Friction Ridge Examination (Fingerprints): Evaluating the Extent and Scope of "Verification" in Analysis Comparison Evaluation and Verification (ACE-V)

Introduction

Verification is the final step in the overall examination process that is mandated by current practice in the friction ridge examination community, with the aim of reviewing the conclusions drawn in a given case. There are currently four possible conclusions that an examiner may reach during a friction ridge examination. The first of these occurs after the initial analysis of the unknown impression and is essentially an "of value" or 'of no value' decision. If the unknown impression is determined to be 'of no value', then the examination ceases. In other words, there is no need to compare the impression to a set of known (inked) impressions because the unknown impression lacks sufficient information to draw a meaningful conclusion regarding the friction skin source of the impression.

However, if the unknown impression is deemed to be 'of value', then the examiner will proceed to compare the impression with a set of known impressions to determine whether or not the unknown and the known impressions were made by a common source. It is after this comparison process is completed that one of the three remaining conclusions will be drawn: identification, exclusion, or inconclusive [1]. An identification means the unknown and known impressions were indeed produced by a common source, while an exclusion means the two impressions were made by different sources. The inconclusive determination is reserved for those rare instances where an examiner is unable to determine whether or not the impressions share a common source with any degree of professional confidence. Typically an examiner will render an inconclusive decision when the known prints lack the necessary quality to conduct a complete examination.

What is Verification?

Verification, the word as used in the context of the analysis, comparison, evaluation, and verification (hereinafter "ACE-V") (*see* **Friction Ridge Examination (Fingerprints): Interpretation of**; **Friction Ridge Skin: Comparison and Identification**) of friction ridge patterns in the forensic context, is the process of reviewing the conclusion(s) and accompanying data of the initial examiner in order to determine

1. the scientific validity of the conclusion;
2. the scientific validity of the methodology employed to draw the conclusion; and
3. the ability of the conclusion to withstand scrutiny.

In other words, the examiner conducting the "verification" step in ACE-V checks to see if the reported conclusion is supported by the existing physical evidence. Essential to this process is the quality control concept (and perhaps, requirement) of documentation. This is accomplished by the initial examiner taking detailed contemporaneous bench notes during each phase of the process of examining friction ridge impressions in a given case.

If the documentation is inadequate or incomplete, the examiner conducting the verification has no way of determining if the first three steps (A, C, and E) were appropriately conducted and if the conclusion reached by the original examiner offers assurances of trustworthiness and is likely to have been correct.

Triplett and Cooney associate the verification phase of ACE-V with the peer review phase in the scientific method of hypothesis testing [2]. In doing so, they further state that proper peer review is an attempt to falsify the conclusion of the examiner of record and/or the way in which it was drawn. Ashbaugh described verification as follows: "Verification is a form of peer review and is part of most sciences . . . its purpose is to verify process and objectivity as opposed to only check results" [3]. The National Academy of Sciences stated that "verification occurs when another qualified examiner repeats the observations and comes to the same conclusion, although the second examiner may be aware of the conclusion of the first" [4].

This linking of "verification" with "peer review" is considered appropriate in conducting friction ridge examinations, where the terms are often used interchangeably in that context, but peer review is not always ascribed the same meaning in other scientific endeavors. Indeed, the words "peer review," as used in the *Daubert* decision [5] and in some other forensic methodologies, are more frequently associated with an evaluation of a suggested methodology in the abstract, rather than as the verification of a result obtained in a single forensic case. Peer review, in the broader scientific field and as used by the US Supreme Court in *Daubert*, is widely seen as the publishing of critiques, evaluations, or analyses of articles wherein the author evaluates the scientific merit of other's published methodological approach to solving problems.

Recommendations on the Extent of Verification

The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) has been establishing guidelines and standards in various areas of friction ridge examination since 1995 [6]. Its recommendations regarding the extent of verification appear in three of the Group's documents, and state that all identifications shall (must) be verified and that exclusions or inconclusive decisions should (may) be verified [7–9]. In addition, the SWGFAST document dealing with the examination of simultaneous impressions states that the determination of simultaneity itself shall be verified [8]. This is due to the complex nature of determining whether partial friction skin fragments found on the same substrate (surface) were deposited simultaneously. This complexity has been investigated to a limited extent, most recently by Black [10].

One cannot help but wonder why the above recommendations do not treat all friction ridge examination conclusions equally. The answer lies in the belief of the professional community that the erroneous identification is a far more grievous error that an examiner can make than arriving at either an erroneous exclusion or an erroneous "inconclusive" decision. This belief stems from the potential consequences of each type of error. An erroneous identification (individualization) is defined as "the incorrect determination that two areas of friction ridge impressions originated from the same source" [11].

The erroneous exclusion, although another type of serious error, is not given the same weight. An erroneous exclusion is defined as "the incorrect determination that two areas of friction ridge impressions did not originate from the same source" [11].

It is easy to understand why the erroneous identification is a serious error. The consequences are staggering for a person who is erroneously linked to a crime. However, the consequences are potentially as staggering in any case where a suspect is erroneously excluded as being involved. The most immediate consequence is the potential for the suspect to commit additional crimes. Unfortunately, in the latter instance, the erroneous exclusion will not be discovered by most agencies if they are not verifying exclusions (or "inconclusive" or "no value" decisions) as a matter of course.

Do We Need 100% Verification of All Conclusions?

The answer to this question may be intimated by asking another: How often does an examiner want to be wrong? It is safe to say that friction ridge examiners never want to be wrong. Peoples' lives and liberties may be affected by the presence of inculpatory fingerprint evidence; therefore, it is imperative that the scientifically correct conclusion be drawn at all times. Unfortunately, technical errors do occur. For that reason, verification of all conclusions is a preferred necessary step in minimizing these errors.

Ashbaugh alluded to this when he stated, "... Many organizations erroneously use verification as a method of protecting against errors in place of adequate training. While verification may prevent the occasional error, its purpose is to verify process and objectivity as opposed to only check results" [3]. History has also shown that errors are still made even when verification is performed, as illustrated by the Brandon Mayfield case [12]. So, even though verification will not prevent errors, it seems that the number of errors will certainly decrease by verification of all conclusion decisions.

Preliminary research has shown that 98% of responding agencies ($n = 56$) are performing verif ications on all reported fingerprint identifications [13]. However, exclusion, inconclusive, and "no value" decisions are being verified to a far lesser extent. This could be significant because in

the author's experience of conducting fingerprint examinations, as well as his experience in reviewing the casework of many other agencies, erroneous identifications comprise the minority of errors. Rather, the errors are mostly in the form of erroneous exclusions as well as incorrect "inconclusive" and "no value" decisions. Perhaps serious consideration should be given to verifying all conclusions.

Minimizing Bias during Verification

If we use the terms "verification of a forensic conclusion" in a more generic way, rather than simply as a step in the ACE-V process – where the second examiner must have access to all data from the first examiner – then one must realize that the potential for bias (*see* **Friction Ridge Examination (Fingerprints): Interpretation of**) exists. Too often in friction ridge comparisons the second (verifying) examiner may approach the task with the wrong mindset. Rather than attempting to falsify the first examiner's conclusions [2], the verifier will embark on this journey with the idea of merely agreeing with, upholding, or confirming the initial results.

Anecdotal evidence suggests that there are several factors, such as apathy, lack of integrity, and external influences, which may lead to this faulty mindset. Another – and perhaps the most problematic – factor is the verifier's experience in reviewing a particular person's work product. For example, "Verifier X" has reviewed the casework of "Examiner Y" for the last four years and has never found one instance of either an erroneous identification or exclusion. In fact, Verifier X has never found a single technical error.

It is possible for this experience to now have an adverse effect on the verification phase in the next case where Verifier X reviews for Examiner Y because there is no expectation that Examiner Y could be wrong. Not only is Examiner Y wrong this time, but because Verifier X did not try to falsify or disprove the results, the error is repeated instead of being detected. Bias should be a legitimate concern for all examiners. None are immune to its effects. That is why a proper mindset is essential to reduce the negative impact that bias may have on the verification phase.

Another way that some examiners, and agencies, try to minimize bias is through the practice of blind verification. Blind verification is defined as "the independent examination of one or more friction ridge impressions by another qualified examiner who has no expectation or knowledge of the conclusion of the original examiner" [11]. In other words, the verifying examiner does not have access to the bench notes and conclusions of the original examiner. For some, this has been standard practice for quite some time, while other agencies have only recently adopted it, as did the Federal Bureau of Investigation in the wake of the Brandon Mayfield case [12].

While blind verification is an excellent quality control measure, and one that indeed does seem to reduce bias, the practice does have a significant limitation. This limitation is that the second (verifying) examiner has no access to the bench notes of the initial examiner. This creates a twofold problem. First, the verifying examiner has no way to ensure that the initial examiner arrived at the correct conclusion in the correct manner (e.g., the proper application of ACE). Second, the caseload of a given agency is effectively doubled because blind verification amounts to a reexamination of a case in its entirety – a problem which many agencies could not afford to create because of heavy caseloads and limited personnel.

Conclusion

Verification is a necessary quality control measure in fingerprint examination although, unfortunately, it is not applied equally to all conclusions. And yes, even when verification is performed, there is no assurance that the conclusion(s) will be free from error. But if an examiner minimizes bias by adopting a proper mindset and attempts to falsify the original examiner's conclusion – but is unsuccessful in doing so – then the original conclusion is indeed verified and is likely to be scientifically correct. The proper application of this final phase of the ACE-V methodology also helps to ensure that fingerprint conclusions are reproducible among qualified examiners. Further, because some agency standard operating procedures (SOPs) require an examiner to document the features used in reaching a conclusion, this provides added support for the widespread belief or conviction that fingerprints remain a reliable means of personal identification.

References

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