Proposing Solutions to Reduce Friction Ridge Errors

(Task-Relevancy)

Michele Triplett – February 2025

When performing friction ridge comparisons, errors are always a concern. In 2009, the National Academy of Sciences (NAS) recommended research be performed to identify the causes and extent of errors. Then, based on the research, develop procedures to minimize errors [1]. The NAS gave an example saying the research "… might include studies to determine the effects of contextual bias in forensic practice (e.g., studies to determine whether and to what extent the results of forensic analyses are influenced by knowledge regarding the background of the suspect and the investigator's theory of the case". The words *might* and *whether* imply that the NAS was not presuming bias was a primary concern, they were simply indicating it could be a concern or a place to begin.

Research in this regard is difficult because when errors occur, it is hard to determine the reason for the error. When conclusions are subjectively based, they can be influenced by indirect information (i.e., bias) or different opinions may be determined at different times or different from others in the field. The reason for differing conclusions is unknown and bias is only one of many possible reasons.

In 2015, the National Commission on Forensic Science (NCFS), an advisory group to the Obama Administration's US Attorney General, gave recommendations to address contextual bias, stating, "FSSPs should rely solely on task-relevant information when performing forensic analyses" [2]. This recommendation sounds logical however, no research has established how often analyses are influenced by irrelevant information. The NCFS also recommended, "The standards and guidelines for forensic practice being developed by the Organization of Scientific Area Committees (OSAC) should specify what types of information are task-relevant and task-irrelevant for common forensic tasks" [2].

In 2024, the Organization for Scientific Area Committees (OSAC) Friction Ridge (FR) subcommittee published a list of what they considered task-relevant information [3]. It should be noted that although the FR subcommittee was responding to the NCFS recommendation, they used a different definition of task-relevant, listing information as "necessary" versus information that has the potential to assist the examiner in arriving at a conclusion (OSAC list of task-relevant information below).

4.1 Only the following information is considered task-relevant for the Analysis, Comparison, and Evaluation phases of friction ridge examination.
- 4.1.1 Questioned impressions
- 4.1.2 Substrate
- 4.1.3 Matrix
- 4.1.4 Processing methods
- 4.1.5 Collection methods
- 4.1.6 Orientation and location of impressions

4.1.7 Environment/locality from which questioned impressions were recovered.

4.2 The following information is considered task-relevant for the Comparison and Evaluation phases of friction ridge examination only.
4.2.1 Exemplar impressions
4.2.2 Date of collection
4.2.3 Whether any exemplars were generated by a database search, the size of any databases searched, and any search parameters.

Are all the pieces of information on the OSAC list *necessary*? When a comparison has an abundance of clear information, only the questioned print and the exemplar prints are necessary to arrive at a well-supported conclusion, however, as a comparison becomes more complex, that is when additional information may be beneficial. For instance, the placement of an impression on an object may help establish the area of the hand the impression originated from, or its proper orientation. This would apply to manual comparisons and may not apply to AFIS systems that have finger and palm prints that are searched 360°. Knowing the matrix was a liquid could help the examiner determine the impression is tonally reversed. These pieces of information may be useful for a comparison but not necessary for establishing sufficiency and support for a conclusion.

A problem arises. Having knowledge of the matrix or substrate has the potential to be subtly biasing information if the matrix and or substrate appear to be highly probative pieces of information, such as a bloody impression on a butcher knife. Information that might be helpful to perform a comparison may also introduce bias when arriving at a conclusion, yet masking this information weakens the ability to perform a thorough comparison.

To summarize, the NAS recommended research be performed to establish the cause and extent of errors. The NCFS speculated that contextual bias was one cause of error and gave recommendations to mitigate bias. The OSAC responded to the NCFS recommendation by creating a list of task-relevant and task-irrelevant pieces of information so agencies could manage exposure to task-irrelevant information. In the end, some items on the list could instill bias.

Since all conclusions are not influenced by bias (note: research has shown that bias is only an issue when information is limited or vague [4] (i.e., complex comparisons)), masking information in all cases is an excessive solution that gives the illusion of strong quality assurance (QA). Developing QA measures for complex comparison would better address both the potential for bias, and address other sources of error such as inappropriate use of the method, competency issues, and inappropriate personal thresholds. Using validated procedures/criterion based on scientific protocols, and having a strong review process will diminish and catch errors prior to errors being reported out. The review process needs to ensure conclusions are supported by the information in the impressions, not based on extraneous information such as the matrix, substrate, livescan impression, etc. Reliance on confidence and promoting subjective opinions, as opposed to scientifically supported objective conclusions, will continually result in having to develop new QA methods to address each type of human error. When subjectivity is minimized, issues and

overburdensome solutions will become unnecessary (e.g., linear assessment, documentation, gyro, masking, blinding, conflict resolution, etc.).

In order to fix a problem, we have to recognize where a problem exists.

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References

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