To Bayes or not to Bayes? The question of how fingerprint examiners should convey their judgements

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Abstract Body (Introduction, Background, Results and Conclusion)

What fingerprint examiners should say, or should be allowed to say, about the results of forensic comparisons has been a contentious issue in the legal and forensic science communities. Fingerprint examiners have historically conveyed their judgements categorically, such as an 'identification' or 'exclusion.' Recently, there has been a deluge of commentary and proposals, from across the forensic sciences, recommending that examiners make use of Bayes theorem, likelihood ratios, and Random Match Probabilities in order to best present their opinion evidence to a trier of fact.

Recent empirical evidence suggests, however, that fingerprint examiners are capable of extraordinary feats of identification by making use of non-analytic cognition in their decision making, and so may not be able to articulate the weight of their evidence. And there is also emerging evidence that fact-finders struggle to make sense of statistical information about evidence. This current situation may well leave fingerprint examiners asking, "where to from here?" In the context of Bayesian approaches, and in light of recent empirical evidence, how should fingerprint examiners should convey their judgements?

Here we discuss several presently unresolved questions about the issue. When, if ever, should examiners claim to have determined with certainty that two items have a common source? When, if ever, should they express an opinion about the probability that two items share a common source? Should examiners be allowed, or even required, to present statistics on the probability of coincidental matches? Should they be allowed or required to present statistics about error rates? And if statistical evidence is presented, how should such statistics be presented, as frequencies, as likelihood ratios, or in some other format?

We will outline a range of possible approaches for presenting fingerprint opinion evidence in courts and reports, and how they best facilitate reliable, accurate, and effective communication of forensic evidence to a trier of fact. We conclude by outlining a proposal based on the diagnostic model in medicine, and suggest that an indication of performance (and error) in previous situations, (reasonably) similar to the particular analysis, provides valuable information to those obliged to evaluate fingerprint testimony.

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