Statistical model unlocks barriers to use of fingerprint evidence in court

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Potentially key fingerprint evidence is currently not being considered due to shortcomings in the way it is reported, according to a report published today in *Significance*, the magazine of the Royal Statistical Society and the American Statistical Association. Researchers involved in the study have devised a statistical model to enable the weight of fingerprint evidence to be quantified, paving the way for its full inclusion in the criminal identification process.

Fingerprints have been used for over a century as a way of identifying criminals. However, fingerprint evidence is not currently permitted to be reported in court unless examiners claim absolute certainty that a mark has been left by a particular suspect. This courtroom certainty is based purely on categorical personal opinion, formed through years of training and experience, but not on logic or scientific data. Less than certain fingerprint evidence is not reported at all, irrespective of the potential weight and relevance of this evidence in a case.

Today's *Significance* paper, which publishes in advance of the full study in the *Journal of the Royal Statistical Society: Series A* later this year, highlights this subjectivity in current processes, calling for changes in the way such key evidence is allowed to be presented. According to Professor of Statistics Cedric Neumann, "It is unthinkable that such valuable evidence should not be reported, effectively hidden from courts on a regular basis. Such is the importance of this wealth of data, we have devised a reliable statistical model to enable the courts to evaluate fingerprint evidence within a framework similar to that which underpins

DNA evidence."

Neumann, from Pennsylvania State University, and his team devised and successfully tested a model for establishing the probability of a print belonging to a particular suspect. After mapping the finer points of detail on a "control print" and "crime scene print", two hypotheses were then tested. The first test, to establish the probability that the crime scene print was made by the owner of the control print (the suspect), compared the control print with a range of other prints made by the suspect. The second test, to establish the probability that the crime scene print was made by someone other than the suspect, compared the crime scene print with a set of prints in a reference database. A likelihood ratio between the two probabilities was calculated; the higher the ratio indicating stronger evidence that the suspect was the source of the crime scene print.

"Current practice allows a state of certainty to be presented which is not justified scientifically, or supported by logical process or data," said Professor Neumann. "We believe that the examiner should not decide what evidence should or should not be presented. Our method allows all evidence to be supported by data, and reported according to a continuous scale."

More information: Neumann, C.: Fingerprints at the crime-scene: Statistically certain, or probable?; Significance (2012); DOI: 10.1111/j.1740-9713.2011.00539.x

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