testimony provides the “necessary information” for this court to take judicial notice of the uniqueness of fingerprints, in accordance with Federal Rule of Evidence 201(d).

Based on his research involving the prenatal development of fingerprints, Dr. Babler testified that fingerprints are permanent. Because the deeply-rooted primary ridges form a template for secondary ridges—the ridges that are visible on the surface of the skin—he conjectured that only a very deep wound could alter a fingerprint. Test. Babler, Tr. July 7, 1999, at 47. Dr. Babler’s research provides an adequate basis for this court to take judicial notice of the permanency of fingerprints.

IV. Admission of Expert Testimony

For several decades, the standard for admission of expert testimony was the “general acceptance” standard that was established in Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923): “[W]hile courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.” In articulating the “general acceptance” standard, the Frye court addressed only the admissibility of novel scientific evidence. Other courts subsequently extended “general acceptance” as a test of admissibility for all scientific evidence.

Some fifty years after Frye's articulation of the "general acceptance" standard, Congress adopted Federal Rule of Evidence 702, entitled "Testimony by Experts":

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Federal Rules of Evidence, Pub. L. No. 93-595, 88 Stat. 1926, 1937 (1975). Rule 702 did not mention "general acceptance," much less adopt this as the test for admission of expert testimony. Daubert, 509 U.S. at 588. Nevertheless, many courts continued to use the "general acceptance" standard until the Supreme Court clarified, in 1993, that Frye's "general acceptance" standard had been superseded by Federal Rule of Evidence 702. Daubert, 509 U.S. at 587.

Daubert emphasized that the basic standard of relevance under the Rules is "a liberal one," id. at 587, but that a "trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable," id. at 589.¹³ That is, trial judges are called on to play a "gatekeeping role" with respect to scientific testimony. Id. at 597. In applying Rule 702 to the admission of scientific testimony, the Court emphasized that, for evidence to be considered "reliable," the proposed expert's opinion must actually be based on what Rule 702 terms "scientific knowledge." The Court, speaking through Justice Blackmun, clarified what "scientific knowledge" signifies:

¹³ In the present case, the defendants only challenge the reliability of fingerprint identifications, not their relevance.

The adjective “scientific” implies a grounding in the methods and procedures of science. Similarly, the word “knowledge” connotes more than subjective belief or unsupported speculation. The term applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds. Of course, 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. But, in order to qualify as “scientific knowledge,” an inference or assertion must be derived by the scientific method. . . . In short, the requirement that an expert’s testimony pertain to “scientific knowledge” establishes a standard of evidentiary reliability.

Id. at 590 (quotations and citations omitted). In further delineating what trial judges should be looking for in scientific testimony, Justice Blackmun presented four “general observations,” which are commonly referred to as the “Daubert factors”: (1) whether the technique “can be (and has been) tested,” (2) whether the technique has been “subjected to peer review and publication,” (3) “the known or potential rate of error . . . and the existence and maintenance of standards controlling the technique’s operation,” and (4) “general acceptance.” Id. at 593–94.¹⁴

¹⁴ In a pre-Daubert Third Circuit case that was cited with approval by the Supreme Court in Daubert, 509 U.S. at 591, 594, 594 n.12, Judge (now Chief Judge) Becker articulated three factors for determining when scientific testimony should be permitted.

In our view, Rule 702 requires that a district court ruling upon the admission of (novel) scientific evidence, i.e., evidence whose scientific fundamentals are not suitable candidates for judicial notice, conduct a preliminary inquiry focusing on (1) the soundness and reliability of the process or technique used in generating the evidence, (2) the possibility that admitting the evidence would overwhelm, confuse, or mislead the jury, and (3) the proffered connection between the scientific research or test result to be presented, and particular disputed factual issues in the case.

United States v. Downing, 753 F.2d 1224, 1237 (3d Cir. 1985). With respect to the

In Kumho Tire, the Court held that Daubert's interpretation of Rule 702 applies with equal force to proposed expert testimony based on technical or other specialized knowledge. 526 U.S. at 141. The Court also emphasized that the four Daubert factors are flexible and that the "list of specific factors neither necessarily nor exclusively applies to all experts or in every case." Id.

In an effort to bring Rule 702 into closer verbal harmony with Daubert and Kumho Tire, Congress amended Federal Rule of Evidence 702:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Fed. R. Evid. 702. This newly-amended Rule 702 took effect on December 1, 2000 and is thus applicable to the case at hand.

V. Fingerprint Identifications

The primary question that the parties dispute is whether fingerprint identifications are scientifically reliable and thus admissible under Federal Rule of Evidence 702, as construed

soundness or reliability of the technique, Judge Becker offered a non-exhaustive list of factors that trial judges may examine: scientific acceptance, novelty, "existence of a specialized literature dealing with the technique," qualifications of the witness, non-judicial uses of the technique, and the frequency of erroneous results. Id. at 1238–39.

by the Supreme Court in Daubert and Kumho Tire. While the four factors discussed in Daubert are flexible general guidelines, not a rigid test for admissibility, Daubert, 509 U.S. at 594–95; Kumho Tire, 526 U.S. at 152, the factors do provide a useful framework for determining whether fingerprint identifications are scientifically valid and thus reliable, Daubert, 509 U.S. at 594–95. In their submissions in the case at bar, both the government and the defendants have undertaken to apply the Daubert factors, albeit with discrepant results. Agreeing with the parties that, with respect to fingerprint identification evidence, the Daubert factors constitute a proper touchstone of admissibility, this court will also proceed along the analytic path marked out by the Daubert factors.

A. Testing

1. Definition of “Testing”

The first Daubert factor is “whether a theory or technique . . . can be (and has been) tested.” 509 U.S. at 593. According to the government, “[t]he ACE-V process and the experts’ conclusions have been tested empirically over a period of 100 years and in any particular case they can be tested by examination of the evidence by another expert.” Gov’t Mot. & Resp. at 112.

The second clause of this sentence seems to be arguing that, following testimony by one fingerprint examiner that a particular latent print corresponds with a particular known print, testimony by a second examiner constitutes a form of “testing.” However, this is not “testing” of the “theory” or the “technique” of fingerprint identification in the Daubert sense.

With respect to “theory,” the fact that a second examiner, following the same “technique” as a prior examiner, reaches the same (or, indeed, a different) result, would not seem to shed any light on the validity of the “theory” underlying that “technique.” With respect to “technique”—assuming, for purposes of discussion, that the validity of the “theory” were acknowledged—it is difficult to see that a single confirmatory examination would be adequate to validate the “technique.” Conversely, it is not apparent that a result arrived at by a second examiner discrepant from a result arrived at by a prior examiner would (1) establish that the first result was erroneous, or (2) offer a secure basis for concluding that the “technique” was faulty. A scientist might be disposed to require scores, or perhaps hundreds, of observations before regarding the “technique” as having been “tested.”¹⁵

The first clause in the sentence from the government’s motion papers quoted above—“[t]he ACE-V process and the experts’ conclusions have been tested empirically over a period of 100 years”—apparently refers to the fact that fingerprint identification has been a customary ingredient of trials for a century. Some courts that have addressed the admissibility of fingerprint testimony have also equated the use of fingerprint identifications in court with “testing.” In Havvard, for example, the court stated, “the methods of latent print

¹⁵ With respect to the ACE-V process at issue here, reliance on a second examiner’s same result as a confirmatory “test” of the first examiner’s result is subject to the further dilution that, not infrequently, the second examiner has been advised of the prior result. See, e.g., Test. Ashbaugh, Tr. July 7, 1999, at 116 (“There are situations where, when we ask for verification, the expert will know that an identification has been made.”).

identification . . . have been tested for roughly 100 years. They have been tested in adversarial proceedings with the highest possible stakes—liberty and sometimes life.” 117 F. Supp. 2d at 854, aff’d 260 F.3d 597; accord Ramsey, Cr. No. 01-5-4, at 6–7.

“[A]dversarial” testing in court is not, however, what the Supreme Court meant when it discussed testing as an admissibility factor. In his brief elaboration on testing, Justice Blackmun quoted an evidence treatise with approval: “Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry.” Daubert, 509 U.S. at 593 (quoting Green, Expert Witnesses and Sufficiency of Evidence in Toxic Substances Litigation: The Legacy of Agent Orange and Bendectin Litigation, 86 Nw. U. L. Rev. 643 (1992)). In an article on Daubert, Professor Imwinkelried explained the importance of falsifiability to scientific testing:

Attempts to disprove the hypothesis are more significant [than verification] in two respects. First, although a single outcome consistent with an hypothesis furnishes little proof of the truth of the hypothesis, a hypothesis phrased as a universal statement is disproved by even one singular inconsistent outcome. Second, even when there are an impressive number of consistent outcomes and no inconsistent outcomes, the hypothesis is not definitively confirmed because it is always possible that an empirical test will some day demonstrate the theory to be incorrect. The theoretical possibility of disproof remains.

Edward J. Imwinkelried, Evidence Law Visits Jurassic Park: The Far-Reaching Implication of the *Daubert* Court’s Recognition of the Uncertainty of the Scientific Enterprise, 81 Iowa L. Rev. 55, 62 (1995) (quotations and citations omitted). Thus, by striving to falsify a certain

premise or outcome, scientists can more closely approximate what is “true.” Id. at 61–62.¹⁶

It makes sense to rely on scientific testing, rather than “adversarial” courtroom testing, because to rely on the latter would be to vitiate the gatekeeping role of federal trial judges, thereby undermining the essence of Rule 702 as interpreted by the Court in Daubert. If “adversarial” testing were the benchmark—that is if the validity of a technique were submitted to the jury in each instance—then the preliminary role of the judge in determining the scientific validity of a technique would never come into play. Thus, even 100 years of “adversarial” testing in court cannot substitute for scientific testing when the proposed expert testimony is presented as scientific in nature.

2. Absence of Testing of Fingerprint Techniques

On the record made in Mitchell, the government had little success in identifying scientific testing that tended to establish the reliability of fingerprint identifications.¹⁷ By

¹⁶ The centrality of falsifiability to the scientific pursuit is further examined in another article:

A universal statement can be shown to be false if it is found inconsistent with even one singular statement about a particular event of occurrence. But the reverse is not true; a universal statement can never be proven true by virtue of the truth of particular statements, no matter how numerous.

. . . . Thus no hypothesis can ever be proven absolutely true, but a hypothesis may become well corroborated if it survives a variety of tests that fail to falsify it.

Bert Black et al., Science and the Law in the Wake of *Daubert*: A New Search for Scientific Knowledge, 72 Tex. L. Rev. 715, 755–56 (1994).

¹⁷ In a recent “solicitation,” the National Institute of Justice requested research that would test the “validity of *individuality in friction ridge* examination based on

measurement of features, qualification and statistical analysis.” U.S. Dep’t Justice, Nat’l Inst. Justice, Solicitation: Forensic Friction Ridge (Fingerprint) Examination Validation Studies 4 (2000) (emphasis in original). Under the heading “Areas of Research Required,” the solicitation explained what it sought: “statistical validation of individuality in friction ridge analysis,” “qualitative/quantitative aspects of friction ridge comparison,” and “statistical validation of standard operating procedures for friction ridge (fingerprint) comparison.” Id. at 4–5. The solicitation stated that the need for this research/testing stemmed from Daubert:

[A]ll expert testimony must follow the admissibility rules for scientific evidence set forth in recent court cases e.g. *Daubert v. Merrill* [sic] *Dow Pharmaceuticals* (113 S.Ct. 2786). These rules require scientists to address the reliability and validity of the methods used in their analysis. Therefore, the purpose of this solicitation is to address the needs identified in the above NIJ publication and to provide greater scientific foundation for forensic friction ridge (fingerprint) identification.

Id. at 3.

It appears that the timing of the NIJ solicitation release was tied, at least in part, to the Mitchell case. Dr. Richard M. Rau, a forensic program manager at the Department of Justice who played a leading role in the development of the solicitation, testified about the relationship between the solicitation, Daubert and Kumho Tire, and the Mitchell case:

Q: The question was, with that in paragraph two of that letter, you provided some reasons as to why you believe that it was urgent, and you used the word urgent at the very end of that paragraph as to why the solicitation should be issued. Correct?

A: Yes.

Q: And you identified the opinion changed to Rule 702, Federal Rule of Evidence 702. Why did you believe that made the issuance of the solicitation to be urgent?

A: I think it’s because they raised the issue of reliability.

Q: And because they raised the issue of reliability, you thought it was important that these validation studies be conducted?

A: Yes.

Q: You also identified the Kumho Tire decision. Why did you believe that made the issuance of the solicitation urgent?

A: It had come out just before I wrote this, and it supported the

contrast, defense testimony strongly suggested that fingerprint identification techniques have not been tested in a manner that could be properly characterized as scientific. Particularly pointed was the testimony of forensic scientist David Stoney, the Director of the McCrone Research Institute in Chicago. According to Dr. Stoney:

Daubert case and the findings. It applied not only to scientific evidence, but to technical evidence.

Q: So you understood Kumho Tire to mean that the government or prosecution would have to make the same kind of showing of reliability for all kinds of experts, not just scientific experts, correct?

A: yes.

....

Q: And, finally, you refer there in paragraph two to the challenge to the admissibility of fingerprint evidence in a case in Philadelphia. Now, of course, you were referring to this case, correct?

A: yes.

Q: And why did you believe that the challenge that was brought in this case made the issuance of the solicitation urgent?

A: As you know, I'm not an expert in fingerprint analysis and matching. So what I'm going to say is based on my opinion only.

The feeling was that when the people that wrote status and needs met to discuss about the needs for research in the forensic field, that they pulled out the documents, the weapons and fingerprints, among others, and the issue of the need to do more research in those fields to show the reliability of the procedures. I felt that if what happened in the document case, where a federal judge ruled that it wasn't admissible on that basis—

Q: Ruled that what wasn't admissible, sir?

A: The document examination, the matching of documents.

Q: Handwriting analysis?

A: Handwriting analysis. That if that were to happen for fingerprints, there was no fallback position since there wasn't any other research around.

....

Test. Rau, Tr. Jan. 3, 2001, at 41–44.

The determination that a fingerprint examiner makes . . . when comparing a latent fingerprint with a known fingerprint, specifically the determination that there is sufficient basis for an absolute identification is not a scientific determination. It is a subjective determination standard. It is a subjective determination without objective standards to it.

Test. Stoney, Tr. July 12, 1999, at 87.

Dr. Stoney's point that "[t]he determination that a fingerprint examiner makes . . . when comparing a latent fingerprint with a known fingerprint . . . is a subjective determination," was fully confirmed by the testimony presented by government witnesses Ashbaugh and Meagher. After describing the "analysis" ingredient of ACE-V, Sergeant Ashbaugh proceeded to discuss "comparison" and "evaluation" in the following terms:

Once the comparison is complete, and we recommend that the whole print be compared, the next thing that we would do is then evaluate what we saw during comparison as far as agreement of the various ridge formations. And I break it down into actually two separate areas. The first area is, do I have agreement? If you say yes to that, if you form the opinion you have agreement, then you have to ask yourself, is there sufficient unique detail present to individualize?

That final decision is a subjective decision. It's based on your knowledge and experience and your ability. And that, if you say yes, I feel there's enough to individualize, then you formed an opinion of identification.

Test. Ashbaugh, Tr. July 7, 1999, at 115–16. FBI supervisory fingerprint specialist Meagher gave very similar testimony:

A: The analysis and comparison process is a very objective process. The evaluation process is the subjective opinion of that examiner that he has reached the conclusion that it's ident, non-ident.

Q: The evaluation, the ultimate determination is a subjective one, is it not, sir?

A: Yes.

Test. Meagher, Tr. July 8, 1999, at 228–29.

The significance of the fact that the determinations are “subjective” was explained by the further testimony of Dr. Stoney:

Now, by subjective I mean that it [a fingerprint identification determination] is one that is dependent on the individual’s expertise, training, and the consensus of their agreement of other individuals in the field. By not scientific, I mean that there is not an objective standard that has been tested; nor is there a subjective process that has been objectively tested. It is the essential feature of a scientific process that there be something to test, that when that something is tested the test is capable of showing it to be false.

Test. Stoney, Tr. July 12, 1999, at 87.¹⁸

¹⁸ Likewise, Professor James E. Starrs, a professor at George Washington University’s Department of Forensic Sciences and at the Law School, who teaches courses on fingerprints and their examination, testified that fingerprint identification techniques have not been scientifically tested:

It is my opinion that the present process as I know it of fingerprint comparison and analysis, is not predicated on a sound and adequate scientific basis for purposes of making an individualization to one person from a fragmentary print to the exclusion of all other persons in the world.

. . . .

Shorthand for my reasons are, many of which you have already heard even today, and that is that the claim of absolute certainty either way on the part of fingerprint examiners, the failure to carry out controlled empirical data searching experimentation, a failure to recognize the value of considerations of the error rate. The lack of objectivity and uniformity and systemization with respect to the standards, if any, of the fingerprint analysis.

Finally, . . . , a failure to show a due regard to a vigorous and uncompromising skepticism [sic] as Carl Sagan described it, to a mind open vision of what might or might not be accepted skepticism [sic], what they are doing as to the inconsistencies they are making on an individual and general basis.

B. Peer Review and Publication

The second Daubert factor is “whether the theory or technique has been subjected to peer review and publication.” 509 U.S. at 593.¹⁹ As with the testing factor, the purpose of the inquiry into peer review and publication is to gauge the scientific reliability of the proposed testimony. Thus, in explaining this factor, the Supreme Court wrote that “submission to the scrutiny of the scientific community is a component of ‘good science.’” Daubert, 509 U.S. at 593. This sentiment was echoed in a law review article that attempted to explain the scientific method to lawyers and judges: “The peer-review system represents both an effort to police scientific claims and to assure their widest possible dissemination.” Bert Black et al., Science and the Law in the Wake of *Daubert*: A New Search for Scientific Knowledge, 72 Tex. L. Rev. 715, 777 (1994). Thus, formal peer review is an “integral part of the scientific publication process.” Id. At the Mitchell hearing, Dr. Stoney defined a peer-reviewed publication:

The term is used in the context of scientific publications to refer to where you have made a formal submission to a peer review journal where an editorial board of that journal has then usually anonymously, but in any case, has reviewed the work in a formal way, given an opinion to the editor of the journal, and then subsequently your paper has either been accepted or rejected from that process.

Test. Starrs, Tr. July 12, 1999, at 150.

¹⁹ In Havvard, the court stated that the publication factor “does not fit well with fingerprint identification because it is a field that has developed primarily for forensic purposes.” 117 F. Supp. 2d at 854. While it is correct that the end purpose of fingerprint identifications is a forensic one, the reliability of identification techniques must be assessed just as any other scientific, technical, or specialized technique under Rule 702.

Test. Stoney, Tr. July 12, 1999, at 41.

The government maintains that “[t]he fingerprint field and its theories and techniques have been published and peer reviewed during a period of over 100 years.” Gov’t Mot. & Resp. at 112. It is the case that there are numerous writings that discuss the fingerprint identification techniques employed by fingerprint examiners.²⁰ But it is not apparent that their publication constitutes “submission to the scrutiny of the scientific community” in the Daubert sense. Even those who stand at the top of the fingerprint identification field—people like David Ashbaugh and Stephen Meagher—tend to be skilled professionals who have learned their craft on the job and without any concomitant advanced academic training. It would thus be a misnomer to call fingerprint examiners a “scientific community” in the Daubert sense.

The Havvard court suggested that the “verification” phase of the ACE-V process constitutes peer review:

[A]ny other qualified examiner can compare the objective information upon which the opinion is based and may render a different opinion if warranted. In

²⁰ For example, Sergeant Ashbaugh has authored several books and articles on the uniqueness of fingerprints, and on “ridgeology.” The Ashbaugh articles brought to this court’s attention include David Ashbaugh, The Premises of Friction Ridge Identification, Clarity and the Identification Process, 44 J. of Forensic Identification 499 (1994); David Ashbaugh, The Key to Fingerprint Identification, 10 Fingerprint Whorld 93 (April 1985); and David Ashbaugh, Defined Pattern, Overall Pattern, and Unique Pattern, 42 J. of Forensic Identification 505 (1992). These articles do not, however, establish the scientific reliability of fingerprint identifications, nor does it appear that the articles were published in peer-reviewed journals, as defined by Dr. Stoney supra.

fact, peer review is the standard operating procedure among latent print examiners.

117 F. Supp. 2d at 854. In his Mitchell testimony, Sergeant Ashbaugh voiced the same view. ACE-V “verification,” he said, “is a form of peer review, and it is part of the scientific process.” Test. Ashbaugh, Tr. July 7, 1999, at 116. The difficulty is that if the opinion announced by a fingerprint examiner—“ident, non-ident,” as Mr. Meagher expressed it—is, as both Mr. Meagher and Sergeant Ashbaugh acknowledged, “subjective,” another opinion rendered by another examiner, whether in corroboration or in refutation, does little to put a “scientific” gloss on the first opinion, much less constitute “peer review” as described by Dr. Stoney.²¹

C. Rate of Error and Controlling Standards

The third Daubert factor is that trial judges “consider the known or potential rate of error . . . and the existence and maintenance of standards controlling the technique’s operation.” Daubert, 509 U.S. at 594.

1. Rate of Error

The government divides the “rate of error” question into two parts—“methodology error” and “practitioner error.” The government’s argument with respect to these two different rates of error is as follows:

²¹ It is to be recalled that the government also contends that a regime of re-examination by a second examiner constitutes a Daubert “test”—a contention that this court, for the reasons explained supra, Part V.A.1 of this opinion, finds unpersuasive.

Dr. Budowle's testimony established that methodology error rate in the science of fingerprints is not a relevant inquiry. Moreover, practitioner error can be detected and corrected by another qualified examiner, either in the verification process or through consultation with other experts during litigation.

Gov't Mot. & Resp. at 113.

a. "Methodology Error"

Dr. Bruce Budowle, whose testimony the government invokes ("Dr. Budowle's testimony established that methodology error rate in the science of fingerprints is not a relevant inquiry") is a geneticist in the FBI's Laboratory Division. Dr. Budowle's testimony with respect to methodology error was as follows:

Q: Tell us how it [error rate] applies to scientific methods, methodology.

A: Well, this transcends all kinds of forensic, it transcends all disciplines in that, but in the forensic area particularly, this has been an issue discussed repeatedly in lots of disciplines, whether it is DNA chemistry and latent fingerprints.

We have to understand that error rate is a difficult thing to calculate. I mean, people are trying to do this, it shouldn't be done, it can't be done. I'll give you an example as an analogy. When people spell words, they make mistakes. Some make consistent mistakes like separate, some people I'll say that I do this, I spell it S-E-P-E-R-A-T-E. That's a mistake. It is not a mistake of consequence, but it is a mistake. It should be A-R-A-T-E at the end.

That would be an error. But now with the computer and Spell Check, if I set up a protocol, there is always Spell Check, I can't make that error anymore. You can see, although I made an error one time in my life, if I have something in place that demonstrates the error has been corrected, it is no longer a valid thing to add as a cumulative event to calculate what a error rate is. An error rate is a wispy thing like smoke, it changes over time because the real issue is, did you make a mistake, did you make a mistake in this case? If you made a mistake in the past, certainly that's valid information that someone can cross-examine or define or describe whatever that was, but to say there's an error rate that's definable would be a misrepresentation.

So we have to be careful not to go down the wrong path without understanding what it is we are trying to quantify.

Now, error rate deals with people, you should have a method that is defined and stays within its limits, so it doesn't have error at all. So the method is one thing, people making mistakes is another issue.

Test. Budowle, Tr. July 9, 1999, at 122–23, quoted in Gov't Mot. & Resp. at 42–43.

The full import of the quoted Budowle testimony is not easy to grasp. Its basic thrust, however, would seem to be contained in the concluding sentences: “Now, error rate deals with people, you should have a method that is defined and stays within its limits, so it doesn't have error at all. So the method is one thing, people making mistakes is another issue.”

Mr. Meagher's testimony with respect to error rate tracked Dr. Budowle's testimony and is easier to understand. The testimony is as follows:

Q: Now—Your Honor, if I could just have a moment here.
Let's move on into error rate, if we can, please, sir?

I want to address error rate as we have—you've heard testimony about ACE-V, about the comparative process, all right?

Have you had an opportunity to discuss and read about error rate?

A: Yes.

Q: Are you familiar with that concept when you talk about methodologies?

A: Sure.

Q: And where does that familiarity come from, what kind of experience?

A: Well, when you're dealing with a scientific methodology such as we have for ever since I've been trained, there are distinctions—there's two parts of errors that can occur. One is the methodological error, and the other one is a practitioner error.

If the scientific method is followed, adhered to in your process, that the error in the analysis and comparative process will be zero.

It only becomes the subjective opinion of the examiner involved at the evaluation phase. And that would become the error rate of the practitioner.

Q: And when you're talking about this, you're referring to friction ridge analysis, correct?

A: That is correct. It's my understanding of that regardless of friction ridge analysis.

The analysis comparative evaluation and verification process is pretty much the standard scientific methodology and a lot of other disciplines besides—

Q: And that may be so.

Are you an expert or familiar with other scientific areas of methodologies?

A: No, I'm not an expert, but I do know that some of those do adhere to the same methodology as we do.

Q: Are you an expert on their error rate?

A: No.

Q: Based on the uniqueness of fingerprints, friction ridge, etcetera, do you have an opinion as to what the error rate is for the work that you do, latent print examinations?

A: As applied to the scientific methodology, it's zero.

Test. Meagher, Tr. July 8, 1999, at 154–56.

This court accepts Dr. Budowle's testimony "that error rate is a difficult thing to calculate" and his further testimony that "error rate deals with people, you should have a method that is defined and stays within its limits, so it doesn't have error at all." Test. Budowle, Tr. July 9, 1999, at 122–23. Further, this court accepts, arguendo, Mr. Meagher's response to the question whether "you have an opinion as to what the error rate is for the work that you do, latent print examinations": "As applied to the scientific methodology, it's zero." Test. Meagher, Tr. July 8, 1999, at 156. Assuming, for the purposes of the motions now at issue before this court, that fingerprint "methodology error" is "zero," it is this court's view that the error rate of principal legal consequence is that which relates to "practitioner error." As Dr. Stoney explained at the Mitchell hearing:

You can't have a fingerprint examination without a fingerprint examiner. If you attempt to say errors that individuals make don't count, then you wouldn't have a scientific process that is being tested anymore.

The individual is an inherent part of getting to the opinion in this process. And, errors that individuals make are a very important part of evaluating whether or not it works.

Test. Stoney, Tr. July 12, 1999, at 104. It is the practitioner error rate that affects, for better or worse, the reliability of the fingerprint identification testimony on which the government seeks to have the jury base some aspects of its verdicts.²² Accordingly, the next Daubert ingredient to be considered is practitioner error.

b. "Practitioner Error"

After having opined, in his Mitchell testimony, that the error for "scientific methodology" is "zero," Mr. Meagher was questioned by government counsel about "practitioner error":

Q: How would one correct the practitioner error that you talked about?
Sir, you do not deny that there's practitioner error, correct?

A: Yes, there is.

Q: Practitioners make mistakes?

A: Sure, we're human.

Q: And how would one, like myself, if I was charged with a crime and part of that evidence had to do with fingerprint analysis and fingerprint opinion, how would I be able to see if there was practitioner error?

²² In Daubert, after instructing that "in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error," Justice Blackmun noted "see, e.g., *United States v. Smith*, 869 F.2d 348, 353-54 (CA7 1989) (surveying studies of the error rate of spectographic voice identification technique)." 509 U.S. at 594. The studies described in Smith dealt with the error rates of spectographic voice identification specialists, or, to use the terminology of the parties in the case at bar, "practitioner error."

A: Well, the images exist. You haven't done anything. They can simply be—the corrected action can simply be given to another qualified examiner for review.

Q: So what you used to—as an examiner used to come to an opinion, any other practitioner could pick up, do ACE-V and come to whatever opinion they are going to come to?

A: That is correct.

Test. Meagher, July 8, 1999, at 156–57.

As previously noted supra, Part I.B, Mr. Meagher had conducted a survey in which he sent Byron Mitchell's ten-print card and alleged latent fingerprints to state agencies. The ten-print card was to be compared with the state fingerprint records: the result—that only Pennsylvania, the state in which Mitchell had been incarcerated, reported a “hit”—was significant confirmation of the uniqueness of fingerprints. The other aspect of the Meagher survey—a request that state agencies determine whether the latent prints matched the known Mitchell prints—offered scant support for the accuracy of fingerprint identification. Nine of the thirty-four responding agencies did not make an identification in the first instance.²³ In

²³ Mr. Meagher followed up by sending photographic enlargements of the prints in a plastic sleeve, on which the level two Galton detail information was marked. Mr. Meagher asked the nine agencies to reconsider their initial responses, emphasizing that the survey was being prepared for a Daubert hearing. All nine agencies changed their responses and made a positive identification. Test. Meagher, Tr. July 8, 1999, at 119–21. Mr. Meagher explained his resubmission of the fingerprints to the nine agencies:

Well, just as if I would have done in-house with any examiner, especially in a training status, if an individual fails to make an identification that we believe they should have been able to, we would take that information back to that individual, show them the characteristics of which they should take into consideration, ask them to reassess their position and, you know, use the information that's now presented to them and try to come

his testimony, Mr. Meagher offered a variety of explanations: the examiner did not know that the survey was related to a Daubert hearing, id. at 136; the photos of the ten-print card or latent prints were insufficiently clear, id. at 136, 141–42, 148–49; three of the examiners “just screwed up,” id. at 138, 139, 150; inexperience, id. at 143–45; insufficient time, id. at 147; the examiner “attitude toward the survey was not as serious as it should have been,” id. at 148; and “[i]t was late in the day and [the examiner] was probably tired,” id. at 150. While the survey results fall far short of establishing a “scientific” rate of error, they are (modestly) suggestive of a discernible level of practitioner error.²⁴

2. Controlling Standards

The parties raise three types of “standards controlling the technique’s operation,” Daubert, 509 U.S. at 594, which play a role in fingerprint identifications.

up with the same conclusion. That is, that the two prints were identical.

Id. at 124–25.

²⁴ The defendants also point out that in proficiency examinations that were given to fingerprint examiners beginning in 1995, the error rates have been alarmingly high. In 1995, fewer than half of the 156 participating examiners—44%—correctly identified all five latent prints that were being tested, while 31% of the examiners made erroneous identifications. Possession of Truth, 46 J. Forensic Identification 521, 524 (1996) (Def. Ex. 2). While the results had improved somewhat by 1998, only 58% of the examiners correctly identified all the matching prints and did not make incorrect identifications. Latent Prints Examination Report No. 9808, Forensic Testing Program 2 (Def. Ex. 3). As with the Mitchell survey, these proficiency examination results may be taken as somewhat suggestive of practitioner error. However, it should be stressed that these results, standing alone, can hardly be regarded as significant evidence of what the “rate of error,” in the Daubert sense, may be. 509 U.S. at 594.

a. Galton Point Minima

Various witnesses at the Mitchell hearing testified that the ACE-V process is the method in general use among fingerprint examiners in the United States. However, the application of this method, in particular whether a minimum number of Galton points must be identified before a match can be declared, varies from jurisdiction to jurisdiction. Sergeant Ashbaugh testified that the United Kingdom employs a sixteen-point minimum, Australia mandates that twelve points be found in common, and Canada uses no minimum point standard. Test. Ashbaugh, Tr. July 7, 1999, at 144–45. In the United States, state jurisdictions set their own minimum point standards, while the FBI has no minimum number that must be identified to declare an “absolutely him” match, Test. Meagher, Tr. July 8, 1999, at 105, but does rely on a twelve-point “quality assurance” standard, id. at 104. As described by the Havvard court, “there is no single quantifiable standard for rendering an identification opinion because of differences in both the quantity of characteristics shown in the latent print and the quality of the image.” Havvard, 117 F. Supp. 2d at 853. While there may be good reason for not relying on a minimum point standard—or for requiring a minimum number, as some state and foreign jurisdictions do—it is evident that there is no one standard “controlling the technique’s operation,” Daubert, 509 U.S. at 594.

b. Identifying Fingerprints

Government and defense witnesses agreed that the actual identification of a latent fingerprint—that is, the decision that the ridges of the two prints that are being compared are

sufficiently “identical” to be considered an “absolutely him” match—is a subjective determination. Sergeant Ashbaugh testified for the government:

The opinion of individualization or identification is subjective. It is an opinion formed by the friction ridge identification specialist based on the friction ridge formations found in agreement during comparison. The validity of the opinion is coupled with an ability to defend that position and both are found in one’s personal knowledge, ability and experience.

Test. Ashbaugh, Tr. July 7, 1999, at 142. Likewise, Mr. Meagher testified for the government that the evaluation phase is characterized by “the subjective opinion of the examiner.” Test. Meagher, Tr. July 8, 1999, at 155. Dr. Stoney, testifying for the defense, agreed:

The determination that a fingerprint examiner makes or that an examiner makes when comparing a latent fingerprint with a known fingerprint, specifically the determination that there is sufficient basis for an absolute identification is not a scientific determination. It is a subjective determination standard. It is a subjective determination without objective standards to it.

Test. Stoney, Tr. July 12, 1999, at 87. With such a high degree of subjectivity, it is difficult to see how fingerprint identification—the matching of a latent print to a known fingerprint—is controlled by any clearly describable set of standards to which most examiners subscribe.

c. Examiner Qualifications

The Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST) adopted “quality assurance guidelines for latent print examination” in 1997.

Test. German, Tr. July 8, 1999, at 35.²⁵ Nevertheless, it appears that these guidelines remain just that, optional recommendations. There are no mandatory qualification standards for individuals to become fingerprint examiners,²⁶ nor is there a uniform certification process. Mr. Meagher, for example, testified that while some FBI fingerprint examiners are certified by the International Association for Identification (IAI),²⁷ he is not certified by the IAI, but by the FBI. Test. Meagher, Tr. July 8, 1999, at 66.

²⁵ Edward German, a Special Agent with the U.S. Army Criminal Investigation Laboratory, chair of the Quality Assurance Committee of SWGFAST, and chair of the Friction Ridge Automation Committee of SWGFAST, explained the SWGFAST Guidelines. Special Agent German testified that the Guidelines “concern minimum qualification guidelines for considering a person to be trained as a latent print examiner. They also concern the training to competency guidelines, which means the topics or subjects that need to be covered, the recommended and suggested topics to be covered at training.” Test. German, Tr. July 8, 1999, at 35.

²⁶ According to one critic:

Traditionally, fingerprint training has centered around a type of apprenticeship, tutelage, or on-the-job training, in its best form, and essentially a type of self study, in its worst. Many training programs are the “look and learn” variety, and aside from some basic classroom instruction in pattern interpretation and classification methods, are often impromptu sessions dictated more by the schedule and duties of the trainer than the needs of the student. Such apprenticeship is most often expressed in terms of duration, not in specific goals and objectives, and often end with a subjective assessment that the trainer is ready.

David L. Grieve, The Identification Process: The Quest for Quality, 40 J. of Forensic Identification 109, 110–11 (1990), quoted in Def. Mot. at xxix.

²⁷ The IAI is “a forensic organization here in the United States that supports training and holds conferences and attempts to set standards for the United States.” Test. Ashbaugh, Tr. July 7, 1999, at 178.

D. General Acceptance

In Daubert, the Supreme Court noted that “general acceptance”—the major ingredient of the Frye legacy—can still lend support to a trial judge’s finding that a technique is scientifically reliable. Daubert, 509 U.S. at 594.²⁸ The government points out that fingerprint identifications have been used for over 100 years. Gov’t Mot. & Resp. at 3. See also Ramsey, Cr. No. 01-5-4, at 9 (acknowledging that fingerprint identifications are “generally accepted in the relevant scientific community” because they are “accepted by the vast, vast majority of persons who are engaged in fingerprint analysis”). In addition, Mr. Meagher testified that he sent a survey to state law enforcement agencies, with a striking result: “Unanimously, all states responded, the fact that they do use fingerprints as a means to individualize and they all believe in the two basic principles to our discipline, that is, fingerprints are unique and permanent.” Test. Meagher, Tr. July 8, 1999, at 112. It is apparent that law enforcement officials uniformly place strong reliance on the fingerprint examiner community’s acceptance, and utilization, of ACE-V and its kindred identification processes.

General acceptance by the fingerprint examiner community does not, however, meet the standard set by Rule 702. First, there is the difficulty that fingerprint examiners, while respected professionals, do not constitute a “scientific community” in the Daubert sense. See

²⁸ In listing “general acceptance” as a reliability factor, the Court quoted with approval Judge Becker’s opinion in Downing, in which he wrote that a “reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community.” 753 F.2d at 1238.

supra, text following note 20; see also note 28. Second, the Court cautioned in Kumho Tire that general acceptance does not “help show that an expert’s testimony is reliable where the discipline itself lacks reliability.” 526 U.S. at 151. The failure of fingerprint identifications fully to satisfy the first three Daubert factors militates against heavy reliance on the general acceptance factor.²⁹ Thus, while fingerprint examinations conducted under the general ACE-V rubric are generally accepted as reliable by fingerprint examiners, this by itself cannot sustain the government’s burden in making the case for the admissibility of fingerprint testimony under Federal Rule of Evidence 702.

VI. Admission of Fingerprint Testimony

Pursuant to the foregoing discussion, it is the court’s view that the ACE-V fingerprint identification regime is hard to square with Daubert.

The one Daubert factor that ACE-V satisfies in significant fashion is the fourth factor: ACE-V has attained general acceptance within the American fingerprint examiner

²⁹ As noted above, until Daubert displaced Frye, “general acceptance” was widely considered the standard of admissibility for scientific evidence. The Court ruled that “the Frye test was superseded by the adoption of the Federal Rules of Evidence.” Daubert, 509 U.S. at 587. Thus, in stating that general acceptance was still a factor to be considered in determining the admissibility of scientific evidence, the Court did not intend that scientific evidence could be deemed reliable and thus admissible based on its general acceptance alone. To do so would be to maintain Frye as the controlling standard for the admission of scientific evidence, a prospect which the Court clearly did not intend.

community.³⁰ But the caveat must be added that, in the court's view, the domain of knowledge occupied by fingerprint examiners should be described, in Rule 702 terms, by the word "technical," rather than by the word "scientific," the word the government deploys.

Given that Kumho Tire establishes that the Daubert analysis is applicable to "technical" as well as "scientific" knowledge, it may be thought that this court's characterization of the knowledge base of fingerprint examiners as "technical" rather than "scientific" is a semantic distinction which is of no practical consequence. However, as discussed above, the court finds that ACE-V does not adequately satisfy the "scientific" criterion of testing (the first Daubert factor) or the "scientific" criterion of peer review (the second Daubert factor). Further, the court finds that the information of record is unpersuasive, one way or another, as to ACE-V's "scientific" rate of error (the first aspect of Daubert's third factor), and that, at the critical evaluation stage, ACE-V does not operate under uniformly accepted "scientific" standards (the second aspect of Daubert's third factor).

Since the court finds that ACE-V does not meet Daubert's testing, peer review, and standards criteria, and that information as to ACE-V's rate of error is in limbo, the expected conclusion would be that the government should be precluded from presenting any

³⁰General acceptance need not connote universal and unqualified acceptance. As pointed out above, some state fingerprint examiners (like some in other countries) require a minimum number of points in common between the latent print and the rolled print before an identification can be arrived at, whereas ACE-V, at the "evaluation" phase, sets no minimum standard and relies, instead, on the "subjective" judgment of the examiner. See supra Parts I.C, V.C.2.b.

fingerprint testimony. But that conclusion—apparently putting at naught a century of judicial acquiescence in fingerprint identification processes—would be unwarrantably heavy-handed. The Daubert difficulty with the ACE-V process is by no means total. The difficulty comes into play at the stage at which, as experienced fingerprint specialists Ashbaugh and Meagher themselves acknowledge, the ACE-V process becomes “subjective”—namely, the evaluation stage. By contrast, the antecedent analysis and comparison stages are, according to the testimony, “objective”: analysis of the rolled and latent prints and comparison of what the examiner has observed in the two prints. Up to the evaluation stage, the ACE-V fingerprint examiner’s testimony is descriptive, not judgmental. Accordingly, this court will permit the government to present testimony by fingerprint examiners who, suitably qualified as “expert” examiners by virtue of training and experience, may (1) describe how the rolled and latent fingerprints at issue in this case were obtained, (2) identify and place before the jury the fingerprints and such magnifications thereof as may be required to show minute details, and (3) point out observed similarities (and differences) between any latent print and any rolled print the government contends are attributable to the same person. What such expert witnesses will not be permitted to do is to present “evaluation” testimony as to their “opinion” (Rule 702) that a particular latent print is in fact the print of a particular person. The defendants will be permitted to present their own fingerprint experts to counter the government’s fingerprint testimony, but defense experts will also be precluded from presenting “evaluation” testimony. Government counsel and defense counsel will, in closing

arguments, be free to argue to the jury that, on the basis of the jury's observation of a particular latent print and a particular rolled print, the jury may find the existence, or the non-existence, of a match between the prints.

In arriving at this disposition of the competing government and defense motions and supporting memoranda, this court has derived substantial assistance from the thoughtful approach taken by Judge Gertner, of the District of Massachusetts, in dealing with the comparable problem of handwriting evidence. In United States v. Hines, 55 F. Supp. 2d 62 (D. Mass. 1999), Judge Gertner wrote as follows:

The Harrison [Diana Harrison, an FBI document examiner] testimony may be divided into two parts: Part 1 is Harrison's testimony with respect to similarities between the known handwriting of Hines, and the robbery note. Part 2 is Harrison's testimony with respect to the author of the note, that the author of the robbery note was indeed Hines.

55 F. Supp. 2d at 67.

When a lay witness, the girlfriend of the defendant for example, says "this is my boyfriend's writing," her conclusion is based on having been exposed to her paramour's handwriting countless times. Without a lay witness with that kind of expertise, the government is obliged to offer the testimony of "experts" who have looked at, and studied handwriting for years. These are, essentially, "observational" experts, taxonomists—arguably qualified because they have seen so many examples over so long. It is not traditional, experimental science, to be sure, but *Kumho's* gloss on *Daubert* suggests this is not necessary. I conclude that Harrison can testify to the ways in which she has found Hines' known handwriting similar to or dissimilar from the handwriting of the robbery note; part 1 of her testimony.

Part 2 of the Harrison testimony is, however, problematic. There is no data that suggests that handwriting analysts can say, like DNA experts, that this person is "the" author of the document. There are no meaningful, and accepted validity studies in the field. No one has shown me Harrison's error

rate, the times she has been right, and the times she has been wrong. There is no academic field known as handwriting analysis. This is a “field” that has little efficacy outside of a courtroom. There are no peer reviews of it. Nor can one compare the opinion reached by an examiner with a standard protocol subject to validity testing, since there are no recognized standards. There is no agreement as to how many similarities it takes to declare a match, or how many differences it takes to rule it out.

Id. at 69 (footnotes omitted).

I find Harrison’s testimony meets Fed. R. Evid. 702’s requirements to the extent that she restricts her testimony to similarities or dissimilarities between the known exemplars and the robbery note. However, she may not render an ultimate conclusion on who penned the unknown writing.

Id. at 70–71.³¹

VII. CONCLUSION

For the foregoing reasons:

A. This court will take judicial notice of the uniqueness and permanence of fingerprints.

B. The parties will be able to present expert fingerprint testimony (1) describing how any latent and rolled prints at issue in this case were obtained, (2) identifying, and placing before the jury, such fingerprints and any necessary magnifications, and (3) pointing

³¹ Accord United States v. Van Wyk, 83 F. Supp. 2d 515, 523–24 (D.N.J. 2000) (relying on Hines in permitting a forensic stylist to compare writings of known authorship with writings of unknown authorship, but not permitting the forensic stylist to give an opinion as to the author of the questioned writings). But see United States v. Paul, 175 F.3d 906 (11th Cir. 1999) (upholding trial court’s decision to permit a handwriting examiner to give an opinion as to the author of documents in question).

out any observed similarities and differences between a particular latent print and a particular rolled print alleged by the government to be attributable to the same persons. But the parties will not be permitted to present testimony expressing an opinion of an expert witness that a particular latent print matches, or does not match, the rolled print of a particular person and hence is, or is not, the fingerprint of that person.

**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA**

UNITED STATES OF AMERICA

v.

Cr. No. 98-362-10, 11, 12

CARLOS IVAN LLERA PLAZA,
WILFREDO MARTINEZ ACOSTA, and
VICTOR RODRIGUEZ

ORDER

For the reasons expressed in the accompanying opinion,

1. The government's Combined Motion in Limine to Admit Latent Print Evidence and Response to Defendant Acosta's Motion to Preclude the Introduction of Latent Fingerprint Identification Evidence is GRANTED insofar as it asks this court to take judicial notice of the uniqueness and permanence of fingerprints;

2. The balance of the government's motion, together with the defendants' Motion to Preclude the United States from Introducing Latent Fingerprint Identification Evidence, are GRANTED IN PART and DENIED IN PART. The government may present expert fingerprint testimony (1) describing how the rolled and latent fingerprints at issue in this case were obtained, (2) identifying, and placing before the jury, the fingerprints and such

magnifications as may be required to show minute details, and (3) pointing out observed similarities (and differences) between any latent print and any rolled print the government contends are attributable to the same person. The defendants may present expert fingerprint testimony countering the government's fingerprint testimony. But no expert witness for any party will be permitted to testify that, in the opinion of the witness, a particular latent print is—or is not—the print of a particular person.

DATE: _____

Pollak, J.