



B169 Fingerprint Error Rate on Close Non-Matches (CNMs)

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Learning Overview: The goal of this presentation is to provide attendees with information about the risk of false fingerprint identification in cases in which prints from different sources have many common features and few dissimilar features.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by making attendees aware of data related to how often expert fingerprint examiners err in difficult cases.

The accuracy of fingerprint analyses is critically important to the administration of criminal justice. However, a 2016 Report by The President's Council of Advisors on Science and Technology (PCAST) indicated that there were only two well-designed empirical studies that directly examined the accuracy of fingerprint examiners' identification conclusions.¹ These two studies reported very low false positive error rates on print pairs that the authors described as "challenging" and "representative of case work."^{2,3}

Though encouraging, it is not clear whether similarly low error rates would be observed for CNMs in which the latent and exemplar prints have many common features and few dissimilar features. It is important to learn more about CNM error rates because CNMs are more likely to arise in casework as database searches become more common and as the size of the searched databases increases.

In the present study, high-level fingerprint examiners from 125 Chinese fingerprint agencies completed a mandatory online proficiency test using Picture Annotation Software 4 (PiAnoS4) fingerprint software that included two CNMs. PiAnoS4 enables participants to conduct a detailed, annotated, step-by-step examination of print pairs using the standard fingerprint method. Examiners viewed eight consistent points of comparison (minutiae) between the prints followed by an inconsistent point. Examiners were instructed to provide one of three conclusions for each latent-exemplar print pair: identification, exclusion, or inconclusive. In keeping with casework practices in China, the instructions discouraged reliance on the inconclusive conclusion. Examiners were also encouraged to provide written comments that document their thoughts at various decision points. Each agency received a unique user name and code. Agencies had five days to complete the test and submit results.

The false identification rates on the CNMs were 15.9% (17 out of 107, 95% Confidence Interval (CI): 9.5%, 24.2%) and 28.1% (27 out of 96, 95% CI: 19.4%, 38.2%), yielding a combined false identification rate of 21.7% (44 out of 203, 95% CI: 16.2%, 28.0%). These false positive error rates are higher than those observed by Ulery et al. and Pacheco et al., but they are roughly in line with error rates observed elsewhere on difficult CNMs.^{1,2} Written comments from examiners who committed identification errors suggest that those examiners frequently failed to note any important points of difference between the latent and exemplar prints. A smaller percentage of examiners who committed identification errors observed dissimilarities, but they often rationalized them away as unimportant artifacts.

This presentation concludes that the false identification rate on CNMs may be substantially higher than the error rate identified in the two well-designed studies singled out in the PCAST Report. If so, then the probative value of reported identifications may be lower than widely believed in cases where the risk of encountering a CNM is amplified.

Reference(s):

1. Ulery, Bradford T., Hicklin, R. Austin, Buscaglia, JoAnn., Roberts, Maria Antonia (2011). Accuracy and reliability of forensic latent fingerprint decisions. *Proc. Natl. Acad. Sci. U.S.A.* 108, 7733-7738.
2. Pacheco, Igor, Cerchiai, Brian, Stoiloff, Stephanie. (2014). *Miami-Dade research study for the reliability of the ACE-V process: Accuracy & precision in latent fingerprint examinations.* (Document No 248534, Award Number 2010-DN-BX-K268).
3. President's Council of Advisors on Science & Technology, Executive Office of the President (2016). *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods.*

Error Rate, Close Non-Match, Fingerprint