A111 A Comparison of Fingerprint Screening Ability Between a Computerized Search Program and Human Examiners

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The goal of this presentation is to compare the screening ability of fingerprint examiners using the same data and experimental design that were used in the computer based companion study.

This presentation will impact the forensic science community by comparing *Daubert* considerations of error rate, statstical confidence, and examiner subjectivity.

In the companion paper, a Fingerprint Search Program Validation Study, the optimal search settings and latent fingerprint screening capability of a finger print search program are reported. A parallel study is presented here. The goals of this project were to compare the screening ability of fingerprint examiners using the same data and experimental design that were used in the computer based companion study. Both the results obtained by fingerprint examiners and a comparison of the two studies are reported here.

Using rolled and plain (slapped) fingerprints of high quality, several fingerprint examinations were performed and the results were compared to known theoretical outcomes. In place of a database of extracted prints, examiners were provided with the prints found in the search program's database in hard copy format. Examiners used conventional optical/hand methods to compare the database prints to the test latent print. The experimental design is described below:

1. Can the fingerprint examiner find an exact copy of the full latent in the database? This is a self-matches-self experiment with the expected outcome of a match on every attempt.

2. Can the fingerprint examiner match the full print by searching portions of an exact copy of the full print? This is a form of a self-matches-self experiment that simulates searching the database with an ideal partial print. To mimic a partial print, the full latent print was divided into quarters or quadrants and each was searched as a separate latent print. Fifteen minutiae were arbitrarily chosen for all experiments as it is generally accepted that a full latent can be identified from twelve to sixteen minutiae, even if only a partial print is present. The expected outcome is 100 percent.

3. Can the fingerprint examiner match the full print by searching a series of plain prints of the same finger that have varying quality and spacial orientation? In this case the database contained only prints made with the same finger as the full latent and is another version of a self-matches-self test. Because each plain print contained at least fifteen minutiae, the theoretical outcome should be 100 percent.

4. This experiment was the same as experiment number three above, except non-matching prints were included in the database to better simulate a real life search. The same setting and number of minutiae were used as before, except the theoretical outcome changes to include non-matching candidates for examination.

In some cases fifteen minutiae were not sufficient to identify the full print in the database resulting in true candidates not being omitted from the list of candidates for consideration by the examiner. Even when the selectivity setting was reduced to allow more lenient comparisons, not all the true candidate prints in the database were identified. Although this deficiency does not lead to false identifications it does increase the examiner's work and in the case where only a single true print exists in the database, it may not be selected as a candidate for consideration

The inability of a partial print with fifteen minutiae to match a full print in the database casts a shadow on both the software and the prevailing fingerprint comparison protocol. Basing an identification on twelve to sixteen minutiae (prevailing standard) might be too low.

Daubert considerations of error rate, statstical confidence, and examiner subjectivity will be discussed. Graphs and tables of the data will be presented.

Fingerprint, *Daubert*, Validation