

**FINGERPRINTS AND EXPERT IDENTIFICATION EVIDENCE:
MARKERS OF UNRELIABILITY**

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October 2014

... fingerprint evidence has been afforded a near magical quality in our culture. In essence, we have adopted a cultural assumption that a government representative's assertion that a defendant's fingerprint was found at a crime scene is an infallible fact, and not merely the examiner's opinion. As a consequence, fingerprint evidence is often all that is needed to convict a defendant, even in the absence of any other evidence of guilt. Unfortunately, our societal acceptance of the infallibility of examiners' opinions appears to be misplaced.¹

¹ *State v Quintana* (2004) UT App 103 P.3d 168, Thorne J., [13]-[14]. Without citations.

PROLOGUE

What do a police detective and a defence lawyer have in common?

They both have identifiable fingerprints.

Imagine this scenario.

A detective attends the scene of a murder in the town of Dubbo, in central western New South Wales as part of a team of investigators. The detective's task is to guard the crime scene from outside the house. Crime scene officers also attend and collect hundreds of fingerprint markings which are later examined by a number of fingerprint experts from the Forensic Services Group of the NSW Police Force. One of the fingerprints – on the doorframe of the bathroom where the deceased was found – is identified as having been made by the detective. Another of the fingerprints is identified as having been made by the man accused of the murder. The detective immediately disputes that the fingerprint inside the house is hers. She says that she did not go inside the house nor anywhere near the bathroom. Four fingerprint experts confirm the identification and two of the most senior fingerprint experts in the State independently verify it. The integrity of the fingerprint evidence is central to the prosecution of the murder. At the murder trial the detective is asked about the fingerprint attributed to her. She does not accept that it is hers and again denies having been inside the house at all. The man accused of murder is convicted. Following that trial, the detective is arrested and prosecuted for perjury on the basis that she had lied in her testimony regarding the fingerprint that had been attributed to her. At her trial for perjury, experts come from overseas and give evidence disputing the identification of the fingerprint inside the house. She is acquitted by the jury.

Then about five years later, a Melbourne defence lawyer, (who converted to the Muslim religion and was formerly in the defence force), is arrested by the Australian Federal Police in connection with a terrorist bombing of commuter trains in a foreign country. In the immediate aftermath of the attack, fingerprints found on a bag of detonators connected to the attacks are sent to INTERPOL and Australian intelligence authorities and the Australian Federal Police identify the Australian national as the source of one of the prints and the match is verified by a number of examiners. The lawyer is detained for two weeks before the foreign police force inform the Australian authorities that they had identified an Algerian national as the source of the fingerprints on the bag. The Australian authorities withdraw their fingerprint identification of the lawyer and release him from custody.

So what do a police detective and a defence lawyer really have in common? They both have identifiable fingerprints, which may be misidentified.

These tales are compelling in more ways than one. They speak to the 'near magical quality' of fingerprint evidence that pervades our culture. At the same time, they speak to the fallibility of expert opinion based on fingerprint comparisons. And they are compelling, because if Dubbo is Kilmarnock, Scotland in the United Kingdom and Melbourne is Portland, Oregon in the

United States of America, then these tales and the mistaken identifications by the respective authorities are real.

The detective is Shirley McKie. She attended a murder scene in Kilmarnock in 1997 but she did not leave her fingerprints in the house. Following her arrest and prosecution for perjury, the jury acquitted her in 1999. A number of inquiries were then held. Further experts from overseas were engaged and further doubts were raised about other fingerprint marks at the scene of the murder. The man accused of the murder, David Asbury, was granted bail pending an appeal against his conviction. The decision to grant bail was not opposed by the Crown; nor did the Crown oppose his appeal when it came to be heard. Mr Asbury's conviction for murder was quashed in 2000.

Following one of the inquiries into the McKie case, the Minister for Justice informed Parliament that the detective's fingerprint had been misidentified and that the Scottish fingerprint bureau was not fully effective and efficient. A Parliamentary Justice Committee Report highlighted the widely divergent professional opinions in relation to the identification of the detective's fingerprint. The Scottish Government settled a civil claim with Ms McKie. The several inquiries into the ordeal culminated in *The Fingerprint Inquiry* by Sir Anthony Campbell, who published his final report in 2011, confirming the misidentification of Ms McKie's fingerprint. Despite all this, the Scottish fingerprint examiners continue to maintain that their identifications are correct.²

The defence lawyer is Brandon Mayfield from Portland. The terrorist attack in which he was wrongly implicated was the 2004 bombing of commuter trains in Madrid, Spain. The United States Department of Justice, Office of the Inspector General ("the OIG") investigated the misidentification, investigation and detention of Mr Mayfield, including whether Mr Mayfield was targeted because of his Muslim religion. The OIG report, *A Review of the FBI's Handling of the Brandon Mayfield Case* was released in 2006.³

INTRODUCTION

These cases call for close scrutiny of the contemporary practices of fingerprint examiners and the continued reliance on their expert identification evidence in our criminal justice system. In Australia, we do not know what injustices may have occurred by virtue of over a century of reliance on fingerprint identification evidence by the police and in our courts. Australia has not been home to any public fingerprint scandal and consequential inquiry, but the

² A. Campbell, *The Fingerprint Inquiry Report* (Edinburgh, Scotland: APS Group Scotland, 2011). The story above and further details about the Shirley McKie case are from the contents of the report, predominantly from the historical background, 31-41.

³ Office of the Inspector General, US Department of Justice, *A Review of the FBI's Handling of the Brandon Mayfield Case* (2006). The story above and further details about the Brandon Mayfield case are from the contents of the report, predominantly from the background to the Executive Summary, 1-4.

issues, concerns and recommendations raised by the international reports equally apply here.

The door to challenges to this type of evidence has remained tightly shut since the High Court refused special leave to Edward Parker in 1912.⁴ Mr Parker had been convicted of breaking into a warehouse and stealing from a safe inside the building. His fingerprint had been identified on a ginger-beer bottle in the warehouse. Griffith CJ declared a fingerprint to be 'in reality an unforgeable signature.'⁵ Since then, fingerprint identification evidence matching a crime scene print to a known individual has escaped any concerted examination in our courts.

The actors in the legal system – prosecutors, defence lawyers, and the judiciary – have permitted an 'aura of "infallibility"'⁶ and the 'near magical quality'⁷ of fingerprint identification evidence to persist. They have allowed uncritical deference to expertise and to the *ipse dixit* of fingerprint examiners. The criminal law has attributed 'cogency' to fingerprint evidence.⁸ It has done so in a consistently complacent way.⁹ Scrutiny and examination of fingerprint identification evidence in the courtroom is well overdue.

The purpose of this paper is to assist defence lawyers in meeting fingerprint identification evidence in criminal trials, so as to reduce the chance of wrongful convictions. The paper should be of interest to prosecutors too. The duties of a prosecutor to disclose weaknesses in their case to the defence and to present reliable evidence to the court – consistent with the onus and burden of proof and the presumption of innocence – are fundamental to our adversarial system. The current approach to presenting fingerprint identification evidence reflects the reality, however, that the burden of exposing weaknesses and challenging the reliability of evidence in the prosecution case often falls on the accused.

The focus of this paper is on challenging the link between a latent fingerprint impression and the accused thereby weakening the link between the accused and the crime. It is assumed that an accused may not be able to provide positive evidence of an alternative explanation for the presence of the fingerprint on an object or surface linked to a crime. This is often the case where a prosecution comes some time after the event following a 'cold-hit' fingerprint match. Whilst there may be weaknesses in the prosecution case by virtue of a tenuous link between the crime and the existence of the identified fingerprint on an object or surface, they will not be explored here.

⁴ *Parker v The King* (1912) 14 CLR 682.

⁵ *Parker v The King*, above n 4, 683.

⁶ Campbell, *The Fingerprint Inquiry Report*, above n 2, 564.

⁷ *State v Quintana*, above n 1.

⁸ Referring to *Parker v The King* (1912) 14 CLR 681 and *Moreshead v Police* [1999] SASC 162, Carruthers AJ (with whom Mason P and Hidden J agreed) stated in *Regina v SMR* [2002] NSWCCA 258 at [96]: 'The above cases emphasise the cogency which the criminal law attributes to fingerprint evidence.'

⁹ Campbell, *The Fingerprint Inquiry Report*, above n 2, 689.

The aims of this paper are (1) to demonstrate the importance of the tribunal of fact being made aware of the dangers of relying on fingerprint identification evidence in a criminal trial, particularly in cases where that evidence represents the high-water mark for proof of the identity of the offender; and (2) to provide a practical model to achieve that awareness through cross-examination, and judicial warnings and directions.

There are four main ways a defence lawyer might combat expert evidence of this kind in a criminal trial:

- (1) objecting to the admissibility of the expert evidence lead by the prosecution pursuant to sections 79, 135 or 137 *Evidence Act 1995*;
- (2) cross-examining the prosecution expert;
- (3) calling expert evidence in the defence case (to give opinion evidence disputing a 'match' and/or to give evidence about the fallibilities of fingerprint expertise and that field of forensic science); and
- (4) seeking directions and warnings from the judge (or the magistrate in summary trials) at the close of the case.

The overwhelming tide of authority and practice is to admit opinions of expert fingerprint examiners called by the prosecution into evidence. This is the case even in jurisdictions in which a reliability standard is set for admissibility.¹⁰ It is also usually unrealistic for an accused to engage an expert to give evidence for the defence, particularly in summary trials. Given that state of affairs, and without ruling out the other avenues, this paper is concerned with the tasks of a defence lawyer in challenging the prosecution expert through cross-examination and in persuading the trial judge to give directions and warnings to the tribunal of fact in relation to expert evidence and evidence of a kind that may be unreliable.

You might expect some opposition to any attempt to challenge what is considered infallible and incontrovertible. To such opposition, a useful riposte is contained in the judgment of Hunt CJ at CL in *R v Mr C CCA 67 A Crim R* at 562:

*The crown's opposition to the relief sought is based solely upon the fact that this has never been done before. Lord Denning provided the best answer to that argument, in Packer v Packer [1954] P 15 at 22: "What is the argument on the other side? Only this, that no case has been found in which it has been done before. That argument does not appeal to me in the least. **If we never do anything which has not been done before, we shall never get anywhere. The law will stand still whilst the rest of the world goes on; and that will be bad for both.**"*

¹⁰ Gary Edmond, Simon Cole, Emma Cunliff and Andrew Roberts, *Admissibility Compared: The Reception of Incriminating Evidence (i.e., Forensic Science) in Four Adversarial Jurisdictions* University of Denver Criminal Law Review 31(3) 31-109 (2013).

The first part of the paper will highlight the aspects of fingerprint expert practice and evidence that point to its unreliability. In the second part, a suggested approach to the practical task of cross-examining a fingerprint examiner will be put forward. Building on the evidence adduced in cross-examination, the third part will deal with the issue of judicial warnings and directions. In addition to a direction concerned with expert witnesses, it will be argued that fingerprint identification evidence is a type of evidence that may be unreliable and accordingly it warrants a warning under section 165 of the *Uniform Evidence Act*.

1. MARKERS OF UNRELIABILITY

Fingerprint identification evidence has been criticised for a number of failings and factors pointing to its unreliability. Here, attention will be drawn to five key issues:

- (1) Key assumptions and methods lack scientific foundation.
- (2) The method and ultimate decision-making are highly subjective in nature.
- (3) There are inherent limitations to the comparison and matching of fingerprints.
- (4) Mistakes are made but the rate of error is essentially unknown.
- (5) Human judgment is affected by bias in various forms.

1.1 Key assumptions and methods lack scientific foundation

The words of Justice Hodges of the Victorian Supreme Court in *R v Parker* aptly describe the underlying assumptions of fingerprint identification evidence:

It is said that the markings on the fingers of any individual retain their special characteristics from the cradle to the grave, and also that the markings on the fingers of no two individuals are the same, so that absolute correspondence between a finger-print and the markings on a man's hand is unmistakable evidence that he is the person who made such print.¹¹

The first two assumptions are commonly referred to as the persistence and uniqueness of the friction ridge features on the skin of human fingertips (or fingerprints). They are key to the further assumption that experts in this field may then give the ultimate opinion that a fingerprint impression left at a crime scene comes from 'a single unambiguous source'¹² and that the match of the

¹¹ *R v Parker* [1912] VLR 152 at 154.

¹² National Research Council, Committee on Identifying the Needs of the Forensic Science Community, *Strengthening Forensic Science in the United States: A Path Forward* The National Academies Press, Washington DC (2009), 136.

crime scene print may be made to a particular individual 'to the exclusion of all other persons' (called individualisation or source attribution).¹³ His Honour, Justice Hodges, continued (in his dissenting judgment):

My difficulty arises from the fact that the subject of fingerprints has not been sufficiently studied to enable these propositions to be laid down as scientific facts.¹⁴

In refusing special leave only weeks later, the High Court stated that '[t]he fact of the individuality of the corrugations of the skin on the fingers of the human hand is now so generally recognized as to require very little, if any evidence of it'. That was over a hundred years ago. Yet, the words of Justice Hodges in dissent still resound today in the scientific world. A number of reports have criticised the assumptions of uniqueness and individualisation and demonstrated that they are 'neither empirically based nor plausible.'¹⁵ It is said that forensic identification 'rests upon indefensible conceptual foundations.'¹⁶ And it is commonly noted that forensic science techniques such as fingerprint identification evidence have received their 'judicial imprimatur without a critical evaluation of the supporting scientific research.'¹⁷ Our precedent-based system favours continued reliance on the evidence of fingerprint experts by actors in the world of the courtroom despite the concerns of scientists in the real world outside it.

The fingerprint expert community appears to have reluctantly acknowledged the fallacy of uniqueness: 'it is impossible to prove that no two individuals possess the same friction ridge arrangement in sequence.'¹⁸ However, experts continue to testify as to individualisation and give evidence that they attribute a particular latent fingerprint to a particular individual to the exclusion of all others.

Even if the assumptions of persistence and uniqueness are accepted as a legitimate starting point for undertaking the task of fingerprint examination and comparison in the criminal justice system, these assumptions appear to have been dangerously elided with the further proposition that a fingerprint expert 'has been able reliably to observe and interpret a sufficient number of matching characteristics in mark and print to prove that a particular individual

¹³ Gary Edmond, Matthew B. Thompson and Jason M. Tangen, *A guide to interpreting forensic testimony: scientific approaches to fingerprint evidence* (2013) 13 Law, Probability and Risk 1-25, 15.

¹⁴ *R v Parker*, above n 4, 154.

¹⁵ Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13, 15.

¹⁶ Simon A. Cole, *Forensics without uniqueness, conclusions without individualization: the new epistemology of forensic identification* (2009) 8(3) Law, Probability & Risk 233-255, 234.

¹⁷ Paul C. Giannelli, Edward J. Imwinkelried and Joseph L. Peterson, *Reference Guide on Forensic Identification Expertise in the Reference Manual on Scientific Evidence: Third Edition*. Washington, DC: The National Academies Press (2011), 59.

¹⁸ Joseph Polski, Ron Smith, Robert Garrett, et al, *The Report of the International Association for Identification, Standardization II Committee* (2011); available at: <https://www.ncjrs.gov/pdffiles1/nij/grants/233980.pdf>, 19.

is the donor of the particular crime scene mark.¹⁹ As Simon Cole argues, the latter does not necessarily follow.

In its scathing 2009 report, the National Academy of Sciences ('NAS') in the United States of America similarly pointed out that:

Uniqueness and persistence are necessary conditions for friction ridge identification to be feasible, but those conditions do not imply that anyone can reliably discern whether or not two friction ridge impressions were made by the same person. Uniqueness does not guarantee that prints from two different people are always sufficiently different that they cannot be confused, or that two impressions made by the same finger will also be sufficiently similar to be discerned as coming from the same source.²⁰

1.2 The method and ultimate decision-making are highly subjective in nature

Fingerprint comparison expertise is a forensic discipline that relies on subjective assessments and interpretation by an examiner comparing observed characteristics or patterns in the latent fingerprint impression and the fingerprint impression of a known person. The standard approach of fingerprint examiners is the ACE-V method: analysis, comparison, evaluation and verification. Analysis involves a judgment about whether the latent print is of a sufficient size and level of detail to warrant comparison with a known print. The comparison stage involves 'visually "measuring," and comparing ... the details that correspond' between the crime scene print and the known print. Then the evaluation stage involves the ultimate determination of whether a crime scene print can be attributed to a known person, whether that person can be excluded as the source of the crime scene print, or whether the material is insufficient meaning an inconclusive result. This stage involves the subjective interpretation of the observed characteristics. If the first examiner declares a match, then a second examiner carries out the verification stage by performing the ACE process again. The verification process may be 'blind' but commonly the second examiner is aware that the first declared a match.²¹

Each stage is characterised by an element of subjectivity and each stage depends on human performance and the individual examiner's powers of observation. The ACE-V method 'does not specify particular measurements or a standard test protocol'.²² As a result, there is 'room for human error' at each

¹⁹ Simon A. Cole, *Is Fingerprint Identification Valid? Rhetorics of Reliability in Fingerprint Proponents' Discourse* (2006) 28 Law & Policy 109-135, 116-117.

²⁰ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 144.

²¹ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 137-138.

²² National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 139.

stage.²³ In particular, the final evaluation and determination of individualisation is critically subjective. There are no figures or statistics about the frequency of particular fingerprint characteristics in the general community. Instead, examiners rely on experience and an entirely subjective view of whether there are sufficient similarities in a pair to declare a match. Examiners are often no longer required to find a certain minimum number of points of similarities in a pair of prints.²⁴ According to the community of fingerprint experts, it is 'repeated exposure' to friction ridge impressions which allows an examiner to:

... develop a *sense* of the rarity of features and groups of features; the rarity of particular kinds of ridge flows; the frequency of features in different areas of the hands... the degree to which differences can be accounted for by mechanical distortion of the skin; a *sense* of how to extract detail from background noise; and a *sense* of how much friction ridge detail could be common to two prints from different sources.²⁵

Thus relying on what could be called their 'fingerprint *sense*', the examiner will decide whether there is sufficient commonality between a pair of prints to declare them to come from the same source.

The NAS concluded that the ACE-V method provides a 'broadly stated framework' for fingerprint identification evidence but it does not 'qualify as a validated method'. It is 'too broad to ensure repeatability and transparency' and even if two analysts follow the method, there is no guarantee they will reach the same conclusion.²⁶ In short, to follow the ACE-V method 'does not imply that one is proceeding in a scientific manner or producing reliable results.'

1.3 There are inherent limitations to the comparison and matching of fingerprints

Crime scene prints are usually only a fragment or partial impression of the total possible impression from a fingertip. They may be smudged or imperfect in other ways. A crime scene (latent) impression is often only a fifth of the size of the record print.²⁷ The level of detail depicted in a crime scene print may be adversely affected the condition of the person's skin, the type of residue from

²³ Giannelli, Imwinkelried and Peterson, *Reference Guide on Forensic Identification Expertise*, above n 17, 76.

²⁴ Giannelli, Imwinkelried and Peterson, *Reference Guide on Forensic Identification Expertise*, above n 17, 74-75.

²⁵ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 140-141. Emphasis added.

²⁶ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 142.

²⁷ Giannelli, Imwinkelried and Peterson, *Reference Guide on Forensic Identification Expertise*, above n 17, 74.

the fingertip which leaves the impression, the mechanics of the contact between the fingertip and the surface, the nature of the surface touched, the technique used to develop a print and capture it for analysis and the proportion of the fingertip surface that is available for analysis.²⁸ Thus, 'not all fingerprint evidence is equally good, because the true value of the evidence is determined by the quality of the latent fingerprint image.'²⁹

In addition to these factors, variations in pressure and skin elasticity almost inevitably distort each impression of a fingertip.³⁰ This means that even fingerprints made by the same finger will typically exhibit some differences each time the impression is left on a surface. Given the assumption of uniqueness, a single inexplicable difference between two impressions will result in a conclusion that they are not from the same source. However, the frequent inevitable differences between impressions mean that an examiner must decide and justify whether any given difference is 'a *true* dissimilarity, or whether the apparent dissimilarity can be discounted as an artefact or resulting from distortion.'³¹ This part of the process highlights the subjective nature of fingerprint identification evidence. The process lacks credibility when 'examiners can too easily explain a "difference" as an "acceptable distortion" in order to make an identification.'³² Examiners should be required to give cogent explanations for any differences they observed, yet often examiners do not report any differences observed or their explanations for them.

1.4 Mistakes are made but the rate of error is essentially unknown

The inquiry into the McKie case confirmed that the fingerprint identification linking Ms McKie to the inside of the house was a mis-identification. Examiners followed the ACE-V method, including confirmation of the match by four experts in addition to independent verification by two senior examiners. The process did not protect Ms McKie from false positive identification.

In the Mayfield case, features that were observed to correspond between Mr Mayfield's print and the crime scene print were later exposed to be open to an alternative interpretation leading to the identification of Mr Daoud as the source of the crime scene print. The FBI examiners failed to give adequate consideration to the incomplete nature of the agreement between the ridge details in the crime scene print and Mr Mayfield's. The OIG report concluded

²⁸ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 137-138.

²⁹ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 87.

³⁰ Giannelli, Imwinkelried and Peterson, *Reference Guide on Forensic Identification Expertise*, above n 17, 74.

³¹ Giannelli, Imwinkelried and Peterson, *Reference Guide on Forensic Identification Expertise*, above n 17, 74-75.

³² National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 145.

that ‘the “quality” of the agreement was inadequate to support the conclusion of identification.’³³

In addition to these notorious mistakes, there are a number of known cases in which fingerprint examiners have subsequently been found to have erroneously reached the conclusion of a match.³⁴ These known cases of error are ‘most likely only the tip of the proverbial iceberg of actual cases of fingerprint misattribution.’³⁵ Despite this, claims persist that fingerprint identification has a zero error rate. There have been attempts to delineate between the so-called infallibility of the methodology and the human error of the examiner. Simon Cole easily debunks this approach:

“There is no methodology without a practitioner, any more than there is automobile without a driver, and claiming to have an error rate without the practitioner is akin to calculating the crash rate of an automobile, provided it is not driven.”³⁶

There is a lack of research about the rate of error in practice.³⁷ The fact that errors do occur yet the rate of error is unknown should favour the accused in terms of there being an available doubt about the evidence.

1.5 Human judgment is affected by bias in various forms

The sources of bias which operate on human judgment are many and varied: ‘we unconsciously pick up cues from our environment and factor them in an unstated way into our mental analyses’.³⁸ Without proper safeguards in place, the danger that a form of bias will influence a result is unacceptable, particularly given that human judgment and decision-making is commonly affected in subtle ways of which we are not consciously aware and in ways that ‘cannot be willed away’.³⁹

Institutional bias

In NSW, the Identification Services Branch within the Forensic Services Group of the Police Force provides the fingerprint examination, comparison and identification service to the NSW Police Force, by using manual and

³³ Office of the Inspector General, *A Review of the FBI’s Handling of the Brandon Mayfield Case*, above n 3.

³⁴ Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification* (2005) 95(3) *J. Crim. L. & Criminology* 985-1078.

³⁵ Cole, *More Than Zero*, above n 34, 991.

³⁶ Cole, *More Than Zero*, above n 34, 1039.

³⁷ Cole, *More Than Zero*, above n 34.

³⁸ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 122-124. The list below has been generated from the sources of bias identified here.

³⁹ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 122 and 185.

computerised fingerprint systems.⁴⁰ ‘The work of the ISB is entirely reactive.’⁴¹ Fingerprint experts in the NSW Police Force, being part of the law enforcement agency and reacting exclusively to its demands, are thereby ‘subject to a general risk of bias’ which favours pro-police outcomes.⁴² This is perhaps the most self-evident form of bias which may operate.

A fingerprint decision may be tainted by bias as a result of:

- (1) A desire to please co-workers or supervisors or avoid conflict in the workplace, leading to erroneous identification of a suspect’s fingerprint, or a sidelining of rigorous scientific procedures.
- (2) A desire to reach closure and solve the case, favouring identification of the suspect’s fingerprint.
- (3) An environment of urgency in a criminal investigation, in which an examiner is influenced to identify quickly a matching fingerprint and in which other examiners are influenced to quickly and repeatedly verify an initial erroneous identification.

Contextual bias

The surrounding context and information available to an examiner when they undertake their task may influence their ultimate decision. This may arise because of:

- (4) A tendency to be influenced by how a question is framed or how data is presented to them, for example, when an examiner is asked to compare a pair of fingerprints – one from the crime scene and one from the only suspect in the case – rather than comparing the crime scene print to a pool of possible candidates. To draw an analogy from another identification procedure in the criminal justice context, it would be like asking an eyewitness to conduct an identification parade to indicate whether they can pick the perpetrator of a crime from a line-up in which only one candidate is presented.
- (5) A tendency to be influenced by extraneous information (‘domain irrelevant information’) in relation to the suspect, favouring identification of the suspect’s fingerprint, for example, where the examiner is told that the suspect has confessed to the crime or that they were in police custody at the time of the examination, or that the investigating police believe the person to be the perpetrator, or where the examiner has access to the suspect’s criminal record.

Contextual forms of bias are perhaps the easiest to safeguard against, yet fingerprint examiners are often not insulated from case information when carrying out their evaluation, nor are they insulated from the information when

⁴⁰ *Crown Employees (Police Officers - 2009) Award* [2009] NSWIRComm 190, [674]-[683].

⁴¹ *Crown Employees (Police Officers - 2009) Award*, above n 40, [684].

⁴² National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 185.

selecting prints for comparison from computerised fingerprint databases.⁴³ Australian examiners are not shielded from domain irrelevant information throughout their task.

Some research has considered the issue of bias as a result of extraneous information being supplied to the examiner. One study revealed that in six out of 24 examinations involving contextual manipulation, the examiners reached a conclusion that was consistent with the biasing information and yet different from the conclusion that they had reached when examining the same prints on an earlier occasion in their daily work.⁴⁴ Another study involved the covert evaluation of five examiners, tested by consent but at an unknown time over a period of 12 months. The experts had an average of 17 years of experience. The prints they were asked to examine (unbeknownst to them) were taken from their previous cases in which they had examined them and declared a match. When asked by a colleague to examine the prints on the subsequent occasion, they were told that the fingerprints were from the famous Mayfield case of misidentification by the FBI. Four of the five examiners changed from their original position that the fingerprints matched: only one reported that the prints matched on the subsequent examination; three reported that they did not match and one reported an inconclusive result.⁴⁵ This research demonstrates not only is there 'enough ambiguity in fingerprint patterns to reverse a decision from "match" to "non-match"' but 'top-down, contextual influences' can affect examiner's conclusions. The ultimate conclusion is: 'examiners are indeed susceptible to bias.'⁴⁶

Other cognitive biases related to fingerprint methodology

A fingerprint examiner may labour under a number of cognitive biases related to the observation and analysis of fingerprint patterns. These may include:

- (6) A tendency to see what the examiner *expects* to see (expectation bias), for example, where an examiner analyses a pair of prints following a suggested match of the pair by a computerised system, the examiner is more likely to themselves see a 'match'.
- (7) A willingness to ignore or a lack of knowledge about base rate information such as how common particular features are in fingerprints throughout the human population, leading to a premature determination of sufficiency in the suspect's fingerprint.
- (8) A tendency to see patterns that do not actually exist (related to a tendency to underestimate the amount of complexity that can really exist in nature).

⁴³ Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13, 20.

⁴⁴ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 123, citing I.E. Dror and D. Charlton. 2006. Why experts make errors. *Journal of Forensic Identification* 56 (4):600-616.

⁴⁵ Matthew B. Thompson, Jason M. Tangen and Duncan J. McCarthy, *Expertise in Fingerprint Identification* (2013) *Journal of Forensic Sciences*, 3.

⁴⁶ Thompson, Tangen and McCarthy, *Expertise in Fingerprint Identification*, above n 46.

- (9) A tendency to become wedded to a preliminary conclusion upon observing a small number of similarities, such that a suspicion or belief that the fingerprint belongs to the suspect becomes an entrenched view.

Fingerprint bureaus should have in place risk management systems to reduce the impact of bias on an examiner's results.

2. CROSS-EXAMINATION

The proposed cross-examination flows from the issues raised above and draws from a number of the reports and articles dealing with fingerprint identification referred to in this paper.⁴⁷ It is based on the author's experience of the standard approach of NSW Police Force fingerprint examiners and their reports in criminal cases.

In suggesting avenues for questioning prosecution experts, it is important to be mindful of two of the golden rules of cross-examination: only ask leading questions and know the answer to every question you ask. Where possible, adherence to those rules is maintained.

In any given case, however, in order to know the exact likely answer to many of the questions below, it will be necessary to make a request for disclosure for further material from the police (such as standard operating procedures or protocols used by fingerprint examiners; training manuals and certification documents; the examiner's case file and notes made); and to subpoena further material from other sources (for example, external proficiency and exam test results for the examiner).

For example, it would be worth issuing a subpoena for the following types of records:

1. All documents relating to the relevant forensic case number including:
 - a. Images and examination graphs;
 - b. Documents referred to by the expert when carrying out his fingerprint expert duties;
 - c. Correspondence to or from the expert;
 - d. Instructions provided to the expert;
 - e. Documents created by the expert during the course of their duties;
 - f. COPS entries;
2. Any standard operating procedures fingerprint experts;
3. Any document or documents setting out the method to be applied by NSW Police Force fingerprint experts;

⁴⁷ Particularly, National Research Council, *Strengthening Forensic Science in the United States*, above n 12; Campbell, *The Fingerprint Inquiry Report*, above n 2; and Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13.

4. Documents relating to the training, assessment, and accreditation of the expert, such as certificates from the Australian Board of Fingerprint Examiners; examination papers and results; documents relating to in-house training or workshops in which the expert participated.
5. Documents relating to the taking of the fingerprint impressions from the accused (often using a Live Scan machine) and including documents relating to their custody at the time of the taking of those fingerprint impressions.
6. Documents relating to the matching or linking of fingerprint impression(s) belonging to the accused to the crime scene including by a computer database and before the formal expert comparison took place.

By way of example, in NSW in 2014, the following Police documents existed:

- Identification Services Branch, Forensic Services Group "Fingerprint Induction Course Learning Guide: Fingerprint Training and Research Unit".
- Digital Job Card - Summarises the process of analysis by the crime scene officer, the National Database candidate check, the examination by a number of fingerprint technicians and examiners.

Introduction and confirming the expert's opinion

You prepared a report in this matter which details your involvement as the fingerprint examiner, is that right?

Is your report an accurate account of the entire fingerprint identification process that took place in relation to the accused?

In your opinion, 'Graph W1 is identified to the right middle finger of the accused', is that right?

You go on to say in your report, 'That is to say the impression appearing in the photographs bearing forensic case number 29384 and labelled W1 are made by one and the same [name and date of birth of the accused]', is that right?

Is that the standard way you are trained to report your conclusion of a fingerprint examination?

Do I understand correctly that in your opinion, the crime scene fingerprint matches the accused's fingerprint to the exclusion of all other people?

So it is your opinion that the accused is the only possible source for the fingerprint impression recovered from the crime scene, is that right?

Are you confident in that conclusion?

Are you 100% certain about that conclusion?

It is anticipated that the fingerprint examiner will answer all of these questions affirmatively. These initial questions will be an important foundation for later questions which seek concessions from the witness.

Assumptions

What assumptions of fact is your opinion based on?

Is your opinion based on an assumption that no human being throughout history has identical fingerprints?

That is commonly referred to as the uniqueness of human fingerprints, is that right?

The assumption that all human beings have unique fingerprints is a premise relating to friction ridge skin, is that right?

As a fingerprint examiner, you examine and compare impressions of the skin.

You do not examine and compare the skin itself, do you agree?

There is an important distinction between ridge detail in the skin and the detail reproduced in impressions, do you agree?

Your assumption of the uniqueness of fingerprints is not referred to in your report, is that right?

You acknowledge in your report that you have read the Expert Witness Code of Conduct in Schedule 7 of the NSW *Uniform Civil Procedure Rules 2005*, is that right?

You also acknowledge in your report that you agree to be bound by the Code, is that right?

What does the Code of Conduct require in relation to assumptions of fact on which opinions in your report are based?

The Code of Conduct requires you to include any assumptions of fact on which your opinions are based in your report, do you agree?

It states that "An expert's report must (in the body of the report or in an annexure to it) include the following... (b) the facts, and assumptions of fact, on which the opinions in the report are based".

Do you accept that you haven't complied with the requirements of the Code in that respect?

Do you agree that your opinion that the crime scene impression was made by the accused to the exclusion of all others is untenable?

You certainly have not examined the fingerprints of all human beings throughout history?

That would be impossible for anyone to do, do you agree?

There is no database containing the fingerprints of all human beings since the beginning of time?

There is not even a database containing the fingerprints of all human beings currently living in the world or of all Australians?

So do you accept that it is impossible to say that every human being has a unique set of fingerprints?

Do you agree with this statement: it is impossible to prove that no two individuals possess the same friction ridge arrangement in sequence?

Are you aware that that statement forms part of an adopted resolution by the International Association of Identification in 2009?⁴⁸

Do you accept that your opinion is based on an assumption that has not and cannot be proven?

Do you agree that in those circumstances, the conclusions drawn from your fingerprint examination should not be expressed in absolute terms?

If the witness accepts that their opinion is based on the assumption of uniqueness and then ultimately (as they surely must) concedes that the assumption is not a legitimate one, the value of the witness' ultimate opinion will be diminished.

Reasons

In your report you detail your process of comparing the accused's fingerprint impressions with the crime scene impression. You set out in your report that you placed the accused's fingerprint impressions one by one, side by side with the crime scene impressions and you referred backwards and forwards between them. You compared the pattern type and ridge flow, friction ridge characteristics, their relative positions to each other and the number of intervening ridges between those characteristics. You compared the impressions until all available friction ridge detail had been compared. You then indicate your opinion.

Can you point the Court to where the reasons for your opinion are set out in your report?

⁴⁸ Polski, Smith, Garrett, et al, *The Report of the International Association for Identification, Standardization II Committee*, above n 18, 19.

Do you agree that you have not included your reasons for your opinion in your report?

What does the Expert Witness Code of Conduct require in relation to providing your reasons for your opinion?

Do you agree that it states “An expert’s report must ... include ... the expert’s reasons for each opinion expressed.”

Do you accept that you have not complied with the Code in that regard?

Do you agree that you have not referred to any similarities that you detected between the pair of impressions in your report?

In your report, you are essentially telling the Court that you looked at the fingerprint impressions from the crime scene and belonging to the accused, you compared them and in your opinion they are a match, is that right?

You are asking the Court to accept your say-so that the fingerprints match without giving any reasons for that opinion, do you agree with that?

It is the experience of the author that fingerprint examiners in NSW commonly report their findings in an *ipse dixit* fashion, without any reasons to support their conclusions nor any visual demonstration of any similarities observed. In addition to the failure to comply with the Expert Witness Code, the absence of reasons for an opinion significantly reduces the weight to which a Court would attribute the fingerprint evidence.

Following the decision of *JP v Director of Public Prosecutions (NSW)* [2015] NSWSC 1669 referred to in the post-script, it will be necessary to make a tactical decision in relation to whether to cross-examine at all on this topic, lest the cross-examination adduces evidence to support the admissibility of the opinion.

ACE-V method

I’m going to ask you some questions about the ACE-V method for fingerprint examination and identification. Is that the method that you use?

The analysis of a crime scene print involves an assessment of whether there is sufficient ridge detail to warrant comparison with another impression, is that right?

That process represents the A in the ACE-V method, is that right?

The comparison, the C in the ACE-V method, is the next step?

The comparison step involves looking from the crime scene impression to the impressions from a known person, back and forth and comparing them, is that right?

Then the evaluation, the E in the ACE-V method, is the stage where a fingerprint examiner comes to a conclusion about the pair of impressions?

That conclusion is usually either that the pair of impressions come from the same source, or that they do not come from the same source, or alternatively an inconclusive result is reported, is that right?

Fingerprint impressions

The level of detail in a fingerprint impression is classified as Level 1 detail, Level 2 detail and Level 3 detail, is that right?

Level 1 detail is the overall ridge flow, loops, whorls, arches and so on.

Level 2 detail is the individual friction ridge paths, friction ridge events, such as bifurcations, ridge endings and dots, and their relative arrangements.

Level 3 detail, the highest level of detail is the ridge structures such as edge shapes and pores and their relative arrangements.

Not all fingerprint impressions depict all three levels of detail with clarity, is that right?

Many of the minute details that make small areas of friction skin different to other fingertips do not survive the transition from finger to impression, is that right?

I'm going to ask you some questions about fingerprint impressions recovered from crime scenes. Do you agree that the crime scene fingerprint marks are usually only a fragment or partial impression of the total possible impression from a fingertip?

So the size of a fingerprint impression that is developed from a crime scene is often not as big as the fingerprint impression developed when reference fingerprints are taken from a person at the police station?

I'm going to ask you some questions about factors that affect the level of detail in a crime scene fingerprint impression. Do you agree that the level of detail may be affected by the condition of the person's skin, such as scars or warts?

Do you agree that it may be affected by the type of residue from the fingertip which leaves the impression, such as sweat, and any other substances that might be on the fingertip or the surface such as blood, paint, dirt, oil or grease?

Do you agree that the level of detail may be affected by the mechanics of the contact between the fingertip and the surface, for example the amount of pressure applied, any twisting or movement of the finger on the surface?

The pressure applied when an impression is made generally changes the shape of the friction ridge by flattening or broadening each ridge, is that right?

Do you agree that the level of detail in an impression may also be affected by the nature of the surface touched, whether it is smooth or rough, textured, porous or not and so on?

The surface can cause distortion or interfere with the way the impression is made, affecting its appearance and clarity, do you agree?

The level of detail in an impression may also be affected by whether the surface is protected or not, wet, dry, cold or hot, is that right?

Do you agree that it may also be affected by the technique used to develop a print and capture it for analysis?

For example, different development techniques target different fingerprint constituents (amino acids, lipids/skin cells, salts, blood/proteins). And these constituents are not necessarily evenly distributed across a finger, is that right?

On top of all of those factors, are there any other factors that you say might affect the level of detail in a crime scene print?

Do you agree that an examiner's conclusion about a match depends upon the quality and size of the crime scene print?

I'm going to ask you some questions about fingerprint impressions made by a single finger.

Do you agree that when a single finger touches a surface on multiple occasions using varying degrees of pressure, there will be corresponding variations in the impression left by that fingertip?

Do you agree that the skin on human fingertips is to some degree elastic?

The elasticity of the skin of the fingertip will also mean that the impression left by that fingertip will vary to some degree each time it touches a surface?

The amount of fingertip applied to the surface will also affect the proportion of the total possible impression that is made on the surface, is that right?

The angle on which the fingertip touches the surface will also affect how the impression looks when it is recovered from the surface, is that right?

If the same finger makes two impressions, it is possible for example for a ridge characteristic in the skin to be reproduced inconsistently as a ridge ending or bifurcation in the separate impressions, do you agree?

As a fingerprint examiner you expect to see some differences in fingerprint impressions even when they are made by the same finger, is that right?

Subjectivity of fingerprint examination

A conclusion that a pair of impressions come from the same source depends on the ability of the examiner to analyse and compare the fingerprint impressions, is that right?

It depends on the examiner's ability to observe Level 1 detail, Level 2 detail and Level 3 detail.

It depends on the examiner's ability to observe similarities?

And it also depends on the examiner's ability to observe differences?

Do you agree that some examiner's have better powers of observation than others?

It is a subjective attribute based on the individual, is that right?

When you examine crime scene impressions and compare them to the impressions of a known person, part of your assessment involves deciding whether differences between the impressions are true differences or whether they can be discounted as an artefact or as resulting from distortion, is that right?

An examiner's conclusion about a match depends on their tolerance or view of an acceptable level of variation between the impressions, is that right?

Do you agree that the comparison and evaluation method depends on the examiner's view about whether differences between the impressions are real or can be explained away?

An examiner's tolerance for differences will depend on their ability to make observations, their own view of the level of detail required for examination and their view about the distortion of fingerprint impressions, is that right?

An examiner's view about tolerance of differences is subjective, do you agree?

It depends on the individual examiner, is that right?

The conclusion that two impressions are from the same source means that the examiner is satisfied that there is a sufficient level of correspondence between the two impressions, is that right?

It is commonly called 'sufficiency', is that right?

Whether you are satisfied of sufficiency depends on a number of factors and I'm going to take you through them.

One of the factors it depends on is the clarity of the impressions.

One of the factors is the number of similarities you have detected between the impressions.

One of the factors is your sense of the degree to which differences can be accounted for or explained.

One of the factors is your sense of how to distinguish ridge detail from 'background noise'.

One of the factors is your view about how rare certain features or patterns that you observe in the impressions are in fingerprints generally, is that right?

One of the factors is your sense of the frequency of certain characteristics in fingerprints generally.

Are there any other factors you take into account to determine sufficiency? What are they?

Can you explain to the Court when you are satisfied that there is sufficient matching detail?

Would you identify a person based on four points of similarity?

Do you agree that you cannot give evidence about the actual frequency of particular characteristics or combinations of characteristics in fingerprints in the human population.

For example, you cannot give evidence about the frequency of left loops on fingers generally or arches on thumbs.

You cannot give evidence about how rare particular characteristics or combinations of characteristics in fingerprints are in the human population generally.

That data is not available, do you agree?

Do you agree that there is no statistical foundation for the conclusion of 'sufficiency'?

The determination of sufficiency is based on the individual examiner's view about all those factors, is that right?

It is subject to each examiner?

Fingerprint examiners operate to a personal threshold on whether there is sufficient matching detail for a conclusion of identity, do you agree?

Possibility of disagreement

Is it possible for two fingerprint examiners to disagree at the analysis stage?

Is it possible that another fingerprint examiner will come to a different conclusion about whether they can observe sufficient Level 2 or Level 3 detail to warrant comparison with a known print?

Is it also possible for two fingerprint examiners to disagree about characteristics observed during the comparison stage?

For example, is it possible that another fingerprint examiner will come to a different conclusion about whether variations in a pair of impressions can be attributed to the mechanics of the contact between a fingertip and a surface or by the pressure applied?

Is it possible that one examiner will find there to be a similarity in a certain part of the impressions, where the other examiner will not detect that similarity?

Are you aware that some research has demonstrated that some examiners have found less than 15 similarities, where other examiners have found over 50 similarities, when looking at the same pair of impressions?⁴⁹

I want you to assume that an examiner using the ACE method comes to the conclusion that two fingerprint impressions come from the same source. They will declare a match, is that right?

That match will be based on that individual examiner's powers of observation, level of experience, view about sufficiency, and their view about any differences and how they can be explained, is that right?

If an examiner using the ACE method comes to the conclusion that certain fingerprint material that they examine is insufficient to determine a match, they will report an inconclusive result.

Now, I want you to assume that two examiners are looking at the same pair of fingerprint impressions. It is possible, that based on their individual powers of observation, level of experience, points of view about sufficiency, and their view about any differences and how they can be explained, the first examiner will declare a match in relation to the same pair of impressions where the second examiner will report an inconclusive result, do you agree?

Is it then also possible that two fingerprint examiners using the ACE technique can come to different conclusions about the same pair of impressions in relation to whether they match or not?

Is it possible for two fingerprint examiners to disagree at all at the evaluation stage?

⁴⁹ Campbell, *The Fingerprint Inquiry Report*, above n 2, 603.

Are you saying that it is not possible for another fingerprint examiner, examining the same set of prints, to come to a different conclusion about their identification?

Given the highly subjective nature of the ACE method, do you agree that it must be possible for examiners to come to different conclusions?

Have you ever disagreed with another fingerprint examiner about whether the quality of a latent print is sufficient to warrant further examination?

Have you ever disagreed with another fingerprint examiner about whether two fingerprint impressions are from the same source or not?

Are you aware of any disagreement between fingerprint examiners within the Identification Services Branch of the NSW Police Force in relation to the examination or identification of fingerprints?

Is it your experience that the fingerprint examiners within the ISB are always of the same mind in relation to the examination and identification of fingerprints?

Answers that suggest there is always agreement between fingerprint examiners will be damaging – either as implausible and thereby affecting the credibility of the witness; or as tending to suggest an environment in which dissent is not permitted and thereby affecting the reliability of the evidence.

The comparison with the accused's fingerprints

The only fingerprint impressions that you and compared to the crime scene print, belonged to the accused, is that right?

Do you agree that you cannot look at both impressions at the same time?

You have to go from one image to the other and back again, is that right?

As soon as your eyes leave the crime scene print, your brain is depending on your memory to make the comparison, is that right?⁵⁰

When you compared the accused's fingerprint(s) with the crime scene print, did you detect any differences between the impressions, which were ultimately discounted?

If the witness answers no –

Are you saying that the two impressions were identical?

No two fingerprint impressions are identical, are they?

⁵⁰ Campbell, *The Fingerprint Inquiry Report*, above n 2, 377.

Even impressions created by the same finger, you agreed earlier will inevitably be different on each occasion an impression is made on a surface, do you agree?

If the witness answers yes –

What were the differences that you detected?

What is your explanation for each difference you detected?

Is it possible that there was a difference between the impressions that you were unable to detect?

Is it possible that your powers of observation were not sufficient to detect a difference or differences between the impressions?

Are your powers of observation infallible?

You agree, don't you, that no human being has infallible powers of observation?

Is it possible that one of the differences you discounted was really a true difference between the impressions?

Your determination of sufficiency was based on [x] number of similarities between the two impressions, is that right?

Assume, for example, that the examiner's opinion is based upon ten points of similarity between the two impressions. Of these ten, if two or three may be demonstrated to be in doubt, then the strategy for cross-examination may be to have the examiner admit that with the removal of each of the asserted similarities, the ultimate opinion of a match becomes much less tenable. The exposure of two or three similarities as being ambiguous or unreliable, may also lead to a suggestion to the examiner that his or her opinion was reached prematurely.

Information available to the examiner during their examination

When you commenced your task as the fingerprint examiner, you retrieved from the Digital Information Management System images relating to forensic case number 29384 which included an examination graph labelled W1, is that right?

The examination graph included the name of the victim and the location and date of the examination and the name of the examination officer.

You also retrieved from the fingerprint database a set of fingerprint impressions belonging to the accused.

The reason you retrieved the accused's fingerprint impressions from the database is because the fingerprint computer had indicated his fingerprint matched W1, is that right?

The reason you retrieved the accused's fingerprint impressions from the database is because you were told by the investigating police that he/she was the suspect in the case, is that right?

What were your instructions?

Why did you retrieve the crime scene images and the fingerprint impressions belonging to the accused?

Were you asked to confirm whether the accused was the perpetrator of the offence?

What other information did you have about the case generally before you carried out your fingerprint examination?

What other information did you have about the case generally before you reached your conclusion in the case?

What other information about the accused did you have before you carried out your fingerprint examination?

What other information about the accused did you have before you reached your conclusion in the case?

Did you have access to the accused's criminal history?

Before you reached your conclusion, did you know about what other evidence had been collected in the case?

Had you talked to the investigating police at all in relation to the case before coming to your conclusion about the fingerprints?

Had you been told that the co-accused had admitted to the offence and implicated the accused in the offence?

It is the experience of the author that the expert will often have a number of pieces of information about the accused at the time of conducting their examination, including information provided to the examiner electronically when they are allocated the task of examining the fingerprints.

Verification process

The verification process, the V in the ACE-V method, involves a second examiner reviewing the fingerprint case using the ACE method themselves, is that right?

In your report, there is no mention of any verification process, do you agree?

Does the verification process only occur when the first examiner has declared a match between two impressions?

When a second examiner reviews a case, are they usually told that they are examining the fingerprints for the purpose of verification?

When the second examiner reviews a case, they are told that the first examiner has made a match between the two impressions, is that right?

Are you familiar with the term 'blind' verification?

That refers to a verification process where the person carrying out the review is blinded to the original conclusion, is that right?

The standard process for verification in the Identification Services Branch is not 'blind', is that right?

How often does a reviewer in the Identification Services Branch come to a different conclusion to the original examiner?

When there is a disagreement between the original examiner and the reviewer, what is the standard procedure?

Is that disagreement usually reported in the examiner's report?

Where there is a disagreement, that means that one of the examiners is mistaken in their conclusion, do you agree with that?

See fingerprint inquiry.⁵¹

It is the experience of the author that it is very common for one or two other fingerprint examiners to declare a 'match' between the accused and the crime scene print before an examination is carried out by the fingerprint examiner who ultimately provides an Expert Certificate of Opinion, being the witness proposed to be called by the prosecution to give evidence of a fingerprint 'match'. The prosecution witness is ordinarily informed of the findings of the earlier examiners when they are allocated the task of examining the fingerprints, thereby contaminating their examination.

Bias

You are employed by the NSW Police Force, is that correct?

In your role as a fingerprint examiner, you work exclusively for the NSW Police Force, is that right?

⁵¹ Campbell, *The Fingerprint Inquiry Report*, above n 2, 627.

Are you familiar with the term 'cognitive bias'?

Could you explain to the Court your understanding of the term?

Are you familiar with the concept of contextual effects or influences on thinking?

Could you explain to the Court your understanding of the concept?

Are you familiar with the term 'domain irrelevant information'?

Could you explain to the Court your understanding of the term?

Do you agree that the accused's criminal history is domain irrelevant information?

Do you agree that the fact the accused had been arrested and charged is also domain irrelevant information?

Those pieces of information are not relevant to your task of examining, comparing and seeking to identify the source of the crime scene fingerprint impression, are they?

Are you aware of recent studies that show that even experienced latent fingerprint examiners can change their mind about whether two impressions match or not as a result of being exposed to domain irrelevant information?

Do you keep abreast of the current available scientific research in relation to fingerprint identification?

Do you agree that various forms of cognitive bias can influence a person's thinking unconsciously? Without them knowing it?

So that the person is not aware that their thinking is being influenced by those other factors?

Do you agree that is the case even when an examiner is carrying out their task sincerely?

Do you agree that various forms of bias threaten the reliability of fingerprint identification evidence?

Do you agree that you might not be aware that your judgment was being affected by external factors when you examined the fingerprint impressions in this case?

Do you agree that it is quite likely that you were not aware of contextual biases affecting your judgment?

Proficiency testing

You have completed the Australian Field Forensic Science Accreditation Board or AFFSAB assessment process for fingerprint identification, is that right?

At the end of that process, you were accredited by the AFFSAB as a fingerprint examiner?

During the assessment process, were you tested on your skills of fingerprint identification when the correct answer was known? By that, I mean, where the source of both fingerprints in the comparison is known?

Your test results show that you made [x] number of mistakes in relation to your examination and identification of fingerprints, is that right?

Since your accreditation, have you been tested on your skills of fingerprint identification when the correct answer was known?

Potential for error

Are you able to tell the Court about the error rate for fingerprint examination?

Do you claim that there is a zero chance of error in fingerprint examination?

Do you agree that there are actually a number of potential sources of error associated with your technique of fingerprint examination and identification ?

That is because your technique depends on your capabilities as a human being to make observations and make subjective decisions about those observations?

You agree, don't you, that fingerprint examination and identification is subject to human error?

In this case, it is possible that you have made a mistake or mistakes in your examination of the fingerprint impressions?

It is possible that your conclusion of a match between the accused and the crime scene impression is in error?

In order for a Court to attribute substantial weight to a witness' opinion, it is integral that they are not 'begrudging or disingenuous in their recognition and attribution of possible errors – both generally and specifically'.⁵² A reluctance to make appropriate concessions in reports and in testimony in relation to the potential for error will damage the credibility of the expert.

⁵² Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13, 20.

Criticisms of fingerprint examination and identification

Are you aware that the ACE-V method has been heavily criticised by the science community?

You understand that you have an overriding duty to assist the Court and to do that impartially?

Part of acting impartially as an expert witness involves disclosing the existence of uncertainty, concern or criticism in your particular field, do you agree?

Can you tell the Court about any uncertainty, criticisms or concerns that have been raised by the scientific community in relation to fingerprint examination and identification?

Are you aware of any criticisms at all of fingerprint identification evidence?

Of course you are aware of the United States National Academy of Science Report *Strengthening the forensic sciences in the United States: A Path Forward*, published in 2009?

Have you read the report?

The report states that:

With the exception of nuclear DNA analysis... no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.⁵³

Are you aware of that part of the report?

The report also states that:

ACE-V provides a broadly stated framework for conducting friction ridge analyses. However, this framework is not specific enough to qualify as a validated method for this type of analysis. ACE-V does not guard against bias; is too broad to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results. For these reasons, merely following the steps of ACE-V does not imply that one is proceeding in a scientific manner or producing reliable results.

Are you aware of that part of the report?

As you said in your evidence earlier, you use the ACE-V method in your fingerprint examinations, don't you?

⁵³ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 7.

The NAS Report also concluded in relation to fingerprint comparisons that:

Errors can occur with any judgment-based method, especially when the factors that lead to the ultimate judgment are not documented. Some in the latent print community argue that the method itself, if followed correctly (i.e., by well-trained examiners properly using the method), has a zero error rate. Clearly, this assertion is unrealistic, and, moreover, it does not lead to a process of method improvement. The method, and the performance of those who use it, are inextricably linked, and both involve multiple sources of error (e.g., errors in executing the process steps, as well as errors in human judgment.)⁵⁴

Do you now acknowledge that it is possible that you made a mistake or mistakes in your examination of the fingerprint impressions in this case?

Do you now acknowledge that it is possible your match conclusion in this case is mistaken?

Following the 2009 report by the National Academy of Science, there was a review carried out by the US National Institute of Standards and Technology in relation to latent fingerprint evidence, are you aware of that?

In 2012, they released their report *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach* and made a number of recommendations, are you aware of that?

One of the recommendations, Recommendation 3.7, was in these terms 'Because empirical evidence and statistical reasoning do not support a source attribution to the exclusion of all other individuals in the world, latent print examiners should not report or testify, directly or by implication, to a source attribution to the exclusion of all others in the world.'⁵⁵ What do you say about that recommendation?

Do you agree that your report and evidence today are not consistent with that recommendation?

You would of course be aware of the 2011 Fingerprint Inquiry by Lord Campbell in Scotland?

Have you heard the name Shirley McKie?

Do you now agree that, the conclusions drawn from a fingerprint examination should not be expressed in absolute terms?

In light of these recommendations, do you stand by the opinion you have given that the crime scene fingerprint impression can be attributed to the accused exclusively?

⁵⁴ National Research Council, *Strengthening Forensic Science in the United States*, above n 12,143.

⁵⁵ Cited in Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13, 5.

Are you aware that that Lord Campbell's report was heavily critical of the fingerprint examination and identification field?

The report revealed that a number of experienced fingerprint examiners made mistakes, is that right?

A number of them made the same mistake?

Mistakes that resulted in a police detective being wrongfully arrested and prosecuted for perjury?

Lord Campbell recommended that:

'Examiners should discontinue reporting conclusions on identification or exclusion with a claim to 100% certainty or on any other basis suggesting that fingerprint evidence is infallible.'⁵⁶

Your evidence earlier was that you were 100% certain about your match conclusion, do you remember giving that evidence?

In light of the recommendations made, do you stand by your earlier evidence that you are 100% certain about your match conclusion?

Lord Campbell also recommended that:

Examiners should receive training which emphasises that their findings are based on their personal opinion; and that this opinion is influenced by the quality of the materials that are examined, their ability to observe detail in mark and print reliably, the subjective interpretation of observed characteristics, the cogency of explanations for any differences and the subjective view of 'sufficiency'.⁵⁷

Do you wish to change any the evidence you have given today in light of that recommendation?

As a certified fingerprint examiner, you would of course also be aware of the Brandon Mayfield case involving the mis-identification of fingerprints by the FBI?

They wrongly identified Brandon Mayfield as the source of a fingerprint found on a bag of detonators recovered from the 2004 Madrid terrorist attack on commuter trains, you're aware of that?

That case involved mistakes made by very senior and experienced fingerprint examiners?

It also involved a number of examiners making the same mistake?

⁵⁶ Campbell, *The Fingerprint Inquiry Report*, above n 2, 695.

⁵⁷ Campbell, *The Fingerprint Inquiry Report*, above n 2.

Do you keep abreast of the key issues and developments in the field of fingerprint examination and identification?

Do you agree that you have not referred to any of these reports or inquiries or the criticisms, concerns and recommendations raised in them in the report that you prepared for the Court for this case?

It is the experience of the author that even senior fingerprint experts in the NSW Police Force are entirely unfamiliar with the academic literature in the field of fingerprint comparison. It may be necessary for the witness to be provided with an opportunity to review the academic literature on which any cross-examination is to be based before the hearing commences.

DIRECTION AND WARNING

There is currently no suggested direction in relation to fingerprint identification evidence in Australia. In the USA, there is a view that a jury should be instructed that there is no basis to believe that fingerprint examiners are infallible, that their testimony is informed opinion, but not fact.⁵⁸ Similarly, in the UK, it is considered necessary for a judge to warn the jury that the fingerprint evidence is opinion evidence only, that the expert's opinion is not conclusive and that it is for the jury to determine whether guilt is proved in light of all the evidence.⁵⁹

Having consistently admitted evidence of fingerprint comparison and identification and permitted absolute reliance upon it in Australia, 'courts might be reluctant to rethink their role in the trial process'⁶⁰ in giving warnings and directions to the tribunal of fact regarding the unreliability of that evidence. Prosecutors might oppose the giving of a warning or direction given the longstanding status of fingerprint evidence and that it has not been recognised as falling into the category of evidence covered by section 165.⁶¹ However, if a case involves cross-examination of the kind proposed above, then the expected answers are likely to establish a firm foundation on which to make an application for a direction and warning in relation to the fingerprint identification evidence. The various aspects of unreliability explored above demand a more extensive direction and a specific warning to the tribunal of fact about the unreliability of fingerprint identification evidence.

⁵⁸ *State v Quintana*, above n 1, [14]-[15].

⁵⁹ *R v Buckley (Robert John)* (1999) 163 JP 561 (Rose LJ), 9.

⁶⁰ National Research Council, *Strengthening Forensic Science in the United States*, above n 12, 110, citing D. L. Faigman, M.J. Saks, J. Sanders and E.K. Cheng. 2007-2008. *Modern Scientific Evidence: The Law and Science of Expert Testimony*.

⁶¹ To this opposition, a useful riposte is contained in the judgment of Hunt CJ at CL in *R v Mr C CCA 67 A Crim R* at 562: "The crown's opposition to the relief sought is based solely upon the fact that this has never been done before. Lord Denning provided the best answer to that argument, in *Packer v Packer* [1954] P 15 at 22: "What is the argument on the other side? Only this, that no case has been found in which it has been done before. That argument does not appeal to me in the least. If we never do anything which has not been done before, we shall never get anywhere. The law will stand still whilst the rest of the world goes on; and that will be bad for both."

The following is suggested as the content of the judicial direction and warning on fingerprint identification evidence.⁶²

You have heard evidence from a fingerprint examiner [x] who gave evidence that they matched the fingerprint impression recovered from the crime scene to the accused. Whether two fingerprint impressions match is a matter of opinion. Whether in this case the crime scene fingerprint impression matches the fingerprint impression taken from the accused is a matter of opinion.

The examiner's opinion is based on a subjective assessment by the fingerprint examiner. The opinion is based on human judgment. The opinion is influenced by the quality of the fingerprint impressions that are examined. The examiner's opinion is also influenced by the examiner's personal ability to observe detail in the impressions reliably. The examiner's opinion is influenced by the examiner's subjective interpretation of the observed characteristics and their subjective view of "sufficiency". The examiner's opinion may also be influenced by various sources of bias. Whether you accept that opinion as being reliable is a matter for you. Whether you accept that opinion as reliable will depend on your assessment of how the opinion has been influenced. Whether you accept that opinion as reliable also depends upon how convincing you found the examiner's explanations for any differences between the impressions to be.

I must warn you that this type of evidence may be unreliable. Fingerprint examiners sometimes disagree about whether fingerprint impressions match. Fingerprint examiners sometimes make mistakes. Sometimes multiple fingerprint examiners make the same mistake. Even highly skilled experts sometimes make mistakes. There are several documented cases where a fingerprint examiner has made a mistake and found that two prints "match" when they actually came from two different people. People have been wrongly arrested, prosecuted and convicted because of mistakes made by fingerprint examiners. In practice, we do not know how often examiners say that two fingerprints match when they actually come from two different people. Fingerprint evidence is not infallible. It is not a 100% certainty.

The fingerprint examiner's opinion is not conclusive for your task. You must decide whether the prosecution has established the guilt of the accused beyond reasonable doubt in light of all of the evidence in the case.

⁶² It has been suggested that much of the below is 'the kind of information or caveats that ought to be included with the fingerprint examiner's report and testimony.' See Edmond, Thompson and Tangen, *A guide to interpreting forensic testimony*, above n 13, 11.

CONCLUSION

The various factors of unreliability which attach to fingerprint identification evidence demand the urgent attention of defence lawyers and the other actors in the criminal justice system. Particularly where the identification of the accused is the key issue in a case, fingerprint evidence should not be able to enter the deliberations of the jury room or fall for consideration by a Magistrate without significant scrutiny through cross-examination and a warning with the authority of the judge or Magistrate that the evidence may be unreliable.

POST SCRIPT

Since writing this paper in October 2014, a couple of further decisions concerning fingerprint expert opinion are worth noting.

The Court of Appeal for British Columbia handed down a decision in the matter of *R v Timothy Dale Bornyk* [2015] BCCA 28 in January 2015. The case was a Crown appeal from an acquittal in relation to a break and enter offence where the key evidence was a sole fingerprint found in the home. The prosecution expert identified the accused as having deposited the print. After the trial concluded, the trial judge sent counsel four articles that were critical of fingerprint identification. Counsel made further submissions and the judge found the accused not guilty. The articles contained matters not put to the expert in evidence. The trial judge also conducted his own examination of the prints and identified differences, also not put to the prosecution expert in questioning. The Court of Appeal held that the judge erred in taking into account opinion evidence that was not evidence in the trial and that the judge erred in making his own comparison of the fingerprints unassisted by expert evidence, given that fingerprint comparison is an area of forensic science in which expert evidence elucidation is required. The verdict was set aside and a new trial ordered.

The Supreme Court of NSW handed down a decision in the matter of *JP v Director of Public Prosecutions (NSW)* [2015] NSWSC 1669 in November 2015. The case involved an appeal from a decision of the Children's Court at Dubbo finding a young person guilty of a break and enter offence in circumstances where the only evidence supporting the identification of the young person as the offender was expert opinion evidence that a partial fingerprint on a jewellery box disturbed during the break-in belonged to the young person's left thumb. The police fingerprint expert was cross-examined extensively about matters going to the unreliability of the fingerprint comparison field. The expert's evidence included that he found a number of similarities between the two prints and a number of so-called "explainable differences". The witness did not provide any explanations to the Court for the differences detected. The Children's Court admitted his opinion and relied upon it to be satisfied beyond reasonable doubt that the young person was the offender. The finding of guilt was made despite the Magistrate giving himself a warning in similar terms to that proposed above.

A number of issues were raised on the appeal. Justice Beech-Jones held that the opinion as expressed by the fingerprint expert in the *pro forma* Expert Certificate was insufficiently supported by reasons or factual findings for it to be admitted into evidence: at [52]. However, his Honour held that the expert provided sufficient reasons and factual findings in oral evidence during cross-examination to make his conclusion admissible. Ultimately the appeal was dismissed. The way that both the Children's Court and the Supreme Court approached this case tends to reveal the persistent magical quality of the expert opinion of Police fingerprint examiners in our criminal courts.

The author welcomes any comments or feedback on the issues raised in this paper.

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