Document #4

Guideline for the Articulation of the Decision-Making Process for the Individualization in Friction Ridge Examination (Latent/Tenprint)
REVISED DRAFT FOR COMMENT

1. Preamble

1.1. This document offers directions for articulating the decisions leading to individualization conclusions, which result from the examination of friction ridge evidence. This document takes into consideration the current status of professional practices, legal decisions, and scientific research.

1.2. The intention is to bridge long-standing historical explanations, current criticisms of these practices, and a growing body of scientific and institutional support for constructive alternatives.

1.3. This document presents a series of statements, in sequence, linked to one another. Together these provide an explanation and articulation of the foundation for current friction ridge individualization practice. An expanded section giving further explanation follows each statement. They are intended to be sequential and to build upon one another to present a coherent explanation of the examination process. They are not meant to stand-alone. Supporting references are provided and competent examiners should be aware of this material. The references cited are meant to be representative, not all-inclusive.

1.4. The level of presentation of the statements and explanations is one that can be made by any competent friction ridge examiner to non-practitioners (e.g., attorneys, jurors, or judges).

2. Overview of Statements and Explanations

2.1. Friction ridge skin is a complex, unique, and persistent morphological structure.

2.2. An impression of the features of friction ridge skin may result when a surface is touched.

2.3. During analysis of a friction ridge impression, an examiner can detect features that would be expected to be present in another impression from the same area of friction ridge skin.

2.4. The features detected during the analysis phase are then compared between two impressions. An examiner judges whether correspondence exists between these features.

2.5. As an examiner finds more features in agreement between two impressions, it becomes less likely that the set of features being used for comparison would be present in an impression from another source.

2.6. As more features are found in agreement during a particular comparison, an examiner's confidence increases towards a level where a conclusion of individualization is possible. Prior to forming this conclusion, an examiner considers both the accumulation of corresponding features and the likelihood of observing these features in an impression from another source.

2.7. The examiner makes a decision to reach a conclusion of individualization.

2.8. The examiner must communicate the individualization conclusion in writing. This conclusion may be communicated later through oral testimony. The target audiences for these communications may vary by agency or situation.

3. Scientific Context for Current Practices in Friction Ridge Examination

3.1. Traditionally (for over 100 years) conclusions of individualizations were expressed differently, as an absolute identification: that *this person* did, *in fact*, make this impression, to the exclusion of all others in the world. As the practices of forensic science and of friction ridge examination have evolved, it is now recognized that our conclusions are more appropriately expressed as a decision, rather than proof. This decision is based on the support our findings provide to alternative possibilities (competing hypotheses).

3.2. Methods that *measure* the quality and quantity of details in friction ridge impressions are a continuing focus of scientific research.

4. Unique and Persistent Morphological Structures on Friction Ridge Skin

4.1. Statement

Friction ridge skin is a complex, unique, and persistent morphological structure.

4.2. Further explanation

Research, long-standing practice, and extensive practical application support the premise that the details present in the structure of friction ridge skin are unique to each individual. These also have shown that barring injury or disease, the essential features of this detail remain unchanged (except for growth) over the life of any individual. These aspects of friction ridge skin (uniqueness and persistence) are generally acknowledged and are part of what make impressions from friction ridge skin such a useful means to identify people. These premises are not points of contention.

4.3. Support for statement and explanation

4.3.1. Studies of individuality, persistence, and morphology: Babler (1979), Cummins and Midlo (1943), Hale (1952), Holt (1968), Lin, Liu et al. (1982), Maceo (2011), Montagna and Parakkal (1974), Okajima (1967), Okajima (1970), Okajima (1975), Srihari, Srinivasan et al. (2008), Wilder and Wentworth (1932), Wertheim (2011), Wertheim and Maceo (2002), Wilder and Wilder (1904).

4.3.2. Historical use for personal identification: Barnes (2011), Henry (1900), and Komarinski (2005).

4.3.3. Scientific studies of friction ridge specificity: Champod and Margot (1997), Chang and Srihari (2008), Egli (2009), Egli, Champod et al. (2007), Langenburg (2011), Langenburg (2012), Neumann, Champod et al. (2006), Neumann, Champod et al. (2007), Neumann, Evett et al. (2011), Neumann, Evett et al. (2012), Pankanti, Prabhakar et al. (2002), Stoney and Thornton (1986), and Stoney and Thornton (1987).

4.3.4. How a rule or law is generated in science: Langenburg (2011), Peirce (1877), and Peirce, Houser et al. (1992).

4.3.5. These premises are not points of contention: Cole (2009).

5. Transfer of Friction Ridge Features to Impressions

5.1. Statement

An impression of the features of friction ridge skin may result when a surface is touched.

5.2. Further explanation

Contact with a surface may result in an impression of the friction ridge skin. The resulting impression is not a perfect recording of the skin itself, as it is subject to distortions and environmental effects. Each impression from the same area of friction skin will reproduce a subset of the skin's discriminating features that will vary in appearance from other impressions from the same source skin.

5.3. Support for statement and explanation

Ashbaugh (1999), Maceo (2009), Vanderkolk (2009), and Vanderkolk (2011)

6. Features Expected in Other Impressions from the Same Source

6.1. Statement

During analysis of a friction ridge impression, an examiner can detect features that would be expected to be present in another impression from the same area of friction ridge skin.

6.2. Further explanation

Examiners trained to competency have demonstrated an ability to accurately detect reliable discriminating features such as ridge events, creases, and scars in friction skin impressions. Their ability has been demonstrated to surpass that of those who are untrained (i.e., novices). Even in highly distorted impressions, examiners are capable of accurately detecting these features. The focus is not only on the quantity of features available, but also on the clarity of the features. Examiner confidence in the reliability of the features increases with clarity.

6.3. Support for statement and explanation

6.3.1. Busey and Parada (2010), Langenburg (2004), Langenburg (2012), Vanderkolk (2009), Vanderkolk (2011)

6.3.2. SWGFAST Document #10 (2013), Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

7. Features are Compared and Judgments on Correspondence are Made

7.1. Statement

The features detected during the analysis phase are then compared between two impressions. An examiner judges whether correspondence exists between these features.

7.2. Further explanation

A side-by-side comparison between two impressions determines whether the features are in correspondence or not. Correspondence is judged with respect to the features themselves and their relationship to one another among the ridge paths. The correspondence is not exact, but is determined taking into account tolerances that are influenced by distortions and other environmental effects.

7.3. Support for statement and explanation

7.3.1. Ashbaugh (1999), NIST (2012), and Vanderkolk (2011)

7.3.2. SWGFAST Document #10 (2013), Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

8. Increasing Agreement is Less Likely to Occur in Impressions from Other Sources

8.1. Statement

As an examiner finds more features in agreement between two impressions, it becomes less likely that the set of features being used for comparison would be present in an impression from another source.

8.2. Further explanation

8.2.1. As the number of features in agreement increases, an examiner's confidence also increases that this set of features will not occur in friction ridge skin impressions from another source.

8.2.2. The reason that the examiner's confidence increases is that, as more features are found in agreement, the likelihood of finding these features (by random chance or coincidence) in a friction ridge skin impression from another source becomes more remote.

8.2.3. The quantity of features is important; however, so is their clarity and specificity. Not all features carry the same weight. There are differences in both clarity and specificity. Features that are clearer carry more confidence that they are accurate representations of the actual friction ridge skin. Specificity of features (weighted value and rarity) differs due to their shape, type, spatial relationship, and location within the general pattern. Currently, specificity is assessed based on the examiner's training and experience. Research continues to gather data supporting these assessments.

8.3. Support for statement and explanation

8.3.1. Ashbaugh (1999), Champod (1995), Champod (1996), Champod and Margot (1997), Dass, Zhu et al. (2005), Egli, Champod et al. (2007), Gutièrrez, Galera et al. (2007), Jain, Prabhakar et al. (2002), Chen and Jain (2009), Kryszczuk, Drygajlo et al. (2004), Lin, Liu et al. (1982), Neumann, Champod et al. (2006), Neumann, Champod et al. (2007), Neumann, Evett et al. (2012), Osterburg, Parthasarathy et al. (1977), Pankanti, Prabhakar et al. (2002), Roddy and Stosz (1999), Sclove (1979), Sclove (1980), Seweryn (2005), Stoney and Thornton (1986), Stoney and Thornton (1987), and Stosz and Alyea (1994).

8.3.2. SWGFAST Document #10 (2013), Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

9. Two Competing Hypotheses are Considered and an Examiner's Level of Confidence is Approached

9.1. Statement

As more features are found in agreement during a particular comparison, an examiner's confidence increases towards a level where a conclusion of individualization is possible. Prior to forming this conclusion, an examiner considers both the accumulation of corresponding features and the likelihood of observing these features in an impression from another source.

9.2. Further explanation

9.2.1. This part of the comparison is a balance between (1) the degree of correspondence between features shared by the two impressions and (2) the likelihood that those features would be observed in an impression from another source. To approach individualization, the magnitude of the balance needs to be such that the degree of correspondence is high and the likelihood that these features would be observed in another source is low. That is, taking into account any dissimilarities, the features in agreement must be both sufficiently clear, within tolerance, and sufficiently discriminating.

9.2.2. When the two conditions above are satisfied, the examiner begins to approach the decision threshold beyond which individualization can be concluded.

9.2.3. More formally, these two conditions are represented by two competing hypotheses. One hypothesis is: The observed features in the unknown impression came from the same source as the impression being compared; the other hypothesis is: The unknown impression came from some other source. The degree of the correspondence of features (including both similarities and dissimilarities) allows the examiner to evaluate his/her findings under the first hypothesis. The specificity of the features allows the examiner to evaluate his/her findings under the second hypothesis. The framework of Analysis, Comparison, and Evaluation (ACE) offers a mechanism for performing these evaluations. The weight of the evidence will to some degree support one hypothesis or the other. For an individualization conclusion, the support for the hypothesis of a common source would be overwhelming.

9.3. Support for statement and explanation

Champod (2009), Evett (1987), Evett and Buckleton (1989), Fienberg and Finkelstein, (1996), Finkelstein and Fairley (1970), Lindley (1977), Wertheim (2000).

10. The Examiner Makes a Decision

10.1. Statement

The examiner makes a decision to reach a conclusion of individualization.

10.2. Further explanation

10.2.1. To make a decision of individualization, corresponding features must be in tolerance (with respect to their clarity and distortions) and there must be sufficient quantity and quality of features such that the expectation is that they would not occur in an impression from another source.

10.2.2. Individualization is the decision by an examiner that there are sufficient features in agreement to conclude that two areas of friction ridge impressions originated from the same source. Individualization of an impression to one source is the decision that the likelihood the impression was made by another (different) source is so remote that it is considered as a practical impossibility. The decision is supported by demonstrable data and the application of Analysis, Comparison, Evaluation, and Verification (ACE-V) per the standards (SWGFAST Document #10, 2013).

10.3. Support for statement and explanation

10.3.1. Risk is low: Gutowski (2006), Langenburg (2009), Langenburg, Champod et al. (2010), Ulery, Hicklin et al. (2011), and Tangen, Thompson et al. (2011)

10.3.2. Decision-making in forensic identification: Biedermann, Bozza et al. (2008)

10.3.3. SWGFAST Document #10 (2013), Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

11. The Examiner Reports the Decision

11.1. Statement

The examiner must communicate the individualization conclusion in writing. This conclusion may be communicated later through oral testimony. The target audiences for these communications may vary by agency or situation.

11.2. Further explanation

11.2.1. The use of SWGFAST terminology is recommended when reporting a conclusion. The SWGFAST document provides the community with standard definitions for currently accepted conclusions.

11.2.2. The SWGFAST Individualization/Identification Position Statement (Document #103) states that: "The ability of a latent print examiner to individualize a single latent impression, with the implication that they have definitely excluded all other humans in the world, is not supported by research and was removed from SWGFAST's definition of individualization."

11.2.3. Specific words and phrases conveying absolute certainty are inappropriate or misleading and should not be used to express conclusions. Specific problematic phrases include:

11.2.3.1. Exclusion of all others

11.2.3.2. 100% certainty (as an absolute fact)

11.2.3.3. Zero error rate / infallible method

11.2.4. These concepts should rather be expressed as the conclusion of the examiner, based upon data observed and interpreted through the examiner's training and experience. The examiner has a level of personal confidence associated with the accuracy and reliability of this conclusion; however, the accuracy and precision of this personal level of confidence cannot currently be measured and reported. For this reason, certainty should not be reported numerically or in absolute terms.

11.2.5. SWGFAST recognizes that reporting and testimony protocols differ among agencies; however, minimum reporting requirements as outlined in SWGFAST documents must be included.

11.3. Support for statement and explanation

11.3.1. SWGFAST Document #10 (2013), Standards for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

11.3.2. SWGFAST Document #5 (2012), Standard for Reporting Friction Ridge Examinations (Latent/Tenprint), Ver. 2.0.

11.3.3. Garrett (2009), National Research Council (2009), NIST (2012), The Fingerprint Inquiry (2011)

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13. Revision Table

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