Task Number: **2016-001**

Article Title: **More than Zero: Accounting for Error in Latent Fingerprint Identification.**

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Article's Subject Matter:

- **In an attempt to estimate the error rate of fingerprint identification, the author reviews 22 unintentional reported cases of misattributed latent fingerprints from the US (16) and UK (6) from 1920 to 2004. Author focusses on false positives exposed outside of law enforcement agency and demonstrates that perceived safeguards to errors e.g. verification, competence of examiners (IAI certification), high point standard (UK 16 point rule) and access to defense experts, failed in many of these examples. Author criticizes fingerprint profession and the courts for belief in 'zero error rate' and for assigning all errors to examiner incompetence which has stifled meaningful root cause analysis of errors. Two alternative causal mechanisms for error are discussed and applied to Mayfield case.**

Key Points in Article

- **"Error rate" has been enshrined as non-definitive criteria for admissible scientific evidence under *Daubert*:**
    - **Forensic identification is a routine, repetitive technical procedure that yields, not new knowledge, but one of a prescribed set of possible results and as such seems amenable to estimation of error rate.**
- ***Kumho Tire* specifically noted that even in experience-based testimony it is relevant to know the error rate.**
    - **Major hindrance is the lack of an accepted metric for measuring latent print quality and/or quantity or the difficulty of a comparison.**
- **Response to *Daubert/Kumho* - latent print examiners (LPE) claim zero error rate.**
- **DNA testifies that defendant may be source of DNA sample and random match probability indicates the frequency with which randomly chosen individuals from a population would also be consistent with the unknown DNA sample.**
- **LPE testify that defendant is the source of the latent to the exclusion of all others and are banned from offering probabilistic opinions to the court**
- **Where does the boundary lie between insufficient (inconclusive) and sufficient (individualization) corresponding ridge characteristics between unknown & known?**
- **LPE describe ACE-V methodology and until recently resisted "blind" verification.**

- **Testimony at the court's discretion. No qualifications such as IAI Certification necessary to qualify as expert witness.**
- **Latent print errors:**
    - **False positive – reporting an individual is the source when they are not**
    - **False negative -- reporting an individual is not the source when they are.**
- **2 ways to calculate error rate:**
    - **Casework: # actual cases of error / # cases in which fingerprint evidence used, requires 'ground truth' and generates false positive & false negative rates.**
        - **Casework ground truth is not known.**
    - **Simulation where the researcher knows the ground truth.**
        - **Can differ from real-world practice.**

- **Author believes <u>misattribution data</u> is clustered in recent years and is accelerating.**
- **Serious crimes overrepresented: homicides (11 errors); attempted homicide (1); rape (2); burglary & larceny (4); narcotics (1); perjury (1); unknown crime (2).**
    - **Does pressure to resolve homicide case lead LPE to "push the envelope"?**
    - **Does heightened attention of media, defense counsel & experts expose mistakes?**
    - **FBI report on Mayfield opts for "pressure…high-profile case…influenced …examiner's initial judgement".**
- **Extraordinary circumstances were required to expose the majority of errors (14) ranging from trial of co-conspirator, confession of true perpetrator, prosecution of police officer & intervention of American LPE, alibi, post-conviction DNA exoneration and an identified corpse turning up alive!**
    - **High degree of fortuity strengthens likelihood that known cases represent only small portion of actual cases of error.**
    - **LPE argue that 'system works' as errors came to light and in cases where LPE argued that error was made (6-8 cases) this is defendable but majority of cases (14-16) not exposed through routine reviews or checks.**
        - **If errors not exposed, LPE claim infallibility; if errors are exposed LPE claim detection mechanisms work.**
- **<u>Safeguards</u> against misattribution include verification, examiner competence, high point standard and use of defense experts.**
    - **12 to 17 errors occurred on verified impressions.**
    - **7 errors produced by IAI-certified LPE (considered most competent within US). Is it possible that CLPEs are overconfident in marginal attributions?**
    - **6 errors made under the 16 point standard (UK). 8 cases at least 14 points.**
    - **4 cases disputed identifications corroborated by independent defense experts.**
- **Only 1 of 155 cases of post-conviction DNA exonerations is result of fingerprint misattribution compared to hair comparison (21) and serological evidence (40). Most likely due to inability to extract DNA in hair and serology cases compared to 'touch' DNA from fingerprints.**

- **Fingerprint community has failed to conduct meaningful, well-designed simulations intended to capture potential error rate but they have conduced <u>poor simulations</u>.**
- **Proficiency tests (PT) measure competency of LPE, not an estimate of accuracy of LPE.**
- **External (independent institution):**
  - **Design flaws include; mail out tests unproctored, untimed, completed individually or 'by committee', no metric to assess difficulty of comparison, no data on experience/ qualifications of LPE completing tests, number of exclusions relatively small.**
  - **LPE suggest tests taken by foreign laboratories and novices can inflate false positive results.**
    - **False positive rate: # of participants who committed error / total # of participants (20% error rate, 1995 test).**
    - **Alternative: # false positives / total # comparisons (4.4%, 1995 test).**
    - **Overall false positive rate aggregated over entire testing period ~0.8%**
    - **Drs Haber and Haber believe many are 'by committee' so 'consensus error rate' = square root of 'comparison error rate' (0.9%).**
  - **Only report false positives could mean that LPE only report inconclusive in PT.**
- **Internal (designed & administered by organization being tested):**
  - **Discusses FBI results from CTS proficiency tests (1 FBI false positive in 1995 test) and internal FBI administered tests (0 false positives & 3 false negatives 1995-2001)**
    - **Retired Scotland Yard examiner states FBI tests were too easy**
    - **FBI examiner states "routinely cheat by discussing their answers"**
- **Given these exposed errors <u>how can the zero error rate be sustained</u>?**
  - **Typological parsing assigns errors to 2 distinct categories: methodological (scientific) and practitioner (human).**
    - **Claim that methodology has a zero error rate enshrined as dogma.**
  - **Temporal parsing assigns errors to a conceptually distant past no longer relevant to present.**
    - **Claim errors evoke change in procedure so mistakes no longer likely.**
- **Issues with 'methodological error rate' since practitioner is integral to the method.**
  - **The overall error rate (sum of method and practitioner) is only relevant piece of information to put before the court.**
  - **All known cases of error are automatically assigned to practitioner error.**
  - **Pat Wertheim "…the error rate is 'zero', what we mean is that no two people ever have had or ever will have the same fingerprint."**
    - **The issue in *Daubert* was never about errors caused by individuals possessing duplicate fingerprint patterns.**
- **<u>Courts view</u> error rate of fingerprints as essentially zero with small margin of error resulting from differences in individual examiners which is mitigated by peer review.**
- **Courts credited FBI examiners in that they were not themselves aware of having committed errors (until 2 years later Mayfield erupted).**

- **Mitchell (first challenge to fingerprints under Daubert) acknowledged that it is problematic to automatically assign all errors to practitioners.**
    - o **"the error rate has not been precisely quantified, but the various methods of estimating the error rate all suggest that it is very low"**
        - ▪ **Small #'s exposed errors**
        - ▪ **FBI Survey sent to 51 crime labs asking them to search Mitchell's print in their database and have court-qualified LPE manually compare latents to Mitchell's exemplar. Most identified Mitchell.**
        - ▪ **To agencies that did not report a "match" FBI sent second package containing enlargements enclosed in plastic sleeves with red dots marking the corresponding characteristics. All agencies now agreed.**
        - ▪ **Only using one exemplar cues participant to desired answer, red dots further leads the participant.**
        - ▪ **Assessment of error based on assumption that FBI's conclusion correct.**
    - o **50K x 50K Study consisted of computer searching database of 50,000 print images against itself and was immediately discredited by practitioners (Stoney), statisticians (Champod) and legal scholars (Kaye).**
- **Despite gullibly accepting unsupported assertions US court in 2004 instructed jurors "...there may be scientific basis to believe that fingerprints are unique, there is no similar basis to believe that examiners are infallible".**
- **Zero tolerance for errors has deterred inquiry into how errors occur and allows retrospective judgement that individuals who have their errors exposed are incompetent without providing proof e.g. failed PT's.**
    - o **Sociology of error invokes external causes to explain only false results i.e. bias, prosecutorial pressures, over-haste etc.**
    - o **Normal Accident Theory (NAT) suggests that fingerprint errors are simply consequences of normal activity**
- **Two possible causal mechanisms for fingerprint errors as likely as incompetence:**
    - o **Natural confounding – existence of areas of friction ridge skin on different persons' fingertips that while not identical are in fact quite similar.**
        - ▪ **Rejected due to 'law' that nature never repeats itself**
    - o **Bias – high proportion of practitioners are law enforcement officers**
        - ▪ **'Observer effects' during comparison going from unknown to known to see if ridge detail is in agreement may cause observers to expect to see similarities instead of differences.**
        - ▪ **Further exacerbated by verifiers not being blind to original conclusion.**
    - o **Defense examiners corroborated disputed identifications indicate that expectation bias is powerful.**
- **Mayfield Case report of International Review Committee's findings:**
    - o **"The error was a human error and not a methodology or technical failure."**
        - ▪ **Ignores impeccable credentials of laboratory, individual examiners and independent expert.**

- o **Issue of quality of latent print Spaniards originally took.**
  - ▪ **Spanish managed to attribute impression to Daoud.**
  - ▪ **Why didn't FBI examine original evidence when they were in Spain?**
- o **High profile case suggested as cause of error but no evidence to support that.**
  - ▪ **Just as likely that the high-profile nature caused the error to be exposed**
  - ▪ **Continues to dismiss all errors as exceptional rather than result of NAT**
- o **Unlikely to find persuasive explanation for the error because LPE do not keep bench notes.**
- o **Could Mayfield error be due to natural confounding resulting from searching global databases?**
- **Process of studying error requires law enforcement agencies and professional forensic science community to assemble a complete database of latent print errors.**
- **IAI should develop a mechanism for reviewing disputed identifications.**

Issues:

- **Shows data on the number of errors per year and interprets the data to indicate acceleration of errors in more recent times without adjusting for the total number of comparisons performed.**
- **Criticizes fingerprint profession for use of flawed data then promotes Drs Haber and Haber's "consensus error rate" which is based on guesswork & assumptions that are equally unreliable.**

Myths:

- **Some issues raised in this 2005 article have been addressed by the profession:**
  - o **"Exclusion of all others" wording removed from individualization definition by SWGFAST in 2009.**
  - o **Certification is required by Ontario and RCMP**
    - ▪ **RCMP PT's are self-administered.**
    - ▪ **CIS certification program has not been widely adopted.**
    - ▪ **Derived from casework where ground truth is unknown.**
  - o **RCMP record false positives identified through QC/QA process.**
    - ▪ **All errors have been attributed to human error but in most historical cases cause of error unknown.**
    - ▪ **Only one record of false negative.**
  - o **Student project to determine causes of RCMP errors**
    - ▪ **No observable trends due to small number of examples and inconsistent root cause analysis.**
  - o **Blind verification has been adopted by OPP and Calgary PS.**
  - o **Bias – CPC training to look for differences is more robust than training to look for similarities.**

- o **Canadian FI profession does record bench notes during analysis of the unknown prior to looking at the known which protects against expectation bias.**
- o **RCMP mechanism for reviewing disputed identifications is an Independent Evaluation Group (IEG).**
- o **RCMP Minutiae Assessment Tool Study will determine the error rate of RCMP examiners on 15 comparisons where the ground truth is known. The study is assessing tools that might improve the accuracy of examiners.**

Completed by: Dr. Della Wilkinson   Date   2016-02-26