F3 Assessing the Strength of Fingerprint Conclusions

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After attending this presentation, attendees will understand the importance of assessing the complexity of a comparison and the demonstrable level of association found between two impressions. Assessing these factors allows for the strength of any pattern evidence conclusion to be more accurately discerned.

This presentation will impact the forensic science community by protecting against over-interpretation and ensuring conclusions are as accurate as humanly possible.

False convictions have pushed the topic of forensic errors into the national spotlight. Fingerprint conclusions are very accurate, but errors have occurred. The strength of any conclusion needs to be measurable since criminal proceedings rely heavily on this type of information. Attempts to articulate the strength of fingerprint conclusions have persisted for decades (e.g., counting points, Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST) Sufficiency graph, statistical modeling, etc.). This presentation will discuss past methods for determining the strength of conclusions, discuss their limitations, and present an alternative approach that is both easy and effective.

Historically, fingerprint conclusions have been reported in a categorical fashion, such as "the impression has been identified to John Doe." Reporting conclusions in this manner has made conclusions sound conclusive, when in reality they may be strongly supported with visual data, marginally supported with visual data, or lack visual data that can be successfully demonstrated to others (i.e., simply the beliefs of the practitioners stating the conclusion). In order to determine the strength of the conclusion, the basis behind the conclusion needs to be assessed. Conclusions have been reported categorically as a means of simplifying a very intricate process that was based on a large number of non-quantifiable variables. No statistical model has been able to express the strength of conclusions despite ongoing and previous efforts dating back to the late 1800s.

The lack of a clearly defined criterion for arriving at conclusions makes it difficult to evaluate a practitioner's conclusions. Without a standard, there is no means of judging correctness. This is extremely concerning when people's liberties and lives are on the line. Currently, the only way to assess a conclusion is to ask for another practitioner's opinion, which is mistakenly viewed as a measure of accuracy. Repeating a conclusion is simply measuring whether or not the conclusion is acceptable to another practitioner; it is not establishing absolute truth.

Instead of oversimplifying conclusions as categorical variables (identification or exclusion), it is more appropriate to present decisions on a continuum that expresses the complexity of a comparison (e.g., Basic, Advanced, Complex) and the demonstrable level of association (such as overwhelming, compelling, persuasive, considerable, marginal, none or none found). The complexity of a comparison is important because it determines the extent of testing required to ensure the interpretation and amount of data are sustained under a critical review. The results of the testing establish the acceptable level of association, which indicates the strength of a conclusion (e.g., a complex comparison does not indicate that a conclusion is weak; it indicates that additional quality assurance measures are required to establish a strong conclusion).

Conclusions based on specific criterion and vetted against rigorous scrutiny will preempt errors and make conclusions more trustworthy than conclusions based on personal thresholds and confidence levels. Clear thresholds

also make it possible to judge the acceptable level of association used to support a conclusion, which helps assess the risk of error for each conclusion. Measuring acceptance or rejection based on a criterion is a far more informative approach than judging conclusions based on the beliefs of other individuals. Ultimately, utilizing the following method will provide stronger conclusions and allow others to assess the strength of conclusions.

This method can also be beneficial to re-assess conclusions arrived at using a different method. The level of complexity, the degree of testing performed, and the level of association will establish the strength behind any conclusion.

Fingerprints, Level of Association, Conclusions