

## Standard for Friction Ridge Examination Conclusions



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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.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

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

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

1	Scope .....	
2	Normative References .....	
3	Terms and Definitions .....	
4	Source Conclusions .....	
4.1	General .....	
4.2	Source Exclusion .....	
4.3	Inconclusive with Dissimilarities .....	
4.4	Inconclusive .....	
4.5	Inconclusive with Similarities .....	
4.6	Source Identification .....	
5	Limitations .....	
	Annex A (informative) Examples .....	
	Figure 1— Informative Visual Illustration of Source Conclusions	

# Standard for Friction Ridge Examination Conclusions

## 1 Scope

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

This standard does not cover the following topics:

- 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.

## 3 Terms and Definitions

For purposes of this document, the following definitions apply.

### 3.1

#### **agreement (synonym of correspondence and corresponding friction ridge detail)**

Observed similarities in 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 that supports a conclusion of source identification.

### 3.2

#### **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*."

### 3.3

#### **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.

### **3.4 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.

### **3.5 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*”.

### **3.6 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*.”

### **3.7 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.

### **3.8 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).

### **3.9 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).

### **3.10 inconclusive**

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

### **3.11 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.

**3.12****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.

**3.13****interpretation**

Explanations for the observations, data and calculations.

**3.14****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.

**3.15****probability**

An expression of the chance that a particular event occurs.

**3.16****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).

**3.17****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.

**3.18****similarity**

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

**3.19****source**

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

**3.20****source exclusion**

The conclusion that two friction ridge impressions did not originate from the same source.

**3.21****source identification**

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

An examiner shall reach only one of the conclusions listed in this section when comparing two friction ridge impressions. In reaching a conclusion, an examiner shall assess the similarities and dissimilarities in the observed data and consider the probability of both under each of the two following propositions: the two impressions originated from the same source or 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.

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.

Source Exclusion EXC	Inconclusive with Dissimilarities (Moderate, Weak)	Inconclusive OR Equivalent Support INC	Inconclusive with Similarities (Weak, Moderate)	Source Identification ID
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NOTE Figure not to scale.

**Figure 1—Informative Visual Illustration of Source Conclusions**

### 4.2 Source Exclusion

Source exclusion is the conclusion that two friction ridge impressions did not originate from the same source. After a comparison of all relevant areas, the observed data are incompatible with the proposition that the two impressions originated from the same source. (See Annex A, Section *Source Exclusion*).

### 4.3 Inconclusive with Dissimilarities

Inconclusive with Dissimilarities is the conclusion that the observed data provide 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. 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 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 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 source than different sources. However, the examiner may also expect to see similar correspondence in another source. 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 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*).

### 5 Prohibitions

In supporting a conclusion, 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) 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) use the expressions “reasonable degree of scientific certainty,” “practical certainty,” “practical impossibility,” with “absolute” or “100% certainty” or their equivalents.
- 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;
- f) state or imply 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 or set thresholds. 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 questioned 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 could therefore conclude that the observed data are incompatible with the proposition that the two impressions originated from the same source, but only when the questioned impression is very clear, and the examiner is confident that there is no distortion.

(i.e., Disagreement observed with high clarity detail.)



**A.2.2** Consider a situation in which the examiner observed strong indications of 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 could therefore conclude that the observed data are incompatible with the proposition that the two impressions originated from the same source.

(i.e., Disagreement observed, with high clarity detail.)

**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 questioned 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 questioned impression, they would not support a conclusion of Source Exclusion and could therefore conclude Inconclusive with Dissimilarities.

(i.e., Accumulation of dissimilarities, no evidence supporting same source.)



**A.3.2** Consider a situation in which the questioned impression lacked a clear focal point (core or delta) and no corresponding features were observed in the suspected area of anatomical source between the questioned 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 could conclude only Inconclusive with Dissimilarities.

(i.e., Accumulation of dissimilarities, 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 could therefore conclude Inconclusive and request fully rolled exemplars from the 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 questioned 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 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 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 were limited similarities observed between the core of a loop containing a single rod in the exemplar and the questioned impression; however, insufficient to support a Source Identification. These features 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 questioned impression, thus the provision of further exemplars will not assist in supporting a different conclusion. The examiner could therefore conclude Inconclusive with Similarities.

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



**A.5.2** Consider a situation in which there were similarities observed between the delta area below a loop (such as five ridge endings) in the exemplar and the questioned impression; however, insufficient to support a Source Identification. These features 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 questioned impression, thus the provision of further exemplars will not assist in supporting a different conclusion. The examiner could therefore conclude Inconclusive with Similarities.

(i.e., Evidence in support, no evidence against, but insufficient for a source identification due to questioned impression.)



**A.5.3** Consider a situation in which there were similarities observed between the delta area below a loop (such as five ridge endings) in the exemplar and the questioned impression; however, insufficient to support a Source Identification. These features 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 could therefore conclude Inconclusive with Similarities and request further exemplars.

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



**A.5.4** Consider a situation in which there were similarities observed in the hypothenar area of the palm (such as six ridge endings) in the exemplar; however, there was one possible bifurcation on the edge of the questioned impression in a locally low-quality area that was not present in the exemplar. These similarities were not strong enough to support a Source Identification. These features may also be observed in a different source. The examiner could therefore conclude Inconclusive with Similarities.

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



**A.5.5** Consider a situation in which there were similarities observed in the delta area below a loop (such as six ridge endings) in the exemplar and the questioned impression; however, the candidate was produced from an ABIS 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, these features may also be observed in a different source. The examiner could therefore conclude Inconclusive with Similarities.

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

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



**A.6.1** Consider a situation in which there was an accumulation of similarities observed between the tip of a finger (such as sixteen ridge endings and an enclosure) in the exemplar and a clear questioned impression. Such overwhelming agreement would not be expected in a different source. The examiner could therefore conclude Source Identification.

(i.e., Accumulation of similarities observed, evidence is in support for a Source Identification.)



**A.6.2** Consider a situation in which there was an accumulation of similarities observed between the delta area below a loop (such as five ridge endings with 30 pore structures and ridge edge shapes) in the exemplar and a clear questioned impression. Such overwhelming agreement would not be expected in a different source. The examiner could therefore conclude Source Identification.

(i.e., Accumulation of similarities observed, evidence is in support for a Source Identification.)



**A.6.3** Consider a situation in which there was an accumulation of similarities observed between the hypothenar area of the palm (such as a whorl type pattern and ten ridge endings) in the exemplar and a clear questioned impression. Such overwhelming agreement would not be expected in a different source. The examiner could therefore conclude Source Identification.

(i.e., Accumulation of similarities observed, rare features used in concert, evidence is in support for a Source Identification.)

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