CHAPTER THREE
BACKGROUND FOR THE OFFICE OF THE INSPECTOR GENERAL'S ANALYSIS OF FINGERPRINT ISSUES RAISED BY THE MAYFIELD CASE

In this chapter, OIG provides background information regarding the FBI Laboratory Latent Print Units (LPU) and latent fingerprint examination methodology. This information is relevant to the OIG's assessment of the causes of the FBI Laboratory's misidentification of Latent Fingerprint 17 (LFP 17) and the OIG's review of the Laboratory's programmatic responses to the error. Part I of this chapter describes the LPU. Part II provides an overview of the latent fingerprint examination process.

I. Description of the FBI Laboratory LPU

Organization. At the time of the Mayfield fingerprint identification, latent fingerprint examinations were conducted by three latent print units (referred to collectively as the LPU), located within the FBI Laboratory's Forensic Analysis Section. Each latent print unit included two teams of fingerprint examiners (each headed by a team leader) and one or more programmatic groups (each headed by a program manager). The examiner teams were responsible for casework while the programmatic groups were responsible for a variety of other functions, including quality control, technology development, and other management and administrative issues. The team leaders each supervised three to five fingerprint examiners, and the program managers were responsible for administering their programs and the personnel assigned to those programs. As of September 2004, the 3 LPUs consisted of 92 employees: 78 fingerprint examiners, 8 photographers, 5 technicians, and 1 management analyst.

Case Work. Although the LPU performs fingerprint examinations primarily in connection with FBI investigations, it also conducts examinations on behalf of state, local, and other federal agencies. In FBI investigations, the LPU typically has custody of the evidence on which the fingerprint was deposited and processes the fingerprints itself. In other investigations, the requesting agencies sometimes send photographs of the latent prints to the LPU for examination. LPU supervisors assign cases to individual examiners based on various factors, including examiner caseload, case priority (more experienced examiners may be assigned to high-priority cases), and the examiner's prior experience with the case.

Along with the latent fingerprint, the LPU may also be provided with the known fingerprints or the name of a suspect. If known prints for the suspect are available to the LPU, the examiner will first compare the suspect's prints with the latent print. If an identification occurs, the examination is concluded.

If no identification occurs, the examiner initiates a search for potential candidates through the FBI's Integrated Automated Fingerprint Identification System (IAFIS). IAFIS is an automated system that permits computer searches of FBI databases containing over 470 million fingerprints. An IAFIS search is also initiated if the examiner is not provided with any potential suspects. Once the examination is completed, the examiner prepares a report of the results which is sent to the originating agency.

Accreditation. Since 1998, the FBI Laboratory has been accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). ASCLD/LAB accreditation is voluntary. As of June 12, 2005, 289 laboratories were accredited by ASCLD/LAB. Accreditation requires a demonstration that the laboratory's management, personnel, procedures, equipment and facilities satisfy minimum standards. ASCLD/LAB makes its accreditation decisions based on documentation submitted by the applicant laboratory and periodic on-site inspections.

Training and Certification. Prior to 1999, the Laboratory certified its latent fingerprint specialists based upon satisfactory completion of the training program, which included competency testing throughout the training period, moot court testimony, and casework review. All individuals hired into the position of fingerprint specialist up to 1999 were required to have at least five years of prior experience in fingerprint classification and searching fingerprint files. Upon successful completion of their training within the Laboratory, they were certified by the Laboratory as latent fingerprint specialists. Green, Wieners and Massey followed this career path.

Beginning in 1999, the pre-requisite of five years of experience was removed and a new formal certification process was adopted. Prospective LPU examiners (now called "Physical Scientists") now undergo a 24-month training program within the LPU. LPU certification requires passing a 3-day test that includes a written examination and fingerprint comparisons. Examiners who had previously been certified under the pre-1999 procedures are grandfathered into certification.

In 1977, the International Association for Identification (IAI), the leading professional organization of forensic identification specialists in the United States, initiated a testing and certification program for latent fingerprint examiners. The IAI Program is voluntary; it is not a prerequisite to performing latent fingerprint examinations or testifying as an expert in most courts. Wieners was certified by the IAI after taking the IAI test. Massey was grandfathered into IAI certification. Green never sought certification by the IAI.

Periodic Proficiency Testing. ASCLD/LAB requires accredited laboratories to implement annual proficiency testing. The LPU has conducted annual proficiency testing of all of its latent fingerprint examiners, including supervisors and unit chiefs, since 1995. Initially, the LPU developed its own proficiency tests, but since 2002 the LPU has used tests provided by Collaborative Testing Services, the only supplier of latent fingerprint proficiency tests approved by ASCLD/LAB. To pass the proficiency test, LPU examiners are required to obtain a perfect score. A corrective action plan is implemented for any examiner who fails the test.

II. Overview of the Latent Fingerprint Examination Process in the FBI Laboratory LPU

This section describes basic principles and procedures of latent fingerprint examination as practiced by the FBI Laboratory LPU. It is not intended to provide an exhaustive or definitive treatment of latent fingerprint examination techniques, but rather to provide background for understanding the OIG's review of the causes of the fingerprint identification error in the Mayfield case.

A. Policies and Procedures Governing the LPU

The FBI Laboratory has adopted several Standard Operating Procedures (SOPs) to govern the LPU, including Standard Operating Procedures for Examining Friction Ridge Impressions (the Examination SOPs). The Examination SOPs cite two brief references prepared by The Scientific Working Group for Friction Ridge Analysis, Study, and Technology (SWGFAST) for further detail regarding the examination process: The SWGFAST Friction Ridge Examination Methodology for Latent Print Examiners, (the SWGFAST Methodology) and the SWGFAST Standards for Conclusions (SWGFAST Standards).[51] The versions of the Examination SOPs, the SWGFAST Methodology, and the SWGFAST Standards that were in effect at the time of the Laboratory's identification of LFP 17 are provided in Appendices F, G, and H. In general, the examination processes described in the following sections are those set forth in these three documents.

In addition, the Examination SOPs cite David R. Ashbaugh's text, "Quantitative-Qualitative Friction Ridge Analysis" (hereinafter "Ashbaugh"), as

[51] SWGFAST is an organization sponsored by the FBI Laboratory comprising latent fingerprint examiners from many laboratories. Since 1995, SWGFAST has established guidelines for latent fingerprint examination.

a reference for FBI latent fingerprint examiners.[52] Accordingly, Ashbaugh is cited and quoted extensively in the following description of the latent fingerprint examination process. Other references are cited to explain additional aspects of the latent print examination discipline of relevance to the Mayfield matter. Areas of disagreement within the discipline – including disagreements that some examiners have raised with the approach set forth in Ashbaugh – are also described below.

B. Friction Ridges and the Premises of Fingerprint Identification

A fingerprint is a reproduction of the pattern of friction ridge formations of the surface of a finger, made as the result of the transfer of oil or other matter during contact between the finger and an object. Friction ridges are the ridges on the skin of the fingers, palms, and feet, which produce increased friction for gripping. Friction ridges form prior to birth in patterns that are attributed to a combination of genetic and environmental causes.[53]

Friction ridge patterns and fingerprints are frequently described in terms of three "levels of detail." Level 1 detail refers to ridge flow, encompassing familiar patterns such as loops, whorls, and arches. Figure 3 depicts common Level 1 patterns.[54]

Level 2 detail refers to the details that occur on individual ridge paths, including the turns that each ridge takes, the size and shape of each ridge, and the places where ridges terminate or split, also known as ridge path deviations. Ridge path deviations include features such as ending ridges (where a single ridge comes to an end); bifurcations (where a single ridge splits to form two adjacent, roughly parallel ridges); and dots (extremely short ridges). An "enclosure" is formed where a ridge bifurcates into two ridges that rejoin at a second bifurcation to form a single ridge again. A human fingerprint may contain 75-175 ridge path deviations. Common Level 2 details are shown in Figure 4. As a major ridge path deviation develops in the friction skin, other ridge formations develop around it. For example, when a ridge ends, the adjacent ridges will tend to converge, as illustrated in Figure 4. Ridge path deviations, sometimes called "points" or "minutiae," have long been a major focus of latent print examination, but the evaluation of Level 2 details also considers ridge paths and the *absence* of deviations (continuous ridges). Some

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[52] David R. Ashbaugh, *Quantitative-Qualitative Friction Ridge Analysis, An Introduction to Basic and Advanced Ridgeology* (CRC Press 1999).

[53] See generally Ashbaugh, Ch. 3.

[54] The images contained in Figures 3-5 were obtained from http://fingerprints.tk/, and are reproduced with permission.

examiners identify Level 2 details by making tracings of individual ridge paths on an enlargement of the fingerprint.

Level 3 detail refers to extremely tiny features of the friction ridges, such as the shape of ridge edges, the width of ridges, and the shape and relative location of pores along the ridges. Each ridge is made up of "ridge units." Each ridge unit includes one sweat gland and one pore opening. According to Ashbaugh, Level 3 features are created by differential growth or random damage (such as from scarring) at the ridge unit level.[55] Common Level 3 details are shown in Figure 5.

One premise of fingerprint identification is that friction ridge formations persist throughout life except for (1) changes associated with growth, (2) temporary damage to the skin surface, and (3) permanent damage due to scarring of the underlying tissues. A second premise is that friction ridges and their formations are unique to each individual, even within a very small area of the friction skin. These premises are commonly referred to as "permanence" and "uniqueness." Some critics of latent fingerprint identification claim that these premises have never been scientifically proven,[56] while latent fingerprint examiners respond that the premises are firmly grounded in more than a century of experience as well as in principles of genetics, fetal development, and cellular biology.[57]

C. Latent Fingerprints

The term "latent fingerprint" is commonly used to describe an accidental fingerprint left at a crime scene. Forensic laboratories use a variety of physical and chemical processing techniques to enhance the visibility of latent prints and to photograph them for comparison purposes.

Latent fingerprints are typically assessed in terms of both the quantity and quality of friction detail that is reproduced. Quantity refers generally to the amount of detail available and is affected by many factors, including the size of the latent prints. In many latent prints, only a small fraction of the friction ridge detail on a complete finger is reproduced.[58] Quality is used

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[55] Ashbaugh, p. 143.

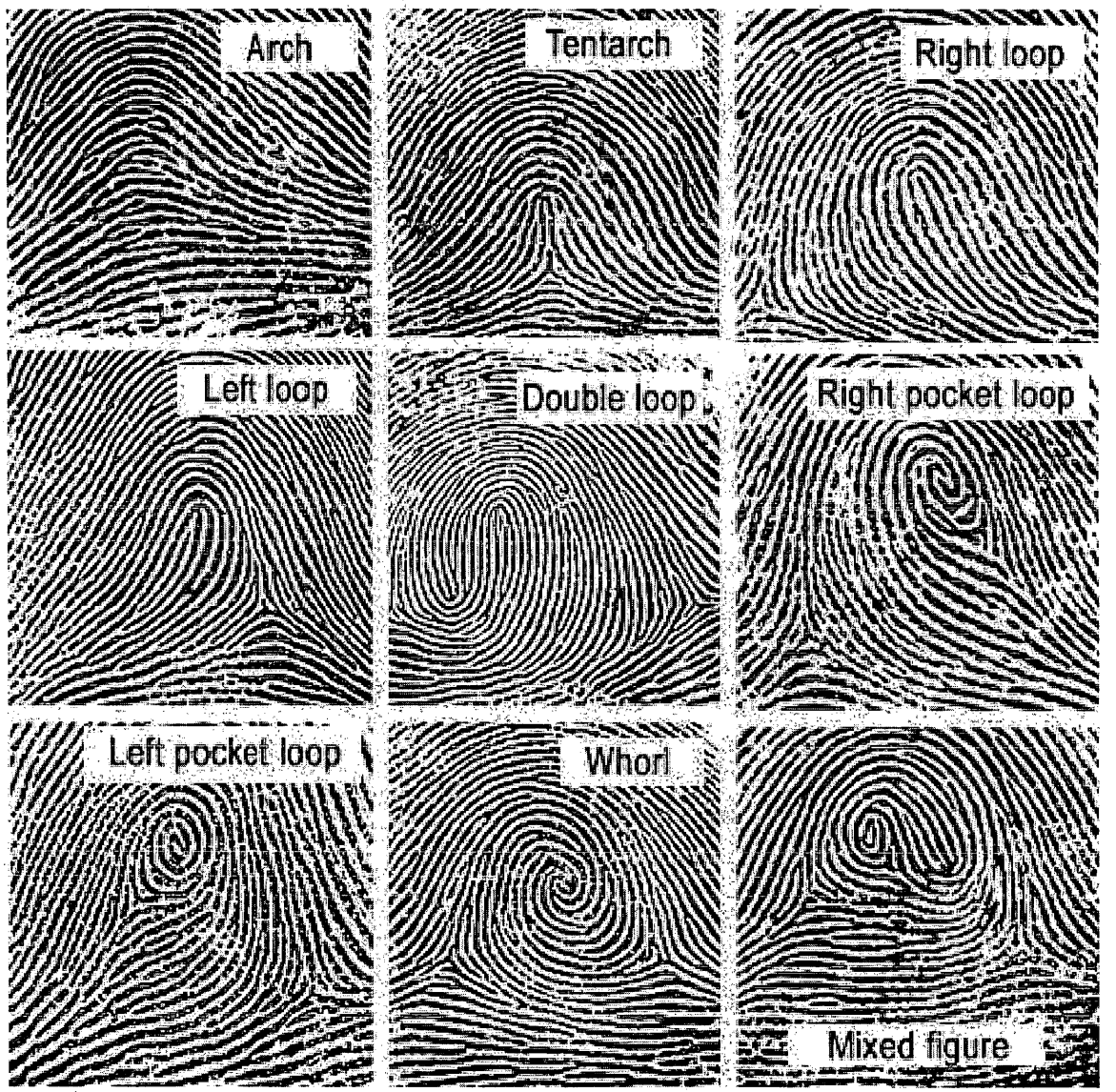
[56] E.g., Robert Epstein, "Fingerprints Meet *Daubert:* The Myth of Fingerprint 'Science' Is Revealed," *Southern Cal. L. Rev.* Vol. 75, 2002, pp. 612 and 625; David A. Stoney, "Scientific Status, Fingerprint Identification," *Modern Scientific Evidence: The Law and Science of Expert Testimony,* 2002, § 27-2.1.2[6].

[57] E.g., Ashbaugh, pp. 61-85.

[58] United States v. Mitchell, 365 F.3d 215, 221, 225 n. 5 (3d Cir. 2004) (testimony suggested that the typical latent print is perhaps 1/5 the size of a full fingerprint)

FIGURE 3

Common Level 1 Patterns



Images obtained from http://www.fingerprints.tk/. Reproduced with permission.

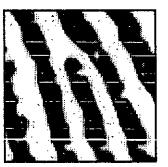
FIGURE 4

Common Level 2 Details

BIFURCATION

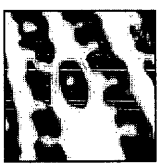
ENDING RIDGE

(note convergence of adjacent ridges)



ENCLOSURE

DOT

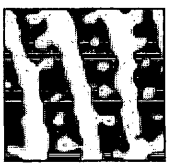


Images obtained from http://www.fingerprints.tk/. Reproduced with permission.

FIGURE 5

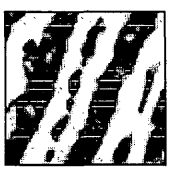
Common Level 3 Details

PORES



RIDGE EDGE SHAPES

INCIPIENT RIDGES



SCARS

Images obtained from http://www.fingerprints.tk/. Reproduced with permission.

interchangeably with "clarity" and is defined as how well the details from three-dimensional ridges are reproduced in a two-dimensional fingerprint.[59]

Numerous factors may affect the transfer of detail from the friction ridges of a finger to an impression on an object, potentially obscuring some of the differences between one finger and another. Unlike friction ridges, fingerprints are usually two-dimensional. Inevitably, some unique detail is lost when a three-dimensional friction ridge pattern is reproduced as a two-dimensional print.

One factor affecting the clarity of a latent fingerprint is the surface or "substrate" upon which a latent fingerprint is deposited. Different substrates affect the amount of detail from the friction ridges that is transferred to the print, and may introduce distortions to the print.[60] For example, a flexible substrate (such as a plastic bag like the one on which LFP 17 was found) can cause distortion as a result of the pliability of the material or the existence of folds or wrinkles. "Double taps," where a single print is deposited in two distinct applications of pressure, are a common type of distortion with flexible substrates.[61]

Distortion can also be introduced by the substance that is actually deposited by the finger to form the impression of the friction ridge details (the "matrix"), such as sweat, sebaceous oils, blood, or mud. Matrices differ in viscosity, adherence, and other attributes that affect how clearly and accurately friction ridge features are recorded in latent prints.[62]

"Deposition pressure" refers to downward pressure during the deposition of a print. Among other things, it will affect the apparent width of the ridges and furrows, and can significantly affect the appearance of ridge edge shapes. "Lateral pressure" refers to a sideways or lateral force that may result in sliding of the friction ridges resulting in smearing in the fingerprint or a double tap.[63] Both types of pressure can distort the appearance of a latent print.

There are many different development media used to enhance the visibility of latent fingerprints, such as fingerprint powder and various chemicals. The development medium utilized in a particular case will depend

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[59] SWGFAST Methodology § 3.1.1.; SWGFAST Glossary (definitions of "clarity" and "qualitative"); Ashbaugh, p. 93.

[60] Ashbaugh, pp. 114-118.

[61] Ashbaugh, p. 114.

[62] Ashbaugh, pp. 118-120.

[63] Ashbaugh, pp. 123-129.

on the substrate and other factors. Each development medium can affect the appearance of a latent print and the accuracy with which details are reproduced.[64] Some development media will tend to fill in gaps in the fingerprint, obscuring Level 3 details and even causing ending ridges to appear as bifurcations. Other media may cause apparent breaks in a continuous ridge. Once developed, latent prints are often photographed for purposes of dissemination and comparison; photographic processes and digital imaging can also affect the appearance of a latent print.

Each of the foregoing factors may affect the clarity of a latent print. Because of these factors, latent fingerprints are not perfect reproductions of the friction skin, even over a small area. The premise that friction skin is unique in a very small area only applies to a fingerprint to the extent that clarity is present in the print.[65] The problem for the latent print examiner is to determine whether there is sufficient reliable detail in a latent print to determine that it was made by a particular finger, to the exclusion of all others.

D. Known or Exemplar Prints

The identification of a latent fingerprint is established through the agreement of friction ridge formations between the latent print and the known print of a particular candidate. "Known" or "exemplar" fingerprints are friction ridge impressions known to be those of a particular person, taken under controlled circumstances, such as during an arrest. Historically, exemplar prints have been made with ink, although in recent years the use of electronic fingerprint capture devices has become more commonplace. In a "rolled print," the image is made by rolling the surface of the finger from nail edge to nail edge in an effort to capture as much detail as possible. A "flat impression" or "plain impression" is made by pressing the fingers onto the card simultaneously, without rolling. In many cases when a subject is fingerprinted, a record is made of both individual rolled prints for all 10 fingers plus flat prints, and sometimes palm prints.

Because known prints are taken under controlled conditions, the quantity and quality of detail captured in known prints is typically (but not always) greater than is available in the latent print of interest. Factors such as over-inking may adversely affect the quality of known prints, however.

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[64] Ashbaugh, pp. 120-122.

[65] Ashbaugh, p. 93.

E. The ACE-V Process for Latent Print Identification

The FBI Laboratory and many other crime laboratories utilize the "ACE-V" method for examining latent fingerprints. ACE-V is an acronym for the four steps of the method: Analysis, Comparison, Evaluation, and Verification. The Examination SOPs in effect in the FBI Laboratory at the time of the identification of LFP 17 did not describe the ACE-V process in detail. They referenced the SWGFAST Methodology, the SWGFAST Standards, and Ashbaugh, and stated that the methodology "includes both qualitative and quantitative analysis." The individual steps of the ACE-V process are described below.

1. Analysis

The SWGFAST Methodology defines "Analysis" as "the assessment of a friction ridge impression to determine suitability for comparison," and lists various factors to be considered in the analysis stage, including the quality (clarity) of detail at all three levels and the various factors described above that may affect the appearance and reliability of details reproduced in a latent print (e.g., substrate, matrix, deposition, development method).

Another function of the analysis stage is to establish the friction ridge details that can be seen in the latent print and hence are available to utilize in the comparison phase. The examiner considers all three levels of detail in this phase. According to LPU Unit Chief Meagher, the analysis should be performed on the latent print *before* consideration of any available known prints, in order to "limit or try to restrict any bias in terms of what appears in the known exemplar."[66] In other words, analysis of the latent is performed prior to the examination of the relevant exemplar, in order to avoid having the

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[66] Testimony of Stephen Meagher in United States v. Llera-Plaza, No. 98-CR-00362-10 (E.D. Pa.), February 25, 2002, p. 40. An internal LPU document titled "Questions Following a Review of the International Expert Panel Review," dated 7/21/05, revised as of 8/16/05, states at page 9 that "[c]omparisons proceed only after full analysis is complete." Another experienced examiner expressed the point as follows:

> The reason for working from the unknown image to the known has its foundation in human psychology. When dealing with a less clear image, usually the latent or unknown print, the brain is subject to influence by "mind-set." If a feature is first observed in a clear image, the brain may form an expectation and be tricked into seeing the same feature in an unclear image even though it does not actually exist there. . . . To avoid this possibility, a cautious examiner always finds the features in the unknown print first, free from mind-set, then locates and evaluates the corresponding features in the known print.

Pat A. Wertheim, "Scientific Comparison and Identification of Fingerprint Evidence," *The Print*, Vol. 16, No. 2, September-October 2000, p. 18.

known print suggest features in the latent print to the examiner. Ashbaugh describes the problem this way:

> During forensic comparison one must maintain an objective state of mind to guard against seeing things that are not there. For example, during the comparison process, examining the clear inked known impression *prior to carrying out an analysis of an unknown print* could cause the brain to jump to a conclusion and see details in the murky unknown ridge structures that may not actually be there.[67]

Several examiners we interviewed inside and outside of the FBI described analysis as an iterative process in which the examiner's initial interpretation of a latent fingerprint may be adjusted during the comparison phase as it is informed by features seen in the known print. John Vanderkolk, a SWGFAST member and experienced examiner with the Indiana State Police who served as an OIG consultant in the Mayfield matter, described this as a "recurring, reversible and blending" application of the analysis, comparison, and evaluation phases of the ACE-V model, and distinguished it from a linear process of proceeding from analysis to comparison to evaluation.[68]

During the analysis phase, the examiner brings to bear his understanding of how friction ridges form and how they tend to appear in latent prints. For example, the examiner must attempt to distinguish between an incompletely reproduced ridge (a gap in the reproduction of a continuous ridge resulting from the circumstances under which the latent print was deposited) and an ending ridge (a Level 2 detail in the friction skin where a ridge terminates). In the case of an ending ridge, the adjacent ridges on either side will tend to fill in any void left by the ending ridge and this directional change will be visible on the ridge path of those adjacent ridges. An example of this convergence of ridges is shown in Figure 4. Analysis of this type enables the examiner to distinguish those features on a latent print that reflect true events in the friction skin from those features that result from the imperfect conditions under which latent prints are often made or developed.

Another function of the analysis step is to evaluate the factors that might cause distortion of the friction ridge impression. These factors may be apparent from the appearance of the print (such as indications in the appearance of a latent print that a "double tap" occurred), or evidence external to the image (such as information about how the substrate might distort the

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[67] Ashbaugh, p. 105 (emphasis added).

[68] See also John R. Vanderkolk, "ACE+V: A Model," *Journal of Forensic Identification,* Vol. 54, No. 1, 2004, pp. 45-52.

appearance of the print). Understanding such factors is critical to determining whether dissimilarities between a latent print and an exemplar are "explainable" or whether they compel a conclusion that the subject did not make the print. (See discussion in Section II.E.3.b below regarding the treatment of dissimilarities during the "evaluation" phase of ACE-V.)

Ashbaugh recommends that the results of the analysis stage be committed to writing in certain cases:

> When the print is complex, involving more than two distortion issues, a written report should be prepared by the expert carrying out the analysis, describing the details of the distortions observed. . . . In very serious cases a complete written analysis should always be completed. . . .
>
> Preparing a written analysis prior to comparison promotes objectivity and demonstrates professionalism. It also removes the opportunity for anyone to suggest that one is seeing friction ridge details where none exist. . . . [W]hen the print has some distortions which may require explanation at a later date . . ., then a written analysis should be used.[69]

However, FBI policies in place at the time of the Mayfield identification did not require the examiner to create a written record of the analysis in any category of case.

2. Comparison

The SWGFAST Methodology defines the "Comparison" phase of ACE-V as "the direct side-by-side observation of friction ridge detail [in the latent and known prints] to determine whether the detail in two impressions is in agreement based on similarity, sequence, and spatial relationship." Ashbaugh describes comparison as a process of making comparative measurements, which are commonly performed visually by the examiner but sometimes are conducted physically.[70]

The comparison of the latent print with the exemplar may be conducted under a magnifier utilizing a one-to-one scale (life-sized) photograph of the latent, which permits direct comparison with the original inked fingerprint card. Alternatively, the examiner may utilize photographic enlargements or scanned images on a computer screen. This is a matter of preference for the

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[69] Ashbaugh, pp. 112-113.

[70] Ashbaugh, p. 136.

examiner; no FBI standards or protocols dictate that a comparison be conducted at a particular scale.

The examiner often uses Level 1 detail to place the latent and exemplar prints in the same orientation in order to facilitate a comparison. Differences in ridge flow, such as a "whorl" pattern in the latent versus an arch pattern in the exemplar, may enable the examiner to exclude the exemplar even without a comparison of Level 2 or Level 3 detail.

Assuming the exemplar is deemed sufficiently similar to merit a more rigorous side-by-side comparison, the examiner compares the prints on a ridge-by-ridge basis, looking for similarity and dissimilarity at all three levels of detail. Major ridge path deviations (Level 2 details) are a primary focus during the comparison, although if clarity is excellent Level 3 details may also be compared.[71]

Matching Level 2 ridge deviations in the latent and known prints are sometimes referred to as "points of similarity," and are often used in enlargements to demonstrate identifications, but the term can be misleading because the comparison process involves more than the mere tallying of such features. Each such ridge deviation is compared with respect to its relationship to other features (measured by distance, direction, and the number of intervening ridges), its location within the print, its type (e.g., bifurcation versus ending ridge), and its orientation (e.g., which way an ending ridge points). Moreover, the comparison is not limited to the consideration of ridge deviations; what happens along the ridges between the deviations is also important identifying information.[72]

Level 3 details are sometimes used to support identifications, but the reliability of these very small details in latent prints is the subject of continuing debate within the fingerprint community. For example, John D. "Dusty" Clark, a SWGFAST member and former California Department of Justice examiner (currently with the Western Identification Network) who served as an OIG consultant in this matter, has written:

> There is such a degree of variation of appearance in the 3rd level detail due to pressure, distortion, over or under processing, foreign or excessive residue on the fingers, surface debris and surface irregularity, to name a few. The repeatability of the finite detail that is utilized in the comparison process has never been subjected

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[71] Ashbaugh, p. 93.

[72] Ashbaugh, p. 141 ("It is just as important to establish where the path goes as where it starts, stops, or bifurcates.").

to a definitive study to demonstrate that what is visible is actually a true 3rd level detail or an anomaly.[73]

An additional factor complicating comparison of Level 3 detail is the fact that each ridge unit contains a pore, so that pores occur repeatedly and frequently along every ridge in the friction skin. Accordingly, finding a pore at a particular location in a latent print has limited identifying power, compared to a Level 2 ridge deviation. Ashbaugh emphasizes the need to consider relative pore location by triangulation across adjacent ridges, but cautions that this practice "is not advised over more than one ridge."[74] Unlike pores, Level 2 ridge deviations do not repeat in regular intervals across all ridges.

3. Evaluation

Section 3.3 of the SWGFAST Methodology defines the "Evaluation" phase of the ACE-V process as "the formulation of a conclusion based upon analysis and comparison of friction ridge impressions." There are three possible conclusions that an FBI examiner may reach under the Examination SOPs and the SWGFAST Methodology: individualization (identification), exclusion, and inconclusive.

a. Individualization (identification)

Individualization is a determination that two friction ridge impressions (e.g., the latent print and the exemplars) "originated from the same source, to the exclusion of all others." The SWGFAST Methodology states that the individualization is the result when the compared impressions contain "sufficient quality (clarity) and quantity of friction ridge detail in agreement." The SWGFAST Standards for Conclusions state: "The standard for individualization is agreement of sufficient friction ridge details in sequence." SWGFAST provides no elaboration regarding how much "agreement" is "sufficient" beyond stating that the determination must be based on both the "quantity" and "quality" of friction ridge details. Indeed, the SWGFAST Standards state that "[t]here is no scientific basis for requiring that a predetermined number of corresponding friction ridge details be present in two impressions to effectuate individualization." Accordingly, the FBI's Examination SOPs state that "no minimum number of friction ridge detail is [sic] required to establish an identification."

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[73] Dusty Clark, "What is the Point," http://www.latent-prints.com/id_criteria_jdc.htm, December 15, 1999.

[74] Ashbaugh, p. 155, Fig. 5.2.

Despite rejecting a minimum point standard for declaring an identification, the FBI Laboratory SOPs in place at the time of the Mayfield identification required that "when less than 12 points of level two detail are utilized in making an identification, it must receive supervisor approval before being reported as an identification." This requirement was imposed in addition to the verification requirement applicable to all identifications, as described in Section II.E.4 below. The Laboratory has since discarded this requirement.

As noted above, the Examination SOPs and the SWGFAST Standards require that an identification determination be based on both qualitative and quantitative considerations. The SWGFAST Glossary defines "quantitative" in the context of the identification conclusion as "the amount of information contained in a friction ridge impression." In practice, this means that although no minimum number of features in agreement is required to establish individualization, the more features in agreement, the easier it is for the examiner to exceed his threshold of doubt and reach the conclusion of identification.[75]

The SWGFAST Glossary defines "qualitative" as "the clarity of information contained within a friction ridge impression." The clarity of a latent print will dictate whether extremely small Level 3 details can be used to support an identification. The clarity of the print will also affect the ability of the examiner to distinguish between different types of Level 2 details, such as bifurcations and ending ridges.

According to the SWGFAST Methodology, an individualization cannot be determined solely on the basis of agreement in Level 1 detail, for the simple reason that many people share similar overall ridge patterns such as whorls, arches, and loops. An individualization may be based on sufficient agreement of Level 2 details such as ending ridges and bifurcations and the individual ridge paths between these ridge events. The SWGFAST Methodology states that Level 3 detail is used "in conjunction with" Level 1 and Level 2 detail to individualize, but the Methodology permits an examiner to identify on the basis of agreement of Level 1 and Level 2 detail without reference to Level 3.

In practice, it appears to be an unusual event to encounter a latent print lacking sufficient ridge deviations or other Level 2 details to support an identification but having clear Level 3 details that are in agreement with an

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[75] See, e.g., John R. Vanderkolk, "Levels of Quality and Quantity in Detail," *Journal of Forensic Identification,* Vol. 51 No. 5, 2001, pp. 461-468 (describing the process of achieving "sufficiency" as the examiner finds increasing quantity or quality of detail in agreement, crossing a threshold or "gray area" of doubt).

exemplar.[76] As previously noted, there is dispute within the discipline as to the reliability with which Level 3 friction ridge details are reproduced in latent fingerprints. Ashbaugh clearly advocates utilizing Level 3 detail to make identifications, but cautions that: "Identifications based mostly on the individualizing weights of third level details are considered an advanced identification technique. Novices should seek the advice of an experienced identification specialist when this type of print is encountered."[77]

Neither the Examination SOPs nor the SWGFAST Standards provide any further criteria or thresholds for declaring an identification. As described in more detail below in Section II.F., there is a vigorous debate within the discipline regarding the need for objective minimum criteria for declaring an identification.

FBI Laboratory fingerprint examiners only express a conclusion of individualization in terms of absolute certainty, with a zero likelihood that the latent fingerprint was made by a different person.[78] This approach is consistent with the SWGFAST Methodology, which states: "Probable, possible or likely individualization (identification) conclusions are outside the acceptable limits of the friction ridge identification science." This certainty, based on finding sufficiency of detail in agreement, is achieved in the course of an examination as the examiner evaluates the quality and the quantity of information available in the images.[79] However, the claim of absolute certainty has been questioned by some academics and defense counsel.[80]

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[76] John Thornton, "Setting Standards In The Comparison and Identification," (transcript of speech), http://www.latent-prints.com/Thornton.htm, May 9, 2000, ("If I have a print that is clear enough to show reliable level three detail, it invariably has an abundance [of] level two detail as well."). An example of an identification based solely or primarily on the agreement of Level 3 details such as incipient (incompletely formed) ridges and ridge edge shapes is described in Robert D. Reneau, "Unusual Latent Print Examinations," *Journal of Forensic Identification,* Vol. 53, No. 5, 2003, pp. 531-534 (2003). An example of an identification that relies heavily on Level 3 detail appears in Ashbaugh, p. 159.

[77] Ashbaugh, p. 143.

[78] See, e.g., David L. Grieve, "Possession of Truth," *Journal of Forensic Identification,* Vol. 46 (1996), pp. 521, 527-528. See also CBS News Transcripts, 60 Minutes, January 5, 2003, which includes the following exchange between Leslie Stahl and LPU Unit Chief Meagher:

STAHL: Does an FBI agent or any fingerprint expert ever go into court and say, "I believe it's a match with 80 percent certainty" or 90 percent certainty?

Mr. MEAGHER: No. We go in with a – a 100-percent certainty that we have an identification.

[79] See, e.g., Vanderkolk, *Levels of Quality and Quantity,* pp. 463-465.

[80] See, e.g., Simon A. Cole, "Grandfathering Evidence: Fingerprint Rulings from Jennings to Llera Plaza and Back Again," American Criminal Law Review, Vol. 41, 2004, pp. 1196-1202; Epstein, pp. 611-612; Stoney, §§ 27-2.1.2[7] and 27-2.3.1[1].

b. Exclusion

The second permissible conclusion under the Examination SOPs is "exclusion," which is defined in the SWGFAST Methodology as a determination that "two friction ridge impressions originated from different sources." The SWGFAST Standards define the standard for exclusion as "disagreement of friction ridge details." Unlike an individualization, an exclusion may be declared in some circumstances merely on the basis of Level 1 detail, such as when the exemplar is clearly a whorl pattern and the latent is clearly an arch pattern.

The SWGFAST Standards state that "[t]he presence of one discrepancy is sufficient to exclude." This is known as the "one discrepancy rule." As a logical counterpart, the standards also require the absence of any "discrepancy" as a condition of individualization. The SWGFAST Glossary defines a "discrepancy" as a "difference in two friction ridge impressions due to different sources of impressions." The SWGFAST Standards state that: "Distortion is not discrepancy and is not a basis for exclusion." "Distortion" is defined in the SWGFAST Glossary as "variances in the reproduction of friction skin caused by pressure, movement, force, contact surface, etc." Under these definitions, events such as smears, double taps, and incomplete impressions may cause differences in appearance that are considered "distortions." Under the SWGFAST Standards, a "distortion" need not preclude an identification that is otherwise supported by sufficient detail in agreement elsewhere in the print.

Thus, one critical task for the examiner in the evaluation stage is to determine whether any differences in appearance between the prints are "discrepancies" (requiring exclusion) or "distortions" (which may permit individualization). According to several LPU examiners interviewed by the OIG, the "one discrepancy rule" means that if there is a difference in appearance between a latent print and an exemplar, an identification cannot be declared unless the examiner has an explanation for the difference.[81]

The nature of the explanation required is an extremely case-specific analysis and there are no criteria stated in the Examination SOPs or the SWGFAST Methodology or Standards for adopting an explanation. Among

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[81] Latent fingerprint examiners are not consistent in their use of this terminology for differences in appearance. Some LPU examiners use the term "dissimilarity" to refer to an explainable difference and the term "discrepancy" to refer to an unexplained difference that precludes identification. However, the SWGFAST Glossary defines both "dissimilarity" and "discrepancy" the same way, as "a difference in two friction ridge impressions due to different sources of the impressions (exclusion)."

other things, explanations will depend on the level of detail at which the difference occurs. As noted above, Level 3 details, such as pores and ridge edge shapes, are extremely small and are understood to vary in appearance from one impression to another as the result of differences in pressure, matrix, or substrate. Accordingly, depending on the clarity of the prints, examiners are generally tolerant of differences in appearance in Level 3 details and are more willing to explicitly or implicitly explain them as being the result of distortions. Indeed, some examiners told the OIG that they would not declare an exclusion based on Level 3 detail, and Unit Chief Meagher has testified that "you have to be very carefully [sic] with Level 3 in exclusion," because factors like processing technique and substrate can distort Level 3 details.[82] By contrast, a difference in appearance at Level 2 – such as a bifurcation occurring in a latent print when the corresponding location in the exemplar appears as a single continuous ridge – may be much more difficult to explain as the product of mere distortion, and therefore may be more likely to require a conclusion of exclusion.

c. Inconclusive

The third permissible conclusion in latent print examination under the SWGFAST Standards is "inconclusive," defined as a determination that the latent examiner is "unable to individualize or exclude the source of an impression." The SWGFAST Methodology cautions, however, that "[i]nconclusive results must not be construed as statements of probability. Probable, possible or likely individualization (identification) conclusions are outside the acceptable limits of the friction ridge identification science." This rejection of probabilistic identifications is consistent with the philosophy of absolute certainty in identification decisions described above.

There is an important but subtle relationship between the "inconclusive" conclusion and the purpose of the analysis phase as adopted by SWGFAST. As noted above, the SWGFAST Methodology states that the purpose of the analysis phase is to "determine suitability [of the relevant fingerprints] for comparison." According to OIG consultant John Vanderkolk, a member of SWGFAST who participated in the deliberations regarding this definition, the "suitability for comparison" standard represented a meaningful revision of the benchmark traditionally employed in the discipline, which was "sufficient for identification" or "of value for identification." Vanderkolk stated that historically, many examiners were reluctant to utilize the "inconclusive" conclusion in a case in which they had previously found the latent print to be "of value for identification." If the examiner was unable to identify or exclude, he would revert to the analysis phase and declare the latent print to have "no value."

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[82] Meagher testimony in *Llera Plaza*, p. 48.

Vanderkolk stated that the purpose of SWGFAST's adoption of the "suitable for comparison" benchmark was to eliminate the tension in the SWGFAST definitions that was discouraging examiners from utilizing the "inconclusive" result in appropriate cases. Under the revised definitions, a print might be deemed "suitable for comparison" during the analysis phase and yet during the comparison phase, the examiner might find that there is too much uncertainty to declare a result of individualization or exclusion. For example, the examiner might find differences between the prints, but be unable to resolve uncertainty regarding whether these differences were mere distortions, or the result of having been made by different people. A conclusion of "inconclusive" would be appropriate in such a case. Dusty Clark and Michael Grimm, two other SWGFAST members who served as consultants to the OIG, agreed with this interpretation of the revised SWGFAST Methodology.[83]

Although the FBI LPU has incorporated the SWGFAST Standards into the Examination SOPs by reference, it is not clear that this change in terminology and attitude toward the "inconclusive" result has been integrated into LPU practice. The FBI examiners that we interviewed still generally described the analysis step as involving a determination of whether the print is "of value," i.e., whether there is sufficient information in the print to effect an individualization, and not merely whether the print is "suitable for comparison." LPU Unit Chief Meagher told the OIG that most instances of "inconclusive" results in the LPU occur when the exemplar print turns out to be of poorer quality than the latent print.[84] If the quality of the exemplar is

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[83] The shift to a "suitable for comparison" standard that admits to the possibility that the latent fingerprint will nevertheless ultimately prove to be unidentifiable was advocated at least as early as 1988 in David L. Grieve, "The Identification Process: Attitude and Approach," *Journal of Forensic Identification*, Vol. 39, No. 5, 1988, p. 211.

[84] Meagher's characterization of the Laboratory's usage of the "inconclusive" result is confirmed by a recent revisions to the Laboratory's Examination SOPs, which state in relevant part that "[i]nconclusive evaluation results when a qualified latent print examiner is unable to individualize or exclude the source of an impression because the corresponding areas of friction ridge detail are absent, i.e. the impression to be compared is from the tip or lower joint of a finger and the corresponding area (tip or lower joint) is not captured on the known card or second impression, or is unusable due to distortion." According to the Laboratory, this revision does not reflect a change in FBI Laboratory practice but rather is consistent with practice existing at the time of the misidentification of LFP 17. Apparently this circumstance (lack of usable detail in a relevant portion of the exemplar print) is not unusual. According to the Laboratory, a recent sampling of cases indicated that approximately 50 percent of all FBI Laboratory latent print reports include at least one comparison that resulted in an "inconclusive" determination. (Because many case reports involve a large number of comparisons, the 50 percent does not represent the frequency of the inconclusive result among all individual comparisons.) We do not believe that the Laboratory's definition of the "inconclusive" result is consistent with the revised SWGFAST Methodology, as described above.

good but the examiner is unable to reach the level of certainty required to declare a conclusion of either individualization or exclusion, it is the practice of some FBI examiners to revisit the analysis phase and declare the latent print to be of "no value." For example, Terry Green told the OIG that this was his practice. Meagher stated that in the case of an "inconclusive" result, the LPU would not normally inform the investigators that there is a potential subject who cannot be excluded as the source of the latent fingerprint.

4. Verification

The Examination SOPs and the SWGFAST Methodology require that all identifications be verified. "Verification" is defined simply as "the independent examination by another qualified examiner resulting in the same conclusion." The verification procedures in the LPU are undergoing revision as a result of the Mayfield matter. The following description pertains to the procedures that were in place at the time of the Mayfield identification.

The LPU Quality Assurance Manual, Procedures for Reviewing a Report of Examination, required that a supervisor select the second examiner for verification comparisons. LPU Unit Chief Meagher told the OIG that in practice, if the supervisor was unavailable, the examiner could simply ask another examiner in the LPU to perform the verification. Meagher stated that although the verifier was aware of the fact that the first examiner had made an identification, the verifier would not know which features in the print were relied upon by the initial examiner in reaching his conclusion.

There was no policy within the LPU addressing the issue of whether consultation between the initial examiner and the verifier is appropriate. In practice, LPU verifiers sometimes consulted with the initial examiner, particularly for the purpose of assisting in an initial orientation of the prints so that the verifier did not spend too much time simply finding the portion of the exemplar that the initial examiner found to be a match to the latent print.

The LPU Quality Assurance Manual provided that if the second examiner reached a different conclusion, the matter "must be referred to the supervisor and/or the Unit Chief for resolution." No formal statistics regarding the frequency of this occurrence have been maintained by the LPU, but LPU witnesses interviewed by the OIG stated that a refused verification was as an extremely unusual event. One option available to the supervisor was to select another verifier if the first verifier declined to confirm the identification. In that instance, there was no policy requiring that the first verifier's disagreement be documented in the case file.

F. Standard for Declaring a Match

Neither the Examination SOPs nor the SWGFAST Standards for Conclusions specify how much "agreement" is "sufficient" to support a conclusion of identification. Historically, many examiners have required that a minimum number of Level 2 ridge deviations be in agreement in order to declare an identification, although the specific threshold varied among jurisdictions, laboratories, and examiners. The FBI Laboratory and SWGFAST currently reject any requirement that a "predetermined number of corresponding friction ridge details" be in agreement, however. Instead, the determination is committed to the judgment and expertise of the individual examiner, who is instructed to take into account both the quantity and quality of available friction ridge detail. Ashbaugh explains this standard as follows:

> A frequently asked question is, "How much is enough?" 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 founded in one's personal knowledge, ability and experience. . . . [I]t must be clearly understood that if there is any doubt whether there is sufficient specific detail present to individualize, then an opinion of individualization cannot be formed.
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> How much is enough? Finding adequate friction ridge formations in sequence that one knows are specific details of the friction skin, and in *the opinion* of the friction ridge identification specialist that there is sufficient uniqueness within those details to eliminate all other possible donors in the world, is considered enough. At that point individualization has occurred and the print has been identified. The identification was established by the agreement of friction ridge formations in sequence having sufficient uniqueness to individualize.[85]

This standard is utilized not only by the FBI LPU, but by many other forensic laboratories in North America and Great Britain. This standard is often associated with "Ridgeology," an expression coined by David Ashbaugh to mean "the study of the uniqueness of friction ridge structures and their use for personal identification."[86] Ashbaugh states that "over the years ridgeology has

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[85] Ashbaugh, p. 103 (emphasis in original).

[86] Id. at 8.

gained acceptance as a word describing a friction ridge identification process based on a quantitative-qualitative analysis as opposed to the old static [numerical threshold] method."[87] For convenience, therefore, the standard in place in the FBI Laboratory at the time of the Mayfield identification is referred to as the "Ridgeology Standard" in this report.

The alternative to the Ridgeology Standard is the utilization of a numerical standard for declaring an identification based on a specific number of minutiae or "points" in correspondence as to type, orientation, and relative position (the "Numerical Standard"). The premise of establishing such a standard is that the probability of encountering two different fingers that share that number of minutiae in common is infinitesimal and can be disregarded.

Although the Numerical Standard approach has been rejected by SWGFAST, the FBI, and other forensic laboratories in the United States, this approach is utilized in many other countries. A 2002 survey reported a variety of numerical standards utilized in different European countries ranging from 8 to 16 points.[88] The Spanish National Police Forensic Science Division utilizes a minimum of 8 to 12 points, but permits an examiner to attest to an identification based on a smaller number under certain circumstances.

There is a vigorous debate among fingerprint examiners, other forensic scientists, academics, and lawyers regarding the comparative merits of the Ridgeology Standard and the Numerical Standard. Opponents of the Ridgeology Standard have made the following criticisms, among others:

- Because the Ridgeology Standard lacks objective criteria, there can be no assurance that different examiners will reach the same result.

- Because the Ridgeology Standard provides no statistically or experientially based margin of safety, its use increases the risk that an erroneous identification will occur.

- The Ridgeology Standard encourages increased reliance on Level 3 details, the reliability and reproducibility of which are in dispute.

- Although the standard purports to permit the examiner to take into account the "uniqueness" of different kinds of friction ridge details, research into the relative frequencies with which different characteristics

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[87] Id.

[88] "European Fingerprint Standards (A 'Pointless' Exercise), *Fingerprint Whorld,* Vol. 28, No. 107, January 2002, p. 19. Great Britain abandoned a 16-point standard in 2001.

or combinations of features appear is lacking, and there is no consensus among examiners about which characteristics are more unique and hence have more identifying power.

Opponents of utilizing a Numerical Standard have made the following arguments, among others:

- The numerical thresholds utilized by many examiners were based on little more than educated conjecture. There is no formal scientific probability study or other validation study justifying a minimum point standard.

- The Numerical Standard omits consideration of the clarity of the minutiae.

- The Numerical Standard lacks consideration of Level 3 detail, which may have significant identifying power.

- The Numerical Standard fails to take account of the greater individualizing power of particularly rare features in the prints.

- The practice of merely counting minutiae tends to distract the examiner from conducting a complete comparison of all aspects of the print, including the distance and ridge path between points.

It is beyond the scope of the OIG's investigation to offer conclusions or recommendations regarding the relative merits of Ridgeology or a Numerical Standard. In Chapter Four of this report, however, the OIG examines the relationship between the standard utilized by the FBI Laboratory in the Mayfield case and the erroneous identification.

G. Integrated Automated Fingerprint Identification System (IAFIS)

The FBI's IAFIS is a system for conducting computerized searches of FBI databases containing the known fingerprints of over 47 million individuals (over 470 million separate prints). The LPU examiners use IAFIS to attempt to identify latent fingerprints in cases lacking known subjects. The IAFIS databases include a Criminal Master File containing known prints taken pursuant to local, state, and federal arrests; a Civil File containing known prints taken in a non-criminal context, such as for military service or government employment; a Special Latent Cognizant File containing the known fingerprints of terrorism suspects and victims; and an Unsolved Latent File containing unidentified latent fingerprints from unsolved crimes.

To conduct an IAFIS search, the examiner "encodes" the latent print on his computer screen by marking selected ridge deviations such as ending ridges and bifurcations. The IAFIS program compares the pattern of points in the latent print, as encoded by the examiner, with the patterns of points in millions of known fingerprints in its databases.

When encoding a latent print for an IAFIS search, the examiner marks both the location of the point and its orientation (the direction of the ridges as they leave the point). The encoder distinguishes between ending ridges and bifurcations by marking the direction of the point differently.[89]

The examiner does not necessarily encode every point he can find in the latent print. LPU examiners have learned through experience with the IAFIS program which types of points are most likely to yield a correct match. LPU Unit Chief Meagher told the OIG that examiners are taught to avoid encoding points in areas of high curvature ridge flow, such as the extreme core of a print. Unit Chief Wieners and Supervisor Green told the OIG that IAFIS does not do well when asked to search prints in which points have been encoded in two or more clusters separated by a gap. One reason is that IAFIS gives significant weight to the ridge count between points. If the ridge count between two clusters of points in a latent is unclear, IAFIS may fail to retrieve the true source of the print. Thus, an examiner will not necessarily encode every point that can be seen in a latent fingerprint, but rather may limit his encoding to points in a defined area in which the ridge count between points is clear.

There is an important distinction between the IAFIS encoding process and the analysis phase of the ACE-V process as described above. To encode a print for IAFIS, an examiner utilizes only part of the information that is collected during the analysis phase – specifically, the location and orientation of the selected minutiae. Among other things, the encoding process does not utilize information about the complete ridge path between points, and does not utilize Level 3 details. Nevertheless, as to the encoded points, the encoding record does reflect the examiner's contemporaneous analysis at a stage prior to the introduction of any possible bias as a result of comparison to an exemplar print.

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[89] For an ending ridge, the encoder marks the direction of the point by drawing a line back up the ridge itself. For a bifurcation, the encoder indicates the orientation by drawing the line between the two forking ridges, essentially bisecting the angle formed by the bifurcating ridges. In some cases the encoder will not be certain whether a point in a latent fingerprint is a bifurcation or an ending ridge, and the way he encodes the point is an educated guess. The IAFIS program does not distinguish between ending ridges and bifurcations, and has sufficient tolerance for differences in the orientation of points to find the proper candidate even if a particular bifurcation is incorrectly marked as an ending ridge or vice-versa.

The examiner selects which databases to search and uses available information to narrow the scope of the databases that are searched by the computer. Because no more than 30 percent of the huge Criminal Master File database can be searched at one time, the examiner must narrow the scope of the search by specifying information about the fingerprint or the subject. This information might include the race or sex of the subject, the particular digit being searched (such as a right index finger), or the Level 1 pattern (such as whorls, loops, or arches). If the available information about the latent fingerprint is insufficient to achieve this limitation, it can be achieved artificially, such as by breaking the search into ten separate searches, one for each possible digit.

The IAFIS program generates a list of 10 or 20 candidates whose known fingerprints score the highest according to a complex algorithm that measures the correspondence of points in the known prints with the encoded points, considering location, orientation, and relationship to other points. Contrary to the impression given by some popular television crime shows, the computer does not make an identification of the latent fingerprint. The examiner conducts a manual examination of the candidate prints, utilizing the ACE-V procedure described above. The examiner initially compares the candidate prints side-by-side with the latent fingerprint on his computer screen, but he may retrieve the original 10-print cards for further comparison before reaching a final conclusion.

Many IAFIS searches do not result in identifications. Among other reasons, the known fingerprints of the person who made the latent fingerprint may not be in any of the IAFIS databases. Since IAFIS was placed in service in 1999, the LPU has declared approximately 1200 identifications of latent fingerprints from IAFIS searches. This is a small fraction of the IAFIS searches that have been conducted during that time.

The examiners interviewed by the OIG stated that the numerical score generated by IAFIS is less significant than the gap between the top scoring candidate and the other candidates. If there is a large gap, this tends to be suggestive that the top candidate is in fact the source of the print. Data provided by the FBI Laboratory indicates that the scoring formula is quite effective in ranking the candidates. In those cases in which an IAFIS search resulted in an identification, the candidate identified by the LPU as the source of the print received the highest score over 80 percent of the time, and received one of the top three scores over 90 percent of the time. However, the Laboratory does not use a print's IAFIS score as a criterion for declaring an identification, and there is no FBI SOP, policy, or fingerprint identification reference that suggests it should do so. The algorithm used by IAFIS to generate candidate rankings does not take into account much of the information that human examiners use to reach the conclusion of

identification, such as the path taken by a ridge between two points or Level 3 details. IAFIS is a tool for narrowing the field of candidates to a manageable size utilizing computer technology; it is not a substitute for a complete ACE-V examination.

H. Simultaneous Impressions

Latent fingerprints sometimes appear on evidence in a relationship to one another that permits the examiner to infer that the prints were deposited simultaneously by different fingers of the same hand. There are a variety of potential indicators that a simultaneous touch may have occurred, such as when the location and anatomy of latent prints on opposite sides of a piece of paper suggest that the paper has been grasped by a thumb and index finger.

The determination that two latent prints were deposited simultaneously has several potential uses in identification. The determination may reveal which digit was associated with each separate print (as in the thumb-index finger example above), which may permit the examiner to specify the digit to be searched in IAFIS and to focus on the correct digit on the 10-print card during the comparison phase.

A second use of simultaneous impressions is to permit identifications in cases where the detail in each individual latent print is insufficient to support an identification standing alone, but the cumulative detail in both prints in agreement with the exemplar prints is sufficient to individualize.[90] At the time of the identification of LFP 17, Section 5.1 of the Examination SOPs stated: "When the friction ridge impressions of two or more fingers of one hand, each in a natural relationship with the other, are found then the information from all impressions is used to reach a conclusion." The LPU Quality Assurance Manual, Procedures for Reviewing a Report of Examination, required the approval of a supervisor and/or Unit Chief for any identification of simultaneous prints in which neither latent print contains 12 or more Level 2 characteristics.

Neither the LPU's SOPs nor the SWGFAST Methodology specify any methodology or criteria for determining whether two latent prints were deposited simultaneously, although such modifications are currently under consideration in the LPU. Ashbaugh provides a brief 2-page discussion of the issue, cautioning that an identification based on cluster prints is an "advanced

[90] Ashbaugh, pp. 134-135.

technique" and that novices should seek advice from senior specialists before attempting such a comparison.[91]

I. Documentation and Review Requirements

Fingerprint identifications by the FBI LPU are documented in reports compiled pursuant to procedures set forth in the FBI LPU Quality Assurance Manual. As detailed in Chapter Five, the LPU documentation requirements are undergoing substantial revision. The following description relates to the procedures that were in place at the time of the Mayfield identification.

The procedures required that a fingerprint identification report contain the following sections: (1) administrative information about the request for examination; (2) a listing and description of the evidence submitted to, or examined in, the LPU; (3) a remarks section; and (4) a "Results of Examination" section. The wording used to convey the results was left to the discretion of the examiner, subject to the approval of the Unit Chief. There was no requirement that the different phases of the ACE-V examination process be described or explained in any way beyond the statement of a conclusion, such as "latent fingerprint X was identified as a fingerprint of John Doe." The examiner was not required to identify any matching details upon which the identification was based, specify any differences in appearance between the latent print and the exemplars, or document any explanations adopted by the examiner with respect to such differences. The documentation could include a set of photographs that the examiner had "pin-punched" to mark important points on which he had relied. Detailed charted enlargements of the comparison were usually not prepared unless needed for a trial. The documentation requirement for a verification was satisfied when the second examiner wrote the word "verified" on the case notes followed by his signature and date. The FBI's documentation requirements, which were similar to those in place in other forensic laboratories, satisfied ASCLD/LAB standards. The FBI Laboratory was accredited by ASCLD/LAB beginning in 1998.

The LPU Quality Assurance Manual required that a supervisor conduct a Peer Review and an Administrative Review of each Report of Examination before the report was issued. The Peer Review involved ensuring that appropriate examinations had been performed and that any identifications had been verified and documented. According to the LPU Quality Assurance Manual, the Peer Review also ensured that "conclusions are supported in the examination documentation and are within the limitations of the discipline." The LPU examiners interviewed by the OIG confirmed, however, that in practice the Peer Review did not involve a substantive review of the basis of the

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[91] Id.

examiner's conclusion and did not constitute a separate examination of the relevant fingerprints. In the absence of any requirement that the basis of the examiner's conclusions be described or recorded in the Report of Examination, in practice the Peer Review could not actually involve a determination of whether an identification was "within the limitations of the discipline."

The Manual required the Administrative Review to ensure that the Report of Examination was "clear, concise, accurate and complete," and that the documentation conformed to the FBI Laboratory Caseworking Procedures Manual: Procedures for Examination of Evidence. The LPU examiners interviewed by the OIG described the Administrative Review as ensuring that the format of the Report is in compliance with applicable policies. Like the Peer Review, the Administrative Review did not involve a separate examination of the fingerprints.

The LPU Quality Assurance Manual also required that at least one Technical/Casework review be conducted per month for each case-working examiner. Case reviews involved the selection of a case and assessment of the latent fingerprint development techniques used by the examiner (processing reviews) or a complete review of the ACE-V examination carried out in the case (comparison reviews).

J. Errors

Conceptually, there are two kinds of errors that an examiner can make in reaching a conclusion about a latent fingerprint: an erroneous individualization ("false positive") or a missed identification ("false negative"). According to Section 2.2.1 of the SWGFAST Quality Assurance Guidelines for Latent Print Examiners, "[a]n erroneous identification is the most serious error a latent print examiner can make in casework." By contrast, a missed identification may or may not be the result of a deficiency in the examination. For example, even if two friction ridge impressions are from the same source, there may not be sufficient detail available in one of the prints to permit the examiner to reach a conclusion of identification, or the examiner may not be able to explain perceived differences in appearance between the prints with sufficient certainty to effect an identification. In such a case, the proper conclusion for the examiner would be either a determination that the print was not "suitable for comparison" or an "inconclusive" determination. A missed identification may be the result of applying a conservative approach to identification in order to prevent false positives. A missed identification of a fingerprint is only considered an error if the examiner should have been able to make the identification with a proper application of the ACE-V methodology.

According to SWGFAST, two experts having different levels of training, experience, and ability may differ in their conclusions between inconclusive and identification, or between inconclusive or exclusion, without either of them having committed an error.[92] However, conflicting opinions of identification and exclusion denotes an error on the part of one expert.[93]

In addressing the question of whether mistakes can be made in the examination of fingerprints, SWGFAST states: "In any human endeavor, there is a potential for error. Adherence to SWGFAST guidelines for training and quality assurance minimize the risk for human error. Human error should not be confused with methodological or scientific error." [94] In the same document, SWGFAST describes erroneous identifications and missed identifications as types of "human error" but does not explicitly identify any types of "methodological or scientific" errors.[95] Some examiners have testified in court that the error rate for the ACE-V methodology, properly applied, is zero or nearly zero, and several examiners interviewed by the OIG made the same assertion.[96] Critics of such claims have argued that in the absence of an objective standard for identification, it is impossible to distinguish between a methodological error rate and a practitioner error rate, because the examination process is inextricably linked with the human examiner.[97]

In 2002, prior to the misidentification of LFP 17, LPU Unit Chief Meagher testified that to his knowledge, no FBI fingerprint examiner had ever testified to an erroneous identification in court.[98] Meagher testified that he was unaware of any instance in which any *other* fingerprint expert had ever testified that an FBI examiner had made an erroneous in-court identification. Meagher testified that he was aware of one instance in which an FBI examiner discovered her own erroneous identification in 1999 while preparing for trial. The verifier had also made an erroneous identification of this latent print. Meagher testified that, on the basis of conversations with other LPU Unit Chiefs and other examiners, "on average, the FBI has made an erroneous identification about once every 11 years."[99] However, other instances of erroneous identifications

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[92] SWGFAST Press Kit, Section 13, available at www.swgfast.org.

[93] Id.

[94] Id., Section 7.1.

[95] Id., Section 8.

[96] See, e.g., U.S. v. Mitchell, 365 F.3d at 239 ("the existence of any error rate at all seems strongly disputed by some fingerprint examiners"), 246 ("some latent fingerprint experts insist that there is no error rate associated with their activities").

[97] See, e.g., Stoney, § 27-2.3.2; Cole, p. 1232.

[98] Meagher testimony in *Llera Plaza*, pp. 108-114.

[99] Id., p. 114. The OIG did not attempt to confirm this reported error rate.

by non-FBI fingerprint examiners have been reported, some of which have received significant publicity.[100]

Section 7.1. of the LPU Quality Assurance Manual governs steps that must be taken in the event of an error. These provisions are discussed in greater detail in Chapter Five of this report in connection with their application to the examiners involved in the Mayfield error.

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[100] See, e.g., cases described in Cole, p. 1231, n. 176, including State v. Caldwell, 322 N.W.2d 574, 581-82 (Minn. 1982). In the Caldwell case, the Minnesota Supreme Court reversed a murder conviction that had been based, in part, on the testimony of the prosecution's latent fingerprint expert. The court found the identification was erroneous, based on the post-trial testimony of other examiners, that the print was illegible or that the comparison was inconclusive. See also CBS New Transcript, 60 Minutes, January 5, 2003, describing the Ricky Jackson case. In that case, the FBI examiners helped to uncover an error made by local police department examiners that resulted in a murder conviction. After the trial, the defendant's experts obtained a determination by the IAI that the identification was erroneous. According to the CBS News transcript, the district attorney asked the FBI for an opinion, and the FBI Laboratory determined that the identification was wrong. Jackson was released after more than two years of incarceration.

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