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Standard for Friction Ridge Examination Conclusions

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Foreword

This document was revised, prepared, and finalized as a standard by the Friction Ridge Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Friction Ridge Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

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Keywords: *fingerprint, friction ridge, conclusions, decisions, expert opinions*

Table of Contents *(to be completed when the document is finalized)*

Standard for Friction Ridge Examination Conclusions

1 Scope

This standard defines terms and establishes qualitative expressions for the categories of conclusions ~~that may be~~ reached following friction ridge comparisons.

This standard does not cover the following topics:

- ~~conclusions derived directly from and entirely dependent upon validated statistical models or quantitative processes;~~
- the manner by which examiners arrive at their assessments of the strength or weight of the findings with respect to the source of the questioned impression;
- suitability determinations rendered on a friction ridge impression;
- documentation of conclusions;
- how an agency or other forensic service provider (FSP) will define or validate the criteria used for selecting source conclusions.

2 Normative References

There are no normative reference documents. ~~Annex B, Bibliography, contains informative references.~~

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1
conclusion
source conclusion
Opinion stated by an examiner after interpretation of observed data. The opinion is the personal judgement that the observed data can offer support for one proposition over another. A conclusion is distinct from a *"proposition."*

3.2
correspondence
Observation of pattern type, ridge flow, and friction ridge features in sequence, of the same or similar type, in the same relative position to each other, with associated intervening ridge counts. An accumulation of similarities between two impressions resulting in overall conformity.

3.3
disagreement
A dissimilarity, or an accumulation of dissimilarities, that is deemed to be outside of expected variations in the appearance of impressions from the same source resulting in overall nonconformity.

3.4
dissimilarity
An observation that two impressions have a general difference of appearance when comparing an individual feature or detail. Not to be confused with *"disagreement".*

3.5
examiner (friction ridge)
An individual authorized to conduct independent friction ridge examinations for the FSP by observing and interpreting data, making decisions, forming conclusions and opinions, issuing reports and/or providing testimony. Use of the phrase examiner in these documents refers to a *"competent friction ridge examiner"* and not a *"trainee."*

3.6
exemplar impression
exemplar or known
exemplar prints
The deliberately recorded images or impressions from the friction ridge skin of an individual.

Note Examples may include, but are not limited to, inked tenprints, inked palm prints, Livescan prints, powder and lift prints, casted/moulded prints, or photographs of friction ridge skin.

3.7
friction ridge skin
The skin found on the palms of the hands (full palmar surface including fingers) and soles of the feet (full plantar surface including toes).

3.8
impression
friction ridge impression
A reproduction of an area of friction ridge skin produced on a substrate by contact or transfer. Impressions may be referred to as *exemplar impressions, latent impressions,* or *questioned impressions* (refer to those definitions for further clarification).

3.9
inconclusive
INC
The conclusion that the observed data does not provide more support for one proposition over the other.

3.10
inconclusive with dissimilarities
The conclusion that the observed data provide more support for the proposition that the impressions originated from different sources rather than the same source; however, there is insufficient support for a Source Exclusion.

3.11
inconclusive with similarities
The conclusion that the observed data provide more support for the proposition that the impressions originated from the same source rather than different sources; however, there is insufficient support for a Source Identification.

3.12
interpretation
Explanations for the observations, data and calculations.

3.13
observed data
Any information seen within an impression that an examiner relies upon to reach a decision, conclusion, or opinion. This not only includes minutiae, but attributes such as clarity, scars, creases, edge shapes, pore structure, and other friction ridge features.

3.14
probability
An expression of the chance that a particular event occurs.

3.15
propositions
Hypotheses about the actual state of nature or an event, which is unknown or unknowable. Not to be confused with *"conclusions"* nor *"source conclusions"* (refer to those definitions for further clarification).

3.16
questioned impression
(also questioned image or questioned item)
An impression or image of friction ridge skin whose source or identity is unknown; it can include latent impressions, impressions from an unknown source or a known source.

3.17
similarity
An observation that two impressions share a general likeness when comparing an individual feature or detail. Not to be confused with *"correspondence."*

3.18
source
An area of friction ridge skin of an individual from which an impression originated.

3.19
source exclusion
EXC
The conclusion that the observed data provide substantially stronger support for the proposition that the questioned impression originated from a different source than the exemplar impressions compared.

3.20
source identification
ID
The conclusion that the observed data provides substantially stronger support for the proposition that the two impressions originated from the same source rather than different sources.

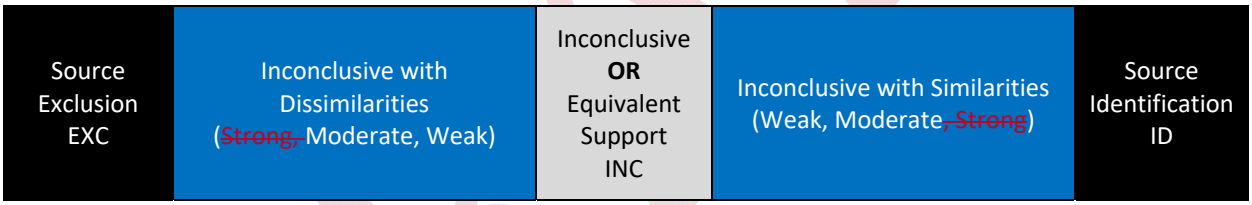
4 Source Conclusions

4.1 General

~~This section establishes the conclusions an~~An examiner ~~may~~shall reach only one of the conclusions listed in this section when comparing two friction ridge impressions. In reaching a conclusion, an examiner ~~considers the relative probability of the observed data and assesses~~shall assess the similarities and dissimilarities in the observed data and consider their probability under each of the two following ~~two~~ propositions: the two impressions originated from the same source or from different sources. ~~Similarities generally provide support for the proposition that two impressions originated from the same source, while dissimilarities generally provide support for the proposition that two impressions originated from different sources.~~

An examiner may utilize their knowledge, training, and experience as well as a statistical model to evaluate how much support the observed similarities or dissimilarities provide for one proposition over another. A conclusion shall be expressed as an opinion, not as a fact, because it is an interpretation of observed data made by the examiner ~~it~~, which is inherently subjective.

~~This document defines the five conclusions that may be selected by examiners when reaching a conclusion after comparing friction ridge impressions.~~ The examiner shall only select one of these conclusions, and only as written and described in 4.2 through 4.6. The five conclusions are illustrated in Figure 1.



NOTE Figure not to scale.

Figure 1—Informative Visual Illustration of Source Conclusions

4.2 Source Exclusion

Source exclusion is the conclusion that the observed data provide substantially stronger support for the proposition that the questioned impression originated from a different source than the exemplar impressions to which it is compared. There is a strong disagreement present such that the examiner would not expect to see that level of disagreement in an impression from the same source (See Annex A, Section *Source Exclusion*).

NOTE Use of this conclusion implies the exclusion of exemplar impressions compared and not all areas of friction ridge skin of an individual, unless otherwise stated.

4.3 Inconclusive with Dissimilarities

Inconclusive with Dissimilarities is the conclusion that the observed data provide ~~more~~stronger support for the proposition that the impressions originated from different sources rather than the same source; however, there is insufficient support for a Source Exclusion. There are observed dissimilarities between the impressions compared, and a lack of correspondence present, such that

the examiner believes the observed data are more probable if the impressions have different sources than the same source. ~~The degree of support may range from weak to moderate to strong or similar descriptors of the degree of support.~~ Any use of this conclusion shall include a statement of the degree of support and the factor(s) limiting a stronger conclusion. The degree of support may range from weak to moderate, or similar descriptors of the degree of support. (See Annex A, Section *Inconclusive with Dissimilarities*).

4.4 Inconclusive

Inconclusive is the conclusion that the observed data ~~does~~do not provide more support for one proposition over the other. This can occur when the observed data provide equivalent support for both same source and different source propositions, or there is no support for either proposition (such as when more complete exemplars are requested~~)~~., often called "incomplete"). Any use of this conclusion shall include a statement of the factor(s) limiting other conclusions. There is no exhaustive list of limiting factors; these are determined by FSP policies and procedures. (See Annex A, Section *Inconclusive*).

4.5 Inconclusive with Similarities

Inconclusive with Similarities is the conclusion that the observed data provide ~~more~~stronger support for the proposition that the impressions originated from the same source rather than different sources; however, there is insufficient support for a Source Identification. There are observed similarities between the impressions and some correspondence present, such that the examiner believes the observed data are more probable if the impressions have the same ~~sources~~source than different sources. However, the examiner may also expect to see similar correspondence in another source. ~~The degree of support may range from weak to moderate to strong or similar descriptors of the degree of support.~~ Any use of this conclusion shall include a statement of the degree of support and the factor(s) limiting a stronger conclusion. The degree of support may range from weak to moderate, or similar descriptors of the degree of support. (See Annex A, Section *Inconclusive with Similarities).*

4.6 Source Identification

Source identification is the conclusion that the observed data provide ~~substantially stronger~~extremely strong support for the proposition that the two impressions originated from the same source rather than different sources. There is strong correspondence present such that the examiner would not expect to see the same arrangement of features repeated in an impression from another source~~.~~ (See Annex A, Section *Source Identification).*

NOTE Source identification does not correspond to the meaning of identification used historically in the discipline: that two impressions were made by or originated from the same source or imply an individualization to the exclusion of all other sources. Source identification is not identification to a single source.

~~5 Limitations~~

5 Prohibitions

When one of the five conclusions is reached, the examiner shall not:

a) assert that two impressions were made by the same source or imply an individualization to the exclusion of all other sources;

~~b)a) state or imply that their personal degree of confidence represents the accuracy of the conclusion;~~

~~c)~~b) assert or imply that friction ridge conclusions are infallible or have a zero, or negligible, error rate;

c) state or imply that their personal degree of confidence represents the accuracy of the conclusion;

~~d)a) cite the number of friction ridge comparisons performed in their career as a measure for the accuracy of a conclusion offered in the case at hand;~~

~~e)~~d) use the expressions "reasonable degree of scientific certainty," "practical certainty," "practical impossibility," or similar assertions as a description of the confidence held in their conclusion.

e) cite the number of friction ridge comparisons performed in their career as a measure for the accuracy of a conclusion offered in the case at hand;

— state or imply that the uniqueness of friction ridge skin is proven or that the concept of the uniqueness of friction ridge skin alone is sufficient to justify a conclusion.

Annex A
(informative)

Examples

A.1 The purpose of this annex is to assist readers' understanding by illustrating situations in which each conclusion might be used. They are just examples and are not to be used to test conformance. This list is not representative of all possible situations that would justify a particular conclusion. Each conclusion used by an FSP needs to be supported based on FSP requirements.

A.2 Source Exclusion (section 4.2) For example:

A.2.1 Consider a situation in which the unknown friction ridge impression was a clear whorl pattern with a distinctive core and no distortion or interpretation issues were noted. The exemplars utilized for comparison of this source contained no whorl type patterns. The examiner ~~would~~could therefore conclude that ~~it~~the evidence is highly unlikely ~~that~~if the impression ~~could have~~had been left by the source being compared, but only when the questioned impression is very clear, and the examiner is confident that there is no distortion.

(i.e., ~~Substantial disagreement~~Disagreement observed with high clarity ~~level 1~~ detail, evidence is in support for Source ~~EXC~~exclusion.)

A.2.2 Consider a situation in which the examiner was highly confident of the orientation and likely area of the anatomical source and observed an anchor point and several clear and distinct features above the core. These were not observed in the corresponding area of the exemplars utilized for comparison. The examiner ~~would~~could therefore conclude that it is highly unlikely that the impression could have been left by the source being compared.

(i.e., ~~Substantial disagreement~~Disagreement observed, evidence is in support for Source ~~EXC~~exclusion.)

A. 3 Inconclusive with Dissimilarities (section 4.3): For example:

A.3.1 Consider a situation in which ambiguous features observed in a low-clarity area of the unknown impression to the right of the delta were the only target group available and were not present in the corresponding area of the exemplars. Because the examiner was not confident in the existence of these features in the impression, they would not support a conclusion of Source Exclusion and ~~would~~could therefore conclude ~~only~~ Inconclusive with Dissimilarities.

(i.e., ~~Strong evidence~~Evidence in support of different source, no evidence supporting same source.)

A.3.2 Consider a situation in which the friction ridge impression lacked a clear focal point (core or delta) and no corresponding features were observed in the suspected area of anatomical source between the impression and the exemplars utilized for comparison. Because the examiner was not confident that they had searched in the correct area or because their FSP's exclusion policy did not allow for exclusions without a focal point, they would not support a conclusion of Source Exclusion and therefore ~~would~~could conclude only Inconclusive with Dissimilarities.

(i.e., ~~Strong evidence~~Evidence in support of different source, no evidence supporting same source.)

A.4 Inconclusive (section 4.4) For example:

A.4.1 Consider a situation in which the suspected area of friction ridge detail was not available or represented in the provided exemplars; however, the provision of further exemplars may support a different conclusion. The examiner ~~would~~could therefore conclude Inconclusive and request fully rolled exemplars from the ~~side and tip of the right middle finger~~suspected area.

(i.e., Inconclusive, sometimes called Incomplete, because there is no information that tilts either way [e.g., need better standards, nothing to compare in the relevant area.])

A.4.2 Consider a situation in which there was a distinct possibility that the unknown friction ridge impression may have been left by the friction ridge detail from the feet of an individual. Exemplars from the feet were not available or compared. The examiner ~~would~~could therefore conclude Inconclusive and request exemplars from the feet of the individual.

(i.e., Inconclusive, sometimes called Incomplete, because there is no exemplar to compare, suspected foot impression.)

A.4.3 Consider a situation in which there was low reliability and discriminability of features such that equally weak support for both same source and different source propositions was present, effectively cancelling each other out. Because there was not enough information guiding the examiner even slightly toward either Source Identification or Source Exclusion, they ~~would~~could therefore conclude Inconclusive.

(i.e., Inconclusive because the evidence in support, and the evidence against, are both weak and equally balanced.)

A. 5 Inconclusive with Similarities (section 4.5): For example:

A.5.1 Consider a situation in which there was limited correspondence observed between the core of a loop containing a single rod and the latent impression; however, insufficient to support a Source Identification. Similar correspondence may also be observed in a different source. The lack of correspondence was due to the limited quality and quantity of information observed in the latent impression, thus the provision of further exemplars will not assist in supporting a different conclusion. The examiner ~~would~~could therefore conclude Inconclusive with Similarities.

(i.e., Weak evidence in support, no evidence against.)

A.5.2 Consider a situation in which there was ~~strong~~ correspondence observed between the delta area below a loop (such as five ridge endings) and the latent impression; however, insufficient to support a Source Identification. Similar correspondence may also be observed in a different source. The lack of correspondence was due to the limited quality and quantity of information observed in the latent impression, thus the provision of further exemplars will not assist in supporting a different conclusion. The examiner ~~would~~could therefore conclude Inconclusive with Similarities.

(i.e., ~~Strong evidence~~Evidence in support, no evidence against, but insufficient for a source ~~ID~~identification due to latent.)

A.5.3 Consider a situation in which there was ~~strong~~ correspondence observed between the delta area below a loop (such as five ridge endings) and the latent impression; however, insufficient to support a source identification. Similar correspondence may also be observed in a different source. The lack of correspondence was due to the limited quality and quantity of information observed in the exemplar, thus the provision of further exemplars may assist in supporting a different conclusion. The examiner ~~would~~could therefore conclude Inconclusive with Similarities and request further exemplars.

(i.e., ~~Strong evidence~~Evidence in support, no evidence against, but insufficient for a source ID due to exemplar. This example would sometimes be called Incomplete but ~~would~~could provide support for same source without additional exemplars.)

A.5.4 Consider a situation in which there was ~~strong~~ correspondence observed in the hypothenar area of the palm (such as six ridge endings); however, there was one possible bifurcation on the edge of the latent impression in a locally low-quality area that was not present in the exemplar. The observed correspondence was not ~~substantially stronger than the observed dissimilarity and therefore could not~~strong enough to support a Source Identification. Similar correspondence may also be observed in a different source. The examiner ~~would~~could therefore conclude Inconclusive with Similarities.

(i.e., ~~Strong evidence~~Evidence in support, some evidence against, but more in support. On balance, the evidence in support is insufficient for a Source ~~ID~~Identification due to latent.)

A.5.5 Consider a situation in which there was ~~strong~~ correspondence observed in the delta area below a loop (such as six ridge endings) and the latent impression; however, the candidate was produced from an AFIS search in a large database. Given the higher chance of a coincidental match in a large database, and the lower discriminability of the features observed, similar correspondence may also be observed in a different source. The examiner ~~would~~could therefore conclude Inconclusive with Similarities.

(i.e., ~~Strong evidence~~Evidence in support but a red flag due to the large AFIS pool and low discriminability. On balance, the evidence in support is insufficient for a source ~~ID~~identification due to AFIS.)

A.6 Source Identification (section 4.6): For example:

A.6.1 Consider a situation in which there was ~~substantial~~strong correspondence observed between the tip of a finger (such as sixteen ridge endings and an enclosure) and a clear latent impression. Such overwhelming correspondence would not be expected in a different source. The examiner ~~would~~could therefore conclude Source Identification.

(i.e., ~~Substantial~~Strong correspondence observed, evidence is in support for a source ~~ID~~identification.)

A.6.2 Consider a situation in which there was ~~substantial~~strong correspondence observed between the delta area below a loop (such as five ridge endings with ~~an abundance of 3rd level detail, including~~ 30 pore structures and ridge edge shapes) and a clear latent impression. Such overwhelming correspondence would not be expected in a different source. The examiner ~~would~~could therefore conclude Source Identification.

(i.e., ~~Substantial~~Strong correspondence observed, ~~2nd and 3rd level detail used in concert,~~ evidence is in support for a source ~~ID~~identification.)

A.6.3 Consider a situation in which there was ~~substantial~~strong correspondence observed between the hypothenar area of the palm and a clear latent impression (such as a whorl type pattern and ten ridge endings). Such overwhelming correspondence ~~combined with this Level 1 feature~~ would not be expected in a different source. The examiner ~~would~~could therefore conclude Source Identification.

(i.e., ~~Substantial~~Strong correspondence observed, rare ~~1st and 2nd level detail~~features used in concert, evidence is in support for a source ~~ID~~identification.)

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