

LATENT SCIENCE: A HISTORY OF CHALLENGES TO FINGERPRINT EVIDENCE IN AUSTRALIA

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Through a review of reported challenges this article explains how latent fingerprint evidence was routinely admitted and relied upon as proof of identity in criminal proceedings before its value and limitations were studied or understood. That it was admitted and used in ways that were disengaged from scientific research reveals a great deal about our adversarial system — of pleas, rules of admissibility, trial safeguards, standards of proof, and heavy reliance on the technical competence of lawyers and judges. This article draws on contemporary scientific research to explain how more than a century of routine legal reliance, along with quite a few admissibility challenges, produced few meaningful responses and no apparent endogenous understanding of the limitations of latent fingerprint comparison. Trial personnel and trial safeguards did not lead to the identification, recognition and communication of methodological problems, uncertainties or the frequency of error. Latent fingerprint evidence continues to be presented in ways that are not informed by scientific research, are inconsistent with mainstream scientific advice, exaggerate the value of opinions, and unnecessarily threaten both the rectitude and fairness of criminal proceedings.

I INTRODUCTION

This article surveys the record of legal challenges to latent fingerprint evidence in Australian criminal proceedings.¹ Starting with the first appeals at the beginning of the 20th century and continuing up to the present day, it documents both the ways lawyers sought to impugn fingerprint evidence and the ways trial judges and appellate courts responded.² Through reference to contemporary scientific

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¹ Technically, latent fingerprints are those that are not visible to the naked eye. Most fingerprints are latent — visualised through powders, chemical processes and/or special lighting. Some crime-scene fingerprints, such as those left in blood or oil, are not latent. This article is primarily concerned with crime-scene fingerprints whether latent or not.

² The article covers the 20th century and concludes with the appeal in *R v Parry* [2017] SASFC 66 ('Parry').

research, the article explains how our admissibility rules and procedure, and even our oft-celebrated trial safeguards, did not apprise decision-makers — whether judges or juries — of the uncertainties, risks and limitations associated with latent fingerprint evidence. Legal responses to latent fingerprint evidence reveal that Australian courts allowed latent fingerprint examiners to make categorical assertions about identity from the very beginning. This permissive disposition persisted as new technologies were adopted, as rules of evidence and procedure were reformed, and as controversies and criticism slowly emerged beyond the courts. Today, the epistemological limitations of latent fingerprint evidence and criticism of legal responses to this evidence remain (almost) unknown to law.

Drawing on the long history of reported decisions, the number of cases involving serious epistemological challenges — engaged with the validity and scientific reliability of latent fingerprint evidence — is tiny. Indeed, for the period from 1900 to 2017 there appears to be just one. Rather than facilitate engagement with scientific research in order to make fingerprint examiners accountable and their opinions comprehensible for judges and juries, oft-celebrated legal protections have been overwhelmingly focused on non-epistemic issues and epiphenomena. Perhaps the most revealing and disconcerting dimension of this account is the apparent failure of any judge to ever require a latent fingerprint examiner to provide independent evidence of the accuracy of latent fingerprint comparison. Australian judges are yet to receive an indication of the error rate, or information about limitations and uncertainties that have come to be notorious among attentive scientists.³

This research is revealing because the record demonstrates that trial safeguards did not encourage or enable lawyers to identify, explore or convey epistemological problems with latent fingerprint evidence and the procedures used by latent fingerprint examiners. This failure was not some isolated mistake or aberration. It has persisted for more than a century, while latent fingerprint evidence was presented (by prosecutors and fingerprint examiners) and understood (by defence lawyers, judges, jurors and perhaps defendants) as inviolable proof of identity. It persisted as authoritative scientific organisations began to question latent fingerprint evidence and its legal reception as categorical evidence of identity.

³ The only exception is Victoria, where full reports may include reference to an indicative error rate, as described by PCAST. See below Part III.

A *Some Notes on Methods*

This article is focused on challenges to latent fingerprint evidence that were recorded in law reports or ‘published’ on electronic databases.⁴ While some of the challenges to latent fingerprint evidence may have been overlooked through this orientation, it offers the tangible benefit of presenting and reviewing materials that were (and are) readily available to generations of lawyers and judges.⁵ The decisions retrieved embody legal authority and legal knowledge. There may have been sophisticated methodological challenges to latent fingerprint evidence that were not reported, but, for reasons that will become apparent, that seems unlikely. Moreover, to the extent that insights or sophistication were not reported, they appear to have been lost. We might reasonably wonder about the existence of knowledge that is not conspicuous in the reported decisions and seems to be unknown to generations of lawyers and judges.

Secondly, this article moves beyond the law reports and draws upon mainstream scientific research in order to enhance understanding of latent fingerprint evidence. Fortunately, the last decade has generated a wealth of materials following a series of independent reviews — discussed below in Part III. These scientific reviews are vitally important because they expose serious discrepancies between legal representations of latent fingerprint comparison evidence and scientific understanding and expectations. Prominent here is the fact that the first rigorous scientific studies of latent fingerprint comparison were finally conducted during the last decade, that is, *since* 2009. This is revealing because latent fingerprint comparison has been in routine use for more than a century, and yet many of those producing and relying upon it were oblivious or indifferent to the absence of scientific foundations. The results of the emerging scientific research provide a standard (or benchmark) that enables us to evaluate both latent fingerprint evidence and the legal responses.

⁴ This study focuses on reported decisions and those available on electronic databases such as Austlii and Westlaw. Databases were searched using terms including ‘finger* w/20 expert’, ‘finger* w/20 admiss*’, ‘fingerprint /p admiss*’ and ‘fingerprint /p reliab*’, as well as through cross-referencing (and ‘snowballing’) among the results. On Westlaw, the first 400 returns for the term ‘fingerprint’ appearing in the text of a case, ranked in terms of relevance, were reviewed. The search also included cross-references to cases such as *R v Castleton* [1909] 3 Cr App R 74 (‘Castleton’), *R v Blacker* [1910] SR (NSW) 357 (‘Blacker’), *R v Parker* [1912] VR 152 (‘Parker’), *R v Lawless* [1974] VR 398 (‘Lawless’), *Bennett v Police* [2005] SASC 167 (‘Bennett’) and *JP v DPP* [2015] NSWSC 1669 (‘JP’). In some cases, searches were focused on specific terms, such as ‘ACE-V’, ‘AFIS’ and ‘points’.

⁵ This is not an attempt to comprehensively document the historical record, but rather to consider what the accessible legal record reveals. Many of the earliest trials were reported contemporaneously in newspapers.

Thirdly, in this article, challenges to latent fingerprint evidence are characterised as either *legal* (ie non-epistemic) or *epistemological*.⁶ For the entire 20th century, challenges to latent fingerprint evidence were overwhelmingly legal in focus. With very few exceptions, they were directed toward legal criteria, such as (non-)compliance with collection and reporting procedures, the admissibility of photographs, the role of the jury in the evaluation of fingerprint evidence, and whether judicial directions were appropriate. While there is nothing remarkable about lawyers and judges engaging with relevant legislation, legal criteria and case law, persistent insensitivity to the validity of the underlying procedures and the abilities of latent fingerprint examiners is an issue that demands attention. This article is fundamentally concerned with epistemology and its legal implications.⁷ It focuses attention on methods (and assumptions) and the *known* value of fingerprint evidence, as drawn from scientific research. Remarkably few historical challenges to the admission and use of fingerprint evidence engaged with these fundamental issues.⁸

Fourthly, it is not the intention of this article to suggest that challenges on predominantly *legal* grounds were inappropriate or without value. Some challenges, focused on procedural irregularities — surrounding collection and use, for example — were successful and may have improved out-of-court investigative behaviours.⁹ Indeed, in the absence of legal engagement with epistemological issues, this focus is comprehensible as *one strategy*. However, qualified success with *legal* challenges to fingerprint evidence should not be conceived of as adequate given the persistent failure to engage with the value of latent fingerprint evidence.

⁶ These are ideal types and the boundaries may on occasion be fuzzy. There are, for example, a few challenges that focus on fingerprint examiners testifying about activity (rather than source), or the age of prints, and these are challenged on the basis of transgression of legal categories — see below Part V. See Thomas Gieryn, *Cultural Boundaries of Science* (University of Chicago Press, 1999); Geoffrey Bowker and Susan Star, *Sorting Things Out: Classification and Its Consequences* (MIT Press, 1999).

⁷ See, eg, Erica Beecher-Monas, *Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process* (Cambridge University Press, 2007); Michael Saks and Barbara Spellman, *The Psychological Foundations of Evidence Law* (New York University Press, 2016); Kristy Martire and Gary Edmond, 'Rethinking Expert Opinion Evidence' (2017) 41 *Melbourne University Law Review* 967.

⁸ Apart from a challenge in the Children's Court of New South Wales in 2015 — discussed below Part VII — and some comments in the Victorian Court of Appeal more than a century earlier — discussed below Part IV — there is no evidence of legal engagement with scientific knowledge, the reliability of latent fingerprint evidence, the effectiveness of legal procedures, the appropriateness of the form of opinions proffered by examiners, and so on.

⁹ Although there is limited evidence of appellate decisions substantially changing the behaviours of investigators. See, eg, Richard Leo, 'The Impact of *Miranda* Revisited' (1996) 86(3) *Journal of Law & Criminology* 621.

Fifthly, it is not the intention of this article to whiggishly judge past legal practice by contemporary standards.¹⁰ Contemporary knowledge does, however, enable us to consider the institutional costs of ignorance, including an apparently slavish commitment to trial safeguards and protections that were, as the following study demonstrates, dormant, misused or ineffective.¹¹ It also allows us to observe the impact of new rules (eg *Uniform Evidence Law* ('UEL') s 79) and procedures (eg *Code of Conduct for Expert Witnesses*), legal responses to emerging technologies (eg electronic databases and search algorithms), and the recalcitrance of legal attitudes and commitments as scientific research and advice emerged. Together, the cases reviewed for this article suggest that courts accepted the beliefs and assumptions of latent fingerprint examiners and persisted with that commitment even as it became untenable with respect to reviews and recommendations produced by peak scientific organisations.¹²

Finally, and importantly, this article recognises that latent fingerprint comparison is basically a valid and scientifically reliable procedure.¹³ The problem, which arises through this diachronic analysis, is that this position has only become *known* — in the sense of being supported by scientific research — recently. This raises questions about what lawyers and courts were doing for a century and leaves unresolved issues pertaining to the admission, representation and evaluation of latent fingerprint evidence. For, while latent fingerprint evidence is a procedure that is potentially quite powerful in assisting with the identification of persons of interest, scientific research confirms that is not as

¹⁰ Herbert Butterfield, *The Whig Interpretation of History* (1932, reprinted WW Norton & Co, 1965); Gary Edmond, 'Whigs in Court: Historiographical Problems with Expert Evidence' (2002) 14(1) *Yale Journal of Law & the Humanities* 123.

¹¹ See Naomi Oreskes and Erik Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (Bloomsbury Press, 2010); Robert Proctor and Londa Schiebinger (eds), *Agnotology: The Making and Unmaking of Ignorance* (Stanford University Press, 2008).

¹² Remarkably, this position persists in relation to latent fingerprint evidence and many other types of forensic science and medicine. However, qualifications are necessary in relation to DNA profiling and some image evidence. See eg, *R v Tran* (1990) 50 A Crim R 233, 242; *R v Lucas* [1992] 2 VR 109; *R v Pantoja* (1996) 88 A Crim R 554; *R v Karger* (2001) 83 SASR 1; *R v Gallagher* [2001] NSWSC 462; *Fitzgerald v The Queen* [2014] HCA 28; *Tuite v The Queen* [2015] VSCA 148 ('Tuite'); *R v Tang* (2006) 65 NSWLR 681 ('Tang'); *Murdoch v The Queen* (2007) 167 A Crim R 329; *Morgan v The Queen* (2011) 215 A Crim R 33; *R v Dastagir* (2013) 118 SASR 83; [2013] SASFC 109; *Honeysett v The Queen* [2013] NSWCCA 135; *Honeysett v The Queen* (2014) 253 CLR 122 ('Honeysett').

¹³ President's Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (Report, 20 September 2016) 95–7 ('PCAST Report').

probative as latent fingerprint examiners, prosecutors and judges have all suggested.¹⁴

II LATENT FINGERPRINT COMPARISON

Most modern latent fingerprint examiners use a procedure known by the acronym ACE-V.¹⁵ Following the detection and collection of one or more fingerprints connected to a suspected criminal offence, this involves assessing the suitability of the prints and *analysing* the detail. Does the quantity and quality of detail in the print make it suitable (or sufficient) for *comparison*?¹⁶ Suitable prints may be analysed, marked-up and searched against a database (where known and unknown prints are stored) using one of a range of proprietorial algorithms to select prints that are deemed sufficiently similar to undergo comparison by a latent fingerprint examiner. Algorithms assemble a ‘pool’ of prints — effectively a candidate list (usually ranking them with some kind of score) — from among the very large number of prints stored on criminal databases.¹⁷ The way latent fingerprints are prepared for searching the database and the choice of fingerprints selected for comparison (from among the pool) are subjective decisions made by the fingerprint examiner. In some cases — eg where there is police intelligence or perhaps an admission — the identity of the persons whose (reference) fingerprints should be compared to the crime-scene latent prints might be suggested directly by investigators. Such comparisons, where they produce ‘matches’, *may* circumvent the need for database searches.

During *comparison* the examiner looks for similarities and differences between latent prints deemed sufficient for comparison and reference prints (or other prints of interest).¹⁸ Because of variation between surfaces, conditions of

¹⁴ Other types of forensic science and forensic medicine, especially comparison methods such as image, voice, footwear, hair, fibre, document, bitemark, firearm and tool mark, are unlikely to be as accurate as fingerprint comparison.

¹⁵ ACE-V stands for Analysis, Comparison, Evaluation and Verification. The procedure is supposed to be applied in order, but not all examiners do so. In recent years the FBI has required examiners to proceed in order in a process described as ‘linear ACE-V’.

¹⁶ Brad Ulery et al, ‘Understanding the Sufficiency of Information for Latent Fingerprint Value Determinations’ (2013) 230(1–3) *Forensic Science International* 99; Austin Hicklin et al, ‘Latent Fingerprint Quality: A Survey of Examiners’ (2011) 61(4) *Journal of Forensic Identification* 385.

¹⁷ The number of prints returned in the candidate list, like the extent of the search, may be modified. And, of course, the candidate list may not include the depositor’s fingerprints. Most criminal databases store millions of fingerprints.

¹⁸ In some cases, examiners might match a latent with fingerprints associated with other crimes, but the identity of the source may be unknown. This may have value for investigators, implicating the same person in different crimes.

deposition (eg humidity, temperature), pressure of contact, cleanliness of hands, age of latent fingerprints, distortion, injury and scarring, size, and so on, the fingerprints to be compared *are never identical*.¹⁹ Comparison leads to an *evaluation*. Evaluation involves detailed assessment of ridge features (eg whorls, loops, bifurcations, ridge endings and islands) and perhaps scars and other features — see Figure 1 below. Following subjective comparison — usually on a computer screen using a variety of tools for manipulation and enhancement — the examiner decides whether the prints match or do not match. The examiner must be subjectively satisfied of enough similarity to conclude that the prints match (ie were made by the same person). Alternatively, the examiner might observe one or more differences that lead them to characterise the prints as non-matching, or incapable of matching or excluding, and so report an inconclusive result. For a match (or identification), any apparent differences are characterised as not meaningful (eg artefacts or the result of distortion, a second touch or other interference that can be ‘explained’ away).²⁰ For an exclusion, apparent differences are considered to be real (rather than artefactual) and so cannot be explained away. Inconclusive determinations reflect an examiner’s inability to declare a match and, often, reluctance to exclude.²¹ They are sometimes expressed in suggestive (ie inclusive) language such as ‘cannot exclude’. For reasons of convention, ‘inconclusive’ results, though implicitly probative, are not usually relied upon in criminal proceedings.²²

¹⁹ Although fingerprints are often characterised as ‘identical’ by examiners and judges. See, eg, *Bennett* (n 4). See also Expert Working Group on Human Factors in Latent Print Analysis, United States Department of Commerce, National Institute of Standards and Technology, *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach* (Report, 2012) 204 (‘NIST Report’).

²⁰ Although this is not usually explained, other than being a variation or apparent difference that the examiner does not believe compromises the ability to make a match decision.

²¹ See, eg, *R v Burling* [2002] NSWCCA 298, [19].

²² Although see *Parry* (n 2), discussed below Part VII(B). The dichotomy, along with the reluctance to report inconclusive results, entails a loss of probative evidence, mainly for reasons of tradition. Here we can begin to perceive the benefit of probabilistic frameworks that can capture a range of values, rather than relying on categorical claims — ie match and non-match.

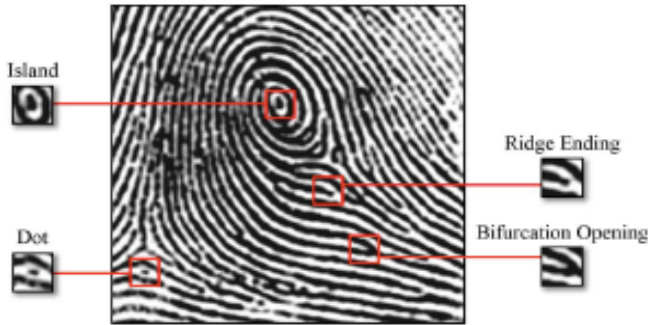


Figure 1 — An example of some minutiae locations in a fingerprint²³

The variety of decisions and potential outcomes introduces a range of possible errors.²⁴ Most obvious are false identifications (false positives) and mistaken exclusions (false negatives or ‘misses’).²⁵ However, some decisions about sufficiency and a reluctance to identify might also be considered ‘errors’.²⁶ Regardless of the precise classification and nomenclature, they may entail a (systematic) loss of information. All of these decisions (and outcomes) are subjective. Consequently, examiners occasionally disagree.²⁷ Backstage inconsistencies, though, are almost never disclosed in reports and testimony.²⁸ Some examiners may be willing to analyse, compare and match latent prints that other examiners would consider ‘insufficient’. Examiners are much more likely to disagree about whether a latent print is of sufficient quality for comparison than whether a particular finger can be matched or excluded.

The final stage of ACE-V is *verification*. Verification stands for a variety of inconsistent practices. These can range from another examiner superficially reviewing the first examiner’s report (usually for technical compliance purposes,

²³ NIST Report (n 19) 83. This image is adapted from the Royal Canadian Mounted Police, *Fingerprint Manual* (Royal Canadian Mounted Police, 1990) ch 2.

²⁴ Match decisions have become vulnerable to error (through so-called adventitious matches) as databases and the number of quite similar but different fingerprints have increased in recent decades. Some databases contain hundreds of millions of prints and algorithms return the most similar prints for subjective comparison.

²⁵ For a reported failure to match, see *R v Deland*; *Ex parte Willie* [1996] 6 NTLR 72.

²⁶ See Itiel Dror and Glenn Langenburg, ‘“Cannot Decide”: The Fine Line Between Appropriate Inconclusive Determinations versus Unjustifiably Deciding Not to Decide’ (2018) 64(1) *Journal of Forensic Science* 10.

²⁷ See, eg, Brad Ulery et al, ‘Measuring What Latent Fingerprint Examiners Consider Sufficient Information for Individualisation Determinations’ (2015) 10(2) *PLOS One* e0118172.

²⁸ For interesting, though exceptional, exposes, see the English cases of *R v McNamee* [1998] EWCA Crim 3524 and *R v Smith* [2011] EWCA Crim 1296.

which may focus on spelling and pagination) to a full-scale and independent ACE procedure performed in conditions where the first examiner's findings are not disclosed to the second examiner.²⁹ Almost all verification in Australia involves an examiner reviewing prints in the knowledge that another examiner, frequently named and known to the reviewer, has previously matched them.³⁰

ACE-V was first described in print in 1959.³¹ The term first appears in an Australian judgment in *R v Ghebrat* ('Ghebrat') in 2011 and, in New South Wales at least, it was not a regular feature of fingerprint reports before they were criticised in *JP v Director of Public Prosecutions* ('JP').³² For most of the 20th century, Australian fingerprint examiners did not use the acronym 'ACE-V' or describe their process in those terms. And, for most of the century, they did not rely on algorithms to search electronic databases for matching prints. Prior to the 1980s, identification by fingerprints was obtained using a range of different processes and methods, not all of which were standardised or scrupulously followed. They were rarely mentioned in reports. Before fingerprints were captured, recorded and searched electronically (with the use of electronic databases and algorithms), complex systems of feature classification enabled examiners to retrieve prints from very large card reference systems.³³

Another aspect of latent fingerprint comparison that is not prominent in the Australian decisions, although it is a conspicuous feature in the United Kingdom, is the reference to point systems.³⁴ Up until the last decade of the 20th century, rules about the number of points of similarity (between ridge features), imposed by police departments and professional organisations, governed the ability and willingness of most examiners to describe two similar prints as a match, and therefore as positive identification.³⁵ Revealingly, the minimum number of points

²⁹ These may operate in parallel.

³⁰ In most cases, for resource reasons, only matches are reviewed. Those responsible for verification know that the prints they are verifying have been matched. See Kaye Ballantyne et al, 'Peer Review in Forensic Science' (2017) 277 (August) *Forensic Science International* 66.

³¹ Roy Huber originally described the structure of ACE-V, and proposed it for every forensic comparison discipline, without advancing the acronym. ACE-V was popularised by David Ashbaugh, of the Royal Canadian Mounted Police, from the 1980s. See Roy Huber, 'Expert Witness' (1959) 2(3) *Criminal Law Quarterly* 276; David Ashbaugh, *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology* (CRC Press, 1999).

³² *Ghebrat v The Queen* (2011) 214 A Crim R 140, 146; [2011] VSCA 299 ('Ghebrat'); JP (n 4) [78], [79].

³³ Early systems are discussed in Simon Cole, *Suspect Identities: A History of Fingerprinting and Criminal Identification* (Harvard University Press, 2001) ('*Suspect Identities*'); Chandak Sengoopta, *Imprint of the Raj* (Pan Macmillan, 2003).

³⁴ For an English discussion and inoculation of inconsistencies, see *R v Buckley* (1999) 163 JP 561.

³⁵ The International Association for Identification ('IAI'), the largest professional society, looms large here. Until recently (influenced by the National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (Report, National Academies Press, 2009) ('NRC

required for a match varied over time and between jurisdictions. The point system was largely discredited, and formally abandoned, when a review by two British scientists in the 1990s concluded that there was no underlying scientific basis for the system, and that the number of points relied upon by different fingerprint bureaus (and some courts) was somewhat arbitrary.³⁶ Bureaus subsequently adopted more holistic approaches, concerned with whether examiners were personally satisfied that the two prints matched. Although not usually referenced in reports, examiners continue to count and refer to points of similarity, particularly if questioned in legal proceedings.³⁷

Latent fingerprint examiners base their claims and abilities on the premise (for many of them a fact) that fingerprints are unique. This is an assumption that, with respect to identification, elides a range of quite complex physiological and statistical issues. The main problem is the way the commitment to uniqueness is used to support the ability to positively identify a specific individual (to the exclusion of all other possible sources of the latent fingerprint). We will return to this issue in the next part, where scientists explicitly question uniqueness and its implications for accurate identification.

The assumptions that fingerprints are permanent and unique are used by examiners (and judges) to support categorical claims pertaining to the identity of the source (of a latent fingerprint). When expressing their opinions, the match decision is usually expressed as positive identification (or individualisation), sometimes *to the exclusion of all other persons*.³⁸ However, fingerprint examiners

Report')), the IAI forbade members from testifying in terms weaker than positive identification, on threat of sanction.

³⁶ See Ian Evett and Robin Williams, 'Review of the Sixteen Points Fingerprint Standard in England and Wales' (1996) 46(4) *Journal of Forensic Identification* 49, and the curious discussion in *R v Buckley* (1999) 163 JP 561. In Australian cases, the number of points arises sporadically, though usually in response to prompting in cross-examination. See *R v Graham* [2017] ACTSC 267, [43]; *CZB v Children's Guardian* [2017] NSWCATAD 208, [86]; *JP* (n 4) [27]; *R v Milos* [2014] QCA 314, [132]; *Soutar v Commissioner of Police* [2006] NSWDC 95, [60]; *Tang* (n 12) [144]; *Bennett* (n 4) [15], [17], [39]–[40]; *Bennett v Police* [2005] SASC 415, [5]–[7], [22], [23], [28] ('*Bennett* (Appeal)'); *Mickelberg v The Queen* [2004] WASCA 145, [186]–[187], [192], [310], [320]–[322], [328], [329], [337], [487], [526]; *R v Burling* [2002] NSWCCA 298, [19]; *R v Walsh* (1993) 70 A Crim R 408 (8 points); *Re Niko Tomicic v The Queen* [1989] FCA 333, [16] (12 points); *R v Moore* [1982] Qd R 162, 169 (9 points sufficient); *MacDonald v A-G (Cth)* (1980) 24 SASR 294, 299. See also HZXD v *Innovation Australia* (2010) 80 ATR 939, [17]. Search for ('fingerprint /20 points') on Westlaw.

³⁷ Consider the reference in *Bennett* (n 4) discussed below.

³⁸ On fingerprint matches being equated with positive identification, see, eg, *Charbaji v The Queen* [2019] NSWCCA 28; *Benki v The Queen* [2019] VSCA 34; *Anderson v The Queen* [2019] VSCA 42; *Ngo v The Queen* [2018] NSWCCA 296; *Kuo v The Queen* [2018] NSWCCA 270; *Thach v The Queen* [2018] NSWCCA 252; *Ramos v The Queen* [2018] NSWCCA 206; *Tuite* (n 12); *McPadden v The Queen* [2018] VSCA 57, [20]; *Dirbass v The Queen* [2018] VSCA 272; *Madul v The Queen* [2018] VSCA 142; *Finn v The Queen* [2018] VSCA 228; *Stanley v Western Australia* [2018] WASCA 229; *Jackson v Western Australia*

[2018] WASCA 223; *Winmar v Western Australia* [2018] WASCA 155; *Flessas v Western Australia* [2018] WASCA 210; *R v O'Dempsey* [2018] QCA 364; *R v MCY* [2018] QCA 275; *R v MKM* [2018] QCA 233; *R v Smyth* [2018] QCA 171; *Walton v The Queen* [2018] NTCCA 15; *Ndlovu v The Queen* [2018] ACTCA 33; *Malayta v Queensland Police Service* [2018] QDC 37, [6], [14]–[16]; *R v Eastman* [No 26] [2017] ACTSC 393; *Miller v The Queen* (2016) 259 CLR 380; *R v Donnelly* [2016] ACTSC 80; *R v Muniz* [2016] QCA 210; *Tierney v The Queen* [2016] NSWCCA 144, [15]; *R v Rogerson*; *R v McNamara* [No 57] [2016] NSWSC 1207; *R v Rogerson*; *R v McNamara* [No 3] [2015] NSWSC 965, [12], [49], [56], [59], [63]; *DPP v Alie* [2015] VCC 1708, [14]; *SPJ v Queensland Police Service* [2015] QDC 217, [8]; *DPP v Hassan* [2015] VCC 1383, [9]; *Murrell v The Queen* [2014] VSCA 334, [138]; *Hoblos v The Queen* [2014] NSWCCA 20, [106]; *Re Gregory Rodin* [2014] VSC 656; *Bowyer v The Queen* [2013] VSCA 358, [5]; *McDonald v The Queen* [2013] VSCA 128, [10]; *R v Webster* [2013] QCA 286; *Tasmania v Hovington* [2013] TASSC 54, [25]; *DPP v Aitken* [2013] VCC 1071, [5]; *R v Walsh* [2012] SASCFC 14, [9], [17]; *R v Cochrane* [2012] SADC 11; *R v MA*; *R v Byquar*; *R v Ramos* [2012] NSWSC 1527; *R v Billings* [2012] NSWSC 1020, [11]; *R v LCM* [2012] QChC 15; *Henderson v Tasmania* [2012] TASSCA 12; *Handlen v The Queen* (2011) 245 CLR 282; *Matthews v Greene* [2011] WASC 258, [32]; *R v Cooper* [2010] VSC 384, [12]; *Chisholm v Wanklin* [2009] QDC 286, [43]; *DPP v El Hajje* [2009] VSCA 160, [9]–[10]; *R v Mazur* [2009] SADC 34; *R v Abbouchi*; *R v Allouche* [2008] VSCA 171, [19], [80]; *Tarrant v Regina* [2007] NSWCCA 124, [9]; *Western Australia v Hone* [2007] WASC 64, [145]; *Chahine v The Queen* [2006] NSWCCA 179; *R v Miski* [2006] NSWCCA 178, [16]; *Banditt v The Queen* (2005) 224 CLR 262; *R v Smit, Smit and Tarrant* [2005] NSWSC 1277, [16]; *Holland v The Queen* [2005] WASCA 140, [116]; *Zeng v The Queen* [2005] NSWSC 1344, [18]; *R v Lennon* [2005] QCA 10; *R v Jones* [2004] VSCA 68, [10]; *Regina v Loeber* [2004] NSWSC 293, [8], [40]; *Thwaites v Western Australia* [2004] WASCA 197, [13]–[14], [31]–[35]; *DK v Dixon* [2004] NTSC 62, [8], [12], [15]; *De Gruchy v The Queen* (2002) 211 CLR 85; *R v Dudgeon* [2002] NSWCCA 41; *R v McMahon* [2002] QCA 18; *R v Vu Le Thanh* [2002] QCA 17; *R v Gluyas* [2002] VSCA 12; *R v Hodge* [2002] NSWCCA 10; *R v Institoris* [2002] NSWCCA 8; *R v Fernando* [2002] NSWCCA 28; *R v Tan* [2002] WASC 42; *R v Easton* [2002] QCA 110; *R v Lafferty* [2002] NSWCCA 118; *The Minister for Immigration and Multicultural Affairs; Ex parte Epeabaka* (2003) 206 CLR 128; *R v Ravet* [2001] NSWCCA 535, [7], [9]; *R v Fitzgerald* [2001] NSWCCA 238, [3]; *R v Kane* [2001] NSWCCA 150, [10]; *DPP v Devine* [2001] TASSC 8; *R v Shaw* [2001] NSWCCA 44; *Nannup v The Queen* [2001] WASCA 39; *Bechara v The Queen* [2001] WASCA 330; *R v Truong* [2001] QCA 98; *R v Jose* [2001] VSCA 38; *R v Speeding* [2001] NSWCCA 105; *Simm v The Queen* [2001] WASCA 79; *R v Pedrana* [2001] NSWCCA 66; *R v Dunn* [2001] NSWCCA 134; *R v Becheru* [2001] NSWCCA 102; *R v Griffiths* [2001] NSWCCA 130; *Parker v The Queen* [2001] FCA 409; *Fowler v The Queen* [2001] WASCA 130; *Lynch v Day* [2001] WASCA 150; *R v Delphin* [2001] SASC 203; *R v Sotheren* [2001] NSWSC 214; *R v McDonald* [2001] QCA 238; *R v Pryor; Ex parte A–G (Q)* [2001] QCA 241; *R v Palaga* [2001] SASC 174; *R v Carter* [2001] NSWCCA 245; *R v Meyboom* [2001] FCA 861; *Knight v The Queen* [2001] NTCCA 4; *Patterson v The Queen* [2001] NSWCCA 316; *R v Goltz* [2001] QCA 264; *R v Delgado–Guerra; Ex parte A–G* [2001] QCA 266; *R v Miles* [2001] NSWCCA 274; *R v Denney* [2001] NSWCCA 281; *DPP v Harika* [2001] VSC 237; *R v Porciello* [2001] SASC 286; *R v Bethune* [2001] NSWCCA 303; *R v Moore* [2001] NSWCCA 454; *Day v The Queen* [2001] WASCA 284; *R v Blyth* [2001] NSWCCA 402; *R v Boulghourgian* [2001] NSWCCA 460; *R v Vinh Ngoc Phan* [2001] NSWSC 1069; *R v Anderson* [2001] NSWCCA 488; *R v Vitsos* [2001] NSWCCA 528; *Festa v The Queen* (2001) 208 CLR 593; *R v Abdallah* [2001] NSWCCA 506; *R v Perese* [2001] NSWCCA 478; *R v Andrew* [2000] NSWCCA 310, [6]; *Behan v The Queen* [2000] WASCA 204; *R v Tang* [2000] NSWCCA 219; *R v Elfar* [2000] NSWCCA 255; *Christianos v The Queen* [2000] WASCA 184; *R v Regazzoli* [2000] QCA 326; *R v Andrew* [2000] NSWCCA 310; *R v Perrem* [2000] QCA 339; *R v Suters* [2000] NSWSC 1116; *R v Agnew* [2000] VSCA 245; *R v Itamua* [2000] NSWCCA 502; *R v Bellamy* [2000] NSWSC 1217; *Ilic v The Queen* [2000] WASCA 41; *R v Catalano* [2000] NSWSC 1248; *R v Festa* [2000] QCA 73; *R v De Gruchy* [2000] NSWCCA 51; *R v K* [2000] NSWCCA 73; *Atholwood v The Queen* [2000] WASCA 76; *R v Iddles* [2000] NSWCCA 128; *R v Beattie* [2000] NSWCCA 201; *R v Brennan* [1999] 2 Qd R 529; *R v Clune* [1999] 72 SASR 420; *R v Daphney* [1999] QCA 69; *Johnsen v Dunstan* [1999] ACTSC 30; *R v Quach* (1999) 21 SR (WA) 363; *R v*

believe this italicised qualification to be redundant, given assumptions about uniqueness and permanence.³⁹ Historically, regardless of the procedure they employed (or the precise number of points identified), fingerprint examiners claimed, and were routinely allowed to testify, that fingerprint comparison (or the particular procedure, such as ACE-V) could unerringly identify a specific person. When pushed, an examiner might occasionally concede that errors are possible, as the result of examiner incompetence or mistake, rather than an

Nguyen [1999] NSWCCA 451; *R v Tuatara* [1999] NSWCCA 242; *R v Bondareff* [1999] 74 SASR 353; *Atholwood v The Queen* [1999] WASCA 256; *R v Howden* [1999] VSCA 130; *R v Martin* [1999] QCA 366; *Naroldo v The Queen* [1999] NTCCA 100; *Leuschel v Police* [1999] SASC 409; *Quach v The Queen* [1999] WASCA 210; *R v Bandiera* [1999] VSCA 187; *McLachlan v The Queen* [1999] WASCA 255; *R v Basso* [1999] VSCA 201; *R v Osland* [1998] 2 VR 636; *R v Millar* [1998] QCA 276; *R v Smith* [1998] 71 SASR 543; *R v Gallagher* [1998] 2 VR 671; *R v Rayner* [1998] 4 VR 818; *R v Mitchell* [1998] QCA 31; *R v Collins* [1998] QCA 280; *Regina v Harrison* [1998] NSWSC 133; *R v Coulston* [1997] 2 VR 446; *R v Carusi* (1997) 92 A Crim R 52; *Markovina v The Queen* [No 2] (1997) 19 WAR 119; *R v Ousley* (1996) 87 A Crim R 326; *MacKenzie v The Queen* (1996) 190 CLR 348; *Markovina v The Queen* (1996) 16 WAR 354; *Regina v Withers* [1996] NSWSC 397; *R v Crupi* (1995) 86 A Crim R 229, [8]; *R v Tillott* (1995) 38 NSWLR 1; *R v Ridgley* [1995] QCA 493; *R v Booth* [1995] QCA 478; *R v Mitchell* (1994) 72 A Crim R 200; *R v Lars* (1994) 73 A Crim R 91; *R v Cowburn* (1994) 74 A Crim R 385; *R v J* [No 2] (1994) 75 A Crim R 522; *R v Hollingshed* (1993) 112 FLR 109; *R v Owens* [1993] QCA 168; *R v Barbaro* (1993) 67 A Crim R 456; *Anic v The Queen* [1993] 61 SASR 223; *Case Stated by DPP* [No 2 of 1993] (1993) 70 A Crim R 323; *Capper v The Queen* (1993) 69 A Crim R 64; *R v Davis* [1992] QCA 464, (from the police interview: 'Don't give me that, Shane. Your fingerprints are all over the place.'). *R v Chai* (1992) 27 NSWLR 153; *R v Connolly* [No 2] [1991] 2 Qd R 661; *R v Hofer* (1991) 55 A Crim R 225; *R v Pernich* (1991) 55 A Crim R 464; *R v Eades* (1991) 57 A Crim R 151; *R v Nichols* (1991) 57 A Crim R 391; *R v Kok Bin Lee* (1990) 1 WAR 411; *R v Vincec* (1990) 50 A Crim R 203; *R v Hallam* (1990) 49 A Crim R 316; *R v Oancea* (1990) 51 A Crim R 141; *R v Matthews* [1990] 58 SASR 19; *R v Clune* [1989] VR 567; *R v Crawford* [1989] 2 Qd R 443; *Pfingst v Kitamura* [1989] 2 Qd R 326; *Sheldon v Sun Alliance Australia Ltd* [1989] 53 SASR 97; *R v Davis* (1989) 44 A Crim R 113; *R v Gionfriddo* (1989) 50 A Crim R 327; *Wilde v The Queen* (1988) 164 CLR 365; *R v Yau Leung Wong* (1988) 37 A Crim R 385; *R v Burr* (1988) 37 A Crim R 220; *Romeo v The Queen* [1988] WAR 304; *R v Suen* (1987) 25 A Crim R 393; *R v Chow* (1987) 11 NSWLR 561; *Mickelberg v The Queen* (1987) 29 A Crim R 442; *Mylonas v The Queen* [1987] WAR 261; *R v Jones* (1986) 22 A Crim R 42; *Phillips v The Queen* (1985) 159 CLR 45; *Mickelberg v The Queen* [1984] WAR 191; *R v Clark* [1984] 2 Qd R 65; *R v Zakaria* (1984) 12 A Crim R 386; *R v Thorpe* (1983) 8 A Crim R 124; *R v Viers* [1983] 2 Qd R 1; *R v Wills* [1983] 2 VR 201; *R v Torney* (1983) 8 A Crim R 437; *R v Williams* [1983] 2 VR 579; *R v Smith* [1982] 2 NSWLR 569; *R v Alexander* [1981] VR 277; *R v Stalder* [1981] 2 NSWLR 9; *R v Ryan* (1981) 5 A Crim R 208; *R v Lattouf* (1980) 2 A Crim R 65; *R v Killick* (1980) 24 SASR 137; *MacDonald v A-G (Cth)* [1980] 24 SASR 294; *R v Thornton* (1980) 3 A Crim R 80; *R v Szach* [1979] 23 SASR 504; *R v Simic* [1979] VR 497; *Driscoll v The Queen* (1977) 137 CLR 517; *R v Clune* [No 1] [1975] VR 723; *R v Charlton* [1972] VR 758; *Ex parte Lee Yum Bo*; *Re Moroney* [1964–5] NSWLR 950; *R v Crooks* (1944) 44 SR (NSW) 390; *R v Morris* [No 3] [1914] St R Qd 274.

³⁹ Simon Cole, 'Forensics Without Uniqueness, Conclusions Without Individualisation: The New Epistemology of Forensic Identification' (2009) 8(3) *Law, Probability & Risk* 233. Fingerprint evidence is often contrasted with other types of evidence that are not 'unique'. See, eg, *R v Crawford* [1985] 2 Qd R 22 and *R v Kern* [1986] 2 Qd R 209 (hair comparison).

intractable feature of the subjective method(s).⁴⁰ In the few cases where examiners were called and asked about error, they typically testified that there was no error in the specific case and in general ‘the possibility of error’ was remote or, more commonly, theoretical or hypothetical.⁴¹

In *JP*, a case heard in 2015 (and discussed below), a senior New South Wales Police fingerprint examiner testified in the following terms:

- A. If the ACE-V methodology is done correct I don’t agree that there’s potentially error rates there. ...
- Q. So you would say that the ACE-V method is infallible is that what you say?
- A. In the correct — used in the correct method and way and by myself yes.⁴²

The following exchange captured his confidence in the identification and the absence of error:

- Q. What’s your level of confidence in relation to that opinion?
- A. 100 per cent.
- Q. You’re a hundred per cent certain about that conclusion?
- A. Yes I am.⁴³

As we shall see, it makes no sense to speak of an infallible method when each stage of ACE-V requires an examiner to engage in subjective assessments — ie interpretation. That interpretation is predicated upon untestable and somewhat misleading assumptions about uniqueness. The fact that examiners were not historically sensitive to the frequency and inter-relatedness of fingerprint features (see Figure 1 above), or concerned with cognitive bias (eg suggestion), only compounds the problems.

At this point we turn to consider what attentive scientists have to say about latent fingerprint evidence and its underpinnings. The perspectives of scientists are revealing because, notwithstanding latent fingerprint examiners presenting themselves and being recognised as forensic scientists, and referring to the ‘science of fingerprints’ from its very inception, before the 21st century hardly any Australian fingerprint examiners possessed formal scientific qualifications.⁴⁴

⁴⁰ Simon Cole, ‘More than Zero: Accounting for Error in Latent Fingerprint Identification’ (2005) 95(3) *Journal of Criminal Law & Criminology* 985.

⁴¹ See the extract from *R v O’Callaghan* [1976] VR 676, reproduced below Part V. The ‘possibility of error’ is taken from a contemporary New South Wales Police pro forma.

⁴² Transcript of Proceedings, *R v JP* (Children’s Court of New South Wales, Magistrate Mijovich, 13 January 2015) 33 (*JP* (Trial transcript) (13 January)). 10–13.

⁴³ Transcript of Proceedings, *R v JP* (13 January 2015) 12–13, 25. See also *R v Graham* (2017) 325 FLR 21, [43], where the expert is reported as being ‘100 per cent confident that the print was that of the accused’.

⁴⁴ *R v Amatto* [2011] NSWDC 194, [2].

III SCIENTIFIC INSIGHT INTO LATENT FINGERPRINT COMPARISON

This article is possible because, during the last decade, scientists have finally begun to study latent fingerprint examiners and their evidence.⁴⁵ These studies were undertaken in response to high-profile misidentifications, wrongful convictions, scholarly criticisms, and the first-ever independent reviews of the forensic sciences. For the first time in more than 100 years, we now have a reasonably good idea of the validity of the (modern) procedure and its scientific reliability — including its accuracy. This is important because, now that we have access to empirically based insights, we can start to consider what courts did in the absence of knowledge. This enables us to reflect on legal awareness (of its absence) and historical performances, as well as to gauge whether the availability of scientific knowledge has transformed contemporary practice.

In this part it is my intention to draw attention to research findings and recommendations produced by attentive scientists in a range of recent reports and reviews — notably *Strengthening Forensic Science in the United States: The Path Forward* (2009), *Latent Print Examination and Human Factors* (2012), *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-comparison Methods* (2016), and *Forensic Science Assessments: A Quality and Gap Analysis — Latent Fingerprint Examination* (2017).⁴⁶ These reports were produced by prestigious scientific and technical organisations, respectively: the National Research Council of the National Academy of Sciences ('NRC'), the National Institute of Standards and Technology ('NIST'), the President's Council of Advisers on Science and Technology ('PCAST'), and the American Association for the Advancement of Science ('AAAS'). In addition, inquiries in the United States and Scotland, following prominent misidentifications (Brandon Mayfield and Shirley McKie, respectively), led to reports, prepared by the Department of Justice (United States) and a Scottish judge — now Lord Campbell.⁴⁷

The first point to make is that all of the independent scientific reviews insist on the need to *validate* the procedures (or methods) used by latent fingerprint examiners. Validation is a process of formal evaluation (or testing), conducted in

⁴⁵ This article is concerned with identification by latent fingerprints, not identification by 10-print sets, which is a very different activity that is now practically automated.

⁴⁶ NRC Report (n 35); NIST Report (n 19); PCAST Report (n 13); William Thompson et al, AAAS, *Forensic Science Assessments: A Quality and Gap Analysis — Latent Fingerprint Examination* (Report, 2017) ('AAAS Report'). For a review, see Gary Edmond, 'What Lawyers Should Know About the Forensic 'Sciences'' (2015) 36(1) *Adelaide Law Review* 33.

⁴⁷ United States Department of Justice, *A Review of the FBI's Handling of the Brandon Mayfield Case* (United States Department of Justice, Office of the Inspector General, Oversight and Review Division, 2006); Anthony Campbell, *The Fingerprint Inquiry Report* (Report, December 2011) ('SFI Report').

circumstances where the correct answer is known (by those evaluating the procedure), in order to determine whether the procedure does what its proponents claim.⁴⁸ It determines the conditions in which a procedure is known to work, as well as how well it works. PCAST explained it in the following way:

For a metrological method to be scientifically valid and reliable, the procedures that comprise it must be shown, based on empirical studies, to be *repeatable, reproducible, and accurate*, at levels that have been measured and are appropriate to the intended application.⁴⁹

PCAST insisted that ‘methods [such as ACE-V] must be presumed to be unreliable until their foundational validity has been established based on empirical evidence’.⁵⁰ Revealingly, the NRC Committee, in the first and most influential of the reports, concluded that, as of 2009, no validation research had been conducted on latent fingerprint comparison.⁵¹ The NRC infamously concluded that, ‘with the exception of nuclear DNA analysis’, none of the remaining comparison procedures have ‘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’.⁵² In response, the multi-disciplinary committees responsible for the NRC, NIST and PCAST Reports called for much greater disclosure and more modest forms of expression by latent fingerprint examiners and many other forensic scientists. NIST recommended replacing ‘[c]laims of “absolute” and “positive” identification’ with ‘more modest claims about the meaning and significance of a “match”’.⁵³

On ACE-V, the modern incarnation of the procedure, the NRC, NIST, PCAST and AAAS all expressed concerns. Rather than a method grounding error-free identification, as suggested in the earlier extracts, assessment by the NRC was more restrained:

⁴⁸ Several of the United States reports, attentive to admissibility standards in the United States, suggested that forensic science procedures that had not been formally validated should not be adduced and relied upon in criminal proceedings. See, eg, PCAST Report (n 13) 140 (Recommendation 8.3) and 145 (Recommendation 9.4).

⁴⁹ PCAST Report (n 13).

⁵⁰ Ibid 32.

⁵¹ NRC Report (n 35) 142–5. The Council endorsed the following assessment by Haber and Haber: ‘we have reviewed available scientific evidence of the validity of the ACE-V method and found none’. See Lynn Haber and Ralph Haber, ‘Scientific Validation of Fingerprint Evidence under *Daubert*’ (2008) 7(2) *Law, Probability & Risk* 87.

⁵² NRC Report (n 35) 7–8.

⁵³ NIST Report (n 19) 130; NRC Report (n 35) 142. See Jennifer Mnookin, ‘The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate’ (2008) 7(2) *Law, Probability & Risk* 127.

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.⁵⁴

In the wake of critical appraisal by the NRC in 2009, scientific research commenced. The first rigorous attempts to evaluate latent fingerprint comparison were published a century *after* Australian appellate courts, including the High Court, accepted that latent fingerprint evidence was not only admissible but also sufficient to support conviction in a case where there was no other evidence. On the basis of recent research, what do we *now* know about modern latent fingerprint comparison? Well, scientists found that fingerprint examiners are ‘exceedingly accurate compared with novices, but are not infallible’.⁵⁵ When examiners were tested in controlled conditions resembling casework, they were found to make small numbers of errors. Reviewing the available research, all conducted in the aftermath of the NRC review, PCAST summarised the existing studies as follows — see Table 1 below.

Study	False Positives			
	Raw Data	Freq. (Confidence bound)	Estimated Rate	Bound on Rate
Early studies				
Langenburg (2009a)	0/14	0% (19%)	1 in ∞	1 in 5
Langenburg (2009b)	1/43	2.3% (11%)	1 in 43	1 in 9
Langenburg et al. (2012)	17/711	2.4% (3.5%)	1 in 42	1 in 28
Tangen et al. (2011) (“similar pairs”)	3/444	0.68% (1.7%)	1 in 148	1 in 58
Tangen et al. (2011) (“dissimilar pairs”)	0/444	0% (0.67%)	1 in ∞	1 in 148
Black-box studies				
Ulery et al. 2011 (FBI)**	6/3628	0.17% (0.33%)	1 in 604	1 in 306
Pacheco et al. 2014 (Miami-Dade)	42/995	4.2% (5.4%)	1 in 24	1 in 18
Pacheco et al. 2014 (Miami-Dade) (excluding clerical errors)	7/960	0.7% (1.4%)	1 in 137	1 in 73

Table 1 — Error rates in studies of latent print analysis⁵⁶

⁵⁴ NRC Reports (n 35) 142–3; NIST Report (n 19) 8–9; PCAST Report (n 13) 66–81.

⁵⁵ Jason Tangen, Matthew Thompson and Duncan McCarthy, ‘Identifying Fingerprint Expertise’ (2011) 22(8) *Psychological Science* 995, 997; Brad Ulery et al, ‘Accuracy and Reliability of Forensic Latent Fingerprint Decisions’ (2011) 108(19) *Proceedings of the National Academy of Sciences* 7733.

⁵⁶ PCAST Report (n 13) 98. Full references and descriptions of all the studies are provided in the PCAST Report.

Of this research, the ‘black-box studies’ were characterised as appropriate for determining the incidence of error. On the basis of the available empirical research, ‘only two properly designed studies of the accuracy of latent fingerprint analysis have been conducted’.⁵⁷ PCAST recommended that these results should inform the way latent fingerprint examiners report their opinions:

PCAST finds that latent fingerprint analysis [has] *a false positive rate that is substantial* and is likely to be higher than expected by many jurors based on longstanding claims about the infallibility of fingerprint analysis. The false-positive rate could be as high as 1 error in 306 cases based on the FBI study and 1 error in 18 cases based on a study by another crime laboratory. In reporting results of latent-fingerprint examination, it is important to state the false-positive rates based on properly designed validation studies.⁵⁸

This information would, according to PCAST, ‘appropriately inform jurors that errors occur at detectable frequencies, allowing them to weigh the probative value of the evidence’.⁵⁹ This recommendation stands in stark contrast to the long-standing presentation of an opinion as positive identification that, if questioned, was defended as certain or infallible.⁶⁰

Scientific review exposed other issues. Attentive scientists expressed concerns about the way the various stages of ACE-V were described and conducted. They found that there were few meaningful standards in place. There were, for example, no empirically informed standards around the quality and sufficiency of latent fingerprints used for comparison and identification. Moreover, they found that examiners did not agree on the sufficiency of prints or the number of points (ridge detail) that could be observed — inter-examiner inconsistency. They also found that the same examiners marked-up different points and different numbers of points when presented with the same prints on separate occasions — intra-examiner inconsistency.⁶¹

In addition, latent fingerprint examiners had historically ignored the risks posed by human factors.⁶² Fingerprint examiners, like other humans, are vulnerable to cognitive bias, particularly suggestion. One small, though

⁵⁷ Ibid 9. These are likely to change, and probably improve, as more studies are conducted and revised procedures (and technologies) and new forms of training put in place.

⁵⁸ Ibid 9–10, 26, 74 (emphasis added).

⁵⁹ Ibid 74, 26.

⁶⁰ Many reports in other jurisdictions refer to the very thin line between the evidence being understood as opinion or fact. Indeed, the SFI Report (n 47) 740), recommended that this should be made clear.

⁶¹ Itiel Dror et al, ‘Cognitive Issues in Fingerprint Analysis: Inter- and Intra-Expert Consistency and the Effect of a “Target” Comparison’ (2011) 208(1–3) *Forensic Science International* 10.

⁶² ‘Human factors’ are psychological and physiological factors that threaten forensic science practices and results.

notorious, study by Dror and colleagues, led four of five experienced latent fingerprint examiners to reverse their decisions on whether two prints matched by priming them with domain irrelevant information.⁶³ The work of latent fingerprint examiners was, and in many bureaux remains, awash in contextual information that is not required to undertake comparison work. That is, examiners are routinely exposed — through contact with detectives, crime scenes, fellow examiners, their documentation and databases — to information that is not required to undertake ACE-V and may actually subvert interpretation. The verifier being exposed to the result of the original examination is yet another example. Historically, like many other forensic scientists, latent fingerprint examiners considered themselves immune to cognitive biases because of their training and experience. Scientists, in contrast, recommended shielding examiners from domain irrelevant information (eg details about the crime or the suspect) and suggestive processes (eg non-blind verification).⁶⁴

The various scientific reports also challenged the significance attributed by latent fingerprint examiners to uniqueness (and permanence).⁶⁵ There is no doubt that fingerprints are highly variable. They might even be unique, although we cannot actually test this. Uniqueness is an assumption. Regardless, notwithstanding their marked variability (or uniqueness), latent fingerprint examiners make mistakes — not identifying fingerprints that match (false negatives), and occasionally matching fingerprints from different sources (false positives). The asserted uniqueness of prints does not prevent fingerprint examiners from making mistakes. Claims about certainty and infallibility, and the implications of fingerprints being unique (or appearing identical), are misguided. The more appropriate issues are the frequency of errors (especially false positives) made in similar conditions and the empirical insight into the frequency (and inter-relatedness) of features.⁶⁶ This is why PCAST recommended that fingerprint examiners should provide an indicative error rate with their match decisions and should aim to develop probabilistic forms of expression and reporting — as with DNA profiling.⁶⁷

⁶³ That is, information that is not required to analyse and compare fingerprints. See Itiel Dror et al, 'Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications' (2006) 156(1) *Forensic Science International* 74.

⁶⁴ NIST Report (n 19); Department of Justice, *National Commission on Forensic Science* (Web Page) <<https://www.justice.gov/ncfs>>.

⁶⁵ PCAST Report (n 13) 61–2. See also NRC Report (n 35) 145.

⁶⁶ Or the frequency of similar features in other fingerprints, leading to some kind of probabilistic formulation.

⁶⁷ DNA profiling evidence is expressed in probabilistic terms, but no error rate is included. Interestingly, analogies with fingerprints were used to support the admission of DNA profiling. See, eg, *R v Galli* [2001] NSWCCA 504.

The most recent of the scientific reviews, a gap analysis by the AAAS, concluded that historical over-claiming by latent fingerprint examiners would be difficult to correct:

Public perceptions of latent print examination have undoubtedly been shaped by decades of overstatement. One of the problems that examiners now face when attempting to convey a more realistic and appropriate sense of the value of latent print evidence is that people generally think a reported association between a latent print and reference print constitutes a virtually infallible identification. In our view latent print examiners should take affirmative steps, when reporting their findings, to address these common misconceptions.⁶⁸

Courts, including Australian courts, would seem to be implicated in this state of affairs and consequently would seem to be obliged to assist in its remediation.⁶⁹

We might also note that latent fingerprint examiners did not proactively identify problems, and most have not disclosed fundamental epistemological deficiencies. Indeed, rather than evaluate their procedures and abilities, most relied upon their (collective) impressions and experience, assumptions about uniqueness and its significance handed down by earlier generations of examiners, in conjunction with the accommodating responses of courts. Fingerprint examiners were apparently satisfied by the alignment of their opinions with confessions, legal admission and convictions. The problem with these and other forms of 'evidence' is that they are proxies at best.⁷⁰ The correct answer — whether the prints are actually from the same source, and whether an error has been made — is usually unknown in case work. Convictions, for example, may be driven by other evidence (often known to the examiner) and are not infrequently factually wrong.⁷¹ Fingerprint examiners did not study their performance or go looking for errors or vulnerabilities. Indeed, most fingerprint examiners and bureaus were not capable of undertaking the remedial validation work themselves. In the wake of the reviews, they continue to report in categorical terms.

There are marked discrepancies between how latent fingerprint evidence is represented in criminal justice settings and how it is understood by attentive scientists. Importantly, legal institutions did not generate a sophisticated endogenous response to latent fingerprint (and other types of forensic science) evidence and, perhaps as troubling, *appear* to be resistant to contemporary

⁶⁸ AAAS Report (n 46) 71.

⁶⁹ See, eg, the cases cited above n 38.

⁷⁰ See Martire and Edmond (n 7).

⁷¹ More problematically, decision-makers rely on fingerprint evidence to convict and assess convictions on appeal.

scientific knowledge and authoritative scientific advice.⁷² Legal rules and procedures have never been interpreted in ways that direct attention to epistemological issues such as validity and scientific reliability. There is, for example, no expectation as a condition of admission that fingerprint examiners will disclose empirically derived error rates — see below Part VI(A).

Scientific research provides a means of assessing legal responses to latent fingerprint evidence — past and present. This, as we shall see, is illuminating. The following study illustrates how no Australian court ever required latent fingerprint examiners to independently demonstrate their abilities or explain limitations and uncertainties — even when their opinion evidence was contested. There was no requirement to show that latent fingerprint comparison was valid, and no consideration of its actual accuracy. There was no attention to the existence of meaningful standards, on sufficiency, quality, agreement, the number of points required, and so forth. No court — and this is very important — required latent fingerprint examiners to present their evidence in a way that was consistent with their known ability and in a form that would assist with rational evaluation (as opposed to deference). Courts allow fingerprint examiners to positively identify persons without qualification or caveat. Courts also allow latent fingerprint examiners to testify about their ‘method’ and ‘the science’ — as in the example in Part II above — in ways that are misguided, misleading and sometimes plainly wrong. Fingerprint examiners testify about their impressions and beliefs (what we might call fingerprint dogma), but these are not necessarily based on scientific knowledge or consistent with the expectations of attentive scientists.

IV ADMISSIBILITY ASSUMED: *R v BLACKER* (1910) AND *R v PARKER* (1912)

Our survey begins at the end of the first decade of the 20th century. By that stage fingerprint bureaux had already been established within most of the Australian police departments, and fingerprint evidence had already been used in investigations and criminal prosecutions.⁷³ The first indication of an issue, for those reviewing the legal record, is the absence of a reported decision addressing

⁷² Although police organisations, lawyers and courts have sometimes prevented examiners from engaging with scientific research and disclosing criticisms and recommendations. Examiners, like other expert witnesses, serve a number of ‘masters’.

⁷³ It was sometimes used to obtain confessions — or that is how police investigations were presented to the public.

(a challenge to) the admissibility of latent fingerprint evidence in Australia.⁷⁴ The first two reported Australian cases, from New South Wales and Victoria, indicate how quickly the primary focus seems to have moved beyond any question of admissibility (and implicitly reliability) to practices surrounding the use of fingerprint evidence — specifically the use of photographs and whether a fingerprint alone could support proof (of identity) beyond reasonable doubt. As in England and Wales, in just a few short years the admissibility of latent fingerprint evidence seems to have been taken for granted by Australian courts.⁷⁵ The absence of sustained legal, and conspicuously appellate, engagement with the foundations is revealing once we appreciate that the validity and accuracy were unknown (at that stage).

The prosecution in *R v Blacker* ('*Blacker*') followed a serious assault on a Chinese market gardener, the ransacking of his hut, and the theft of cash from a box therein. A fingerprint on the box was matched to the thumb of Blacker. Using a 'strong magnifier', police sub-inspector Childs identified 14 points of similarity and opined that the print on the box was made by Blacker's thumb.⁷⁶ Blacker was tried and, on the basis of fingerprint evidence, convicted. The issue reserved in this case was whether enlarged photographs of the latent fingerprint and reference (or known) fingerprints from Blacker had been properly admitted. The defence challenged the admissibility of the particular enlargements on the ground that neither of the enlarged images captured the 'whole' of the latent or the reference print. Rather, they reproduced only that part of the print relied upon by Childs for his comparison. Photographs of the full prints — which had not been enlarged — were admitted along with the enlargements.

On appeal, the Chief Justice of New South Wales had no doubt about the admissibility of the fingerprint evidence:⁷⁷

This new *science of identification* by fingerprints is *based on experiments* which show that the portion of the body most likely to be identified without probability of mistake is the bulbous portion of the thumb, and if similarity is found to exist *the test is a very*

⁷⁴ If there was a serious challenge at trial, then it has not been remembered. Even *Blacker* (n 4) appears to have been quickly forgotten. There were quite a few investigations and prosecutions relying on fingerprint evidence reported in the major metropolitan newspapers in the decade preceding *Blacker*.

⁷⁵ The first reported English decision, *Castleton* (n 4), is reproduced in full in an Appendix to this article.

⁷⁶ *Blacker* (n 4) 358. That is, 'the two marks were made by the same thumb'. See also *Blacker v The King* (1910) 10 CLR 604, 605 ('*Blacker* (HCA)').

⁷⁷ *Blacker* (n 4) 360.

reliable one. In the present case the evidence of the expert showed that the similarity was sufficiently strong to justify the admission of evidence upon the point.⁷⁸

Upon inspection of the photographs, Cullen CJ and his colleagues were satisfied that the fingerprints were made by the same person.⁷⁹

In relation to the partial enlargements, the Court accepted that ‘all the markings upon which the evidence as to the identification was based were represented’.⁸⁰ The enlargements were necessary ‘to illustrate and explain what otherwise the jury could not see for themselves’, and to enable ‘the evidence of the expert ... to be tested’.⁸¹ The omission of some surrounding markings, apparently blurred and not used for the comparison, was said to be immaterial in the absence of the defendant calling evidence to show that the portion used ‘was insufficient’ or not ‘accurately prepared under the supervision of the expert’.⁸² The Chief Justice insisted that the fingerprint evidence ‘was carefully given and thoroughly tested’.⁸³ In particular, the jury was ‘very carefully directed by the learned Judge as to the risk of error to which evidence of this class is open’, and ‘every precaution was taken to guard against any wrongful impression being conveyed to the jury’.⁸⁴

The appeal in *R v Parker* (‘*Parker*’) generated a more expansive appellate response to issues attending the introduction of fingerprint evidence,⁸⁵ although, once again, it had ‘not been suggested that this evidence was wrongly admitted’. The appeal in *Parker* is concerned with the value of the evidence — specifically, the ability of a single latent fingerprint to support criminal proof.⁸⁶ *Parker* is exceptional, among our sample, because, notwithstanding the majority finding the fingerprint evidence admissible and compelling, the Chief Justice of Victoria voiced a forceful dissent.

Parker was convicted of breaking into a warehouse and stealing jewellery from a safe. A latent fingerprint was obtained from a bottle of ginger beer located adjacent to the safe. A photograph of the latent print, as well as a photograph of

⁷⁸ Ibid 360 (emphasis added). Neither the experiments nor the evidence supporting the bulbous part of the thumb being of most use for comparison are referenced.

⁷⁹ This personal assessment appears inconsistent with *Lawless* (n 4) and *R v O’Callaghan* [1976] VR 676, discussed below Part V.

⁸⁰ *Blacker* (n 4) 361.

⁸¹ Ibid. Contrast *Bennett* (n 4) (discussed below), where there is no requirement for the provision of images or the examiner’s markings.

⁸² *Blacker* (n 4) 361–2.

⁸³ Ibid 360.

⁸⁴ Ibid.

⁸⁵ *Parker* (n 4) 153.

⁸⁶ Compare DNA-only prosecutions. See Andrew Ligertwood, ‘Can DNA Evidence Alone Convict an Accused?’ (2011) 33(3) *Sydney Law Review* 487.

Parker's middle fingerprint, were enlarged and admitted at trial. Detective Potter, in charge of the fingerprint identification branch, gave evidence about the resemblance and 'pointed out to the jury nine points of similarity', as well as scars said to appear in both images.⁸⁷ His evidence was summarised as follows:

[H]e was of opinion that the prisoner's finger must have made the print on the bottle. He had examined tens of thousands of finger-prints, and never found two alike. The markings on a person's fingers remain the same through life. Inspector Child[s], of the New South Wales police, gave evidence to the same effect. No two individuals had the same finger-prints.⁸⁸

The jury convicted. The Court of Appeal was asked to consider: 'When the only evidence against an accused person depends upon the resemblance between finger-prints ... [is] such evidence ... sufficient to support a conviction'?⁸⁹

Three judges considered this question and two found that it could. In reflecting on fingerprint evidence, Hodges J considered that, in comparison to eyewitness evidence, fingerprints

would be the strongest, the most satisfactory, and the most conclusive proof of identity that could be produced, and therefore ... finger-print evidence of identity may be undoubtedly sufficient to justify the conviction of the accused.⁹⁰

He continued:

In my opinion, it may be the safest of all evidence, as it does not depend upon the impressions caused by a momentary glance, but the impression is put on record, and the jury can see and judge for themselves as to the identity of the finger-marks and the expert be merely a help to enable the jury to use the evidence of their own eyes.⁹¹

In terms of the respective role of fingerprint examiner and jury, provided the jury 'were satisfied with the witness under examination and cross-examination to arrive at the conclusion', for Hodges J 'that was sufficient to justify a conviction'.⁹²

In his concurrence, Cussen J explained: 'It now seems that this much is established — that there is a very high degree of probability that a finger-print

⁸⁷ *Parker v The King* (1912) 14 CLR 681, 682 ('*Parker* (HCA)'). We can observe claims about permanence and uniqueness, mobilised as though they provide a warrant for individualisation. See, eg, *R v Kamleh* [2003] SASC 3. On *Parker*, see also Jeremy Gans, 'A Tale of Two High Court Forensic Cases' (2011) 33(3) *Sydney Law Review* 515.

⁸⁸ *Parker* (n 4).

⁸⁹ *Ibid* 156–7.

⁹⁰ *Ibid* 158.

⁹¹ *Ibid*.

⁹² *Ibid* 159. However, because Hodges J had neither seen nor heard the cross-examination, he would not say 'whether ... I would have agreed' with the result.

corresponding with that of the prisoner was made by his finger.’⁹³ There was no requirement that fingerprint evidence be corroborated by another class of evidence, and so he affirmed the conviction. Cussen J drew support from two English cases, namely, *R v Castleton* (‘*Castleton*’ — see the Appendix to this article) and another, along with *R v Rudiwick* (an unreported Victorian case), and the appeal to the Supreme Court of Illinois in *People v Jennings*.⁹⁴ His decision seems to suggest that, with respect to similarities between fingerprints, examiners ‘are not, in one sense, speaking as experts ... but merely pointing out to the jury matters which the jury could determine for themselves’. In his words, examiners ‘are simply convenient helpers of the Court’.⁹⁵ (Questions around the division of responsibility between examiners and juries would be an ongoing issue for Australian courts.)

In a spirited dissent, Madden CJ adverted to the ‘extreme danger’ of allowing fingerprint evidence to satisfy criminal proof:

The extreme danger of arriving at such a conclusion warrants me in not deferring to their opinions. We are asked to accept the theory that the correspondence between two sets of finger-prints is conclusive evidence of the identity of the person who made those prints as an established scientific fact, standing on the same basis as the proposition of Euclid or other matters vouched for by science and universally accepted as proved. If this finger-print theory were generally recognised by scientific men as standing on this basis, there would be no more to be said. 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.

My difficulty arises from the fact that the subject of finger-prints has not been sufficiently studied to enable these propositions to be laid down as scientific facts. Finger-prints have been studied by Monsieur Bertillon in France from an anthropometrical point of view, and by Sir Francis Galton and a few others, doubtless highly intelligent persons, from the standpoint of mere observers. But the matter has not been investigated by scientists generally so that we can say that the propositions relied on by the Crown are accepted scientific facts.⁹⁶

⁹³ Ibid 161. The judge speaks in terms of probabilities.

⁹⁴ See *R v Rudiwick* (Argus, 11 December 1909) 18 (listed as Charles Rudebeck); *Castleton* (n 4); an unnamed case cited in Alfred S Taylor, *The Principles and Practice of Medical Jurisprudence*, (J & A Churchill, 1910) vol 1, 127–8, and *People v Jennings*, 252 Ill 534, 96 NE 1077 (1911) (‘*Jennings*’).

⁹⁵ *Parker* (n 4) 160.

⁹⁶ Ibid 154. See *R v Mitchell* (1997) 98 A Crim R 32. And, more generally, see Josh Ellenbogen, *Reasoned and Unreasoned Images: The Photography of Bertillon, Galton, and Marey* (Penn State University Press, 2013).

For Madden CJ, the evidence also raised issues of honesty and trust that threatened to undermine legal safeguards. He referred to being dependent on the '*ipse dixit*' of the examiner: how could the cross-examiner or jury assess whether, among the 29,000 sets of prints purportedly examined by the witness, there were 'no two alike'?⁹⁷ And, vitally, how could his evidence be 'tested'?

[W]hen the detectives swear that no two men's finger-prints could possibly be alike, I think that that is apt to be accepted by the jury, who have no personal knowledge to test it by ...⁹⁸

The Chief Justice was not personally satisfied that 'there is any marked similarity' between the images of the latent fingerprint and Parker's fingerprint.⁹⁹ In the process he characterised the English Court of Appeal's decision in *Castleton* as 'most unsatisfactory', noted that those who had bought and delivered the ginger beer were not called, and observed that the possibility that the prisoner had innocently touched the bottle had not been excluded (by the prosecutor). The Chief Justice was of the opinion that the case should have been withdrawn from the jury.¹⁰⁰

Despite the split in the Court, all three judges questioned the claim about the individuality (or uniqueness) attributed to fingerprints. They agreed that 'the statement made by the expert witnesses that there could not be two finger-prints alike should not have been admitted, because ... their knowledge or the knowledge of anyone else on the subject does not profess to be based on any universal law, but is merely empirical'.¹⁰¹ That is, it was based on personal experience. Hodges J did not think it 'necessary to say that there could not be any other finger-mark in the world like it' and agreed 'with what the learned Chief Justice has said as to the admissibility of that piece of evidence'.¹⁰² Cussen J indicated that fingerprint examiners might identify differences (for exclusionary purposes), but as far as similarities were concerned, they could merely point these out to the jury for their consideration.¹⁰³ The headnote in the *Argus Law Reports* summarised the Courts' position in the following terms:

⁹⁷ *Parker* (n 4) 154. This term reappears in *Kumho Tire Co Ltd v Carmichael*, 526 US 127 (1999) ('*Kumho*').

⁹⁸ *Parker* (n 4) 155.

⁹⁹ *Ibid.*

¹⁰⁰ Consider the discussion of the meaning of a print in *R v Barbera* [1972] 1 NSWLR 612 and the cases cited below n 110.

¹⁰¹ *Parker* (n 4) 155 (Madden CJ), 159 (Cussen J), 158 (Hodges J).

¹⁰² *Ibid* 158.

¹⁰³ *Ibid* 161. This seems similar to the approach to image interpretation subsequently adopted in *Tang* (n 12).

Semble, per Curiam, — Evidence by experts that no two finger-prints can be identical is not admissible as being the statement of a scientific fact based upon a universal law.¹⁰⁴

Blacker and Parker each sought review by the High Court of Australia. Both requests were refused. During the oral application in *Blacker*, counsel raised the issue of the enlargement of part of the fingerprint and the possibility that ‘the portion omitted might have shown the prints were dissimilar’. The issue was left hanging.¹⁰⁵ The High Court appeared to accept the claim that, ‘if within a small radius around the bulb certain characteristics were found to coincide, that would identify the print irrespective of the outlying portions’.¹⁰⁶ If enlargements were not admissible, insisted Griffith CJ, ‘you might as well object to a witness using a microscope’.¹⁰⁷ Isaacs J explained that the enlargement of one part of the print ‘goes to the weight of the evidence, but not its admissibility’.¹⁰⁸

Subsequently, dismissing the application in *Parker*, Griffiths CJ drew an analogy between fingerprints and signatures:¹⁰⁹

Signatures have been accepted as evidence of identity as long as they have been used. The 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, although it seems to be still the practice to offer some expert evidence on the point. A finger print is therefore in reality an unforgeable signature. That is now recognised in a large part of the world, and in some parts has, I think, been recognized for many centuries. It is certainly now generally recognised in England and other parts of the British Dominions.¹¹⁰

Notwithstanding concerns in the Court of Appeal, the ‘individuality’ (or uniqueness) of fingerprints is here presented as notorious. The High Court seems to have been satisfied about ‘the individuality of the corrugations of the skin on the fingers’.

Blacker and *Parker* were not admissibility challenges per se, although they support, implicitly, the admissibility of latent fingerprint evidence. Following *Blacker* and *Parker*, fingerprints were not only admissible, but also, in cases where identity was in issue, fingerprint evidence alone could sustain proof beyond reasonable doubt.

¹⁰⁴ *R v Parker* in *The Argus Law Reports*, vol xviii (14 May 1912).

¹⁰⁵ *Blacker* (HCA) (n 76) 606.

¹⁰⁶ *Ibid* 605.

¹⁰⁷ *Ibid* 606. This statement seems to conflate the issue of enlargement, live in the application for leave, with the separate issue of the validity and accuracy of latent fingerprint comparison.

¹⁰⁸ *Ibid*.

¹⁰⁹ Counsel questioned whether *Castleton* was authority for a fingerprint-only conviction.

¹¹⁰ *Parker* (HCA) (n 87) 683 (Griffith CJ).

V A CENTURY OF CONSOLIDATION: ROUTINE RELIANCE AND NON-EPISTEMIC CHALLENGES

Between 1910 and the first of the scientific reviews published in 2009, the admissibility and use of fingerprint evidence was challenged in Australian courts in a variety of ways.¹¹¹ Reported challenges were not, however, directed toward the validity and accuracy of latent fingerprint evidence, the absence of (empirically based) standards, the categorical identifications, cognitive bias, and so on. Rather, the history of challenges to latent fingerprint evidence is dominated by legal issues, such as: compliance with procedures for obtaining reference

¹¹¹ The meaning of latent fingerprints (following ‘identification’) was often contested. In the following cases the significance of prints, rather than their accuracy, was in issue: *R v Lockwood* [2018] ACTSC 26; *Oziewicz v Western Australia* [2018] WASCA 81; *ET v Driscoll* [2018] WASC 406, [40]; *Nguyen v The Queen* [2017] VSCA 262, [12]; *R v Clapham* [2017] QCA 99, [17]–[18] (fingerprints on methylamphetamine manufacturing equipment); *R v MacGowan* [2017] SADC 107, [15]; *Alkhair v The Queen* [2016] NSWCCA 4; *R v Forster* [2016] QCA 62; *Victoria Police v Todero* [2016] VMC 30; *R v Cassidy* [2016] NTSC 1 (possible DNA contamination by fingerprint examiners); *Jubraeel v The Queen* [2015] NSWCCA 131, [51]; *Lam v The Queen* [2015] NSWCCA 87, [19]; *Young v The Queen* [2015] VSCA 265, [54]–[55]; *R v Gimm* [2015] QCA 256; *R v Kennedy* [2015] QDC 246, [12]–[14]; *R v Galway* [2014] NSWDC 1; *Naea v Minister for Immigration and Citizenship* [2013] AATA 152, [26]; *Oncev v Western Australia* [2012] WASCA 178, [42]–[43] (speculation about fingerprint examiner’s contaminating DNA); *R v Hay* [2010] QCA 107, [3] (removal of prints to show planning); *Coffman v The Queen* [2010] WASCA 54; *Hong v The Queen* [2009] NSWCCA 242; *Halmi v The Queen* [2008] NSWCCA 259; *Nicholls v The Queen* [2005] HCA 1; 219 CLR 196, [27]; *R v Zurek* [2006] QCA 543, [13] (significance of unidentified fingerprints); *Whittaker v Tasmania* [2006] TASSC 26, [49] (fingerprints on methylamphetamine manufacturing equipment); *R v Jennings* [2005] NSWSC 789, [22]; *Whelan v Police* [2005] SASC 205 (where door no longer available); *R v Tracey [No 6]* [2005] SASC 360; *R v Moore* [2005] ACTSC 66; *R v Staltari* [2005] SADC 4; *Rowbottom v The Queen* [2004] HCATrans 383; *R v Tammie* [2004] VSCA 165, [60]–[64]; *Barr v The Queen* [2004] NTCCA 1 (number of fingerprints expected from joyride); *Dhanhoa v The Queen* [2003] HCA 40 (innocent explanation); *R v Wan* [2003] NSWCCA 225; *R v Rodgers and Dowling* [2003] QCA 99, [45]; *Ahmad v The Queen* [2002] WASCA 70, [104]; *R v Bikić* [2002] NSWCCA 227, [33]; *R v Pedrana* [2001] NSWCCA 66; *R v Hanley* [2001] NSWCCA 350; *R v Vo* [2001] NSWCCA 67, [12]–[13], [28] (persistence of print); *R v Delgado-Guerra* [2001] QCA 266, [18]–[19] (fingerprints adjacent to crime); *R v King* [2001] QCA 419; *R v Regazzoli* [2000] QCA 326, [12], [25]ff; *R v Sinden* [2000] QCA 408; *Atholwood v The Queen* [2000] WASCA 76, [4]; *R v Van Mai* [2000] VSCA 184; *R v Liddell* [2000] VSCA 37; *R v Colebrook* [1999] NSWCCA 262; *R v Hudd* [1999] NSWCCA 382, [62]–[63]; *R v Power* [1999] SADC 125, [10]–[11]; *R v Wakim* [1998] 2 VR 46; *Ross v Tran* (1996) 87 A Crim R 144; *R v Kneeshaw, Tetley and Mckinley* [1996] SADC 3524; *R v Barbera* (NSWCA, 22 May 1959).

fingerprints;¹¹² the ability to obtain fingerprints from a minor;¹¹³ the use of fingerprints obtained when the defendant was a minor;¹¹⁴ whether adequate caution was given;¹¹⁵ whether the disclosure (or implication) of previous offences, through the existence of a fingerprint record, was unfair to the defendant at trial;¹¹⁶ the hearsay implications of fingerprints on a document;¹¹⁷ the cross admissibility of fingerprint evidence;¹¹⁸ whether fingerprints could sustain proof in particular cases (following *Parker*);¹¹⁹ the appropriate judicial directions for the

¹¹² *Western Australia v Cunningham* [No 3] [2018] WASCA 207; *Boski v Biffin* [2015] NSWSC 363; *R v SA, DD and ES* [2011] NSWCCA 60, [6]ff; *R v Carr* [No 2] [2011] NSWSC 724, [10], [27]; *Watkins v Victoria* [2010] VSCA 138 (damages for excessive use of force); *Aydin v The Queen* [2010] VSCA 190; *R v Tang* [2010] VSC 578; *McNeill v The Queen* [2008] FCAFC 80, [113]–[120]; *R v McNeill* [Ruling No 1] [2007] NFSC 2, [104]ff; *Jabbour v Hicks* (2007) 183 A Crim R 297 (under control order); *R v Fouyaxis* [No 2] [2007] SADC 62 (where DNA sampling destroyed possibility of obtaining fingerprints); *Lackenby v Kirkman* [2006] WASC 164; *R v Millard* [2006] ACTSC 56; *Maguire v Beaton* [2005] NSWSC 1241; *Pong Su* [No 2] [2004] VSC 492, [9]ff; *R v Delgado-Guerra; Ex parte A–G*, [2002] 2 Qd R 384; *R v Knight (aka Black)* [2001] NSWCCA 114; *R v Cvitko* [2001] SASC 72, [49] (whether defendant misled by reference to partial fingerprint during interview); *Lednar v Magistrates Court* [2000] VSC 549; *Cox v Robinson* [2000] QCA 454; *Mickelberg v The Queen* [1998] WASCA 55; *R v Sparkes* [1996] TASSC 106; *Grollo v Bates* [1994] FCA 1293; *DPP v Morrison* [1993] 1 VR 573 (consent); *R v Browning* (1991) 103 FLR 425; *Narburup v O'Brien* [1991] 1 NTLR 63; *R v McPhail* (1988) 36 A Crim R 390; *Bonder v Howell* [1984] WAR 76; *Fullerton v Commissioner of Police* [1984] 1 NSWLR 159; *Japaljarri v Cooke* (1982) 64 FLR 314; *Milner v Anderson* (1982) 60 FLR 225; *Coxan v Mazey* [1981] Tas R 209; *R v Boland* [1974] VR 849; *Carr v The Queen* (1973) 127 CLR 662; *R v Barnsley* [1972] 2 NSWLR 220; *R v Hass* [1972] 1 NSWLR 589; *Sernack v McTavish* [1971] ALR 441; *Trobridge v Hardy* (1955) 94 CLR 147.

¹¹³ *Police (NSW) v JC* [2016] NSWChC 1.

¹¹⁴ *R v Sarlija* [2006] ACTCA 22; *R v Sarlija* [2005] ACTSC 120.

¹¹⁵ *Milner v Anderson* (1982) 42 ACTR 23.

¹¹⁶ *R v Fennell* [2017] QCA 154, [91]ff; *R v Ahola* [No 6] [2013] NSWSC 703; *Kuehne v The Queen* [2011] NSWCCA 101, [20]–[28].

¹¹⁷ *Re Pong Su* [No 18] [2005] VSC 58.

¹¹⁸ *R v Elqueta* [1999] SASC 2, [20]ff; *R v Mayfield* (1995) 63 SASR 576.

¹¹⁹ *R v Fitzgerald* [2005] SADC 118; *Chahine v The Queen* [2006] NSWCCA 179; *R v Beattie* [2000] NSWCCA 201, [19]; *R v Barbera* (1972) 1 NSWLR 612 (referring to *R v Barbera* (NSWCA, 22 May 1959) and the significance of fingerprints on the outside of a car).

jury when fingerprint evidence was in issue;¹²⁰ and whether the jury could compare the fingerprints themselves.¹²¹

Perhaps the most sustained question concerns this last issue — the respective roles of fingerprint examiners, judges and juries in the evaluation of the fingerprint evidence. In *Blacker* (and *Castleton*) the Court of Appeal seems to have been satisfied that the latent fingerprints were those of the appellant on the basis of its own examination. The issue also rose in *Parker*, and more prominently later in the century in *R v Lawless* ('*Lawless*') and *R v O'Callaghan* ('*O'Callaghan*').¹²²

Lawless was convicted of murder on the basis of circumstantial eyewitness evidence and a latent fingerprint found on a cigarette packet recovered from the crime scene. He accused the police of planting the cigarette packet.¹²³ The Crown conceded that the fingerprint evidence in this particular case was insufficient on its own to prove guilt. On appeal, Lawless questioned the way the latent fingerprint evidence was presented to the jury. The trial judge insisted that the jury would not be provided with a magnifying (or 'Hendry') glass:

[T]he jury would not be allowed to carry out such an experimentation as it was an expert field of knowledge, and the accused would have to contest the witness's evidence with expert evidence or suggest to the jury that he should not be believed, but the jury could not set themselves up as experts.¹²⁴

The trial judge charged the jury in the following terms:

It is, of course, entirely a matter for you to judge and examine his evidence and to make up your own minds as to whether you are satisfied with it and satisfied that he is

¹²⁰ *Tema v Western Australia* [2011] WASCA 41, [73]ff; *R v Morgan* [2009] VSCA 225, [28]–[32]; *CMH (a child) v Bower* [2009] WASC 347; *Halmi v The Queen* [2008] NSWCCA 259, [91]; *Chahine v The Queen* [2006] NSWCCA 179, [33]–[34], [59]ff; *Perombelom v Western Australia* [2006] WASCA 168, [20]–[22]; *R v Maloney* [2004] NSWCCA 250, [42]ff; *Maniaci v The Queen* [2000] WASCA 195; *R v Peel* [1999] 2 Qd R 400; *Regina v Harrison* [1998] NSWSC 133 (CCA); *R v Bartels* (1986) 44 SASR 260; *R v Moore* [1982] Qd R 162; *Simic v The Queen* (1980) 144 CLR 319; *R v O'Callaghan* [1976] VR 676, 678. In *Maniaci v The Queen* [2000] WASCA 195, [8], [24], the trial judge's statement — '[c]ourts take judicial notice of the fact that no two people have identical fingerprints. If you are satisfied that an accused person's fingerprints have been found at an incriminating location or on an incriminating object, then that calls for some explanation as to how the fingerprints got there' — was not deemed inconsistent with *Woolmington v DPP* [1935] AC 462 ('*Woolmington*') or the right to silence. See also *R v Moir* (1912) 12 SR (NSW) 111.

¹²¹ *Lawless* (n 4); *S v Nala* (1965) 4 SA 360, 362.

¹²² *Lawless* (n 4); *R v O'Callaghan* [1976] VR 676 ('*O'Callaghan*'). See also *R v Amatto* [2011] NSWDC 194 (where a puerile legal challenge to the relevance of latent fingerprint evidence was succinctly dismissed), and *R v Moore* [1982] Qd R 162. Contrast the Canadian decisions in *R v Bornyk* 2013 BCSC 1927 and *R v Bornyk* 2015 BCCA 28.

¹²³ Discussed in *Report of The Board of Inquiry into Allegations against Members of the Victoria Police Force* (Report, 1978) vol 3; *Lawless v The Queen* (1979) 142 CLR 659.

¹²⁴ *Lawless* (n 4) 422.

accurate and honest, reliable, both in the investigation he made of the print and in the opinion that he expressed that it belonged to the accused man.¹²⁵

The Court of Appeal was satisfied that the trial judge's actions were appropriate and did not interfere with the prerogatives of the jury (or encourage them to become experts):

We are of the opinion that the judge was right in his intervention. It is a matter for expertise not possessed by the ordinary run of mankind to identify characteristics of fingerprints and their patterns in each of two prints and make a comparison and form a conclusion as to whether they are identical or not and the jury could not be invited or allowed to act as experts. That is not to say of course that the jury could be prevented from examining the exhibits for the purpose of determining whether they were satisfied to the necessary degree by the evidence of the witness. The determination was for them, but the provision of evidence was for the experts.¹²⁶

In *O'Callaghan*, the fingerprint evidence was challenged on the ground that the jury was invited to undertake its own analysis of the fingerprints. On appeal, the Court endorsed *Lawless*: 'when properly understood there is no conflict between what was said in *Lawless* and the decision in *Parker*'.¹²⁷ Both *Lawless* and *Parker* were said to 'make it plain that it is for the jury to decide whether one set of fingerprints is the same as another'.¹²⁸ The Court explained that it 'may be misleading to say that it is for the expert to form a conclusion whether two prints are identical, but his Honour made it clear that the determination of the question of fact was for the jury and that they had to consider whether they were satisfied with the expert evidence'.¹²⁹

The Court of Appeal was also asked to consider the admission of the following testimony:

Under cross-examination the expert said: "I have never been proved wrong on fingerprint identification, but the problem is it takes five years to train a fingerprint man, and members of the jury can see something in a fingerprint which they would consider makes it not in when in fact it is in." He was led into repeating and re-affirming his view that the impressions shown in Exhibits "B" and "C" were identical. Then after a lengthy cross-examination this question was put to him: "Would you go so far as to say that there are not and never have been any two prints which are the same as each other?" to which he replied, "I will, yes." Not content with that answer counsel persisted and finally these questions and answers were asked and given "You would say that never in the history of the world has there been a person born with the

¹²⁵ Ibid 423.

¹²⁶ Ibid (references omitted).

¹²⁷ *O'Callaghan* (n 12) 679.

¹²⁸ Ibid.

¹²⁹ Ibid. See also *R v Dearing* [1975] VicSC 37, 17–20.

same fingerprint as somebody else? — From my studying of text books and the findings of other[s] as you call scientists, and from my own examination of ridge characteristics occurring in fingerprints I have examined, I would say most emphatically no. “I take it you go a step further and say it is just not possible for such a thing to occur? — I would say yes, unless that impression was made by the same finger”.¹³⁰

Rather than treat some of these answers as impermissible, following the prohibition in *Parker* (and later *Ghebrat*), the fact that they were asked by defence counsel meant that, for the appeal, leave should not have been given to raise them.¹³¹ To the extent that these answers, made in the absence of scientific support (and against prohibition by the Court of Appeal), are received at trial, responsibility is attributed to the defence.¹³² Cross-examination is consistently presented, across the fingerprint cases, as an effective trial safeguard. However, when questions lead to ignorant, exaggerated and misleading answers, from an expert witness called by the Crown, the defence is blamed.¹³³

A handful of further appeals questioned the opinions of latent fingerprint examiners where opinions extended beyond match decisions (conventionally restricted to identity or *source*) to the *activity* associated with deposition of a latent fingerprint or the age of a print.¹³⁴ In *Hillstead v The Queen*, the fingerprint examiner testified that fingerprints in blood were deposited contemporaneously with a bloody murder. This testimony, presented without qualification or support, was judged to have been improper — *ipse dixit* that trespassed beyond the scope of legally recognisable fingerprint expertise.¹³⁵ The appeal in *R v SMR* was dismissed notwithstanding the examiner having offered an opinion about the age of a latent fingerprint on a library book, in circumstances where the trial judge did not appropriately address the limitations.¹³⁶ Expertise in fingerprint comparison for purposes of assisting with identification is not known to extend to determining the age of a print or the activity leading to deposition.¹³⁷ Even in *Mickelberg v The Queen*, a series of wrongful convictions involving serious police

¹³⁰ O’Callaghan (n 122) 677.

¹³¹ Ibid.

¹³² This is a consistent pattern in cases, where the defence is blamed for asking questions (or not asking questions). In *JP* (n 4), questions posed in cross-examination were said to somehow repair the non-compliant report and satisfy conditions for admission and use.

¹³³ This is a problem with the testimony (and its foundations), not the questions.

¹³⁴ *Barr v The Queen* [2004] NTCCA 1; *R v SMR* [2002] NSWCCA 258; *Kelly v Western Australia* [2018] WASCA 21, [48]–[50].

¹³⁵ *Hillstead v The Queen* [2005] WASCA 116, [50], [52]ff. Contrast *Mahmood v Western Australia* [No 2] [2008] WASCA 259, [55]ff, [225]; *Mansell v Western Australia* [No 6] [2013] WASCA 120, [137]–[139].

¹³⁶ [2002] NSWCCA 258. Contrast *R v Peel* [1999] 2 Qd R 400, 410.

¹³⁷ The scope of the expertise (or ‘field’) is an issue here. See also *R v Surridge* (1942) 42 SR (NSW) 278, 59 WN (NSW) 221, and *R v Spero* [2006] VSCA 58.

malfeasance that took decades to unravel, concern with the latent fingerprint evidence was directed to whether it was planted or a forgery.¹³⁸ The reliability of identification by latent fingerprint comparison was taken for granted throughout; only trespassing beyond accepted bounds and interventions by dishonest investigators threatened the integrity of this evidence.¹³⁹

Overall, the reliability (and probative value) of identification by latent fingerprint comparison appears unquestionable and, significantly, remains unquestioned. We can observe continuity in modern reported decisions where Australian courts demonstrate an abiding confidence in fingerprint evidence and find that it is so self-evidently reliable that there is no particular need for proponents to disclose materials, identify assumptions or explain the method. The appeals in *Bennett v Police* ('*Bennett*'), discussed immediately below, might even suggest liberalisation and complacency, as common-law judges no longer expect the Crown — as they had in *Blacker* and *Parker* — to provide photographic evidence, identify points of similarity or explain how the identification was made.

Bennett was identified when a fingerprint located following a break-in was described by a fingerprint examiner as 'identical to a fingerprint taken from Mr Bennett' and 'from the same person'.¹⁴⁰ At trial the examiner testified as follows: 'When I say that something is identical, what I mean is that the impressions were made by the one person excluding all others.'¹⁴¹ *Bennett* was convicted. On appeal, there was no dispute about the examiner being 'qualified to express the opinion that he gave'.¹⁴² The judgment insists that there was 'no suggestion that the process of comparison that he followed is not a recognised and appropriate process'.¹⁴³ Rather, *Bennett*'s counsel complained that the examiner had not supplied images or specified the features he observed. He had, in addition, made no contemporaneous notes.¹⁴⁴ This meant, according to the defence, that it was not in a position to determine the facts on which the opinion was based and so

¹³⁸ *Mickelberg v The Queen* [2004] WASCA 145; *Mickelberg v The Queen* [No 3] (1992) 8 WAR 236.

¹³⁹ It appears to have been easier to allege misconduct by investigators than challenge the actual identification: *R v Meldrum and Borchert* [1995] VSC 109, [65]ff. See also *Hunter Quarries Pty Ltd v Morrison* [2017] NSWCCA 326, 96 NSWLR 658, [441]–[442] (allegation of bias); *R v Robinson* [1999] NSWCCA 186 (following the Wood Royal Commission); *Palmer v The Queen* [1998] WASCA 153; *Lawless v The Queen* (1979) 142 CLR 659.

¹⁴⁰ *Bennett* (n 4) [2], [6]. And, on appeal, *Bennett* (Appeal) (n 36), [12], [16].

¹⁴¹ *Bennett* (Appeal) (n 36) [16].

¹⁴² *Ibid* [5].

¹⁴³ *Ibid*.

¹⁴⁴ *Ibid* [11]. During a lunch break at trial, the examiner took another look at the prints and reported finding 'more than 20 characteristics that were common and identical'.

was incapable of evaluating the opinion (and any reasoning) prior to the proceedings.¹⁴⁵

Doyle CJ explained that admissibility was not affected by the ability 'to describe in detail what the witness observed, or to produce an image or representation of what the witness observed'.¹⁴⁶ 'It was permissible', for the examiner, 'to say that identical features were found, without itemising them.'¹⁴⁷ Oversights and omissions were cast as issues for weight.¹⁴⁸ The defence was characterised as having 'had the fullest opportunity to cross-examine' the witness.¹⁴⁹ Moreover, the failure of the defence to ask for images and cross-examine on them was a factor that Doyle CJ thought ought to be taken into consideration in assessing the merit of the appeal.¹⁵⁰ In the end, the Chief Justice was satisfied with the admission of the evidence and the safety of the conviction because of 'unchallenged evidence that each fingerprint exhibited features that, taken together, led to the conclusion that they were identical'.¹⁵¹ It was not considered 'unfair, in a case like this, to leave it to counsel to cross-examine [the examiner] about the features on which he relied'.¹⁵²

The decision was upheld on a further appeal to the Full Court. The leading judgment in the Full Court provides a description of the comparison from the trial:

In making a comparison between the images of the negatives and in this case the unknown, and the known print on the ink set, it's a matter of comparing the impressions or the characteristics which appear in the image on the negative against the characteristics as they appear in sequence and by looking at the flow of the ridges, the quality of the impressions, an opinion may be formed.¹⁵³

This is a caricature of the 'method'. On appeal, the fact that the examiner had not proactively explained his method or produced the photographs, mark-ups or notes was again challenged because 'the factual basis [of the opinion] had not been established'.¹⁵⁴ It was said to be unfair because 'it was not possible ... to test

¹⁴⁵ Reference was made to the UEL case of *Makita Pty Ltd v Sprowles* (2001) 52 NSWLR 705, [59]–[63] ('*Makita*'). See also *Davie v Magistrates of Edinburgh* [1953] SC 34 ('*Davie*').

¹⁴⁶ *Bennett* (n 4) [44].

¹⁴⁷ *Ibid* [49]. Contrast *Blacker* (n 4) 361: 'If the evidence of the expert is to be tested at all it seems to me that it is necessary to allow his evidence of identification to be explained by something which is visible to the eye.'

¹⁴⁸ *Bennett* (n 4) [44], [47].

¹⁴⁹ *Ibid* [16].

¹⁵⁰ *Ibid* [47]. See also *Dasreef Pty Ltd v Hawchar* [2011] HCA 21, [32].

¹⁵¹ *Bennett* (n 4) [53].

¹⁵² *Ibid* [55].

¹⁵³ *Bennett* (Appeal) (n 36) [17].

¹⁵⁴ *Ibid* [21].

the opinion without access to the information upon which the comparisons had been made'.¹⁵⁵

The Full Court deemed the absence of photographs as a matter for weight. It characterised the defence position as strategic: 'a forensic choice not to ask for production of the image'.¹⁵⁶ As for the factual foundations and the method, the Full Court found that the 'evidence was admissible':¹⁵⁷

[T]he expert had not been challenged as to his expertise, his expertise had clearly been established, the methodology that he used generally in the comparison of fingerprints was explained to the Court [see the previous extract], the defence called no evidence to the contrary, and the expert gave evidence that he found the comparison showed that the fingerprints were identical.¹⁵⁸

We might note that there are no references to ACE-V, validation, standards, error rates, human factors, or scientific research in the decision.

On the issue of jury comparisons, Perry ACJ wrote: 'Identification of similarities in fingerprints is a highly technical matter requiring considerable expertise and experience. I have regularly instructed juries not to attempt to make such as comparison themselves.'¹⁵⁹ This seems to be a succinct summary of the conventional position following *Lawless* and *O'Callaghan*.

In *Parker* and *Blacker*, reference was made to the need for the jury to see the photographs of the prints. All of the judges in *Parker* were critical, and against the admission, of claims about uniqueness and, therefore, though perhaps implicitly, positive identification (to the exclusion of all other persons).¹⁶⁰ A century later, in *Bennett*, positive identification is not questioned and there is apparently no need for the examiner or prosecutor to produce images, explain the basis of the decision, refer to points of similarity, or even address apparent differences or distortion.¹⁶¹

It is not my intention to trivialise these legal (or non-epistemic) challenges. Rather, these examples illustrate how lawyers and courts have taken the reliability of latent fingerprint evidence — in its strongest form, as positive

¹⁵⁵ Ibid [23]. Drawing upon *Makita* (n 145). See also *JP* below.

¹⁵⁶ *Bennett* (n 4) [30].

¹⁵⁷ Ibid [31].

¹⁵⁸ Ibid [32]. Here certification and vague description of method stand in for actual ability and override the need for appropriate presentation.

¹⁵⁹ *Bennett* (Appeal) (n 36).

¹⁶⁰ These are the same, even if they are not always represented or understood as such. If fingerprint examiners believe fingerprints are unique, then they are presenting every match as individualisation.

¹⁶¹ In *Blacker* (n 4) 361, the enlargements were necessary 'to illustrate and explain what otherwise the jury could not see for themselves' and to enable 'the evidence of the expert ... to be tested'. Contrast *Bennett* (n 4) where there is no requirement for the provision of images or the examiner's markings.

evidence of identity — for granted. A handful of the challenges focused on legal and procedural issues were successful and probably represented the most effective way of advancing the particular client's interest within the existing paradigm. These cases, however, suggest that lawyers and judges credulously accepted (or were unwilling or unable to question) assertions, advanced by fingerprint examiners and accepted by earlier courts, about latent fingerprint evidence being effectively infallible evidence of identity based on the uniqueness of human fingerprints. The overwhelming concern with legal rather than epistemological issues seems to be the result of legal tradition and personal beliefs, in conjunction with a conspicuous lack of technical sophistication.¹⁶²

VI ROYAL COMMISSIONS, NEW RULES AND NEW TECHNOLOGIES

A series of notorious mistakes involving forensic science evidence, notably in *Splatt* and *Chamberlain*, and, more recently, prominent appeals in cases such as *Mallard v The Queen*, *Wood v The Queen*, *R v Gilham* and *R v Keogh*, have exerted no discernible impact on the processing and reporting of latent fingerprint evidence.¹⁶³ At the time of the Royal Commission into the *Chamberlain* convictions, the various Australian jurisdictions were, like other advanced nation states, reforming their latent fingerprint operations through the introduction of computerised systems. Dramatic changes to the collection, storage, searching and comparison of fingerprints, facilitated by the introduction of electronic databases and computer programs to facilitate searching and comparison, do not appear to have generated interest from lawyers or judges. Even the introduction of new evidence rules — specifically the UEL from 1995 — that included an admissibility standard for expert opinion evidence loosely modelled on r 702 of the United States Federal Rules of Evidence (1975) — exerted no discernible impact on the reception and presentation of latent fingerprint (or other forensic science) evidence.¹⁶⁴

¹⁶² See, eg, Lynn Lo Pucki, 'Legal Culture, Legal Strategy, and the Law in Lawyers' Heads' (1996) 90 *Northwestern University Law Review* 1498.

¹⁶³ *Royal Commission of Inquiry into the Chamberlain Convictions* (Report, 1987); *Royal Commission of Inquiry in Respect to the Case of Edward Charles Splatt* (Report, 1984); *Mallard v The Queen* (2005) 224 CLR 125; *Wood v The Queen* (2012) 84 NSWLR 581; *Gilham v The Queen* (2012) 224 A Crim R 22; *R v Keogh* [No 2] (2014) 121 SASR 307. See generally Robert Moles and Bibi Sangha, *Miscarriages of Justice: Criminal Appeals and the Rule of Law in Australia* (LexisNexis, 2015).

¹⁶⁴ There are very few differences in admissibility outcomes between UEL and common-law jurisdictions.

A New Rules of Evidence and Procedure

Prior to 1995, almost all of the challenges to latent fingerprint evidence were based on common-law rules of evidence and a range of statutes regulating the collection, storage and use of latent fingerprints. Since 1995, beginning with the Commonwealth (federal courts) and New South Wales, several Australian jurisdictions introduced new uniform evidence legislation. Influenced by the Federal Rules of Evidence (United States), these rules were slowly adopted by a majority (though not all) of the states and territories. One reason why forensic science evidence has not received more sustained consideration is the formal rejection, in the most populous jurisdictions (New South Wales and Victoria), of ‘reliability’ as an admissibility requirement under these rules.¹⁶⁵ Unlike the United States Supreme Court — in *Daubert v Merrell Dow Pharmaceuticals Inc* (‘*Daubert*’) and *Kumho Tire Co v Carmichael* (‘*Kumho*’) — Australian courts have been unwilling to read the need for validation and reliability into the requirement that opinions must be ‘wholly or substantially based’ on ‘specialised knowledge’ — under s 79(1) of the UEL.¹⁶⁶ Writing for the New South Wales Court of Criminal Appeal in *R v Tang* (‘*Tang*’), Spigelman CJ insisted that ‘the focus of attention must be on the words “specialised knowledge”, not on the introduction of an extraneous idea such as “reliability”’.¹⁶⁷ That s 79(1) ‘is not concerned with reliability of the expert’s opinions’ was recently confirmed in *Chen v The Queen* (‘*Chen*’).¹⁶⁸ This disinterest in reliability was endorsed by the Victorian Court of Appeal in *R v Tuite* (‘*Tuite*’) and the High Court has been unwilling to provide meaningful guidance on the application of s 79(1) to forensic science evidence.¹⁶⁹

When expert opinion evidence is contested under the UEL courts are required to confirm that opinions are based on ‘specialised knowledge’ and that the specialised knowledge is based on ‘training, study or experience’. Expert reports (and testimony) are expected to make it possible for courts to determine whether contested opinion satisfies these admissibility conditions.¹⁷⁰ However, when

¹⁶⁵ *Tang* (n 12) [137]; *Tuite* (n 12) [58]–[59].

¹⁶⁶ Interestingly, it was the requirement of ‘knowledge’ in r 702 that led the Supreme Court of the United States to impose a reliability standard on scientific evidence in *Daubert v Merrell Dow Pharmaceuticals Inc*, 509 US 579 (1993) (‘*Daubert*’) and extend it to non-scientific forms of expertise in *Kumho* (n 97). See Gary Edmond, ‘The Admissibility of Forensic Science and Medicine Evidence under the Uniform Evidence Law’ (2014) 38 *Criminal Law Journal* 136.

¹⁶⁷ *Tang* (n 12) [137]. Remarkably, at [138], the Court drew upon the definition of ‘knowledge’ used by the United States Supreme Court in *Daubert* and *Kumho*. [2018] NSWCCA 106, [62] (‘*Chen*’).

¹⁶⁹ See Gary Edmond, ‘A Closer Look at *Honeysett*: Enhancing our Forensic Science and Medicine Jurisprudence’ (2015) 17 *Flinders Law Journal* 287.

¹⁷⁰ *HG v The Queen* [1999] HCA 2 (‘*HG*’).

dealing with latent fingerprint evidence, Australian courts, whether applying the UEL or the common law (as in *Bennett*), have asked very little of latent fingerprint examiners. The judges in *JP* and *R v Parry* ('*Parry*') (both considered below) relied on the following passage from *Dasreef Pty Ltd v Hawchar* ('*Dasreef*') conferring some kind of exemption or 'short cut':¹⁷¹

The way in which s 79(1) is drafted necessarily makes the description of these requirements very long. But that is not to say that the requirements cannot be met in many, perhaps most, cases very quickly and easily. That a specialist medical practitioner expressing a diagnostic opinion in his or her relevant field of specialisation is applying 'specialised knowledge' based on his or her 'training, study or experience', being an opinion 'wholly or substantially based' on that 'specialised knowledge', will require little explicit articulation or amplification once the witness has described his or her qualifications and experience, and has identified the subject matter about which the opinion is proffered (emphasis added).¹⁷²

They also drew on the appeal in *Tang* (primarily an image-comparison case) for support specifically in relation to latent fingerprint evidence. There the New South Wales Court of Criminal Appeal stated:

By long usage, expert evidence is given in the form of an opinion that the fingerprint of the accused is the same as that from the crime scene. Such an opinion is based on the cumulative effect of a number of points of similarity, each of which is itself an expression of opinion.¹⁷³

Spigelman CJ provided this legal rationalisation, confirming the admissibility of categorical identification based on points of similarity — long after the English and most Australian fingerprint bureaus had formally abandoned point systems.¹⁷⁴ This explanation bears little resemblance to available scientific knowledge and advice — that is, the terms required by s 79.¹⁷⁵ Importantly, the 'short cut' referred to in *Dasreef* (and *Tang*) was not intended to exempt evidence from compliance with admissibility rules.¹⁷⁶ Rather, it recognised that some types of evidence obviously satisfy the conditions. The problem is that, in conjunction with an uncritical tradition, this type of 'exemption' has discouraged challenges

¹⁷¹ Gary Edmond and Kristy Martire, 'Knowing Experts? Section 79, Forensic Science Evidence and the Limits of "Training, Study or Experience"', in Andrew Roberts and Jeremy Gans (eds), *Critical Perspectives on the Uniform Evidence Law* (Federation Press, 2017).

¹⁷² *JP* (n 4) [32], citing *Dasreef Pty Ltd v Hawchar* (2011) 243 CLR 588, [37].

¹⁷³ *Tang* (n 12) [144].

¹⁷⁴ See *R v Buckley* (1999) 163 JP 561.

¹⁷⁵ Ian Evett and Robin Williams, 'Review of the Sixteen Points Fingerprint Standard in England and Wales' (1996) 46 *Journal of Forensic Identification* 49.

¹⁷⁶ See Edmond and Martire (n 171).

— focused on ‘specialised knowledge’ — even when appropriate scientific evaluation has not been undertaken.

Another explanation for the failure to consider validity and scientific reliability is the proscription on trial judges considering the reliability of evidence or the credibility of the witness when balancing the probative value against unfair prejudice under s 137 of the UEL — the *Christie* discretion at common law.¹⁷⁷ Unlike most other advanced common-law jurisdictions, Australia does not require the proponent of scientific and technical evidence to demonstrate reliability as a condition of admission.¹⁷⁸ The reliability of evidence plays no role in Australian admissibility jurisprudence and practice.¹⁷⁹ The upshot is that limitations, uncertainties and risks are left for the trial and ultimately the tribunal of fact. Australian courts appear to place extreme confidence in adversarialism and trial safeguards.

Tort reform at the turn of the millennium, flowing from empirically tenuous concerns about the performance of civil-justice systems, led to the introduction of codes of conduct for expert witnesses to supplement new rules of evidence and procedure.¹⁸⁰ Revealingly, these were developed for civil proceedings and only extended to criminal proceedings in the years following as something of an afterthought.¹⁸¹ These new codes made the expectations on expert witnesses explicit. Not only were expert witnesses required to act impartially, codes explained that their overriding duty was to the court. In addition to these explicit behavioural norms, codes listed the minimum requirements for expert reports. They require experts to: identify the factual bases of opinions; describe the process and any equipment used; explain the reasoning (or basis); identify limitations and uncertainties; describe tests that have (or have not) been undertaken and qualifications that are necessary; refer to relevant literature; and

¹⁷⁷ *IMM v The Queen* [2016] HCA 14 (‘IMM’), inadvertently overturned *Tuite* (n 12) 148. At common law, see *R v Christie* [1914] AC 545. Consider also Gary Edmond, ‘Icarus and the Evidence Act: Section 137, Probative Value and taking Forensic Science Evidence “at its Highest”’ (2017) 41(1) *Melbourne University Law Review* 106, and Andrew Roberts, ‘Probative Value, Reliability, and Rationality’, in Andrew Roberts and Jeremy Gans (eds), *Critical Perspectives on the Uniform Evidence Law* (Federation Press, 2017).

¹⁷⁸ Gary Edmond, ‘Forensic Science Evidence, Adversarial Criminal Proceedings and Mainstream Scientific “Advice”’, in Darryl Brown et al (eds), *Oxford Handbook of Criminal Process* (Oxford University Press, 2019).

¹⁷⁹ It may not be meaningfully incorporated into judicial directions and instructions.

¹⁸⁰ Following the *Woolf Report* and the *Ikarian Reefer*: Lord Woolf, *Access to Justice: Final Report to the Lord Chancellor on the Civil Justice System in England and Wales* (HMSO, 1996) and ‘*Ikarian Reefer*’ (1993) 20 FSR 563, 565–6. See also Edward Wright, ‘National Trends in Personal Injury Litigation: Before and after “Ipp”’ (2006) 14(3) *Torts Law Journal* 233.

¹⁸¹ This seems to suggest that judges were not especially concerned about the quality of the state’s forensic science evidence in criminal proceedings.

so on. In principle, expert reports should provide enough information to place a reader in a position to rationally evaluate the opinion and for the trial judge to determine admissibility (should the evidence be challenged).¹⁸² Until very recently, most latent fingerprint reports were just a couple of pages in length. Most simply reported matches and declared that they were in accord with any jurisdictional procedural requirements even when flagrantly non-compliant.¹⁸³

As authoritative criticism and scientific research began to emerge, remarkably the state's latent fingerprint examiners elected not to disclose any of it. It was not until criticism of grossly deficient reporting was formally raised by defence counsel in *JP* in 2015 that the New South Wales Forensic Group began to revise its reporting template. This group had been aware of the NRC, NIST and Fingerprint Inquiry reports for years.¹⁸⁴ Many of the templates in use by state-employed fingerprint examiners remain non-compliant. They are inconsistent with what we might expect from impartial experts.¹⁸⁵ Codes (and the more recent Practice Note from Victoria) may not be rules of admissibility per se, but judges have been very quick to excuse non-compliance in circumstances where the defendant was not in a position to understand what was done (and by whom), or to understand the value of the opinion proffered, and was not referred to the existence of scientific research and the growing chorus of mainstream criticism.¹⁸⁶

B *Technological Innovation, Training and Personnel*

The paucity — really absence — of epistemological challenges prior to *JP* is all the more curious because there were dramatic changes to the way latent fingerprints were collected, processed, stored, searched and analysed across the course of the 20th century. Originally, collection involved dusting, tape lifts, wet photography and often-times the removal and examination of objects that had been touched. Examination relied on naked eyes and magnifying glasses, such as the Hendry glass discussed in *Lawless*. Reference prints were collected from suspects (often

¹⁸² See *HG* (n 170). It was also advocated in the NRC Report (n 35) 135.

¹⁸³ Gary Edmond, Kristy Martire and Mehera San Roque, 'Expert Reports in the Forensic Sciences' (2017) 40(2) *University of New South Wales Law Journal* 590.

¹⁸⁴ Indeed, I have presented on several occasions at conferences organised by the New South Wales fingerprint group (attended by examiners from all over Australia), as well as at national forensic science conferences, and have co-written papers on the very subject that are routinely used in the training of fingerprint examiners (including those in New South Wales).

¹⁸⁵ See Evidence-Based Forensics Initiative, 'Model Forensic Science' (2016) 48(5) *Australian Journal of Forensic Sciences* 496.

¹⁸⁶ See the discussion in *Wood v The Queen* (2012) 84 NSWLR 581, endorsed in *Chen* (n 168).

informally, as in *Blacker*), although card records rapidly expanded as systems were designed to obtain and classify print features for the purposes of searching.¹⁸⁷ By the end of the century, a range of new techniques were in use, some involving the use of chemicals and lighting to locate and enhance the visibility of latent prints on a wide range of surfaces.¹⁸⁸ While latent prints continue to be dusted and lifted, most are now captured by digital camera and stored electronically.¹⁸⁹ Prints are routinely manipulated, enhanced and shared using specialised computer programs, and proprietary algorithms enable rapid searching of massive electronic databases.¹⁹⁰ Notwithstanding these developments, there are few reported references, let alone challenges, to new visualisation, searching and evaluation technologies. Legal references to state-based databases ('AFIS') and the National Automated Fingerprint Identification System ('NAFIS') tend to be both recent and perfunctory.¹⁹¹

Toward the end of the 20th century, ACE-V emerged as the dominant 'method' used by latent fingerprint examiners, although the term appears in few of the decisions reported on Westlaw and Austlii and was not a regular feature in New South Wales police fingerprint reports before they were revised in the shadow of *JP*.¹⁹² Adoption of ACE-V as 'the method' did not resolve inconsistencies around standards or stimulate inquiries and challenges. Prior to formal adoption of ACE-V, bureaus and departments tended to require a minimum number of points of similarity before they were prepared to report a match.¹⁹³ Most bureaus abandoned point systems before the end of the 20th century. Curiously, the number of points required for an identification was rarely specified, or examined,

¹⁸⁷ See Cole (n 33).

¹⁸⁸ See, eg, *Mackenzie v The Queen* (1996) 190 CLR 348; *R v Burrell* [2001] NSWSC 120. There are, in addition, other ways of analysing fingerprints. See, eg, Simona Francese et al, 'Beyond the Ridge Pattern: Multi-informative Analysis of Latent Fingermarks by MALDI Mass Spectrometry' (2013) 138(15) *The Analyst* 4215; Gino Groeneveld et al, 'Detection and Mapping of Illicit Drugs and Their Metabolites in Fingermarks by MALDI MS and Compatibility with Forensic Techniques' (2015) 5 *Scientific Reports* 11716; Lisa Deininger, 'Proteomics Goes Forensic: Detection and Mapping of Blood Signatures in Fingermarks' (2015) 16(11–12) *Proteomics* 1707.

¹⁸⁹ Fingerprints extracted from digital images downloaded from the internet have been used to identify persons, including from photographs of those engaged in child sexual assault.

¹⁹⁰ See *Ross v Tran* (1996) 87 A Crim R 144, 145.

¹⁹¹ *R v Graham* (2017) 325 FLR 21, [43]; *Parry* (n 2); *R v DD* [2016] ACTSC 149; *Police (NSW) v JC* [2016] NSWChC 1; *Shorrock v Commissioner of Police (NSW)* [2014] NSWIRComm 1008; *Shepherd v The Queen* [2011] NSWCCA 245, [133]; *R v Hillier* [2010] ACTSC 33; *R v Millard* [2006] ACTSC 56; *R v Thornton* [2001] QDC 116.

¹⁹² A search (of 'ace-v' & fingerprint) on Westlaw returned just three cases: *Ghebrat* (n 32), *JP* (n 4) and *Wright v WA* [2010] WASCA 199, [253].

¹⁹³ Although procedures and points systems were not uniform.

even after scientists engaged by the Home Office (United Kingdom) reported that point standards were merely conventional.¹⁹⁴

The organisation of fingerprint bureaus and the training of examiners also changed markedly during the course of the 20th century and beyond.¹⁹⁵ The tiny groups that formed in the first decades of the 20th century were consolidated and expanded in police departments and investigative agencies. Simultaneously, training became more formalised from the 1920s and 1930s. In some jurisdictions, notably those influenced by England, training took years as examiners were slowly socialised into fingerprint bureaus and their dogma.¹⁹⁶ Historically, most latent fingerprint examiners were police officers. Very few possessed tertiary qualifications, although, in more recent years, police departments have begun to employ and train civilians with tertiary qualifications in forensic science or the sciences. The value of training and the effective police monopoly on identification by fingerprint do not, once again, loom large in the reported decisions.¹⁹⁷

In parallel to the expansion of fingerprint bureaus and the routinisation of fingerprint evidence for identification, all Australian jurisdictions enacted legislation that enabled investigators to collect the fingerprints of suspects and store and search those of convicted offenders. This legislation tended to become more permissive, gradually expanding the groups whose fingerprints could be legally collected, stored, searched and shared across state and national borders. Ambiguities and omissions in this enabling legislation — manifesting through alleged breaches of procedures and rights — provided some of the main means of contesting latent fingerprint evidence at trial and on appeal. As suggested in Part V above, these represent a considerable portion of the reported historical challenges.¹⁹⁸

It is not surprising that lawyers focused on legal issues in their attempts to challenge the admissibility and use of fingerprint evidence. What is remarkable, however, is how few of the challenges questioned traditional practices and commitments, ACE-V, revised procedures, new technologies, and the profound epistemic pretensions of positive identification (to the exclusion of all others), and claims of a zero-error rate.

¹⁹⁴ See above n 36. Points are occasionally mentioned. Recall that Inspector Childs purported to identify 14 points of similarity in *Blacker* (n 4), and Detective Potter referred to 9 points in *Parker* (n 4).

¹⁹⁵ See David Harris, *Failed Evidence: Why Law Enforcement Resists Science* (NYU Press, 2016); Christopher Lawless, *Forensic Science: A Sociological Introduction* (Taylor and Francis, 2016).

¹⁹⁶ Michael Saks and David Faigman, 'Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It' (2008) 4(1) *Annual Review of Law & Social Science* 149.

¹⁹⁷ The issue of an effective state monopoly was raised in the English Court of Appeal in *R v Smith* [2011] EWCA Crim 1296.

¹⁹⁸ See cases cited above n 111.

VII THE ONLY EPISTEMOLOGICAL CHALLENGE IN AUSTRALIAN HISTORY

This final part offers a glimpse of the way our courts are responding to the emerging scientific findings.¹⁹⁹ Judicial responses, to some extent ongoing, exhibit disengaged, quiescent and even sceptical responses to mainstream scientific research and advice. This part helps us to understand how the exceptional epistemologically sophisticated challenge may be effectively erased from legal institutional memory and collective experience.²⁰⁰

A *Ghebrat v The Queen (2011) and JP v Director of Public Prosecutions (2015)*

Two recent appeals, namely *Ghebrat* and *JP*, raise issues associated with the NRC and the other reports.²⁰¹ It is unclear whether the appellant's counsel in *Ghebrat* was conversant with the NRC Report — it is not cited in the reported decision — but two of the issues raised on appeal overlap with issues identified in the NRC and other reports. *JP* is of a different order. There, trial counsel was aware of the scientific reports and sought to use them to impugn the Crown's evidence in a fingerprint-only prosecution. *JP* appears to be the only time that an Australian court has been exposed to the scientific research summarised in Part III above.

Ghebrat was convicted of robbing a liquor store. One of three latent fingerprints recovered from a large whisky bottle touched during the robbery was matched to his fingerprint. Among the issues on appeal were the significance of this match — given that *Ghebrat* had previously visited the store as a customer — and the way in which the fingerprint evidence was explained to the jury by the trial judge. Of particular concern were the failure to convey the potentially innocent explanation for the presence of the print, the significance of the two unmatched latent fingerprints, and the level of certainty associated with the identification. On the level of certainty, the Court of Appeal explained that the fingerprint evidence and trial judge's explanation to the jury seemed to suggest that once a sufficient number of points of similarity were obtained, the identification evidence was effectively certain. This was criticised. For while the fingerprint examiner had positively identified *Ghebrat* and 'denied that error had

¹⁹⁹ See also Simon Cole and Gary Edmond, 'Science Without Precedent: The Impact of the National Research Council Report on the Admissibility and Use of Forensic Science Evidence' (2015) 4(2) *British Journal of American Legal Studies* 585.

²⁰⁰ This is not necessarily intentional. These are much more likely to be the result of rules, institutional dynamics and expectations rather than some kind of conspiracy.

²⁰¹ *Ghebrat* (n 32).

occurred in this case', the contention that it 'established certainty' was, for the Court of Appeal, 'not supported by the evidence'.²⁰² The appellant's counsel appears to have also raised the issue of cognitive bias, and pointed to the advantages of 'blind' verification, but these are mentioned in the judgment only in passing.²⁰³ The Court of Appeal found, in addition, that the trial judge should not have admitted hearsay evidence about the result of the 'verification' stage from ACE-V. The Court ordered a re-trial. *Ghebrat* seems to have, unwittingly, resurrected anxiety about uniqueness and its implications expressed all those years ago by the same court in *Parker*.²⁰⁴

Perhaps the most interesting feature of *Ghebrat* is that the decision is critical of the trial judge's failure to adequately summarise the evidence on the 'process and the risk of mistake'.²⁰⁵ The trial judge said the following in the charge to the jury:

If the characteristics of the two patterns of fingerprint samples have been found to match at a sufficient number of points, it is possible to say with certainty that the samples came from the same person and if you accept that, that evidence can be used to find that the fingerprints were from that person. The consequences of that, of course, would be that it is supportive of the prosecution's contention that the accused man was the man who entered the store. ...

In this case, the expertise of Mr Gordon was not challenged, in other words, it was not said that he is not an expert, but the suggestion put to him was that like any human being, he can make a mistake; it is a subjective judgment that he makes, *although he said it did not happen certainly in this case*.²⁰⁶

The Court of Appeal concluded that 'the judge's summary would have left the jury with the impression that the process undertaken had been completed to a point that established certainty when this was not supported by the evidence'.²⁰⁷ This suggests that the way in which fingerprint evidence is routinely reported and presented in most Australian jurisdictions — as a categorical identification — is not admissible in Victoria.

Ghebrat seems to have been ignored in practice.²⁰⁸

²⁰² Ibid 146.

²⁰³ Ibid 143.

²⁰⁴ An example of institutional amnesia, *Parker* (n 4), is not cited.

²⁰⁵ *Ghebrat* (n 32) 145.

²⁰⁶ Ibid (emphasis in appellate decision). This extract also suggests how clumsy judicial responses might be. For even if the individual has a heightened ability to analyse and compare prints, it does not follow that he or she can categorically identify or has insight into the level of error.

²⁰⁷ Ibid 146.

²⁰⁸ According to Austlii, *Ghebrat* (n 32) has not been cited by another criminal court.

The only substantial challenge to fingerprint evidence in Australia — JP — was launched by a junior barrister in a regional town in New South Wales.²⁰⁹ JP was alleged to have broken into a house and ruffled through drawers while the elderly residents were in bed. A minor, he was prosecuted in the Children's Court for aggravated break and enter based on a single latent fingerprint match, 'identified to' his left thumb.²¹⁰ JP's barrister had read the article 'How to Cross-examine Forensic Scientists: A Guide for Lawyers' — an NRC Report-inspired guide for lawyers.²¹¹ The case was heard before a magistrate (without a jury); in consequence, we have written 'reasons'.²¹²

The Crown relied on the testimony of a fingerprint examiner and an expert report that was not compliant with the jurisdictional expectations set out in the Code of Conduct for Expert Witnesses.²¹³ The report did not explain what was done, list assumptions (eg uniqueness of fingerprints), explain the basis for the opinion, identify the 'specialised knowledge' (required by s 79 of the UEL), or refer to any limitations. There are, for example, no references to ACE-V and the process of review involved. There are no references to error, uncertainties or what the latent fingerprint examiner knew about the case when undertaking the comparison, and no images are included with the report. There are no references to any of the scientific reviews. Rather, the report was a very short and opaque statement that purported to positively identify JP as the source of the latent print recovered from the scene. Given these deficiencies (which were ubiquitous among Australian fingerprint reports at the time — exemplified in *Bennett*), the defence challenged the admissibility of the expert report and the related opinion.

During the proceedings, the fingerprint examiner was questioned in detail about ACE-V, validation, error, expressions, cognitive bias, uncertainties and limitations.²¹⁴ He was unfamiliar with scientific research in these areas and did not know about the NRC and NIST Reports. He had not read New South Wales Police training materials on cognitive bias. He did not undertake his (ACE-V) analysis in sequence and appears to have commenced with the comparison. Nevertheless, he was '100 per cent' confident in his opinion and rejected the possibility that he had made an error in this or any other case.²¹⁵ The high quality

²⁰⁹ JP (n 4).

²¹⁰ Ibid [10]. There was a generic description of a young male intruder.

²¹¹ Evidence-Based Forensics Initiative, 'How to Cross-examine Forensic Scientists: A Guide for Lawyers' (2014) 39(2) *Australian Bar Review* 174.

²¹² See also *R v Bornyk* 2013 BCSC 1927 and *R v Bornyk* 2017 BCSC 849 ('Bornyk').

²¹³ Edmond et al (n 183).

²¹⁴ See also Gary Edmond et al, 'Forensic Science Evidence and the Limits of Cross-Examination' (2019) 42(3) *Melbourne University Law Review* (advance).

²¹⁵ He accepted that other fingerprint examiners might on occasion err. Contrast *Ghebrat* (n 32).

of the latent print and the existence of 35 points in common were raised, for the first time, during questioning.

The fingerprint evidence was admitted. In assessing it, the magistrate concluded:

In this matter I have oral and written evidence from [the fingerprint examiner]. His evidence was unshaken on his view as to the matching of the thumbprint of JP. In my view I disagree with the submissions in this matter, he has given sufficient evidence in these proceedings as to how he reached that determination. As an expert his expertise was not shaken, his opinion was not shaken.²¹⁶

This was despite the examiner conceding ‘that he had not read a lot of the literature referred to ... in the cross-examination’. The examiner contradicted the express conclusions of the NRC and NIST Reports, testifying that provided the ‘protocol [ie ACE-V] was followed properly it should not involve bias or incorrect assessment’.²¹⁷ We encountered other examples from his testimony in Part II above. When asked, he preferred his own beliefs and New South Wales police procedures to the findings and recommendations of the NRC and NIST, even though he was not familiar with their reports and recommendations or related research. His response to questions not only disclosed a surprising level of ignorance (for a legally recognised expert witness), his answers were also inconsistent with, and combative toward, shared findings and recommendations from peak scientific organisations.

The admissibility of the fingerprint evidence (and Report) and the conviction were pursued on appeal. The appellate court indicated that while the Report ‘set out the methodology that was applied in examining the fingerprints’, it did not state ‘what that examination revealed’.²¹⁸ Instead, there was ‘simply a statement of the ultimate opinion’. Deficiencies, such as the report not providing ‘scientific criteria for its accuracy to be tested’ and not explaining the reasoning process, were said to be repaired by the examiner’s oral evidence — specifically his answers during cross-examination²¹⁹ — although how this was practically accomplished remains something of a mystery. In reviewing the admissibility case law, the appellate court drew on *Bennett*, *Tang* and *Dasreef*:

The judgments in *Bennett* and the observations of Spigelman CJ in *Tang* at [144] indicate that “little explicit articulation or amplification” of the outcome of the application of the methodology is required to satisfy the second condition of

²¹⁶ Transcript quoted in Edmond et al (n 183).

²¹⁷ Ibid.

²¹⁸ *JP* (n 4) [54]. Although in terms of explaining the ‘method’, there was not even a reference to ACE-V.

²¹⁹ Ibid [61].

admissibility of an opinion about the correspondence between two fingerprints (*Dasreef* at [37]).²²⁰

The appellate court read *Bennett* as requiring that ‘some explanation or statement of what the examination revealed ... must be provided for the evidence to be admissible, *albeit not much*’.²²¹

In terms of proof, the appellate court concluded that ‘there was no material to indicate that, to the extent the criticisms’ — from the NRC, NIST and Fingerprint Inquiry Reports — ‘were sustained, they materially affected the weight to be attached to [the examiner’s] opinion that the fingerprints were identical’.²²² The Court accepted that ‘his Honour had the distinct advantage of being able to observe [the examiner] give evidence and respond to criticism’.²²³ Notwithstanding detailed cross-examination on materials that directly questioned the ability to categorically identify, the Court found that at ‘no stage ... was it contended that [the examiner] was not suitably qualified to undertake a fingerprint analysis and express an opinion that two fingerprints were identical’.²²⁴ In terms of the admissibility challenges, and the omission of the assumption that ‘no two persons have the same fingerprint’, the Court indicated that

[t]hat omission is irrelevant to the admissibility of the report in that the relevant opinion was treated by the presiding magistrate as only being a statement to the effect that the two fingerprints were identical. His Honour reasoned for himself as to whether that fact suggested that it was JP’s fingerprint.²²⁵

The appellate court was satisfied that the ‘certificate set out the methodology that was applied’ but, disagreeing with the magistrate, concluded that ‘nowhere in the certificate was there any statement of what the examination revealed’.²²⁶ Rather, the certificate reported the ‘ultimate opinion’ about the match and its implications. This opinion was ‘insufficiently supported by any reasons ... for it to be admitted into evidence’.²²⁷ While the certificate was on that basis in breach of the Code, and perhaps technically inadmissible, admissibility of the opinion fell to ‘be assessed by considering the entirety of [the examiner’s] oral evidence and

²²⁰ Ibid [58]. *JP* (n 4) [32], citing *Dasreef Pty Ltd v Hawchar* (2011) 243 CLR 588, [37] and *JP* (n 4) [35] (emphasis added). The second condition is that the opinion is wholly or substantially based on specialised knowledge.

²²¹ *JP* (n 4) [42] (emphasis added).

²²² Ibid [90]. Self-evidently, the fingerprints were not literally identical.

²²³ Ibid.

²²⁴ Ibid [26].

²²⁵ Ibid [52].

²²⁶ Ibid [54].

²²⁷ Ibid.

not just the certificate'. The prosecutor was not prevented from 'remedying' any 'deficiency'.²²⁸ The examiner's description, during his testimony, of what he had done was presented as rendering his opinion not merely admissible but persuasive given that the conviction of JP was based upon it. Ironically, the very cross-examination that exposed a complete lack of familiarity with fundamental scientific research, scientific criticisms, and limitations with ACE-V was presented as having remedied any deficiencies in the opinion and the failure to explain the reasoning.²²⁹ The range of issues raised by the defence at trial and on appeal were dismissed as issues for weight, or for being 'metaphysical' and therefore irrelevant.²³⁰ The failure to provide 'comparison charts' and 'specify or provide the necessary scientific criteria for its accuracy to be tested' were described as issues for judicial discretion, rather than admissibility.²³¹

However perfunctory the treatment at trial and on appeal, JP was the first time that an Australian court was asked to consider underlying methodological issues and the implications of scientific research and advice for latent fingerprint evidence.²³² Notwithstanding detailed cross-examination on the NRC and NIST Reports, these are not cited in the written decisions by the trial and appellate courts. The examiner's inability to accept them as authoritative — because he was not familiar with them — meant that they were not available to impugn his credibility or inform the evaluation of his conclusion. They were effectively marginalised in the evaluation of the opinion and the determination of guilt. They were not, in effect, (in) evidence.²³³

The trial court accepted the latent fingerprint examiner's evidence as complete proof and, quite bizarrely, questioned the status and findings of reports by prestigious scientific and technical organisations, and Campbell J in Scotland, though without actually naming them. Consider the following:

The difficulty of course with a lot of material that was cross-examined on is there is no method, no chance to actually test the validity of those arguments. I note that a lot

²²⁸ Ibid [56].

²²⁹ This might be considered undesirable on policy grounds, because it excuses the state's failures and transforms the decision as to whether to contest forensic science evidence tactically.

²³⁰ JP (n 4) [60].

²³¹ Ibid [60]–[61].

²³² The earlier challenge in *Bennett*, concerned with the provision of images and the failure to describe specific points of similarity, rather than the validity or the procedure and its accuracy, was relied upon to support admission and accuracy. See also *Bennett* (n 4) [16], [54] on the superficial engagement with 'his method of working' and 'reasoning process'.

²³³ There is no sense that having a rebuttal expert, especially one commenting on methods, limitations and risks, would have changed judicial attitudes. Consider *Bornyk* (n 212); *Wright v Western Australia* [2010] WASCA 199, [77], [251]ff; and, more generally, *R v Madigan* [2005] NSWCCA 170. See also below n 268.

of that material, there is a report there from 2008 or 2009 but I do not have the actual name in front of me, and a follow up report in 2012 provided to judicial bodies of the United States. There is no evidence of any action taken on those views by those researchers or otherwise. The report from Scotland does not take it any further than his opinions being on the balance of probabilities that would assist further inquiries. No great depth as to what the actual error was and how that could potentially relate to the matter in this matter.²³⁴

The only time that ‘validity’ is raised is to question the considered and convergent conclusions of premier scientific organisations and independent judicial inquiries — all pejoratively characterised as ‘arguments’. And, perhaps even more problematic, in the context of an accusatorial trial, the magistrate cast limitations and error as issues for the defence.

B Legal Continuity: Scientific Insights Lost to Post-JP Decision-Making

Lack of engagement with scientific knowledge and scientific recommendations has meant that insights from *JP* do not form part of the formal legal record. Like other challenges that are unreported or reported in ways that do not engage with scientific materials, insights are effectively lost to legal consciousness and experience. Consequently, other lawyers and judges are not apprised of problems, issues and materials raised in the truly exceptional case where a reliability challenge is launched. Lawyers and judges are not only seemingly oblivious to scientific research and scientific recommendations and their implications, but they seem to have an exaggerated view of the value of the latent fingerprint evidence. A good example of this ignorance and the persistence of epistemologically superficial challenges to latent fingerprint evidence can be observed in the aftermath of *JP*, in the South Australian case of *Parry*.²³⁵

The appeal in *Parry* concerns problems in the processing and disclosure of the latent fingerprint evidence. *Parry*’s fingerprints were originally linked to an aggravated robbery through a set of reference prints, obtained in unrelated circumstances in 2007, and uploaded on NAFIS — the national fingerprint database.²³⁶ That identification was performed by Godden, verified by Andrews and reviewed by Lewis.²³⁷ Another comparison was subsequently undertaken, using what are characterised as ‘inferior’ quality reference prints. These were

²³⁴ Transcript quoted in Edmond et al (n 183).

²³⁵ *Parry* (n 2).

²³⁶ National Automated Fingerprint Identification System.

²³⁷ Here, verification appears to be a separate comparison and the review is for technical compliance purposes.

obtained on Parry's arrest for the robbery in 2013. This comparison produced less conclusive evidence. Using the 2013 reference prints, Neilson concluded that the 'impression does not contain sufficient clear ridge detail for a positive identification ... however it cannot be excluded as having been made by the right ring finger [of] Parry'.²³⁸ That conclusion was verified by Noack and reviewed by Greenlees. Subsequently, when the disparity was realised, just days before trial, communications between the prosecutor and the police led to the resolution of the discrepancy between the two conclusions — specifically, the positive identification and the inability to exclude. Noack prepared a new statement using the superior 2007 prints as a reference. With these prints he identified three latent fingerprints to Parry (to two different fingers) and concluded that Parry 'cannot be excluded' in relation to two other latent fingerprints.²³⁹

On appeal, Parry challenged the failure to adjourn proceedings to allow him to call Neilson (who was away), the failure to exclude Noack's evidence because of the difference between the comparisons using the two different sets of reference prints (from 2007 and 2013, respectively), limitations placed on the cross-examination of Noack, the unfair prejudice created by reference to Parry's fingerprints being on the NAFIS database, as well as inadequate directions about forensic disadvantage and identification evidence. The appeal was unsuccessful. Concerns about inadequate disclosure and the unwillingness to delay proceedings were found to be inconsistent with both the materials available to the defence and decisions made by the trial counsel, such as 'positively eschew[ing] adjournment'.²⁴⁰

What is interesting for our purposes is how the trial and appeal — led by experienced counsel — proceed entirely on grounds that are inattentive to scientific research and reliability issues.²⁴¹ Even the ground that tentatively explores the inability to explore communications between the examiner (Noack) and Neilson does not engage with the extensive literature on human factors, particularly the danger of cognitive bias.²⁴² Rather than focusing on the documented risks of examiners undertaking comparisons, verification and review in circumstances where they are aware of the expected result, the ground of appeal appears to be speculatively focused on 'collaboration', really some kind of

²³⁸ Parry (n 2) [38].

²³⁹ Ibid [50]. It is useful to observe that opinions based on multiple prints, especially prints identified to different fingers, are typically much more probative than opinions based on a single latent fingerprint.

²⁴⁰ Ibid [68], [79].

²⁴¹ The parties and/or judges refer to *JP* (n 4) but there are no references to the substantial concerns or scientific reports.

²⁴² The Court of Appeal seems satisfied by the fact that there was apparently no contact between these examiners.

implied conspiracy, between Noack and Neilson because of Neilson's unavailability.²⁴³

There are no references to the scientific reports and recommendations. The trial and appeal in *Parry* proceed as though nothing had happened since *Bennett* in 2006 and perhaps even *Blacker* in 1910.

VIII DISCUSSION

It is important at the very outset to reiterate that this article does not contest the admissibility or continuing use of latent fingerprint evidence *to assist with* identification. Rather, its concern is with: the dearth of epistemologically informed challenges; the historical misrepresentation and exaggeration of the value of latent fingerprint evidence; its likely over-valuation by lay decision-makers; the actual frailty of trial safeguards; and the apparent judicial indifference (or insensitivity) to emerging scientific research and its implications for understanding legal practice.

It would seem to be necessary, as a condition for admission, that the proponent of forensic science evidence disclose the *known* value of the evidence in order to place decision-makers in a position where they might be able to rationally evaluate it.²⁴⁴ Where evidence has been used by the state for a century, and is in routine use, it cannot be the responsibility of the defence to identify exaggeration, or fundamental methodological oversights and limitations of general application, in order to persuade a jury of their significance in individual adversarial proceedings. To adopt such a lax, capricious and inefficient approach to opinion recognised as expert evidence places unbearable demands on the defence, and relieves the state of responsibility for formally evaluating the 'scientific' procedures that it routinely represents as not merely probative but also reliable and sometimes even infallible.

A *The Myth of Admissibility Standards and Critical Legal Scrutiny*

There are no reported decisions on the admissibility or probative value of latent fingerprint comparison that are substantially engaged with scientific research, let alone validity and scientific reliability. Australian courts have never required it. Rather, early courts asserted that fingerprint comparison was part of the 'science

²⁴³ *Parry* (n 2) [111]–[114].

²⁴⁴ Gary Edmond and Andrew Roberts, 'Procedural Fairness, the Criminal Trial and Forensic Science and Medicine' (2011) 33(3) *Sydney Law Review* 359.

of identification', 'based on experiments', and that 'individuality ... is ... generally recognised'.²⁴⁵

At one level, given prevailing admissibility rules and jurisprudence at the beginning of the 20th century, this might not be surprising.²⁴⁶ However, we should recognise that early accommodation allowed evidence to be admitted without being formally evaluated or appropriately qualified in reports and testimony. Our admissibility rules did not require latent fingerprint examiners to formally evaluate their procedures, or to provide insight into limitations, or to express their opinions in scientifically defensible terms. As the way fingerprints were collected, processed and analysed was transformed, slowly evolving adjectival rules (including the introduction of new uniform evidence law from 1995 and Codes of Conduct for expert witnesses just a few years later) were not mobilised and applied in ways that led to enhanced scrutiny or placed appropriate expectations on latent fingerprint examiners.²⁴⁷ There were few epistemologically based challenges to latent fingerprint evidence, and over time confident examiners appearing before complacent courts became disinclined to provide reasons, identify specific points of similarity, or provide images to the defence — eg *Bennett* and *JP*. Even after the release of the NRC, NIST, PCAST and AAAS Reports, latent fingerprint examiners continue to report and testify in ways — ie offering categorical identification without reference to accuracy — that are not compliant with admissibility rules (requiring 'knowledge') and procedural expectations (requiring the disclosure of limitations).

B *The Myth of Trial Safeguards*

Safeguards that are epistemologically insensitive — that do not attend to scientific research — are safeguards in name only. This study directly challenges prevalent legal beliefs about the effectiveness of trial safeguards and even adversarial proceedings. In order to better understand both their limitations and their ability to instil in judges a false sense of confidence, consider the Court of Appeal's assessment of the positive identification in *Blacker*. A century before empirically based insights into the performance and abilities of latent fingerprint examiners were available, before training was formalised and standards were

²⁴⁵ In *Parker* (n 4), the High Court appeared to endorse individuality (as obiter) even though the Court of Appeal had explicitly rejected it.

²⁴⁶ Consider the undemanding common-law tests in *Folkes v Chadd* (1782) 3 Dougl 157; 99 ER 589 and *R v Silverlock* [1894] 2 QB 766. Also, English courts had admitted fingerprint evidence (see Appendix), as had United States courts (see, eg, *Jennings* (n 94)).

²⁴⁷ Simon Cole, 'Grandfathering Evidence: Fingerprint Admissibility Rulings from *Jennings* to *Llera Plaza* and Back Again' (2004) 41(3) *American Criminal Law Review* 1189.

developed, on appeal the fingerprint evidence was said to have been ‘carefully given and thoroughly tested’.²⁴⁸ In addition, we are told that

[t]he jury also were very carefully directed by the learned Judge as to the risk of error to which evidence of this class is open, and as far as the conduct of the trial is concerned every precaution was taken to guard against any wrongful impression being conveyed to the jury.²⁴⁹

There is no evidence of meaningful testing or caution. This was not a ‘new science of identification’, and it was not ‘based on experiments’ that were oriented toward improving accuracy or comprehension. The assessment by the Court of Appeal, like many similar judicial assertions over more than a century, is a hollow assertion based largely on legal impressions (and collective legal ignorance). Such assertions may help to reassure remote audiences about the administration of justice, but careful directions on the risks were not possible because most of the risks were unknown (or not recognised at law). Our courts did not possess or require evidence of validity or scientific reliability. There is no sense in which these and subsequent judges were being disingenuous, but they were recounting and relying upon untutored impressions and beliefs. How could a judge who was not conversant with the accuracy of a procedure ‘carefully direct ... as to the risk of error’? How could they ‘guard against any wrongful impression’? These questions persist.

In *Parker*, and every subsequent case where the admissibility of latent fingerprint evidence was raised, examination-in-chief and cross-examination (and careful judicial ‘instructions’) were presented as appropriate mechanisms to test and explain the evidence. In terms of evidence and proof, provided the jury ‘were satisfied with the witness under examination and cross-examination to arrive at the conclusion ... that was sufficient to justify a conviction’.²⁵⁰ In practice, challenges were not attentive to epistemology and so did not provide trial and appellate courts with insights and materials to facilitate principled responses and rational evaluation of the evidence. Even when procedural impediments (such as the failure to produce a report identifying points of similarity on photographs — as in *Bennett*) or reliability issues were raised explicitly (as in *JP*), trial and appellate judges were not particularly engaged with the issues. Epistemologically oriented questions rarely made a difference.

What is surprising in an accusatorial system of justice is that where the issue loomed, Australian judges expected (and continue to expect) impecunious defendants to address, indeed overcome, the state’s dereliction — that is, its

²⁴⁸ Blacker (n 4) 360 (Cullen CJ).

²⁴⁹ Ibid.

²⁵⁰ *Parker* (n 4) 168.

non-disclosure, omissions, oversights and exaggeration.²⁵¹ In *JP*, bizarrely, scientific research and advice on the very procedure used by the fingerprint examiner were characterised as abstraction (even metaphysical) and not considered relevant to practice or identification in the specific case (see also above Part VIII(D)–(G)).²⁵² Rather than consider error from the perspective of scientific reports and recommendations, the magistrate expected the defendant to somehow identify an actual error — presumably relying on the non-compliant expert certificate (or report), which provided little meaningful information about what had been done.²⁵³ In *JP*, the fingerprint examiner's subjective opinion on identity is used to trump pertinent scientific research and related concerns about uncritical reliance on subjective opinions.²⁵⁴

Among this survey of the leading Australian fingerprint decisions, trial safeguards were repeatedly presented as the appropriate 'solution' to problems with forensic science evidence. This reliance ought to be considered imprudent because, over the course of a century, trial safeguards resulted in only one court, a Children's Court in Dubbo (*JP*), hearing about the kinds of issues regarded by scientists as fundamental. Even that exposure was indirect, through questions posed during cross-examination.²⁵⁵ The availability of trial safeguards did not facilitate appropriate exploration of the sorts of questions and issues required to understand and evaluate latent fingerprint evidence. Reliance on trial safeguards did not lead to latent fingerprint evidence being presented or understood in the ways that attentive scientists insist are appropriate. The requisite information has never been required or provided. Even now that latent fingerprint evidence is known to be foundationally valid, with an error rate that appears to be (impressively) low, disclosure of limitations and recognition of the reality of error — required by Codes of Conduct and Practice Notes — remains exceptional.

The only conspicuous effect of trial safeguards on the presentation of latent fingerprint evidence, across more than a century of routine use in Australia, was the expectation from *Parker* and *Ghebrat* that fingerprint examiners should not

²⁵¹ In *JP* (n 4), this appears to extend to expecting the defendant to identify an actual error. See also *Aytugrul v The Queen* (2012) 247 CLR 170.

²⁵² *JP* (n 4) [60]. Consider also the court's insensitivity to an Ombudsman's report in *Skrijel v Mengler* [2003] VSC 59.

²⁵³ Consider Gary Edmond et al, 'Science Friction: Streamlined Forensic Reporting' (2018) 38(4) *Oxford Journal of Legal Studies* 764.

²⁵⁴ In the New South Wales Judicial Commission Criminal Trial Courts Bench Book, at 355, in introducing 'Expert Evidence', the following is written: 'The method by which fingerprint evidence is admitted is discussed in *JP v DPP (NSW)* [2015] NSWSC 1669 at [39]ff.' That is all.

²⁵⁵ See Gary Edmond, David Hamer and Emma Cunliffe, 'A Little Ignorance Is a Dangerous Thing: Engaging with Exogenous Knowledge Not Adduced by the Parties' (2016) 25(3) *Griffith Law Review* 383.

contend that all fingerprints are different (or unique). That is it.²⁵⁶ No other significant constraints have been placed on admission and reliance. There are no restrictions on categorical identification, even though it is inescapably predicated upon fingerprints being unique (and uniqueness somehow enabling examiners to positively identify persons). Fingerprint reports that are non-compliant with jurisdictional rules, such as Codes of Conduct, are routinely admitted (or excused). Failures and omissions are said to be repaired at trial, sometimes through the actions of defendants, as in the cross-examination in *O'Callaghan and JP* and 'tactical' decisions in *Bennett*.²⁵⁷ Apparently nothing defendants (or appellants) can do or say would lead to the exclusion or qualification of latent fingerprint evidence. Australian judges are far too ready to excuse fingerprint examiners and prosecutors.

To be clear, trial safeguards *might* work if latent fingerprint examiners complied with codes in good faith. They *might* work if prosecutors insisted on compliance and disclosure and explained the forensic science evidence they rely upon in terms that capture its known value — embodying their obligations around rectitude and fairness as 'ministers of justice'.²⁵⁸ Better resourced and better informed defence counsel *might* effectively raise questions about methods and other epistemological issues. They *might* even be able to recruit and use rebuttal experts effectively.²⁵⁹ And trial judges who were more conversant with scientific and technical forms of evidence, or applied meaningful admissibility standards, *might* be better positioned to tailor (more) appropriate instructions and informed reviews. The emphasis is on 'might'. Primary goals and protections should not be based on procedures and responsibilities that repeatedly fail.

In principle, it seems better to regulate the admission of expert evidence rather than try to repair exaggerated claims during adversarial proceedings before non-technical audiences. The frailty of trial safeguards places a premium on admissibility decision-making. Unfortunately, admissibility standards in all Australian jurisdictions are inattentive to (validity and scientific) reliability, and judges have neither imposed nor enforced meaningful conditions on the admissibility of latent fingerprint evidence. Admissibility standards were weak historically and remain weak. Modern reliance on earlier admissibility decisions and long-standing legal practice may not reveal much about the value of forensic science evidence.

²⁵⁶ This expectation is ignored in practice.

²⁵⁷ This is regardless of whether full disclosure occurred just before trial (as in *Parry* (n 2)) or only falteringly during cross-examination (as in *JP* (n 4)).

²⁵⁸ See, eg, *Boucher v The Queen* (1954) 110 CCC 263, 270, and *Whitehorn v The Queen* (1983) 152 CLR 657, 663–4, discussed in Gary Edmond, 'Expert Evidence and the Professional Responsibilities of Prosecutors', in J Hunter et al (eds), *The Integrity of Criminal Process: From Theory into Practice* (Hart, 2016).

²⁵⁹ Although consider Simon Cole, 'A Cautionary Tale about Cautionary Tales about Intervention' (2009) 16(1) *Organisation* 121.

C *Subverting the Rational Evaluation of Opinion Evidence*

Trial procedures and safeguards are intended to provide means of exploring and testing evidence and placing the decision-maker in a position conducive to making sense of — that is, rationally evaluating — it, especially where the evidence is contested. Rules of evidence and procedure, such as s 79(1) of the UEL and Codes of Conduct for Expert Witnesses, are designed to provide parties with timely information to enable them to consider their options.²⁶⁰ Rules requiring impartiality, disclosure, the provision of reasons, and identification of ‘knowledge’ are intended to encourage moderation in expert performances and to bring limitations, uncertainties and disagreement to light.

This study suggests that the reports (and certificates) prepared by latent fingerprint examiners have not placed decision-makers — whether defence counsel, prosecutors, judges or jurors — in a position to rationally evaluate their evidence. Consider, for example, the reports provided in *Bennett* and *JP*. Consider also the testimony in *O’Callaghan* and *JP*. Opinions were not presented in ways that embodied their actual value. There was a lack of research support, no reference to standards, no reference to uncertainties, no reference to an indicative error rate, and criticisms and concerns from mainstream scientists were not disclosed (or acknowledged). This was not always just a case of omission. In *JP*, the examiner’s assumptions and beliefs were misrepresented as fact or true.²⁶¹ The examiner expressly rejected the possibility of error and repeatedly represented ACE-V as infallible. The examiner expressly dismissed authoritative scientific reports and reviews that he had not read. This testimony deprived decision-makers of the ability to gauge the value of the fingerprint evidence and appreciate some of the range of limitations. *JP* is atypical only in the sense that defence counsel was aware of, and sought to elucidate, these epistemological issues.

Our courts seem to have approached latent fingerprint evidence accepting the self-serving claims of examiners about their abilities at face value. They assumed that opinions were correct. It was left to the defence to try to locate and explain the very information that fingerprint examiners and prosecutors were formally obliged to disclose and address — where identification by fingerprint was in issue. In the absence of concern with validity and scientific reliability, how are decision-makers to determine whether opinions are based on ‘specialised knowledge’? How are they supposed to gauge the probative value or weight of the

²⁶⁰ See Code of Conduct for Expert Witnesses, *Uniform Civil Procedure Rules* (UCPR) sch 7, and cases such as *HG* (n 170) and *Ocean Marine Mutual Insurance Association (Europe) OV v Jetopay Pty Ltd* (2000) 120 FCR 146, [22]–[23].

²⁶¹ This may have been inadvertent, but that is not particularly helpful in the context of adversarial proceedings.

evidence — even ‘at its highest’?²⁶² In the absence of knowledge, decision-makers are compelled to rely upon their impressions (and information of unknown utility) when determining the value of the evidence.²⁶³ Rather than formal studies of the abilities of examiners applying ACE or ACE-V, in the handful of cases where epistemic issues were raised, decision-makers were obliged to rely on the demeanour and confidence of the examiner, training and experience, the performance of trial counsel examining and cross-examining, popular impressions about latent fingerprint evidence, the fact of admission and long legal reliance, along with guidance from epistemologically starved trial judges followed by occasional review by epistemologically starved appellate courts.²⁶⁴

Decision-makers continue to be confronted with the task of evaluating the evidence in conditions where they are deprived of the very information required to do so rationally.²⁶⁵ Existing procedures, rules and assumptions compel decision-makers to speculate.

D Problems with Expert-Jury Boundary Work

One of the consequences of the failure to place juries in a position to make sense of the latent fingerprint evidence is that it is unclear how they are supposed to — as judges in *Parker* (notably Hodges J), *Lawless*, *O’Callaghan* and *Bennett* seemed to require — evaluate the expert evidence without undertaking their own assessment of the prints. Courts have done little to assist the jury to fulfil this ambiguous and somewhat heroic legal expectation. How are juries to decide? What were they supposed to do when presented with the prints? Reported decisions caution juries against comparing the prints or simply deferring to expert witnesses.²⁶⁶ However, decision-makers are not provided with the information required to evaluate opinions and related claims.

E Identifying Errors and Other Improper Expectations

There seems to have been an unstated and practically insurmountable expectation that fingerprint evidence is correct and the defence must demonstrate a reason why it should not be relied upon. This approach is

²⁶² See above Part VI(A).

²⁶³ Martire and Edmond (n 7).

²⁶⁴ See, eg, *Lawless* (n 4) 423.

²⁶⁵ This is most acute in fingerprint-only prosecutions.

²⁶⁶ Empirical studies confirm that laypersons are quite error prone, particularly where prints are similar but non-matching. See studies by Tangen et al (n 55).

inconsistent with the terms of s 79(1) of the UEL, the *Code of Conduct for Expert Witnesses*, and the obligations on prosecutors, as well as the burden of proof in accusatorial trials, following *Woolmington v Director of Public Prosecutions*.²⁶⁷

It is not the responsibility of the defence to identify an error, and they will rarely be in a position to do so. Rather, it is the responsibility of the state, through the prosecutor, to eliminate all reasonable doubt consistent with non-guilt. There are two important points to make here. First, the risk of error associated with a forensic science procedure should be negated by the state where that possibility is raised.²⁶⁸ The state, through the prosecutor, can rely on latent fingerprint evidence but that reliance should be constrained by its known value — as demonstrated through appropriately designed scientific studies. Claims of positive identification and error-free performance are inconsistent with the available evidence. They are, according to the AAAS, ‘overstated and are now widely recognised as indefensible’.²⁶⁹ Defendants should be entitled to rely on the known limitations of latent fingerprint evidence.²⁷⁰

Secondly, the defence will hardly ever be in a position to demonstrate an error even when one has occurred. Opinions about fingerprints are based on an examiner’s perception and cognition. Yet, the defendant is somehow expected to challenge this subjective assessment (and its exaggerated presentation as complete evidence of identification) displaced spatially and temporally from the circumstances of its production. Defendants may not be provided with information about the collection and continuity of the sample, the search(es) on the database (and the list of candidates), whether other examiners (dis)agreed about sufficiency or identity, which features were considered similar, the reasons differences are considered apparent (ie not real), any notes, what the examiner knew about the investigation and the suspect (the cognitive bias issue), the conditions of verification, as well as information about the individual examiner and their personal proficiency and professional history.²⁷¹ Even the provision of such information, though, does not enable defendants to ‘look inside’ the examiner’s head in order to identify subjective error or unconscious bias.

The possibility of cross-examination does not somehow repair non-disclosure or allow the defence to determine how or where an error might have

²⁶⁷ *Woolmington* (n 120).

²⁶⁸ Where issues (such as those identified in the scientific reviews) are raised by the defence, the state would seem to have an obligation to respond.

²⁶⁹ AAAS Report (n 46) 9, 71.

²⁷⁰ In many cases, especially those with more elaborate evidentiary arrays, this will make little difference to the outcomes in terms of pleas or trials and appeals.

²⁷¹ For an example of non-disclosure, see *R v Smith* [2011] EWCA Crim 1296.

been made.²⁷² At best it might expose derogation and non-compliance with standard procedures and scientific advice, but these are routinely excused by judges.²⁷³

F Epistemology versus the Beliefs of a Latent Fingerprint Examiner (or Bureau)

One persistent, though misguided, response to exceptional questions pertaining to epistemology is the heavy reliance placed on the testimony (really impressions) of experienced latent fingerprint examiners. This reliance preceded the existence of scientific research (before 2009) and persists insensitive to it (after 2009). By not requiring evidence of validity and scientific reliability, trial and appellate courts seem to be suggesting that specific identification decisions made by individual fingerprint examiners somehow trump or circumvent scientific research evaluating the procedures used to produce these very opinions.²⁷⁴ This risks becoming irrational. A result (really opinion) obtained using ACE-V should not be expressed in terms that are stronger than ACE-V has been shown capable of achieving — see Table 1 in Part III above. Trial and appellate courts must direct their attention to formal evaluation because this provides scientific insight into actual abilities. These studies assist with presentation and the rational attribution of a value to the evidence.

Rather than rely on the impressions of latent fingerprint examiners, scientific research provides the appropriate framework for presenting and understanding the evidence.²⁷⁵ The examiner's opinion cannot rise above the scientific research, even if the examiner is oblivious to that scientific research, is confident, appears to have fared well (ie was 'unshaken') in cross-examination, and so on.²⁷⁶ The fact that the examiner in *JP* — a legally recognised expert — was not familiar with the only formal studies of his 'method' might be considered

²⁷² Use of a defence (or independent) latent fingerprint examiner may not lead to the identification of an error. Several examiners endorsed mistaken identifications in the Mayfield and McKie cases. Indeed, in McKie an examiner engaged by the defence confirmed the identification subsequently criticised by Campbell J. In the case of Mayfield, an independent examiner endorsed the mistaken identification by several FBI examiners.

²⁷³ They are thereby transformed into issues of weight for the jury.

²⁷⁴ David Faigman, John Monahan and Christopher Slobogin, 'Group to Individual (G2i) Inference in Scientific Expert Testimony' (2014) 81(2) *University of Chicago Law Review* 417.

²⁷⁵ This is why PCAST advocated reporting the known error rates from the 'black box' studies.

²⁷⁶ Ironically, ignorance (and ignorance of ignorance — or 'unknown unknowns') may produce less qualified opinion evidence.

alarming.²⁷⁷ It reveals something about legal regulation of expertise and the ability to place decision-makers in a position to evaluate the opinion.²⁷⁸

This point is not restricted to latent fingerprint evidence but applies to all scientific, technical and medical evidence, especially procedures in routine use. These should be formally evaluated so that we have a reasonable idea about their value. The alternative is to rely on the pronouncements of those using, proffering, marketing and advocating them in conjunction with the vagaries of individual adversarial proceedings.

G The Primacy of Epistemology (Over Other 'Legal' Issues)

There is a supplementary issue here. Once again it extends beyond latent fingerprint evidence to other forms of forensic science and forensic medicine evidence. Most of the historical challenges to latent fingerprint evidence were focused on legal-procedural issues, around the collection and use of prints, the use of photographs, the marking and enlargement of photographs, the use of reference prints collected from minors, the task left to the jury, judicial directions, and so forth. However, it makes no sense to waste time and resources litigating such issues before the value of latent fingerprint comparison is formally evaluated and understood — that is, *known*. Logically, we should want to know the value of a procedure and the conditions that govern its application and use (particularly the appropriate way to express the opinion), so that we can consider whether we should even care if reference prints were legally obtained or judicial directions appropriate. Before we waste time and money litigating the peripheries of expert opinions, courts should require proponents to demonstrate that the procedure is valid and scientifically reliable — that is, the opinion is based on 'specialised knowledge' derived from 'study or investigation'.²⁷⁹ We should be confident that those allowed to express their opinions are demonstrably expert and their opinions are based on knowledge (rather than experience or legal tradition).²⁸⁰

²⁷⁷ This begs questions about whether examiners — who have perceptual and comparative abilities — should be entitled to speak about their procedures if they are unfamiliar with pertinent scientific research. Can they be considered expert (beyond making match decisions) if they are unfamiliar with relevant 'specialised knowledge'?

²⁷⁸ Recall *Makita* (n 145) and *Davie* (n 145).

²⁷⁹ *Honeysett* (n 12) [23], quoting *Macquarie Dictionary* (rev 3rd ed, 2001) 1054.

²⁸⁰ *Martire and Edmond* (n 7).

H *The Common-Law ‘Method’*

One of the issues emerging from the foregoing discussion is the capricious nature of legal engagement with latent fingerprint evidence. Case-based responses to scientific evidence may be unprincipled, inconsistent and even incoherent.²⁸¹ Common-law legal systems treat each case discretely because of its peculiar characteristics. While every case may be different, this does not provide a particularly persuasive explanation for inconsistent approaches or the failure to engage with validation where underlying procedures (such as ACE-V) are substantially similar across cases. While the size, quality and number of prints may vary between cases, the actual processing and reporting should be consistent, indeed standardised.

In focusing on individual cases, our common-law courts have not dedicated sufficient attention to systemic issues — questions around the fingerprint ‘method’, its limitations and the ability to categorically identify persons. Common-law courts have been less interested in general scientific studies than specific (or case-based) opinions, even if the specific opinions seem to be inconsistent with the results of the general research and difficult to characterise as knowledge. The focus on individual cases has tended to blind courts to methodological problems and constrained systematic engagement with scientific research and its implications for legal practice. This article seems to suggest, based on a century of legal ignorance, that our past practices have not served us well.

I *Feedback and the Failure to Learn (or Encourage Learning in Others)*

One of the most disturbing features of this account is that legal knowledge of latent fingerprints has not advanced in more than 100 years. Indeed, the high point of jurisprudence in terms of epistemology seems to be the dissent in *Parker*. Contemporary judges do not require latent fingerprint examiners to support their claims with evidence. Contemporary judges do not require any evidence of validity and scientific reliability.²⁸² They allow latent fingerprint examiners to identify persons in categorical terms and leave appropriate qualifications and caveats for the defence and trial safeguards, even though they only seem to have been raised on a few occasions in the course of a long century. Furthermore, no defence counsel — perhaps with the exception of counsel in *Ghebrat* — seems to have

²⁸¹ They have produced unprincipled and incoherent results. Why, for example, do courts allow latent fingerprint examiners (and those comparing bullets and voices) to testify in categorical terms (eg to positively identify persons), whereas DNA profiling is limited to probabilistic forms of expression, and face and body comparison is (or was) limited to describing similarities?

²⁸² The emphasis is on judges because existing rules could be interpreted and applied quite differently.

persuaded a trial or appellate court that they matter. Rather inappropriately, long-standing legal practice and socio-legal experience stand in the place of scientific knowledge. This is unfortunate because many other forensic 'sciences' have modelled themselves on latent fingerprint comparison and adopted the ACE-V 'method' — eg ballistics and tool marks, shoe, foot, tyre and voice comparison, along with identification from images. In consequence, poorly formed and pre-scientific ideas about forensic science and medicine continue to inform the production of forensic science evidence, admissibility decisions (unconcerned with reliability), the presentation of evidence and forensic testing, the exercise of mandatory and discretionary exclusions (unconcerned with reliability), the understanding of proof, and standards of appellate review.

The decisions in *JP*, like the decisions in *Bennett, Parry* and even *Ghebrat*, yield no epistemic insights. They offer no evidence of institutional learning or sophistication. There is no evidence that the judicial officers in *JP* have any more insight or sophistication than those who encountered fingerprint evidence a century earlier. Here we can observe, for those who choose to look, just how inadequate conventional rules, procedures, jurisprudence, Codes of Conduct and responsibilities (devolved onto prosecutors, defence lawyers and trial judges) are in practice. In order to defend the legal performance and the status quo, it would seem to be necessary to accept that the way fingerprint evidence is routinely reported, used in investigations, and presented in courts (along with ordinary challenges) are appropriate.²⁸³ This article, and its heavy reliance on scientific research and recommendations, reveals that such a position is untenable. At the very least it is inconsistent with the expectations of a system of justice that purports to be rational and interested in taking systematic advantage of scientific, technical and medical knowledge.

Not only have our courts failed to obtain scientific knowledge in their attempt to inform the admission and use of forensic science evidence, but perhaps an even greater loss has been the failure to use emerging scientific knowledge to improve our understanding of criminal justice processes. An unprecedented opportunity has been squandered. The scientific reports discussed in Part III above provide authoritative insight into forensic science evidence that, if accepted, strongly suggests that legal practice has been ineffective or misguided, and perhaps both. By not providing conditions in which prosecutors and defence counsel could productively introduce such knowledge into admissibility determinations, trials and appeals, Australian courts have deprived themselves of knowledge in their attempts to do justice in the pursuit of truth.²⁸⁴

²⁸³ It would also be premised on the idea that all who do not challenge the evidence do so because they know they are guilty, when this article raises alternative possibilities — such as the improbability of success following any challenge even if a fingerprint identification was mistaken.

²⁸⁴ Hock Lai Ho, *A Philosophy of Evidence Law: Justice in the Search for Truth* (Oxford University Press, 2008). This is not necessarily inconsistent with doing justice according to law.

One of the most important means of improving performance is through the provision of timely feedback. Current practices deprive our courts of meaningful feedback. Without empirical evidence of performance, insight or independent feedback, our courts have sought to defend their (historical) practice and portray what they have been doing for more than a century as the provision of fair trials. For those who contend that trial safeguards are performing well, we can only wonder about the evidence supporting such contentions. Where are the epistemologically informed challenges, and where is the judicial recognition of the centrality of validity and scientific reliability? Where is the evidence of cross-examination and judicial guidance drawing attention to, and clearly explaining, the significance of non-trivial problems? Where is the evidence of latent fingerprint evidence being presented in scientifically defensible terms? At this point it is far easier to identify authoritative, but unprincipled, rejections of reliability — in *Tang*, *Tuite*, *Chen* and *IMM* — than any (systematic) engagement with readily available scientific knowledge.

IX CONCLUSION

More than a century ago, the Chief Justice of Victoria lamented that ‘the matter has not been investigated by scientists generally so that we can say that the propositions relied on by the Crown are accepted scientific facts’.²⁸⁵ Madden CJ’s concerns about identification by latent fingerprint seems to have been vindicated by subsequent events. Almost 100 years later, the reviews he believed were necessary were finally undertaken. While his concerns are not simply aligned with modern scientific methods and norms, the knowledge produced by recent research has finally placed latent fingerprint comparison on a scientific foundation. Opinions about latent fingerprints turn out to be a probative, but not infallible, form of evidence. The results of scientific research, along with the considered advice of multi-disciplinary collectives of independent scientists, suggest that latent fingerprint examiners should not positively identify persons, and that their results should be expressed with an indication of performance (and error) — ideally in probabilistic terms.

The Chief Justice’s concerns are important for the way they illuminate ongoing jurisprudential problems. The language adopted by Madden CJ is eerily similar to the way the United States Supreme Court defined knowledge in *Daubert*.²⁸⁶ We can these observe similarities in the High Court’s decision in *Honeysett v The Queen*:

²⁸⁵ *Parker* (n 4) 155.

²⁸⁶ *Daubert* (n 166).

[T]he person's training, study or experience must result in the acquisition of knowledge. The *Macquarie Dictionary* defines 'knowledge' as 'acquaintance with *facts, truths, or principles*, as from study or investigation' (emphasis added) and it is in this sense that it is used in s 79(1). The concept is captured in Blackmun J's formulation in *Daubert v Merrell Dow Pharmaceuticals Inc*: 'the word "knowledge" connotes more than subjective belief or unsupported speculation. ... [It] applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds'.²⁸⁷

Our rules and jurisprudence require it. Yet when it comes to latent fingerprint evidence, no judge has reproduced the principled position advanced by Madden CJ.²⁸⁸ When it comes to forensic science evidence, our courts have rarely required prosecutors to identify specialised knowledge and, in consequence, have rarely been provided with opinions that are demonstrably reliable and presented in ways that are conducive to rational evaluation.

²⁸⁷ *Honeysett* (n 12) [23].

²⁸⁸ *Tuite* (n 12) might be an exception, although it was undermined by a side-wind in *IMM* (n 177).

APPENDIX

The judgment from the first reported English fingerprint case, *R v Castleton* [1909] 3 Cr App R 74, is reproduced below in full.

74

COURT OF CRIMINAL APPEAL.

1909
12 November.

Thomas
Herbert
Castleton.

THOMAS HERBERT CASTLETON.

The Court may accept the evidence of finger-prints though it be the sole ground of identification.

This was an appeal from a refusal of Bucknill J. to grant leave to appeal against a conviction for burglary. Appellant was sentenced at the West Riding Quarter Sessions, on October 21st, to three years' penal servitude.

Milton Barber (under sect. 10 of the Criminal Appeal Act) for appellant, who was not present. The conviction is bad, as the only evidence against appellant was that of finger-prints upon a candle left behind. He was not defended at the trial. There was no other evidence against appellant. Even supposing the prints on the candle are those of appellant, the evidence is not sufficiently weighty. He was an associate of thieves, and it may have been that the finger-prints were put there by someone else.

[DARLING J: Can the prisoner find anybody whose finger-prints are exactly like his?]

Counsel said he was not instructed as to that, but the candle might have been used by somebody else, although it belonged to appellant. He referred the Court to a photograph of the impressions of the prints.

THE LORD CHIEF JUSTICE: We are clearly of opinion that this application must be dismissed. The suggestion has been made that these finger-prints may have been put there by someone else, but that suggestion was disposed of by the jury, who decided upon the evidence before them. Our attention has been drawn to the photographs of the impressions of the finger-prints. Looking at the middle finger particularly, as well as to the index finger of the right hand, we agree with the evidence of the expert at the trial.

Application dismissed.

Castleton was subsequently presented as authoritative on the issues of admissibility and proof. It was influential in Australia, the United States and Canada, although the actual decision exemplifies profoundly limited engagement with the procedures used by examiners or their abilities. On the issue of

sufficiency, the Court both defers to the jury and trusts its own comparison of the fingerprints — contrast developments in *Lawless* and *O'Callaghan*. Revealingly, Darling J's question seems to imply, in a way that persists (its spectre re-appears in *JP*, for example), that there is an expectation that the appellant might somehow produce another person with 'identical' fingerprints (or point to an error in the identification).