

Evidence for Expertise in Fingerprint Identification and the Ramifications for the Future Study of Forensic Expertise

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Learning Objective and Outcome: Attendees will receive an overview of recent criticisms of forensic identification; be updated on the findings of and rationale behind recent studies of expertise in fingerprint identification; and understand the implications of these experiments for expert testimony and public policy.

Impact Statement: This presentation will provide a rationale for the design of recent experiments on forensic expertise and put the experimental results in context for the benefit of forensic researchers, examiners, managers, and policy makers.

Abstract: Although fingerprint experts have presented evidence in criminal courts for more than a century, there have been few scientific investigations of the *human* capacity to discriminate these patterns. In 2009, the National Academy of Sciences (NAS) delivered a landmark report highlighting the absence of solid scientific methods and practices in the forensic science domain.¹ Harry T. Edwards (a senior US judge and co-chair of the NAS Committee) noted that forensic science disciplines, including fingerprints, are typically not grounded in scientific methodology, and forensic experts are not bound by solid practices that ensure that the forensic evidence that is offered in court is valid and reliable.² The NAS recommended that the US Congress fund basic research to help the forensic community strengthen their field, develop valid and reliable measures of performance, and establish evidence-based standards for analyzing and reporting testimony.

Recently, researchers have investigated the effect of contextual bias on fingerprint examiners; some of the special abilities and vulnerabilities of fingerprint examiners; the effect of technology; statistical models of fingerprint identification; and the accuracy of fingerprint examiners' decisions. Despite this contribution, there are still few peer-reviewed studies directly examining the extent to which experts can correctly match fingerprints to one another, how competent and proficient fingerprint experts are, how and on what basis examiners make their decisions, and what factors affect matching accuracy. The "Identifying Fingerprint Expertise" experiment was designed to find out whether fingerprint experts were any more accurate at matching prints than the average person, and to get an idea of how often they make errors of the sort that could lead to a failure to identify a criminal compared to how often they make errors of the sort that could lead to inaccurate evidence being presented in court.³ Results show that qualified, court-practicing fingerprint experts are exceedingly accurate (and more conservative) compared with novices, but they do make errors.

In this presentation, a rationale for the design of the experiment will be provided, as well as context for interpreting the results for the benefit of researchers, forensic examiners, forensic managers, lawyers, and judges. It will be argued that fidelity, generalizability and control must be balanced in order to answer important research questions; that the proficiency and competence of fingerprint examiners is best determined when experiments include highly similar print pairs, in a signal detection paradigm, where the ground truth is known; that determining error rates with system-wide black box studies may be inefficient at best and unnecessary at worst; and that inferring from this experiment the statement "The error rate of fingerprint identification is 0.68%" would be disingenuous.⁴ In closing, the ramifications of these findings for the future study of forensic expertise, and the implications for expert testimony and public policy will be presented.

References:

1. National Research Council, Committee on Identifying the Needs of the Forensic Science Community. Strengthening forensic science in the United States: A path forward. Washington, DC: The National Academies Press, 2009.
2. Edwards HT. Statement of The Honorable Harry T. Edwards: Strengthening forensic science in the United States: A path forward. United States Senate Committee on the Judiciary, 2009.
3. Tangen JM, Thompson MB, McCarthy DJ. Identifying fingerprint expertise. *Psychol Sci* 2011;22(8):995-7.
4. Thompson MB, Tangen JM, McCarthy DJ. Expertise in fingerprint identification. *J Forensic Sci* (accepted pending minor revisions).

Fingerprints, Decision Making, Expertise