Position Paper on Examiner's Expert Report

Contents

EXAMINER'S EXPERT REPORT

Purpose

This document has been developed to provide Canadian fingerprint examiners some guidance in writing a comprehensive, understandable and transparent expert report for court testimony. The recommendations are consistent with legal requirements in Canadian courts, including the Criminal Code and relevant case law.

This document describes the minimum amount of information that should be included in an expert report; however, additional information may be added.

Legislation - Criminal Code (R.S.C., 1985, c. C-46)

Notice for expert testimony

(3) For the purpose of promoting the fair, orderly and efficient presentation of the testimony of witnesses,

(a) a party who intends to call a person as an expert witness shall, at least thirty days before the commencement of the trial or within any other period fixed by the justice or judge, give notice to the other party or parties of his or her intention to do so, accompanied by

> *(i) the name of the proposed witness,*
>
> *(ii) a description of the area of expertise of the proposed witness that is sufficient to permit the other parties to inform themselves about that area of expertise, and*
>
> *(iii) a statement of the qualifications of the proposed witness as an expert;*
>
> *(b) in addition to complying with paragraph (a), a prosecutor who intends to call a person as an expert witness shall, within a reasonable period before trial, provide to the other party or parties*
>
> ***(i) a copy of the report, if any, prepared by the proposed witness for the case,*** *and*
>
> ***(ii) if no report is prepared, a summary of the opinion anticipated to be given by the proposed witness and the grounds on which it is based; and***

(c) in addition to complying with paragraph (a), an accused, or his or her counsel, who intends to call a person as an expert witness shall, not later than the close of the case for the prosecution, provide to the other party or parties the material referred to in paragraph (b).

Terms and definitions

Expert report: a report that summarises the Analysis, Comparison, Evaluation, and Verification (ACE-V) of the examiner's opinion(s).

Investigative report: a report that details the entire involvement of the forensic examiner, including the processing of a crime scene and the treatment of any exhibits.

Analysis documentation: Any documentation that records the analysis phase, including any photographs and annotations to images.

Unknown Fingerprint: an impression of friction ridges left from a finger where the source of the impression is unknown.

Known Fingerprint: an impression of friction ridges left from a finger, recorded under controlled conditions, where the source of the impression is known.

Introduction

The requirements to provide an expert report, or a summary of the anticipated testimony, is stipulated in the Criminal Code. However, the courts have provided little guidance by way of case law in the content required in an expert report. The federal court rules, in rule 52.2[1] require expert reports to contain content that is consistent with the propositions in this document.

Traditionally, individual agencies and in many cases the expert witness determines the format and content of an expert report. The goal is to provide relevant and useful information in an impartial, fair and transparent manner, not to overwhelm the courts or place an undue burden on the operational tempo of individual Forensic Identification Services.

Recommendation 5.1 from the 2012 human factors report[2], cautions that; *the report of the examination should ensure that the findings and their limitations are intelligible to non experts".*

In volume 3 of the 2008 Goudge report[3], Inquiry into Pediatric Forensic Pathology in Ontario, recommendation 84 states*; it is essential that the pathologist's opinion be understood by all the users. It must therefore be communicated in language that is not only accurate but also clear, plain, and unambiguous*. This recommendation is applicable to the expert fingerprint examiner, who should refrain from using technical or domain specific terminology.

Expert report

Known fingerprints should be obtained for the offence related to this report. The unknown fingerprint(s) should be compared to the corresponding reference fingerprints.

Required content

- Title page
    - Agency/unit

[1] Federal Courts Rules (SOR (Statutory Orders and Regulations)/98-106)
[2] Expert Working Group on Human Factors in Latent Print Analysis. Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach. U.S. Department of Commerce, National Institute of Standards and Technology. 2012
[3] Inquiry into Pediatric Forensic Pathology in Ontario, published by the Ontario Ministry for the Attorney General 2008

    - Author
    - Date of the report
    - Case identifier
    - Impression identifier
- Background information
    - Brief outline of the case
        - Date
        - Time
        - Location
        - Investigator
    - Any specific requests for examination
    - Any contextual information that was provided
- Summary of the ACE conclusion
- Analysis
    - Define each stage of the analysis
    - Describe results of the analysis of each of the following stage,
        - Anatomical factors
        - Substrate
        - Matrix
        - Development medium
        - Deposition pressure
        - Lateral distortion
        - Clarity/Tolerance
- Comparison
    - Brief description of the comparison process
- Evaluation
    - Definitions of the 3 conclusion scale
    - Reported conclusion opinion
- Verification
    - Identify the verifying examiner and the results of the verification

Suggested/Optional Content

- Table of contents if there is more than one fingerprint identification included in the report
- Impartiality statement
- Glossary of terms
- Scientific foundation of latent print analysis and comparison
    - Including a description of the ACE-V process
    - Any limitations of the process
- SWGFAST Quality Table
- SWGFAST Sufficiency Graph
- Analysis documentation
    - The CanFRWG ACE-V form provides a standardised documentation format
- Fingerprint chart. Can be included in the report or as a separate visual aid for court testimony
- Any annotation of features or mark-ups of the unknown fingerprint

- Images related to various components of the analysis
    - Images can be included in a series of appendices, or embedded into the report

Conclusion

These CanFRWG recommendations form the basis of an expert report. An expert report can be tailored to the needs of individual agencies. Additionally, the report should meet the requirements and the expectations of the tribunal jurisdiction.

An Expert report template has been included. The template is based on the expert report generated by the CanFRWG ACE-V form**.**

The CanFRWG ACE-V form ensures that the requisite required content is reported on and allows for a self-generating expert report, which requires little editing.

Expert Report Template

(Required information)

Friction Ridge Analysis Report

R. vs. (Name) File Number:

[your name]
Forensic Identification Service
[your unit's name]
[date]

This report has been prepared in a fair, objective and non-partisan manner. The author of the report understands that their duty is to the Court and not to the party who has requested the report or retained their services. The author understands that, if they are qualified as an expert witness, the Court demands

their expert opinion evidence be impartial and independent and that they present such evidence without bias.

Summary

On [unknown fingerprint development date], fingermark impression R_ was developed by [Name of examiner] on a [describe the item or surface here]. Known fingerprints were obtained (inked or live scan) bearing the name [Name and date of birth of accused]. On [insert date], [your name] completed an analysis/comparison of developed unknown fingerprint R_ with the known fingerprint (inked or live scan). Unknown fingerprint R_ was identified to the [digit] on the (inked or livescan known fingerprints) bearing the name [Name and date of birth of accused].

Analysis

An analysis was performed on unknown fingerprint R_ to determine its suitability for comparison purposes. The analysis is the gathering of information regarding the unknown fingerprint. It is a systematic process divided into seven stages which allows the examiner to assess the clarity of the unknown fingerprint.

Anatomical Factors

Anatomical factors assist in digit determination and may provide insight about how an object was handled. It may also indicate how the object was used, and someone's actions or position of someone in relation to the object.

[describe anatomical factors for your case here]

Substrate

The substrate is the surface upon which the unknown fingerprint has been deposited. In some cases the substrate may contain imperfections or contaminants which interfere with the deposition of the digit and visualization of the friction ridge detail. The substrate may also be irregular in structure which may contribute to distortions present in the impression.

[describe substrate for your case here]

Matrix

The matrix refers to the substance deposited on the substrate by the friction skin or the substance that was on the substrate when the finger touched the item.

[describe matrix for your case here]

Development Medium

The development medium is the physical or chemical process used to provide contrast between the friction ridges and the substrate (simply, what makes the unknown fingerprint visible).

[describe development medium for your case here]

Deposition Pressure

Deposition pressure is the pressure exerted by the friction skin when in contact with the substrate.

[describe deposition pressure for your case here]

Distortion

Distortion refers to the lateral or rotational movement of the friction ridges when in contact with the substrate.

[describe distortion for your case here]

Clarity

Clarity refers to the visible quality of the friction ridge impression. Certain areas of the impression may have higher or lower tolerance for visible discrepancies between the known and the unknown impressions based on contamination of, deposition pressure, or distortion noted in the impression.

Level 1 Detail

Level 1 detail is the presence of distinguishable friction ridges. If the volume of detail is sufficient, it may be possible to classify the pattern present, therefore reducing the list of donors. Level 1 detail alone cannot be used to identify, but may be used to exclude donors.

[describe level 1 detail for your case here]

Level 2 Detail

Level 2 detail is the specific path taken by each friction ridge and their relation with the neighbouring ridges, including the major ridge path deviations such as bifurcations and ridge endings. A bifurcation is a ridge which has divided into two ridges or two ridges which meet forming one ridge. A ridge ending occurs when a friction ridge stops its course abruptly. Another type of level 2 detail is the incipient ridge. An incipient ridge is an immature friction ridge. They appear thinner and shallower than the surrounding ridges and may not appear in all representations due to deposition pressure, but are permanent friction ridge structures. If the quantity and quality of level 2 detail present in an impression is sufficient, it can be used to exclude or identify.

[describe level 2 detail for your case here]

Level 3 Detail

Level 3 detail refers to the intrinsic shape of friction ridges, the pore locations, alignment or misalignment of ridges, and can have the most discriminating features. This detail can be used to exclude or identify when used in conjunction with level 2 detail.

[describe level 3 detail for your case here]

Tolerance

The tolerance for discrepancies is dictated by the analysis of the unknown fingerprint and by viewing all three levels of detail.

If the quality of the unknown fingerprint is good, the tolerance level for discrepancies is low and a lesser amount of friction ridge detail is required to exclude or identify. If the quality of the unknown fingerprint is poor, the tolerance level for the discrepancies is high and a larger amount of friction ridge detail is required to exclude or identify.

[describe tolerance for your case here]

Comparison

The comparison process is completed by comparing the friction ridges in sequence from the unknown fingerprint to the known fingerprint. A ridge to ridge comparison is conducted until all visible friction ridges on the unknown fingerprint have been examined and compared to the known fingerprint.

Throughout the comparison process special attention is made in taking into account the tolerances dictated by the quality of the unknown fingerprint. A chart depicting both the unknown and known fingerprints is included with this report.

Evaluation

An evaluation is the assessment of the agreement between the friction ridge impressions where two questions are asked:

1) Is there agreement between the fingermark and the reference print?

2) Is there agreement of sufficient quantity and quality of friction ridge formations in sequence to identify?

An 'identification' is the opinion of an examiner that two impressions originated from the same source.

Opinion

Based on my training, knowledge and experience, I formed the opinion that the unknown fingerprint marked R_, located on the [item description] and the known fingerprint of the [digit] on the (inked or live scan) known standard bearing the name [Name and date of birth of accused] originated from the same source.

Verification

Verification is the interpretation of evidence by a Qualified Forensic Identification Employee following an opinion having been rendered by the examiner. This includes an independent Analysis, Comparison, and Evaluation (ACE) of the evidence by the verifier. This will be facilitated by the use of the examiner's Analysis documentation pertaining to Substrate, Matrix, Development Medium, photographs and any other documentation or items needed for the verification.

[Name of verifier], a qualified fingerprint examiner, verified my opinion.

[your name] Date

Expert Report Template (Suggested/Optional content)

Quality Table[4]

Table 1 shall be used for categorizing the levels of quality of the features in an impression (unknown or known). The level of quality determines the degree of tolerances that will be used during the comparison process. High quality will lead to low tolerances and conversely low quality will require high tolerances

Quality	
High	Level 1 is distinct; Level 2 details are distinct; There are abundant distinct Level 3 details.
Medium High	Level 1 is distinct; Most of the Level 2 details are distinct; There are minimal distinct Level 3 details.
Medium Low	Level 1 is distinct; Few of the Level 2 details are distinct; There are minimal distinct Level 3 details.
Low	Level 1 may not be distinct; Most of the Level 2 details are indistinct; There are no distinct Level 3 details.

Table 1: Categories of quality defined as a function of levels of details observed.

[4] SWGFAST Document #10 Standard for Examining Friction Ridge Impressions and Resulting Conclusions, Ver. 2.0 2022-12

Sufficiency Graph[5]

The four categories of quality represented on the vertical axis are given in Table 1

In Figure 1, the solid curve in the graph defines the lower limit of the sufficiency of friction ridge details below which, in area marked A, an identification decision is not warranted. The dotted curve indicates the boundary between levels of complexity (complex versus non-complex). In area marked B in Figure 1, the examination is considered as complex and an identification may be warranted. In area marked C in Figure 1, the examination is considered as non-complex and an identification is warranted. This graph does not suggest or endorse the use of minutiae counts as the sole criteria for a decision threshold.

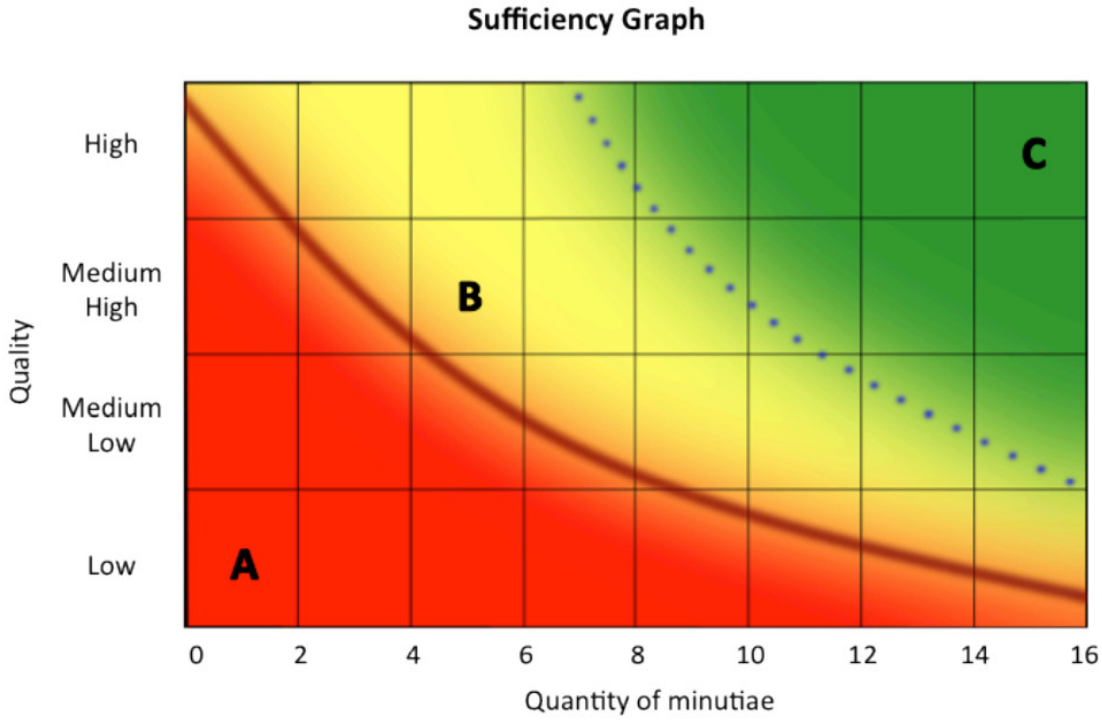

Figure 1: Sufficiency Graph

[5] SWGFAST Document #10 Standard for Examining Friction Ridge Impressions and Resulting Conclusions, Ver. 2.0 2022-12

Scientific Foundation

Friction ridge skin is found on the inner surfaces of the hands and on the soles of the feet. Research has shown that details in friction ridge skin are highly variable, highly discriminating, and persistent[6]. Friction ridge skin secretes sweat. This sweat and other possible contaminants (sebaceous oils, grease, blood, etc.) can leave an unknown fingerprint when contact is made with a surface. The touching of a surface does not always result in a fingerprint. Lack of sufficient sweat and the presence of contaminants, along with an unreceptive surface and certain environmental conditions, can interfere with the recording of a fingerprint. Most unknown fingerprints recovered at crime scenes or on items of interest are latent (hidden) fingerprints that require a development method to make them visible.

Examiners use a four-step process that includes the following phases: Analysis, Comparison, Evaluation, and Verification (ACE-V). The analysis phase includes an assessment of the quantity and quality of detail in an unknown fingerprint and any factors that may distort its appearance. The analysis is completed prior to viewing a known fingerprint. A known fingerprint is the recording of friction ridge skin, taken under controlled conditions and used for comparison purposes. During the comparison phase, the examiner will look for similarities and differences between the unknown fingerprint and the known fingerprint, taking into account any distortion factors identified during the analysis. The evaluation phase is where an examiner will form an opinion regarding the source of the unknown fingerprint. The opinion will be based on the amount of agreement or disagreement between the impressions and interpreted using the examiner's knowledge, training, and experience.

An identification opinion is based on the balance of probabilities between two competing propositions. Proposition 1, the impressions were made by the same source versus proposition 2, the impressions were made by different sources. An identification is an examiner's opinion that there is sufficient agreement between the two impressions to conclude that they were made by the same source.

A colored coded system known as GYRO[7] was used to document the features at both the analysis and comparison phase. GYRO is an acronym for green, yellow, red, and orange. Features marked in green indicate an examiner's high level of confidence in the existence of the features. Yellow and red features indicate moderate and low levels of confidence, respectively. Features marked in orange represent features only observed at the comparison phase.

Research demonstrates that trained examiners have significantly higher accuracy rates then untrained novices[8]. Though, there have been other studies on examiner performance[9], the FBI/Noblis black-box study[10] is considered the leading study into the accuracy and reliability of examiners' conclusions. The

[6] Chapters 2 and 3: The Fingerprint Sourcebook. Washington, DC: U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice, 2011.
[7] Langenburg, G., and C. Champod. 2011. "The GYRO System--A Recommended Approach to More Transparent Documentation." Journal of Forensic Identification, 61(4):373-384.
[8] Tangen JM, Thompson MB, McCarthy DJ. (2011). Identifying fingerprint expertise. Psychological Science, 22, 995-997.
[9] Langenburg, G; Champod, C; and Gennessay, T. Informing the judgments of fingerprint analysts using quality metric and statistical assessment tools. Forensic Science International, 2012; 219(1-3):183-198.
[10] Ulery, B.T.; Hicklin, R.A.; Buscaglia, J.; and Roberts, M.A. Accuracy and reliability of forensic latent fingerprint decisions. Proceedings of the National Academy of Sciences, 2011; 108(19):7733-7738.

false positive rate (erroneous identifications) calculated in this study was 0.17%. It must be noted that this study did not include a verification phase or any other quality control measures. The President's Council of Advisors on Science and Technology (PCAST) concluded in their 2016 report[11] that latent print analysis and comparison is a foundationally valid subjective methodology.

It is acknowledged that friction ridge identification cannot provide a conclusion that would exclude all other persons.

Glossary of Terms

Bifurcation: the point at which one friction ridge divides into two friction ridges.

Core: the location in a friction ridge impression where the innermost ridges form a loop, whorl, or central point.

Delta: a triangular type formation where friction ridges, flowing in different directions, converge.

Discrepancy: the presence of friction ridge features in one impression that do not exist in the corresponding area of another impression.

Dissimilarity: a difference in appearance between two friction ridge impressions.

Distortion: variances in the reproduction of friction ridge skin caused by factors such as pressure and movement.

Epidermis: outer layer of the skin.

Fingerprint: an impression made by the friction ridges of a finger.

Friction Ridge: a raised portion of the epidermis on the fingers, the palmar surfaces of the hand, and the plantar surfaces of the feet.

Furrow: valley or depression between friction ridges.

Known Fingerprint[12]**:** an impression of friction ridges left from a finger, recorded under controlled conditions, where the source of the impression is known.

Minutiae[13]**:** events along a friction ridge path, including bifurcations and ridge endings.

Palmar Skin: skin covered with friction ridges located on the palms of the hands.

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[11] President's Council of Advisors on Science and Technology (PCAST). Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods; Executive Office of the President's Council of Advisors on Science and Technology: Washington, D.C., 2016.

[12] Sometimes referred to as an "Exemplar".

[13] Sometimes referred to as "Characteristics", "Features", "Points", "Galton Details", or "Major Ridge Path Deviations".

Plantar Skin: skin covered with friction ridges located on the soles of the feet.

Quality: the clarity of the features within a friction ridge impression.

Quantity: the amount of information contained within a friction ridge impression.

Suitability[14]**:** an examiner's decision that there is sufficient quality and quantity of information within an unknown friction ridge impression to warrant a comparison to a known friction ridge impression.

Unknown Fingerprint[15]**:** an impression of friction ridges left from a finger where the source of the impression is unknown.

[14] Sometimes referred to as "Sufficient" or "Sufficiency".
[15] Sometimes referred to as a "Fingermark" outside of North America and in literature.