Fingerprint comparison and adversarialism: The scientific and historical evidence

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Abstract

This article suggests that lawyers and courts are largely oblivious to scientific insights regarding the value and limitations of latent fingerprint evidence. It proceeds through a detailed historical analysis of the way fingerprint evidence has been reported and challenged. It compares legal responses with mainstream scientific research. Our analysis shows that fingerprint evidence is routinely equated with categorical proof of identity notwithstanding scientific warnings that such an approach is 'indefensible'. We find that legal challenges to latent fingerprint evidence have uniformly focused on adjectival issues (eg compliance with enabling legislation), leaving the validity and accuracy of this subjective comparison technique virtually unexamined since its reception at the very beginning of the twentieth century. Lack of legal engagement with validity, error and scientific research suggest that adversarial procedures have not worked effectively to secure scientifically reliable expert evidence and that legal personnel struggle with elementary scientific reasoning.

forensic science; expert; safeguards; reliability; history; identification; appeals

A INTRODUCTION: THE CASE OF LATENT FINGERPRINT COMPARISON

The House of Lords' Science and Technology Select Committee recently published *Forensic Science and the Criminal Justice System*.[1] The report identifies 'a serious deficit of high-level leadership and oversight of forensic science from the Home Office and Ministry of Justice' and a lack of funding, regulation and equitable access to forensic science expertise, leading to declining public trust and a risk of miscarriages of justice.[2] Overall, the evidence before the Select Committee 'showed a mixed level of understanding of scientific issues by lawyers and judges'. The Select Committee accepted the Forensic Science Regulator's assessment that '[j]udgments have on occasion demonstrated a lack of understanding of the process of scientific reasoning.'[3]

This article suggests that the problems identified by the Select Committee are deeply embedded in the adversarial approach to criminal justice, and longstanding. Using latent fingerprint evidence as a case study, we provide an empirical account of how lawyers and judges have understood this evidence across more than one hundred years of trials and appeals.[4] Adding to a growing body of research on the (in)effectiveness of legal responses to forensic science evidence in criminal proceedings, the article draws on contemporary mainstream scientific research and insights to assess the performance of the adversarial legal system.[5] By referencing scientific knowledge – what we (now) know about latent

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[1] Science and Technology Select Committee, *Forensic Science and the Criminal Justice System: A Blueprint for Change* (3rd Report of Session 2017 – 2019 published 1 May 2019, HL 333).

[2] Science and Technology Select Committee, *Forensic Science and the Criminal Justice System*, Summary.

[3] Science and Technology Select Committee, *Forensic Science and the Criminal Justice System*, [125].

[4] Latent fingerprints are traces recovered from a scene or item associated with a specific crime which are compared with reference fingerprints of a known person to assist with the identification (or exclusion) of a person as the source. They can also be compared with other (unknown) prints in an attempt to link offences. See generally D. Ashbaugh, *Quantitative–Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology* (CRC Press, 1999).

[5] Law Commission, *Expert Evidence in Criminal Proceedings in England and Wales* (Report No 325, 21 March 2011); G. Edmond, 'Is reliability sufficient? The Law Commission and expert evidence in international and interdisciplinary perspective (Part 1)' (2012) 16 *International Journal of Evidence & Proof* 30T. Ward, 'A New and More Rigorous Approach to Expert Evidence in England and Wales' (2015) 19 *International Journal of Evidence & Proof* 228; P.

fingerprint evidence – we are able to evaluate the effectiveness of legal mechanisms that are presumed to safeguard the integrity of criminal proceedings.[6]

Our study focuses primarily on reported and readily available decisions that discuss latent fingerprint evidence. We searched Westlaw UK and BaiLII for the word 'fingerprint' in the same paragraph as 'reliability', 'admissibility' or 'challenge' (and variations of these terms).[7] We found almost 300 decisions – mostly appeals – and analysed those cases by the nature of the challenge, the charged offence, whether fingerprint evidence was the only evidence of identity, and other questions.[8] Our focus on reported and readily accessible cases captures how influential trial and appellate courts treat latent fingerprint evidence and how they respond to challenges in judgments that are widely accessible to other courts and lawyers. It is possible that more scientifically-informed challenges have been made in trial courts, but remain undocumented because, for example, such challenges have resulted in acquittals. However, we have found no evidence of such challenges in our own research or that of others.[9] To the contrary, the evidence heard by the Select Committee and our own experience suggest that the decisions we report are representative of extant legal strategies and judicial attitudes.[10] The gaps we have identified in those strategies and attitudes are, we believe, real – as is the structural disconnect between scientific research and adversarial trial processes.[11]

The study reveals that latent fingerprint evidence was admitted and relied upon from its earliest days as conclusive proof of identity, without ever receiving a serious legal review of its value or limitations. We found no case where a lawyer had requested or a court required independent evidence of the validity or reliability of latent fingerprint comparison.[12] Despite the conventional legal valorisation of adversarialism and trial safeguards, there appears to be little, if any, endogenous legal awareness of systemic limitations with latent fingerprint evidence.[13] Indeed, latent fingerprint evidence continues to be given in terms that are, according to research scientists, 'indefensible'.[14]

This article's empirical review of reported (and therefore predominantly appellate) decisions reveals that while there have been many challenges to the admissibility and significance of latent fingerprint evidence, surprisingly few of these challenges have

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Roberts and M. Stockdale, 'Forensic Science, Evidential Reliability and Institutional Reform' in P. Roberts and M. Stockdale (eds), *Forensic Science Evidence and Expert Witness Testimony: Reliability through Reform* (London: E. Elgar, 2018).

[6] P. Roberts et al (eds), *Integrity in the Criminal Process* (Oxford: Hart, 2015).

[7] Westlaw UK and Bailii.org databases were searched for any cases with 'fingerprint /p (reliab! OR admiss! OR challeng!)' and for 'fingerprint OR finger-print OR "finger print"' in any case before 1980. The last search was conducted in January 2019.

[8] A full list of cases is on file with the authors. We have not systematically engaged with the Scottish decisions.

[9] See for example A. Cole, *Suspect Identities: A History of Fingerprinting and Criminal Identification* (Cambridge MA: Harvard University Press, 2001); Science and Technology Select Committee, *Forensic Science and the Criminal Justice System: A Blueprint for Change* (3rd Report of Session 2017 – 2019 published 1 May 2019, HL 333); Lord Campbell, *The fingerprint Inquiry Report* (APS Group Scotland, 2011) ('The Fingerprint Inquiry').

[10] There was some contestation in early trials, discussed in the monographs below, but few of these were appealed, legally reported or subsequently cited. See Cole, *Suspect Identities*, n 9 above; C. Seengoopta, *Imprint of the Raj: How Fingerprinting was Born in Colonial India* (London: PanMacMillan, 2003); C. Beavan, *Fingerprints: The Origins of Crime Detection and the Murder Case that Launched Forensic Science* (London: Hyperion, 2001).

[11] We also think it unlikely that trial counsel possesses and applies scientific sophistication that is not observable across a century of appeals. But, if a reader is aware of UK cases in which the scientific validity of fingerprint evidence was systematically challenged at trial, the authors would appreciate hearing from them.

[12] Validation refers to whether a procedure works, in what conditions and how well. It is discussed below in 'The scientific status of latent fingerprint evidence: What we know'.

[13] This article is not intended to indirectly privilege inquisitorial processes. For a comparative analysis of the strengths and weaknesses of inquisitorial processes see G. Edmond and J. Vuille, 'Comparing the use of forensic science evidence in Australia, Switzerland and the United States: Transcending the adversarial/non-adversarial dichotomy' (2014) 54 *Jurimetrics Journal* 221–276.

[14] W. Thompson et al, *Forensic Science Assessments: A Quality and Gap Analysis — Latent Fingerprint Examination* (Washington, DC: American Association for the Advancement of Science, 2017) 71 ('AAAS Report').

focused on the *epistemological* (or epistemic) value of the evidence.[15] The validity and reliability of latent fingerprint comparison was almost never raised or seriously examined in English criminal proceedings even when the identity of the defendant was in issue.[16] The absence of epistemological challenges would not be troubling if latent fingerprint comparisons had been demonstrated to be both valid *and*, as has been frequently claimed, practically infallible. However, as is explained in our section on the scientific status of fingerprint evidence, this is not the case. Until very recently, the validity of latent fingerprint comparison had never been subjected to rigorous scientific scrutiny.

In this article, we use the terms *adjectival* and *epistemological* to differentiate between two kinds of challenges to fingerprint evidence. Adjectival challenges tend to focus on legal and procedural issues such as the adequacy of disclosure, whether the collection of reference prints was within police powers, whether the (implicit) suggestion that the defendant's prints were held on a criminal database was unfair, whether a single fingerprint can constitute proof of guilt beyond reasonable doubt as well as the significance of fingerprints to the allegation. Unlike 'epistemological' challenges, they are not concerned with the accuracy of the identification. Had they manifested, epistemological challenges would be directed at the validity and reliability of procedures, indicative error rates, proficiency of examiners, the existence of standards and their application, the empirical basis for the expression(s) used by fingerprint examiners, and how risks from cognitive bias are managed. Attention to these epistemological issues would have enabled those tasked with evaluating the evidence to ascertain whether the procedure works, how well and under what conditions.[17]

While it might not be surprising to find that lawyers and judges focused primarily on legal issues, it is both surprising and revealing to discover that evaluative attention to epistemological considerations was virtually non-existent. The idea of questioning the underlying methods (eg validity), the categorical expression of opinion, or the accuracy of opinions appears to have been inconceivable to generations of lawyers and judges. This study exposes chronic institutional neglect of the epistemological dimensions of latent fingerprint evidence.

A 'NO DOUBT': LATENT FINGERPRINTS AS CATEGORICAL EVIDENCE OF IDENTITY

Judicial confidence that latent fingerprint evidence serves as complete proof of identity has been ubiquitous since the earliest cases.[18] The reported decisions treat latent fingerprint evidence – whether a single print or multiple prints, individually or in combination with other evidence – as definitive evidence of identity. The examples below are by no means exhaustive, but they convey something of the taken-for-granted nature of the link between fingerprint evidence and identity in the readily available decisions. They might be distinguished from the way another feature comparison technique – DNA profiling – is presented in more qualified statistical terms.[19]

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[15] We accept that the trial can provide scope for serious challenges and that these might occasionally take place. In general, however, this study raises questions about the frequency that trials and appeals facilitate epistemologically sophisticated challenges or encourage appropriate forms of expression.

[16] Contrast the US, where there have been numerous challenges – eg *US v Mitchell*, 365 F.3d 215 (3d Cir. 2004) and *US v Llera Plaza*, 188 F. Supp. 2d 549 (E.D. Pa. 2002) – as *Daubert v Merrell Dow Pharmaceuticals Inc*, 509 US 579 (1993) was gradually invoked in criminal proceedings.

[17] G. Edmond, 'Forensic Science Evidence and the Conditions for Rational (Jury) Evaluation' (2015) 39 *Melbourne University Law Review* 77.

[18] *R v Castleton (Thomas Herbert)* (1910) 3 Cr. App. R. 74.

[19] Curiously, courts have been inconsistent in their approaches to the feature comparison forensics. They (usually) require DNA evidence to be expressed in statistical terms but, for reasons that are conventional rather than scientific,

Consider the following representations:

> … the appellant maintained that he had been mistakenly identified, and he maintained his denials even after his fingerprints were found on Mrs White's pension book.[20]
>
> … his fingerprint was found on the door.[21]
>
> The police found one of Richards' fingerprints in the Volvo.[22]
>
> On forensic examination, the respondent's fingerprint was found on one of the boxes …[23]
>
> A magazine from one of the firearms was found to have the appellant's fingerprint on it.[24]
>
> Fresh evidence obtained by the CCRC shows that O'Toole indeed signed the caption to the statement, though he denied doing so, and his fingerprint is on it.[25]

In each of these examples, the expression (eg x's fingerprint) stands as an assertion about the fact of the matter, without attention to the reasoning process that underlies it or any necessary qualifications.

On occasion, the statement identifying the print as the defendant's is accompanied by an expression of certitude – conspicuously the absence of doubt.

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allow fingerprint and firearm examiners, those interpreting CCTV and other images and voice recordings, to make categorical identifications. See eg *R v Doheny* [1997] 1 Cr. App. R. 369; *R v Adams* [1998] 1 Cr. App. R. 377; *R v Hoey* [2007] NICC 49; *Reed & Reed* [2009] EWCA (Crim) 2698; *R v Broughton* [2010] EWCA Crim 549; *R v Hookway* [2011] EWCA (Crim) 1989; *R v Dlugosz*; *R v MDS* [2013] EWCA Crim 2. See generally Colin Aitken, Paul Roberts and Graham Jackson, *Fundamentals of Probability and Statistical Evidence in Criminal Proceedings: Guidance for Judges, Lawyers, Forensic Scientists and Expert Witnesses* (London: Royal Statistical Society, 2010).

[20] *R v Buck* [2000] 1 Cr. App. R. (S.) 42, 43. There are many cases with fingerprints (sometimes multiple fingerprints) definitively identified to the suspect/defendant/appellant. These include: *R v "AB"* [2016] EWCA Crim 1849, [6]; *Ibrahim v United Kingdom* (2015) 61 E.H.R.R. ECHR 9, [223]; *R v Jackson-Mason* [2014] EWCA Crim 1993, [6], [9]; *R v Lubinga* [2014] EWCA Crim 704, [4]; *Attorney General's Reference (Nos 4, 5, 6, 7 and 8 of 2014) (R. v Deacon), Re* [2014] EWCA Crim 651, [9]; *R v Mohammed* [2013] EWCA Crim 901, [7]; *R v Tyrone Bryant* [2012] EWCA Crim 1644, [6]; *R v Wiggins* [2012] EWCA Crim 885, [3]; *R v Carty* [2011] EWCA Crim 2087, [4]; *R v Clarke* [2012] NICA 2, [4]; *R v Lemos* [2011] EWCA Crim 1874, [4]; *Miguel v The State* [2011] UKPC 14, [4], [12]; *Sammon v R* [2011] EWCA Crim 1199, [12]; *R v Brown* [2011] EWCA Crim 80, [3]; *R v Doi Hoang* [2008] EWCA Crim 1756, [4]; *R v Anderson and Henry* [2008] EWCA Crim 837, [2], [3]; *R v Asiedu* [2008] EWCA Crim 1725, [23]; *Stefan v The Republic of Albania* [2007] EWHC 3267 (Admin), [8]; *R v Xiong Xu and Others* [2007] EWCA Crim 3129, [29]; *R v Reed and Williams* [2007] EWCA Crim 3083, [37]; *R v Uzor and Mba* [2006] EWCA Crim 624, [37]; *R v Smith* [2006] EWCA Crim 135, [3]; *R v Edwards and Rowlands* [2005] EWCA Crim 3244, [5]; *R v Moore and Boyfield* [2005] EWCA Crim 3650, [7]; *R v Keane (aka Theresa Jackson)* [2005] EWCA Crim 202, [10]; *R v Rafiq* [2005] EWCA Crim 1423, [12]; *R v Lee* [2005] EWCA Crim 443, [3], [9]; *R v Gibbs, Ponder and Davis* [2004] EWCA Crim 3431, [29]; *Allan v R* [2004] EWCA Crim 2236, [14]; *R v Kaye* [2004] EWCA Crim 1617, [4], [5]; *R v Banks* [2004] EWCA Crim 1060, [3]; *R v Parkinson* [2004] EWCA Crim 1124, [6]; *R v Farrell* [2004] EWCA Crim 597; *R v Miller* [2003] EWCA Crim 2840, [32]; *Ojinnaka and others v The Crown* [2003] EWCA Crim 3183, [29]; *R v Hibbert* [2003] EWCA Crim 3702, [2]; *R v McDonough* [2003] EWCA Crim 1439, [2]; *R v Moutousamy* [2003] EWCA Crim 2033, [6]; *R v Reay* [2003] EWCA Crim 1126, [21]; *R v Cameron* [2003] EWCA Crim 817, [24]; *R v McKechnie, Gibbons, Smith & Gibbon* [2002] EWCA Crim 3161, [7]; *R v Jenkins* [2002] 1 Cr. App. R. (S.) 7, [4]; *R v Lang* [2001] EWCA Crim 2690, [4]; *R v McGrath and Duckitt* 2000 WL 1881344, [11]; *R v Davis, Rowe and Johnson* [2001] 1 Cr. App. R. 8, [20]; *R v Lesley* [1996] 1 Cr. App. R. 39; *R v Sidhu* (1994) 98 Cr. App. R. 59; *R v Merrick, R v Holmes, R v Thornton, R v Wood* (1980) 71 Cr. App. R. 130; *R v Byrne, R v Coughlan, R v Gillespie, R v Gillespie* (1976) 62 Cr. App. R. 159; *R v Bishop* [1974] 3 W.L.R. 308; *R v Wall* [1974] 1 W.L.R. 930, 933; *R v Greenfield, R v Barker, R v Creek, R v Mendleson* (1973) 57 Cr. App. R. 849, 853; *R v Hall* (1968) 52 Cr. App. R. 528, 532; *Jones v Director of Public Prosecutions* (1962) 46 Cr. App. R. 129, 167; *Rumping v Director of Public Prosecutions* [1962] 3 W.L.R. 763; *R v Seiga* (1961) 45 Cr. App. R. 26.

[21] *R v Foster* [2018] EWCA Crim 93, [2] (sentencing).

[22] *R v Richards & Hope* [2014] EWCA Crim 1196, [28].

[23] *Revenue and Customs Prosecutions Office v Mitchell* [2009] EWCA Crim 214, [5].

[24] *R v Lewis* [2007] EWCA Crim 2912, [6].

[25] *R v O'Toole and Murphy* [2006] EWCA Crim 951, [45].

> In evidence that was not challenged, the forensic scientist who made the match was certain that there were 33 ridge characteristics which matched. There was no doubt, therefore, that a fingerprint of the appellant's had been found on the day after the burglary on the inside of the window.[26]

> Inside the front door … there was found a palm print which was identified as being without doubt that of the appellant.[27]

> Mr Thompson, a highly experienced fingerprint expert, confirmed that as a result of that comparison he had no doubt that the imprints on the door had been made by the appellant.[28]

These examples express what is ordinarily implicit.

Among the cases we located a handful of judgments where the expression is more epistemologically modest. Rather than stating the outcome of the inference – that the fingerprint is the defendant's – there is a description of the comparison process with reference to a 'match', 'identification', 'connection' or 'link'.

> It was examined by forensic science experts who found a fingerprint on the rear-view mirror *matching* those of Hunte.[29]

> A week after the robbery there was found in the flat at Talbot Road a fingerprint which was *identified* as having been made by Allpress.[30]

> He was *linked* to the offence by a fingerprint.[31]

> The Crown … relied on there having been found in a Nissan motorcar, to which both appellants were *connected* by fingerprints, a spent 38 cartridge case and firearms discharge residue.[32]

Other usages are merely descriptive (or implied). For example:

> The appellant was arrested *as a result of* a fingerprint found at the scene.[33]

These statements are more equivocal and perhaps more technically defensible. Ultimately, however, they are consistent with the more prevalent forms of expression reproduced above. The terms 'match', 'identified', 'linked', 'connected' and 'as a result of' are used in ways that suggest judges regard them as synonymous with unequivocal identification.

The following extract is also revealing. It not only provides an additional example, this time from the Chief Justice of England, but it implicitly endorses the contention that mis-identification can be 'effectively ruled out' because of the examiner's experience and knowledge:[34]

> … [the fingerprint examiner] relied on the comparison between them, on the similarities and absence of dissimilarities, on his professional experience during a long career, and on his expert knowledge of the experience of other experts as reported in the literature. He concluded that the possibility of

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[26] *R v Kamuhuza* [2008] EWCA Crim 3060, [4]. See also *R v Bailey, R v Smith* [1993] 97 Cr. App. R. 365, 367; *R v Izzigil, Kaan and Onbasi* [2002] EWCA Crim 925, [12].
[27] *Atkinson* (1988) 86 Cr App R 359, 361. See also *Muldoon and others v Herron* (1970) S.L.T. 228.
[28] *R v Robert James Brooke Albert Clarke* [2012] NICA 2, [4].
[29] *Hunte v The State (Trinidad and Tobago)* [2015] UKPC 33. [5] (italics added). See also *R v Butler* [2013] EWCA Crim 379, [3]; *R v Douglas* [2006] EWCA Crim 232, [2]; *R v Hunt and Dunne* [2001] EWCA Crim 3063, [22]; *R v Arenu* [2009] EWCA Crim 1648, [9]; *R v Bovell, R v Dowds* [2005] EWCA Crim 1091, [21].
[30] *R v Turner and others* (1975) 61 Cr. App. R. 67, 73 (italics added). See also *R v George* 2000 WL 1841694, [2].
[31] *R v Anwar* [2015] EWCA Crim 294, [3] (italics added). See also the Scottish case of *McHale v HM Advocate* [2017] HCJAC 35, [30].
[32] *R v Tozer and Pope* [2002] EWCA Crim 966, [11] (italics added).
[33] *R v Gregg* [2003] EWCA Crim 387, [3] (italics added).
[34] Compare the comments on the significance of experience in the text to n 61.

> the disputed print and the control prints being made by different people could in his judgment be effectively ruled out.[35]

This brief but representative survey reveals that judges describe the results and implications of latent fingerprint evidence without caveats or qualifications. Among the many decisions considered we could not locate a single instance of a trial or appellate judge engaging with the epistemic foundations of the inference to identification or requiring the opinion to be qualified in a way that is scientifically 'defensible'.

As we explain in the next section, the actual reliability of fingerprint evidence has recently been examined by a series of independent scientific committees. The resulting reports have sought to address the epistemological question at the heart of latent fingerprint comparison: how often, when confronted with similar looking prints, do examiners make errors? Research answering this question is only now beginning to emerge. However, none of the judicial decisions we located attends to limitations and the real risk of error with the process of fingerprint comparison, or to how these limitations and risks should be communicated. This observation holds even with respect to decisions issued after the emergence of relevant scientific research and critical reviews.

A THE SCIENTIFIC STATUS OF LATENT FINGERPRINT EVIDENCE: WHAT WE KNOW

In the UK, some traditional forensic science procedures were impugned as wrongful convictions following a series of IRA bombings in the 1970s and 1980s were gradually exposed.[36] Critiques of the traditional forensic sciences emerged alongside, and to some extent in response to, the advent of statistically-informed and scientifically grounded nuclear DNA analysis.[37] More recently, there have been concerns about the dissolution of the Forensic Science Service and the privatization of a large proportion of the state's forensic science work. Fingerprint evidence appears to have escaped a good deal of the resulting scrutiny and outsourcing, although it was the subject of a subsequent inquiry in Scotland and more recently has featured in the Forensic Science Regulator's 'advisory' guidelines.[38]

Critical scientific engagement has been more conspicuous in the United States, where concerns about latent fingerprint evidence came to prominence in scholarly reviews, admissibility challenges in the wake of *Daubert v Merrell Dow Pharmaceuticals, Inc.*, and the FBI's mis-identification of a US citizen (Brandon Mayfield) as the Madrid train bomber based on a latent fingerprint recovered from a backpack.[39] In response to this mis-identification, Congress appropriated funds for what would be the first of a number of

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[35] Lord Chief Justice, Lord Bingham of Cornhill, in *R v Charles* (unreported, Court of Appeal (Criminal Division) transcript of 17 December 1998) quoted in *R v Buckley* (1999) 163 JP 561.

[36] See generally C. Walker and K. Starmer (eds), *Miscarriages of justice: A review of justice in error* (Oxford: Blackstone, 1999); R. Nobles and D. Schiff, *Understanding Miscarriages of Justice: Law, the Media, and the Inevitability of Crisis* (Oxford: Oxford University Press 2000).

[37] J. Mnookin et al, 'The Need for a Research Culture in the Forensic Sciences' (2011) 58 *UCLA Law Review* 725; D. Harris, *Failed Evidence: Why Law Enforcement Resists Science* (New York: New York University Press, 2012).

[38] The FSR's guidelines are discussed in Sections 5.D and 6. See also C. Lawless, *Forensic Science: A Sociological Introduction* (•••: Sage, 2016).

[39] *Daubert v Merrell Dow Pharmaceuticals Inc,* 509 US 579 (1993). See eg M. Risinger, M. Denbeaux and M. Saks, 'Exorcism of Ignorance as a Proxy for Rational Knowledge: The Lesson of Handwriting "Expertise"' (1989) 137 U Pa L Rev 731; D. Faigman, *Legal Alchemy: The Use and Misuse of Science in the Law* (New York: WH Freeman, 1999); Cole, *Suspect Identities,* n 9 above; M. Saks and J. Koehler, 'The Coming Paradigm Shift in Forensic Identification Science' (2005) 309 *Science* 892; M. Saks and D. Faigman, 'Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It' (2008) 4 *Annual Review of Law & Social Science* 149; United States Department of Justice, *A Review of the FBI's Handling of the Brandon Mayfield Case* (Washington, DC: US Department of Justice, Office of the Inspector General, Oversight and Review Division, 2006).

independent reviews of the forensic sciences. The resulting report, issued by the US National Research Council (NRC) of the National Academy of Sciences in 2009, represents the first comprehensive, scientifically-informed, and independent review of the forensic sciences.[40]

B Methodology

The NRC report – *Strengthening Forensic Science in the United States* – placed unprecedented emphasis on the need for forensic science procedures to be grounded in scientific research and for forensic science practitioners to develop empirically-based standards and attend to human factors.[41] In relation to the pattern-matching or feature comparison forensics – eg latent fingerprint comparison, firearms and toolmarks, bitemark, hair and fibre, paint and coatings, document and handwriting, fire and explosives, blood spatter, shoe and tyre impression evidence – the Committee concluded that '[w]ith the exception of nuclear DNA analysis … no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.'[42]

The 'method' currently used by latent fingerprint examiners is captured by the acronym ACE-V.[43] Examiners *analyse* latent and reference prints to determine whether they are suitable (or sufficient) for comparison and to locate features (eg ridge endings, deltas and whorls, various levels of detail, as well as scars). They *compare* prints for similarities, leading to an *evaluation* of whether, given the various similarities and any dis-similarities, the prints can be said to match, or not match or should be reported as inconclusive.[44] Where two prints are said to match, any dissimilarities must be (subjectively) 'explainable'. *Verification* involves review, usually of a match decision, by a different fingerprint examiner.[45] For decades, fingerprint examiners presented their procedures and methods – of which ACE-V is the latest incarnation – as (practically) infallible. In conjunction with assumptions about uniqueness, these beliefs provided the basis for the categorical claims documented in the previous section.[46]

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[40] National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (National Academies Press, 2009) ('NRC report'). See also H. Edwards, 'Solving the Problems That Plague the Forensic Science Community' (2010) 50 *Jurimetrics Journal* 5. Findings and recommendations in the reports are largely applicable to fingerprint comparison in the UK because the fingerprint examiners use the same basic procedure – ACE-V – and many of the same technologies. If English examiners claim to be superior to US examiners that requires empirical evidence rather than appeals to longer and better training or different traditions. At this point such studies do not exist. On the applicability of the US reports to other jurisdictions, consider comments by the co-chair of President Obama's Council of Advisers on Science and Technology: E. Lander, 'Response to the ANZFSS council statement on the President's Council of Advisors on Science and Technology Report' (2017) 49 *Australian Journal of Forensic Science* 1.

[41] NRC report, n 40 above. See also Expert Working Group on Human Factors in Latent Print Analysis, *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach* (US Department of Commerce, National Institute of Standards and Technology, 2012) ('NIST report').

[42] NRC report, n 40 above, 7, 100.

[43] ACE-V is the most recent iteration and so presumably the most robust of the various (and frequently overlapping) methods used by fingerprint examiners across more than a century of operation. ACE-V came to prominence following scientifically-informed criticisms of point standards.

[44] For a description see Ashbaugh, *Quantitative–Qualitative Friction Ridge Analysis.*

[45] AAAS report, n 14 above, 95.

[46] On the issue of uniqueness, see NRC Report, n 40 above, 188–9; 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) 62 ('PCAST report'); M. Saks and J. Koehler, 'The Individualization Fallacy in Forensic Science' (2008) 61 *Vanderbilt Law Review* 199; S. Cole, 'Forensics without Uniqueness, Conclusions without Individualization: The New Epistemology of Forensic Identification' (2009) 8 *Law, Probability, & Risk* 233; J. Koehler and M. Saks, 'Individualization claims in forensic science: Still unwarranted' (2010) 75 *Brooklyn Law Review* 1187

In contrast, the authors of the NRC report concluded that 'there is limited information about the accuracy and reliability of friction ridge analyses [and] claims that these analyses have zero error rates are not scientifically plausible.'[47] They continued:

> 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.[48]

The NRC conducted a fruitless quest for scientific research on the methods employed by fingerprint examiners. After extensive efforts, including inviting the fingerprint community to share its research, it endorsed the 'unambiguous' conclusion of an article by Haber and Haber: '[w]e have reviewed available scientific evidence of the validity of the ACE-V method and found none.'[49] In consequence, the NRC report endorsed the call for 'epistemological humility' where the 'meaning and significance attributed to a "match"' are more 'modest' than 'positive [or categorical] identification'.[50]

B Individualisation

The NRC report was followed by three reports focused exclusively on latent fingerprint comparison and a further report that reviewed research progress in respect of latent fingerprint evidence and six other comparison-based procedures.[51] While documenting some progress over time, each of these reports endorsed the basic findings and recommendations in the NRC report. A report prepared by scientists and fingerprint examiners under the auspices of the authoritative National Institute of Standards and Technology (NIST) and the Department of Justice (DOJ) recommended against equating match decisions with categorical identification (or individualisation).

> Because empirical evidence and statistical reasoning do not support a source attribution to the exclusion of all other individuals in the world, latent print examiners should not report or testify, directly or by implication, to a source attribution to the exclusion of all others in the world.[52]

The report of *The Fingerprint Inquiry* in Scotland recommended that '[e]xaminers should discontinue reporting conclusions on identification or exclusion with a claim to 100% certainty or on any other basis suggesting that fingerprint evidence is infallible.'[53]

Most recently, the American Association for the Advancement of Science (AAAS) issued a quality and gap analysis of latent fingerprint comparison. The AAAS reported that:

> Latent fingerprint examiners traditionally claimed to be able to "identify" the source of a latent print with 100% accuracy. *These claims were overstated and are now widely recognized as indefensible*. While latent print examiners may well be able to exclude the preponderance of the human population as possible sources of a latent print, there is no scientific basis for estimating the number of people

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[47] NRC report, n 40 above, 142.
[48] NRC report, n 40 above, 142–5 (emphasis added).
[49] NRC report, n 40 above, 143, citing L. Haber and R. N Haber, 'Scientific validation of fingerprint evidence under *Daubert*' (2008) 7 *Law, Probability & Risk* 87–109.
[50] NRC report, n 40 above, 142, 184.
[51] The three fingerprint reports are: The Fingerprint Inquiry, n 9 above; NIST report, n 41 above; and the AAAS report, n 14 above. The other important general review of feature comparison forensics, including latent fingerprint comparison, is the PCAST report.
[52] NIST report, n 41 above, 197: Recommendation 3.7. See also NRC report, n 40 above, 106.
[53] The Fingerprint Inquiry, n 9 above, Recommendation 3.

> who could not be excluded and, consequently, no scientific basis for determining when the pool of possible sources is limited to a single person. Moreover, research on examiners' accuracy when comparing known-source prints has provided ample evidence that false identifications can and do occur.[54]

The scientific reports spoke with one voice regarding the real possibility of error and the dangers of over-claiming.

B Cognitive bias and standards

The scientific reports also point to the dangers posed by human factors; particularly a range of cognitive biases introduced when fingerprint examiners receive domain-irrelevant information (eg about the case or the suspect) and through using suggestive review procedures (eg non-blind verification).[55]

> When confronted with ambiguous stimuli, people tend to see what they hope or expect to see … contextual information can produce confirmation bias. Extraneous information can influence people acting in good faith and attempting to be fair interpreters of the evidence.[56]

Scientists have advised forensic scientists to introduce systems to manage the risks posed by domain-irrelevant information and suggestion.[57]

The reports also insist on the need for standards to be empirically based – derived from scientific experiments – rather than tradition or the consensus of fingerprint examiners.[58]

B Uncertainty and error

All of the scientific reviews recommend providing more information in expert reports (and testimony), including measuring uncertainty and providing information about performance and error.[59] The need to report error rates manifested most prominently in a report by the President's Council of Advisers on Science and Technology (PCAST) published in 2016. Relying on the handful of studies undertaken since the release of the NRC report in 2009, the President's Council concluded that:

> … latent fingerprint analysis is a *foundationally* valid subjective methodology—albeit with 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.[60]

Notwithstanding foundational validity, PCAST expressed reservations about whether latent fingerprint comparison is valid in the way it is routinely *applied* in practice. Based

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[54] AAAS report, n 14 above, 71 (italics added).

[55] See K. Ballantyne et al, 'Peer Review in Forensic Science' (2017) 277 *Forensic Science International* 66; I. Dror et al, 'Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications' (2006) 156 *Forensic Science International* 74; G. Edmond, J. Tangen, R. Searston, and I. Dror, 'Contextual bias and cross-contamination in the forensic sciences: The implications for investigations, plea bargains, trials and appeals' (2014) 14 *Law, Probability & Risk* 1.

[56] NIST Report, n 41 above, 10 and more generally G. Edmond and K. Martire, 'Just Cognition: Scientific Research on Bias and Some Implications for Legal Procedure and Decision-Making' (2019) 82 *Modern Law Review* 633.

[57] Ideally, features on the latent print are documented before the examiner sees the reference print to avoid displacement and any review is 'blind'. See D. Krane et al, 'Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation' (2008) 53 *Journal of Forensic Sciences* 1006 and I. Dror et al, 'Context management toolbox: A linear sequential unmasking (LSU) approach to minimizing cognitive bias in forensic decision making' (2015) 60 *Journal of Forensic Sciences* 1111.

[58] NRC report, n 40 above, xx, 19 (Recommendation 1).

[59] G. Edmond, K. Martire and M. San Roque, 'Expert reports in the forensic Sciences' (2017) 40 *UNSW Law Journal* 590; G. Edmond, E. Piasecki, S. Carr, 'Science Friction: Streamlined Forensic Reporting' (2019) 38 *Oxford Journal of Legal Studies* 764.

[60] PCAST report, n 46 above, 101 (italics added).

on its review of the available research, the Council recommended that when reporting opinions about the identity of persons of interest based on fingerprint comparison:

> … it would be appropriate to inform jurors that (1) only two properly designed studies of the accuracy of latent fingerprint analysis have been conducted and (2) these studies found false positive rates [ie, misidentifications] that could be as high as 1 in 306 in one study and 1 in 18 in the other study. This would appropriately inform jurors that errors occur at detectable frequencies, allowing them to weigh the probative value of the evidence.[61]

PCAST found only two methodologically adequate studies (only one of which was large and published). PCAST's recommendations would provide information about the validity and accuracy of fingerprint evidence that, while limited, had never before been available for consideration by courts.

B Experience and judgment

The reports also raised concerns about widespread legal reliance on criteria other than validation and reliability in the evaluation of forensic science evidence.[62] Given that our study reveals heavy legal emphasis on 'experience', conventional (point) standards and other institutional factors as a warrant for reliance and accuracy, PCAST's emphatic disclaimer bears reproducing:

> … neither experience, nor judgment, nor good professional practices (such as certification programs and accreditation programs, standardized protocols, proficiency testing, and codes of ethics) can substitute for actual evidence of foundational validity and reliability. The frequency with which a particular pattern or set of features will be observed in different samples, which is an essential element in drawing conclusions, is not a matter of "judgment." It is an empirical matter for which only empirical evidence is relevant. Similarly, an expert's expression of confidence based on personal professional experience or expressions of consensus among practitioners about the accuracy of their field is no substitute for error rates estimated from relevant studies. For forensic feature-comparison methods, establishing foundational validity based on empirical evidence is thus a *sine qua non*. Nothing can substitute for it.[63]

When contrasted with legal approaches to latent fingerprint evidence, these reports are striking. Unlike the legal decisions discussed in this article, scientists reviewed the research base. They arrived at conclusions that are manifestly inconsistent with the way fingerprint evidence was and continues to be presented in criminal investigations, expert reports, testimony and judgments. [64]

To be clear, the scientific reviews were not entirely critical. Latent fingerprint comparison is recognised as a valuable subjective procedure that has the potential to assist with identification. However, latent fingerprint examiners have improperly claimed more than they ought. Fingerprint evidence continues to be systematically overstated in favour

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[61] PCAST report, n 46 above, 96, 26, 74. See also AAAS report, n 14 above, 9, 73.

[62] G. Edmond, 'Legal and non-legal approaches to forensic science evidence' (2016) 20 *International Journal of Evidence & Proof* 3; K. Martire and G. Edmond, 'Rethinking Expert Opinion Evidence' (2017) 41 *Melbourne University Law Review* 967.

[63] PCAST report, n 46 above, 6.

[64] There are occasional judicial references to the possibility that fingerprint evidence 'could be flawed', as in *R v Clarke* [1995] 2 Cr App R 425, 429 (not a fingerprint case), but these are concerned with admissibility and are not consistent with the way fingerprint evidence is presented or used in the reported decisions. See also *R v Dallagher* [2002] EWCA Crim 1903, [27] (also not a fingerprint case); *R v Jarvis* [2004] EWCA Crim 859, [19]; *R v Barnes* [2005] EWCA Crim 1158, [43].

of the prosecution, and ubiquitous risks from cognitive bias and error are not appropriately managed or disclosed.[65]

A CHALLENGING FINGERPRINT EVIDENCE

In reviewing reported references to fingerprint evidence we found that challenges to fingerprint evidence have been quite common. However, the overwhelming majority of challenges have focused on issues other than identity. (The few qualified exceptions are examined in 'Quasi-epistemological considerations'.) This section shows how legal actors focused on adjectival law, investigative procedure and more recently human rights and privacy, without ever meaningfully engaging with the validity and reliability of fingerprint comparison methods and resulting opinions. Three key themes emerged from our review. First, courts assume that epistemological concerns about the value of fingerprint evidence either do not arise or will, if necessary, be addressed at trial. Secondly, they assume that the manner in which fingerprint examiners express their opinions is appropriate. Thirdly, beyond failing to engage with the substantive value of fingerprint evidence, most of these legal challenges were unsuccessful.

We have structured our discussion of the legal challenges in a manner that broadly aligns with the chronological progress of a case – from questions associated with the collection and processing of prints, through debates about the significance of fingerprint evidence to concerns about trial fairness, concluding with sentencing.

B Collection procedures, new technologies and investigator misconduct

A significant proportion of our sample relied on a procedural irregularity in the collection or storage of the reference fingerprints to challenge the admissibility (or retention) of fingerprint evidence.[66] Some early challenges were based on collection practices and, as statutory regimes were established (and expanded) to facilitate the collection and retention of fingerprints, challenges also focused on alleged non-compliance with evolving procedural regimes. These challenges continued as new technologies were applied to both the detection of latent fingerprints, the capture of reference fingerprints, and the comparison of fingerprints. An associated group of cases challenge the evidence on a very different basis, by alleging police misconduct.

Callis v Gunn is a good example of a case that alleges a defect in the procedure for obtaining reference fingerprints. Callis was charged with larceny from a dwelling house. When in custody at the police station a detective said: 'I want to take your fingerprints. All right?' Callis replied: 'Yes'.[67] At trial the fingerprint evidence was excluded because Callis had not been cautioned. The prosecutor appealed. The Court of Appeal held that the evidence was admissible. The taking of fingerprints was distinguished from taking a confession – which was regulated by the Judge's Rules. For the Court it 'was quite unnecessary to give any caution.'[68] At common law, if the evidence was relevant, it was admissible, subject to discretionary exclusion on the basis that it was 'obtained oppressively, by false representations, by a trick, by threats, by bribes, anything of that sort.'[69]

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[65] The commitment to categorical conclusions has also meant that courts have frequently been deprived of potentially valuable evidence that is suggestive but not conclusive. This is a legacy of the historical commitment to categorical identification and the failure of the community of fingerprint examiners to engage with statistics.
[66] See eg *R v Jones (Yvonne Kathleen)* [1978] 3 All E.R. 1098; *George v Coombe* [1978] 1 WLUK 157.
[67] *Callis v Gunn* (1964) 48 Cr App R 36, 37.
[68] *Callis v Gunn*, 40.
[69] *Callis v Gunn*, 40.

In *R v Tottenham Justices, Ex parte ML*, police sought a reference print of the leading edge of ML's hand in relation to an investigation into the death of a police officer. A minor in custody, ML had already been fingerprinted and was resisting the application. The taking of prints of 'any person not less than fourteen years old' was governed by s 49 of the *Magistrates' Court Act 1980*. The issue facing the Court was whether the term 'finger-prints' in the statutory regime – which expressly included palm-prints – extended to the edge of a hand which had previously been captured. Writing for the Court, Kennedy J adopted a permissive approach: 'I am of the opinion that when Parliament authorized the taking of palm-prints it left it to the good sense of magistrates to decide whether in the particular circumstances of any individual case what was sought to be taken was in reality a palm-print'.[70]

Chester-Nash v CPS, an example of a successful challenge, raised the issue of continuity.[71] Chester-Nash was convicted of stealing food from the kitchen of a Cambridge student house based on identification by latent fingerprint. The only question at trial was the identity of the intruder. Latent fingerprints from the kitchen were matched to a set of reference fingerprints on a document in police records with the defendant's name on it. However, there was no evidence, apart from the name on the fingerprint record (inadmissible hearsay), that these were indeed Chester-Nash's fingerprints. There was, as the defence explained, 'a break in the chain which led from the appellant to the control [or reference] sample'.[72] The difficulty was summarised by the Lord Chief Justice on appeal:

> In my judgment it was a fatal omission in the evidence adduced against the appellant by the Crown that there was no statement from the officer who took the control sample; there was no record produced relating to the taking of the control sample; and the control sample itself was not before the court.[73]

This lacuna meant that the Court could not be satisfied that the reference prints belonged to Chester-Nash. In the absence of the fingerprint evidence there was 'no evidence of identification in the kitchen, but only the evidence of the description given by [a resident student] of a man.'[74] In most of the cases we reviewed, uncertainties, and even failures and omissions, tend to be resolved in favour of the prosecution. It may be significant that *Chester-Nash* involved both a relatively minor offence and a procedural oversight that could readily be addressed by police in future cases.

Numerous institutional and technological changes – for detection, capture and comparison – along with their epistemological implications, receive very limited attention in the reported decisions. The opaque but anodyne reference to improved techniques in *Clarke v R* is illustrative:

> Evidence linking the appellant to the offence did not emerge until 2009 as a result of improvements in fingerprinting techniques.[75]

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[70] *R v Tottenham Justices, ex parte L. (a minor) (The Times*, 11 November 1985), 280.
[71] *Chester-Nash v CPS* [2000] 4 WLUK 525. See also *Chappell v DPP* (1989) 89 Cr App R 82, 86. On the provenance of fingerprints more generally, see *Stefan v The Republic of Albania* [2007] EWHC 3267, [5]; *Bernard v Trinidad and Tobago* [2007] UKPC 34; *Wilberforce v The State* 2007 WL 1292675; *R v Uzor and Mba* [2006] EWCA Crim 624, [37]-[39]; *R v Parkinson* [2004] EWCA Crim 1124, [21]; *R v Kempster* (1990) 90 Cr. App. R. 14, 24.
[72] *Chester-Nash v CPS* [2000] 4 WLUK 525, [8]. Contrast, *R v Rodgers* [2013] NICA 71, [20]. See also *R v Kamuhuza* [2008] EWCA Crim 3060, [12], specifically under the Criminal Justice Act 2003, ss116, 117 and 114(1)(d).
[73] *Chester-Nash*, [18].
[74] *Chester-Nash*, [16].
[75] *Clarke v R* [2012] EWCA Crim 9, [1], [7]. See also *R v Robert Rodgers* [2013] NICA 71, [8].

We can obtain a glimpse of how new technologies are presented and understood as advances in the resolution of another 'cold case', namely *R v Rhodes*.[76] Through the use of 'modern computerized science techniques' Rhodes was identified as an armed robber almost three decades after a robbery.[77] Precisely what these 'modern' techniques involve, along with their validity and reliability, are neither raised nor explained in the appeal. Instead, the trial and appeal focus on the disadvantage to the defence associated with the delay in prosecution (including lost statements and the unavailability of witnesses). The trial judge was obliged to warn the jury about potential unfairness caused by the delay and clearly explain the defence submissions in this regard. In so doing the judge noted, perhaps facetiously, that 'the fingerprints are not suffering from memory problems.'[78] The Court of Appeal was satisfied that 'taken as a whole' the summing-up was 'a fair and balanced one'.[79]

An occasional challenge did focus on the technology; though challenges mostly considered whether new technologies were supported by enabling legislation. In *Public Prosecution Service v Elliott* the Supreme Court (NI) considered a challenge to the use of Livescan. Livescan is a proprietary device (combining a 'camera, scanner and computer') for the electronic capture of reference fingerprints from a glass plate, thereby avoiding the need for inked prints.[80] The appellants challenged the admissibility of fingerprint matches on the basis that the Livescan equipment had not been formally approved as contemplated by the relevant *Police and Criminal Evidence (NI) Order 1989*. The statute was silent on the implications of the 'failure to use an approved device'.[81]

In its reasons, the Court refers to the many advantages attributed to Livescan, such as: 'the ease of electronic transmission, storage and sorting'; the ability to 'almost instantaneously verify or refute the identity of the person tested'; along with easing the 'international exchange of data'.[82] The Court relies upon the persistence of ridge characteristics over time, the fact that there 'was no challenge whatever to the accuracy of the control fingerprints taken … by the Livescan device' and the presence of 'no less than 45 particulars' (ie points) in the specific case.[83] The 'successful operation of Livescan in England and Wales over a decade without any type of approval, as well as experience in Northern Ireland' are used to support the contention that Parliament had not intended 'that the consequence of use of unapproved apparatus should be the exclusion of the evidence.'[84] *Elliott* is an illuminating example of the Court relying on the failure of the defence to make an epistemological challenge as support for the reliability of the procedure and technology.[85] It is representative of the cases reviewed insofar as the challenge focuses on legal and procedural defects and was unsuccessful.

The third group of procedural challenges includes cases in which the defence alleges police misconduct. In *R v Mason*, investigators misled the suspect and his solicitor when they 'set out deliberately to make the defendant believe [they] had a fingerprint on some of the glass fragments from the bottle that was used to perpetrate this crime.' Police

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[76] *R v Rhodes* [2014] EWCA Crim 1434.
[77] *Rhodes*, [2]. See also *R v Rodgers* [2013] NICA 71, [8]; *R v Clarke* [2012] NICA 2, [4].
[78] *Rhodes*, [20].
[79] *Rhodes*, [24].
[80] *Public Prosecution Service of Northern Ireland v Elliott* [2013] UKSC 32, [5]-[6]. See also *R v Clarke* [2012] NICA 2, [4].
[81] *Elliott*, [8], [11].
[82] *Elliott*, [6].
[83] *Elliott*, [15].
[84] *Elliott*, [16].
[85] The logic is limited: non-challenges might be explained by a range of case-specific, resource, competence or institutional factors.

reasoned that if Mason was innocent 'there was no way he would produce a confession.'[86] In response to this 'evidence' Mason made admissions and was convicted. The appeal focused on the admissibility of the confession in light of the deception:[87]

> It is obvious from the undisputed evidence that the police practiced a deceit not only upon the appellant, which is bad enough, but also upon the solicitor whose duty it was to advise him. In effect, they hoodwinked both solicitor and client. This was a most reprehensible thing to do.[88]

The Court of Appeal concluded that, in the interests of fairness, the trial judge should have exercised the discretion to exclude the confession. The Court expressed the hope 'never again to hear of deceit such as this being practiced on an accused person.'[89] In this case, the effectiveness of the deception hinged on pervasive beliefs about the power of fingerprint evidence. The dishonesty inherent in the police behaviour – and its adverse consequences – was immediately evident to the court in a way that more subtle concerns about examiner overstatement may not be.

Following a reference from the Criminal Cases Review Commission (CCRC), in *R v Martin and others*, the Crown did not seek to defend the convictions of three men for armed robbery. The case had been investigated by the subsequently discredited 'Flying Squad'. The case against Martin included video of the robbery and a 'good palm print' said to have been lifted from the crime scene.[90] Martin denied ever having been to the shop and 'said that his palm print *must* have been covertly taken from another source (e.g. his parked car)'.[91] Martin and two others were convicted and their initial appeal was, perhaps predictably, unsuccessful. '[E]verything changed', however, 'when a Police Complaints enquiry investigating the [Flying] Squad revealed massive corruption within it.'[92] Several of the officers involved in the investigation of the robbery were convicted of serious criminal offences – including perverting the course of justice – and three others were awaiting trial. It was these revelations and the real possibility of fabrication that led to the case being reconsidered. The Court allowed the appeal even though it was 'not easy to divine the precise nature of the police misconduct in respect of the palm print'.[93]

Allegations of impropriety were less successful in *R v Barnes*.[94] Following conviction for robbery and grievous bodily harm based substantially on identification by fingerprint, Barnes sought to contest the source of two fingerprints said to have been lifted from a wooden door at the crime scene. That they were the 'appellant's fingerprints' was 'not in issue'.[95] Rather, as in *Martin*, the defence raised the possibility of misconduct by investigators.[96] Barnes sought to introduce fresh evidence from an arborealist who suggested that the absence of wood grain pattern on the tape containing the lifted fingerprint meant that the latent print had not been lifted from a wooden surface. The

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[86] *R v Mason* (1988) 86 Cr. App. R. 349352. See the counter-intuitive research on confessions: G. Gudjonsson, *The Psychology of Interrogations and Confessions: A Handbook* (Chichester: Wiley, 2003); R. Leo, 'False Confessions: Causes, Consequences, and Implications' (2009) 37 *Journal of the American Academy of Psychiatry and the Law* 332
[87] Under PACE ss76 and 78.
[88] *Mason*, 353. See also *Callis v Gunn*.
[89] *Mason*, 353. Note that deceit is permissible in the US.
[90] *R v Martin and others* [2000] EWCA Crim 3550, [21].
[91] *Martin*, [6].
[92] *Martin*, [8].
[93] *Martin*, [21]. Alleged in *R v Moore and Boyfield* [2005] EWCA Crim 3650, [13]. See also *R v Slade* 2000 WL 33116508, [5], [10] where alleged police misconduct involved the planting of a glove with the appellant's fingerprint and *R v Zomparelli* 2000 WL 35801961, [8], where police misconduct and planting of evidence were successfully raised.
[94] *R v Barnes* [2005] EWCA Crim 1158.
[95] *Barnes*, [9].
[96] *Barnes*, [47]. See also *R v Barnes* (1971) 55 Cr. App. R. 100, 102-103: 'he alleged that they were forgeries deliberately planted.'

Crown and the Court were sceptical of the arborealist's expertise and abilities. The prosecutor described the analysis of marks as 'outside of [the arborealist's] field'.[97] The Court was unsure whether 'the exercise of comparing the wood-grain pattern of the door … is one that could validly be undertaken at all'.[98] It concluded that the arborealist had 'no expertise in the interpretation of lifts, or in the identification of wood-grain on lifts'.[99] His evidence was not admissible, and could not as such provide 'a ground for regarding the jury's verdict as unsafe'.[100]

Though not epistemic in orientation, the last group of cases suggest that courts are open to receiving evidence of police misconduct and where such evidence seems plausible, are prepared to act upon it.

B. Trial fairness and fingerprint records

A smaller group of cases address concerns about trial fairness, including the implication of relying on criminal records to locate candidate fingerprint matches, and the challenge, for the defence, of obtaining resources and securing expert assistance.

Occasionally, though unsuccessfully, defendants and appellants raise concerns about the introduction of fingerprint evidence implying that the defendant has a criminal record. Ordinarily studiously avoided, in *R v Howes* the issue surfaced when the prosecutor stated that the false name provided by the defendant was discovered when police compared his fingerprints with their records. On appeal, the Court explained that:

> … it really depends on the effect that the offending words may have on the jury, and it is to be observed that the Deputy-Chairman in this case took very good care in his summing-up not to refer to the matter of fingerprints at all.[101]

For the Court of Appeal, 'notwithstanding the unfortunate course this case took in regard to the appellant not being represented, there has been no miscarriage of justice.'[102] In general, fingerprint examiners, prosecutors and judges have endeavoured to avoid drawing attention to the fact that fingerprint databases are dominated by those who have been convicted. But, notwithstanding this conspiracy of silence, the issue is frequently lurking. On those occasions where it is raised, or manifests (as in *Howes*), it tends to be treated as something that is not unfair or not sufficiently unfair to disturb conviction.

In another group of cases, commencing before though intensifying after the *Human Rights Act 1998*, the applicant/appellant endeavours to have their fingerprints removed from a criminal database following non-prosecution, non-conviction, successful appeal or the intervention of a significant period of time.[103] None of these cases involves a direct challenge to the probative value or reliability of fingerprint evidence. Rather, they tend to engage human rights concerns in relation to the state's ability to retain biometric information, in the shadow of the ECHR.[104] Retention cases tend to reinforce the high

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[97] *Barnes*, [20].
[98] *Barnes*, [33].
[99] *Barnes*, [45], [50].
[100] *Barnes*, [46].
[101] *Howes* (1964) 48 Cr. App. R. 172, 178. See also *Culpepper v Trinidad and Tobago* [2000] 12 WLUK 563.
[102] *Howes*, 179. The jury was presumed to have ignored or forgotten any character implications.
[103] For an early example, consider the Scottish case of *Adamson v Martin* (1916) SC 319. These cases are not limited to fingerprint evidence, and there have been numerous applications in relation to the retention of DNA profiles.
[104] *Gaughran v Chief Constable of Northern Ireland* [2015] UKSC 29; *R. (on the application of RMC) v Commissioner of Police of the Metropolis* [2012] EWHC 1681 (Admin); *R. (GC) v Commissioner of Police of the Metropolis (Liberty and Another intervening)* [2011] UKSC 21; *Mark Richardson v The Chief Constable of West Midlands* [2011] EWHC 773 (QB); *S v United Kingdom* (2009) 48 E.H.R.R. 50; (*On the Application of S) v Chief Constable of South Yorkshire Police, R. (On the Application of Marper) v Chief Constable of South Yorkshire Police* [2004] UKHL 39.

evidentiary value attributed to fingerprint evidence and the concomitant intrusion upon rights such as privacy.

The willingness of the state to fund defence challenges to latent fingerprint evidence seems mixed. In many cases, particularly cases in the twentieth century, counsel received funding to challenge adjectival (particularly procedural) aspects of the evidence. It seems that there was limited interest and limited support for cases where defendants sought to argue mistaken identification. The case of *R v O'Brien* is revealing. The Court of Appeal quashed a conviction in circumstances where Legal Aid refused to fund the defence. Legal Aid had refused funding because 'it was a fingerprint case' and, using circular reasoning, considered the defendant's alibi 'phoney'.[105]

Whether fingerprint examiners and other experts are available to defendants and likely to be called, admitted and relied upon are issues that are first reported in *R v Smith* – discussed below.

B The significance of latent prints

Another substantial group of cases focuses on the significance of prints recovered from crime scenes and associated objects. In these cases, the defence does not contest the capacity of fingerprints to provide unerring identification, but questions the significance of the identification in the context of the case, or points to the presence of unidentified latent prints, to raise doubt about the identity of the true perpetrator(s).[106]

The response to the latent print evidence in *Atkinson* is representative.[107] There, a suspect initially denied having ever been to an apartment where a woman was sexually assaulted. When a palm print on the inside of the front door was matched to him, Atkinson's version of events changed.[108] Rather than question the identification, the suspect offered an explanation that (while not innocent) was inconsistent with participation in the assault. Atkinson explained that he had been looking for premises to burgle when he noticed an open apartment. Upon entering the apartment he realised that an assault was in progress and – recognising one of the offenders – left so as to avoid being implicated. In conjunction with other evidence, the Court of Appeal was in no doubt about the safety of the conviction.

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[105] *R v O'Brien* [1967] 1 WLUK 496.

[106] The many cases include: *R v Spruce* [2016] EWCA Crim 1489, [3] (significance of print on scales with traces of illegal drugs); *Ibrahim v United Kingdom* (2015) 61 E.H.R.R. ECHR 9, [223] (significance of a fingerprint on a newspaper report of a bomb); *R v Adamczewski* [2014] EWCA Crim 1391, [18] (significance of prints on knife acknowledged); *R v Bryant* [2012] EWCA Crim 1644, [6] (significance of prints in car associated with drug supply); *Thambithurai, Seevaratnum, Santharatnam, Nadarajah, Santharatnam v The Crown* [2011] EWCA Crim 946, [9]; *Sher, Farooq, Sharif v The Chief Constable of Greater Manchester Police and others* [2010] EWHC 1859, [111] (Admin); *R v Nelson* [2009] EWCA Crim 1600, [8] (significance of mother's fingerprint matched to bag containing murder weapon); *R v Finch* [2007] EWCA Crim 36, [8]; *R v Shebani* [2017] EWCA Crim 750, [8]-[18] (significance of print on drug packaging); *R v Peter Charles S* [2006] EWCA Crim 1690, [4] (significance of prints on cannabis, but not cocaine, packaging); *R v Robinson* [2005] EWCA Crim 3233, [23] (significance of prints on car, and emergence of explanation); *R v Robinson* [2005] EWCA Crim 3307, [13]; *Setting of Minimum Terms in Relation to Robert Belnavis Pursuant to Paragraph 3, Schedule 22 of the Criminal Justice Act 2003* [2005] EWHC 1933 (QB), [7]; *R v Rahman* [2005] EWCA Crim 2129, [2] (whether a drug courier or more centrally implicated); *R v Odoe* [2005] EWCA Crim 1146, [8] (significance of prints in shop); *R v Peart* [2005] EWCA Crim 528, [3], [9] (significance of prints in shop); *Allan v R* [2004] EWCA Crim 2236, [14]; *R v Farrell* [2004] EWCA Crim 597, [3] (significance of prints on newspaper found in getaway car); *R v Robinson and Bryant* [2002] EWCA Crim 1799, [7], [13] (significance of prints on bag used to hide item used in robbery); *R v Davis* 2000 WL 1918607, [27]; *R v Bishop* [1974] 3 W.L.R. 308 (significance of prints in flat associated with burglary explained on basis of homosexual relationship); *R v Dickson* (1969) 53 Cr. App. R. 263, 264 (reasonable excuse for presence of fingerprint); *Court* (1960) 44 Cr. App. R. 242 (single print on rear vision mirror not sufficient to support possession). See also the Privy Council decision in *Bain v R* [2007] 5 WLUK 235.

[107] *Atkinson* (1988) 86 Cr App R 359.

[108] Fingerprint evidence may be probative in terms of both facts in issue and the credibility of witnesses.

In *DPP v Douglas* fingerprints recovered from both the inside and outside of a stolen car were identified to the defendant.[109] Douglas was charged with stealing the car but the fingerprint evidence, along with his own admissions – limited to rummaging around in the car after it had been stolen and abandoned – could only support a charge of vehicle interference. The trial judge amended the charge and convicted Douglas for the lesser offence. On appeal, a majority upheld the amendment and conviction.

The Court of Appeal responded sympathetically to an employed train driver convicted of burglary in *R v Gallagher*.[110] The case was based on a single latent fingerprint found in circumstances where the defendant's opportunity to commit the burglary was quite limited and the appellant had a lawful reason for being in part of the premises – though not the part where the latent print was putatively recovered. On appeal, the performance of defence counsel at trial was criticised. The case was then viewed by the Crown as unsafe and Gallagher was considered 'entirely innocent'. In what was characterised as 'a very strange case', on appeal there was 'a different picture of the finding of the fingerprint from the one that emerged at trial'.[111] Three different statements from the Scene of Crime Officer (SOCO) were produced, and it became clear that 'proper records were not kept', forms documenting the search 'were not completed', no photographs had been taken, and the precise location from where the latent print was recovered became less certain. The SOCO accepted, after the trial and in anticipation of the appeal, that 'things clearly went wrong *on this occasion*'.[112] For the Court, this meant that 'the appellant's fingerprint' could not properly be attributed to the burgled part of the premises'.[113] The Court explained that '[i]t is unfortunate that [the SOCO's] reservations, now properly expressed to the extent that the conviction cannot stand, were not expressed at the time.'[114]

In *R v Fratson* the Home Secretary referred a conviction in a capital case after a review revealed that a bloody fingerprint on a piece of cardboard 'found on the premises of the murdered man … was not caused by any part of the appellant's hands.'[115] For the Court, this evidence was not inconsistent with Fratson's guilt. According to the Lord Chief Justice:

> The effect of the piece of cardboard on the appellant's case appears to be nothing at all. The matter is purely negative, and could not be important except on the unproved assumption that nobody other than the appellant was concerned in the commission of the crime.[116]

The prosecutor 'leant to the view that the impression was made by the hand of a police-sergeant … investigating the case.'[117] The record does not disclose whether the evidence otherwise suggested that more than one person was involved, nor whether the fingerprints of investigators were compared and excluded. Interestingly, Fratson was subsequently reprieved when another man confessed to the murder.

Once again, none of the challenges called categorical identifications into question or raised other epistemological considerations.

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[109] *DPP v Douglas* [2016] NICA 14.
[110] *R v Gallagher* [2010] EWCA Crim 95.
[111] *Gallagher*, [15]. See also *R v Izzigil, Kaan and Onbasi* [2002] EWCA Crim 925, [12].
[112] *Gallagher*, [16] (italics added).
[113] *Gallagher*, [17].
[114] *Gallagher*, [27].
[115] *R v Fratson* (1931) 22 Cr App R 29, 30.
[116] *Fratson*, 30. This decision was handed down just five years before *Woolmington v DPP* (1935) AC 462.
[117] *Fratson*, 30.

B The absence of prints

In some cases the absence of fingerprint evidence linking the defendant/appellant to the crime was invested with significance.[118] The absence of prints might be raised pro-actively by the Crown where it is said to have little significance or, alternatively, is used to suggest preparation (eg wearing gloves) or a clean-up – with the associated implications for mens rea.[119] Alternatively, where there are no fingerprints belonging to a person of interest where they might have been expected, this information has been relied upon to raise doubt about that person's involvement – as in *Fratson*.[120]

It is common practice for the Crown to make statements – sometimes characterised as 'admissions' – where no fingerprint evidence was recovered. On appeal, in the case of *R v Wyna*, the Court notes that:

> There were further formal admissions before the jury to the effect that there was no forensic evidence of the presence of drugs on the appellant's clothing and his fingerprints were not found on any packaging.[121]

Trial and appellate judges frequently address the significance of an absence of evidence:

> It must be remembered that it is commonplace in criminal trials for a defendant to rely on 'holes' in the prosecution case, for example, a failure to take fingerprints or a failure to submit evidential material to forensic examination. … Often the absence of a video film or fingerprints or DNA material is likely to hamper the prosecution as much as the defence.[122]

The absence of fingerprints or the inability to produce matches looms large among the reported cases. Jones and Wozencroft were convicted for producing and selling fake MOT certificates. The Crown produced certificates, images from Wozencroft's computer, and the shredded remains of documents that showed similarities to MOT certificates. When the recovered documents were tested for fingerprints, chemicals applied to enhance the visibility of latent marks reacted 'rendering it impossible to compare [the documents] scientifically with other documents in the investigation'.[123] Investigators decided not to undertake further testing for fingerprints which meant that there was no fingerprint evidence against the defendants. In response to the defence placing considerable emphasis on this absence during 'the course of the trial and in counsel's closing speeches' the

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[118] *R v Lopez* [2013] EWCA Crim 1744 (no prints recovered); *An Application by John Christopher Walsh for Judicial Review* [2012] NIQB 55 (no prints recovered); *R v Joaque* [2012] EWCA Crim 727, [11] (no prints recovered); *R v Francis* [2011] EWCA Crim 375, [11]; (no prints recovered); *R v Scott* [2011] EWCA Crim 2742, [22] (no prints recovered); *R v Ozger* [2009] EWCA Crim 461, [3] (scene not examined for fingerprints); *R v Valerie Ann Lee* [2005] EWCA Crim 443, [8] (no prints recovered); *R v Wheatley* [2005] EWCA Crim 381 (Crown conceded no fingerprints recovered); *R v Walters* [2004] EWCA Crim 987, [23]; *The Director of Public Prosecutions v Milner* [2001] EWHC Admin 509, [10]; *Wallace and Fuller v Rm* [1997] 1 Cr. App. R. 396 (PC) ('There were no clues in the shape of fragments of clothing, fingerprints, etc'); *Murray v United Kingdom* (1996) 22 E.H.R.R. 29 (ECHR); *R v Shannahan, R v Watts, R v Fay, R v Doot, R v Loving* (1973) 57 Cr. App. R. 13.

[119] See eg *Foran v R* [2014] EWCA Crim 2047, [30] (non-disclosure of unidentified prints on sword seen as ambiguous in context of case); *R v Lattimore, R v Ahmet Salih, R v Leighton* (1976) 62 Cr. App. R. 53; *R v Harrison* [1970] 1 WLUK 243; [1970] Crim. L.R. 415 (possession of gloves might lead to adverse inferences); *R v Brown* (1968) 52 Cr. App. R. 70, 72-73 (torch without prints enough to sustain conviction for possession of housebreaking equipment); *Williams* (1913) 8 Cr. App. R. 133 (prints removed from gun).

[120] *Wang Yam v R* [2017] EWCA Crim 1414, [59] (unknown fingerprints at a murder scene); *R v Morley* (1988) 87 Cr App R 218, 226 (challenged decision to prevent self-represented defendant to call fingerprint examiner in relation to an unidentified print found at crime scene). On expectations, see J. Chin and L. Workewych, 'The CSI Effect' (2016) *Oxford Handbooks Online*; S. Cole and R. Dioso-Villa, 'Investigating the "CSI Effect" Effect: Media and Litigation Crisis in Criminal Law' (2009) 61 *Stanford Law Review* 1335.

[121] *R v Wyna* 2000 WL 491466, [11].

[122] *R v Howell and Howell* [2001] EWCA Crim 3009, [27].

[123] *R v Jones and Wozencroft* [2003] EWCA Crim 717, [14]-[15].

'judge gave a long direction to the jury about the lack of fingerprint evidence.'[124] Following conviction, the appellants sought to revisit the decision 'not to fingerprint the documents' and the preference for comparison of the certificates by a document examiner.

The Court of Appeal dismissed the appeal.

> At best, absence of any sign of their fingerprints on the documents would be neutral as every judge of experience in trying criminal cases, and as this Court, knows. It may be that the judge intruded somewhat into the evidential sphere when he made this indisputable point to the jury. But he did so moderately and fairly, and … accurately. …
>
> As to the judge's remark about the dilemma facing the prosecution in their choice between comparison of documents and examination for fingerprints, he was simply rehearsing the problems of which [the document examiner] had spoken in her evidence, and referring, also, to the policy decision made by the police long before she gave her evidence.[125]

In *R v Humphries* the jury asked about the apparent lack of fingerprints on a baseball bat alleged to have been used in an assault.[126] They asked specifically about the possibility of the bat being cleaned as well as how different surfaces affected the deposition and recovery of latent prints. The trial judge responded:

> There is no evidence on this topic. You must not speculate, but you are entitled to use your experience of the world and your common sense when you approach your job as jurors.[127]

The appeal was successful on the basis that the jury should have been directed that they were 'precluded … from drawing any adverse inference' against the defendants.[128] There was no expert evidence on the subject and 'any suggestion of cleaning or rubbing … should have been put to the appellants'.[129]

The trial judge's instructions on the absence of fingerprint evidence were criticised in *R v Skinner*. Initially, a police officer testified that a canister had not been examined for fingerprints. Following a jury question, and further inquiries, the officer amended his evidence, but the trial judge's summing up was challenged on appeal.[130] The Court of Appeal accepted that:

> The findings of the forensic science laboratory should not have been expressed as saying "does not show that the defendant's fingerprints were not upon the canister". What should have been said is that "the appellant's fingerprints were not found to be on the canister"; in other words a positive statement in his favour, rather than in the double negative way in which it had been expressed by the learned judge.[131]

Nevertheless, the Court was 'not of the view that the way in which the learned judge expressed the matter was so fundamentally wrong as to affect the justice of the conviction in the case.'[132] The Court's concern, about the need to accurately capture the evidentiary significance of this lack of fingerprint evidence, stands in contrast with the judicial tendency to equate opinions about matches with categorical identification.

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[124] *Jones and Wozencroft,* [17].
[125] *Jones and Wozencroft,* [31]-[31]. See also *R v Dale Leon Scott* [2011] EWCA Crim 2742; *R v S (Peter Charles)* [2006] EWCA Crim 1690.
[126] *R v Humphries* [2006] EWCA Crim 558. See also *R v Skye Case* [2015] EWCA Crim 2080, [8] (no prints on gun and ammunition).
[127] *R v Humphries* [2006] EWCA Crim 558, [10].
[128] *Humphries*, [12].
[129] *Humphries*, [12].
[130] *R v Skinner* (1994) 99 Cr. App. R. 212, 214
[131] *Skinner,* 214-215.
[132] *Skinner,* 215.

B Fingerprints and the standard of proof

Very soon after fingerprint evidence became a routine tool in police investigations, courts began to grapple with the question of whether fingerprint evidence, standing alone, could constitute proof beyond a reasonable doubt. In *R v Castleton,* the first reported decision, the Court of Appeal confirmed a conviction for burglary even though the only admissible evidence was latent fingerprints on a candle found at the crime scene and notwithstanding evidence that the appellant associated with thieves who might have moved the candle.[133]

Following *Castleton* fingerprint evidence was considered sufficient to satisfy proof beyond reasonable doubt where cases were contested on identity. Once identified by fingerprint a defendant/appellant was expected to provide an explanation consistent with non-guilt (or identify a mistake). The real possibility of error does not seem to have been advanced as a reason for doubt.

B The significance of fingerprint evidence for sentencing

One of the largest groups of cases is appeals from sentence.[134] Here the issue most frequently raised was whether the suspect made a timely guilty plea. In order to receive the maximum sentence discount, the guilty plea should be offered at the earliest opportunity but before a suspect's culpability is *confirmed* by latent fingerprint evidence. Failure to plead early may result in a reduction (or loss) of discount because latent fingerprint evidence is conceived as incontrovertible evidence of identity (and in many cases the match is treated as synonymous with guilt).[135]

Typical is the case of *R v Magee* in which the defendant pleaded guilty on theft charges:[136]

> The mitigating features, which the learned Recorder noted, were his guilty plea, albeit not at the first reasonable opportunity (which would have been when he was initially questioned by the police). He had, in fact, only accepted his guilt when confronted with the fingerprint evidence.[137]

In another case, *R v Lang,* the sentencing judge questions the value of the guilty plea for similar reasons:

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[133] *R v Castleton (Thomas Herbert)* (1910) 3 Cr. App. R. 74. In *Castleton*, members of the court seem personally satisfied by the match. This issue does not loom large in reported decisions in the UK, but is a prominent feature of appeals in Australia – that is, who gets to compare the prints and the respective roles of examiners and fact-finders (and judges). See *R v O'Callaghan* [1976] VR 676, *Lawless v R* (1979) 142 CLR 659, *Bennett v Police* [2005] SASC 415 as well as *R v Robinson* [1955] 1 WLUK 310; *Patterson v Nixon* 1960 J.C. 42 (Scotland).

[134] For eg *R v Neville Foster* [2018] EWCA Crim 93; *R v Winter* [2013] EWCA Crim 2488, [10] (admission before identification warranted full discount); *R v Luke William Verran* [2013] EWCA Crim 2242; *Attorney General's Reference (No.9 of 2013) (Robert Rees)* [2013] EWCA Crim 597, [13] (made admissions once identified); *R v Butler* [2013] EWCA Crim 379 (made admissions); *R v Kirkham (Ronald)* [2012] EWCA Crim 3131 (made admissions when confronted); *R v Paul Eaton* [2011] EWCA Crim 2219, [4] (initially dissembled); *R v Edwards* [2009] EWCA Crim 122, [2] ('early' plea after initial no comment interview); *R v McNeill* [2008] EWCA Crim 553, [8] (full admissions when presented with fingerprint evidence); *R. v Morgan* [2007] EWCA Crim 2994, [4] (admissions when presented with fingerprint evidence); *R v Maher and Whitworth* [2007] EWCA Crim 2378, [11] (admissions when presented with fingerprint evidence); *R v Lavan* [2007] EWCA Crim 402, [4] (admissions when presented with fingerprint evidence); *R v McCurry and Hulse* [2005] EWCA Crim 2712; *R v Bovell, R v Dowds* [2005] EWCA Crim 1091, [21] (notwithstanding delay, made admissions when fingerprint evidence emerged); *R v Kaye* [2004] EWCA Crim 1617, [4], [5]; *R v Smith* [2003] EWCA Crim 3902, [3]; *R v Smith* [2001] EWCA Crim 452, [4] (full admissions when arrested and confronted with fingerprint evidence); *R v Brewster, R v RH* [1998] 1 Cr. App. R. 220 (made admissions 'before the fingerprint evidence was discovered'); *R v Brewster* (1980) 71 Cr. App. R. 375, 376 ('He had to make those admissions because he had left fingerprints behind').

[135] *R v Blaydes* [2014] EWCA Crim 798; *R v Dooley* (1994) 15 Cr. App. R. (S.) 703.

[136] *R v Magee* [2011] EWCA Crim 1574.

[137] *R v Magee* [2011] EWCA Crim 1574, [10].

> I give such credit as I can for your plea of guilty and the admissions you made to the police. However, the fingerprint evidence, of course, meant that such a plea was virtually unavoidable.[138]

In sentencing cases processes of collection and identification are treated as absolutely unproblematic.

In its early days, fingerprint evidence was used to stabilise identity and in the process address the vexed issue of recidivism.[139] Repeat offenders sometimes avoided harsh sentences by inventing pseudonyms and claiming that a conviction was their first offence (or that their criminal record was shorter than it really was).[140] In *Bacon*, identification by fingerprints in conjunction with rapidly expanding police records was used to unveil such deception:

> At the trial eight previous convictions were proved against him, but it turns out that some of them were in names other than that of Bacon – namely Cox, Barnes, Llewellyn, and Barrell. It is said, however, that they and Bacon were all names of the same man. The appellant denied these previous convictions, except in one case: but on the production of fingerprints, which we have examined, and on which we have heard the evidence of Detective-Inspector Alden, we have no doubt that they are all the same, and that they tally with the finger-prints of the appellant.[141]

Over time, the criminal histories of suspects, defendants and appellants were increasingly resolved through fingerprint records.[142] In *R v Pearson*, fingerprint evidence from South Africa and Australia was deemed inadmissible hearsay and so was not available to the trial judge in order to sentence Pearson as a recidivist. Informal admissions by Pearson during review cured the problem for the Court of Appeal.[143]

A QUASI-EPISTEMOLOGICAL CONSIDERATION: *MCNAMEE, BUCKLEY* AND *SMITH*

Of all the reported cases, a tiny proportion involved some direct challenge to the accuracy of the identification evidence. The following appeals, though not all challenges as such, provide insight into practices, assumptions and commitments, and concerns that are almost never raised in quotidian proceedings, even when identity is expressly in issue. These cases represent the most substantial legal engagement with the epistemology of latent fingerprint evidence. Interestingly, these cases are all modern – they post-date the Runciman Royal Commission on Criminal Justice – but none engages with validation, accuracy, standards (beyond the interpretation of specific points) or cognitive bias, broader implications for latent fingerprint evidence, or the performance of the criminal justice system.[144]

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[138] *R v Lang* [2001] EWCA Crim 2690, [4], [9] (though sentence reduced for other reasons).
[139] Cole, *Suspect identities*, n 9 above; J. Torpey and J. Caplan (eds), *Documenting individual identity: The development of state practices in the modern world* (Princeton, NJ: Princeton University Press, 2001).
[140] Beavan, *Fingerprints*.
[141] *R v Bacon* (1915) 11 Cr App R 90, 90-91.
[142] *Bacon*, 90; *James Harris, alias Robert Desmond* (1913) 8 Cr. App. R. 30 (and confederates); *Pearson* (1910) 5 Cr. App. R. 188; *R v Dunn (Obtaining by False Pretences)* [1964] 1 WLUK 532; *Howes* (1964) 48 Cr. App. R. 172. See also *R v Keane (aka Theresa Jackson)* [2005] EWCA Crim 202, [10]; *R v Salim AKA Herbinier* [2001] EWCA Crim 2817, [25].
[143] *R v Pearson* (1910) 5 Cr App R 188, 188-189. See also *R v Headley* (1979) 1 Cr. App. R. (S.) 158.
[144] The Runciman Royal Commission into Criminal Justice was established because of the crisis of confidence arising from the miscarriages of justice following IRA bombings: Viscount Runciman, *Royal Commission on Criminal Justice*, (London: HMSO, 1993); P. Roberts, C. Wilmore and G. Davis, *The Role of Forensic Science Evidence in Criminal Proceedings*: Royal Commission on Criminal Justice Research Study No 11 (London: HMSO, 1993). See also P. Roberts, 'Making forensic science fit for justice' (2017) 49 *Australian Journal of Forensic Science* 502.

B *R v McNamee* (1998)

Handed down just a few years after the Runciman Commission, the appeal in *R v McNamee* is the first reported decision that engages with the accuracy of a latent fingerprint match in English history. McNamee was convicted in 1987 of conspiracy to cause explosions in relation to the IRA bombing campaign. He was employed by a company owned by two brothers, both admitted terrorists, engaged in the manufacture of explosive devices at the company's premises. Three partial prints linked McNamee to an explosive device recovered from an IRA weapons cache. The question at trial was whether McNamee was involved in the manufacture of bombs or might have innocently touched a battery and insulating tape used in the manufacture of the explosives during the course of his employment.[145] The fingerprint examiners were not called and McNamee was convicted. On appeal, the Court of Appeal refused to hear from fingerprint examiners engaged by the appellant and the conviction was upheld.

Questions about one of the match conclusions produced an application to the CCRC and an eventual reference back to the Court of Appeal. In a second appeal, the Court received testimony from 14 fingerprint examiners 'in relation to this single thumb print [on a battery] over no less than 7 full court days'.[146] These examiners were variously instructed by the CCRC, the appellant and the Crown. The Court's assessment is revealing:

> *Remarkably, and worryingly*, save for those who said that the print was unreadable, there was no unanimity between them, and very substantial areas of disagreement. All the experts, save Mr. Swann who is retired, are currently employed in various police forces.[147]

The Court was disturbed by what emerged on appeal. The examiners could not agree on whether the latent print on the battery was sufficient for analysis and comparison, let alone whether it matched McNamee's thumb. Four of the examiners – respective heads of bureaux (from Cambridgeshire, Norfolk, Thames Valley, and Devon and Cornwall) – testified 'that there was insufficient ridge detail on the thumb mark for it to be safe to make any comparison with the control set of prints.'[148] Another examiner, who explained how the police electronic search algorithm (AFR) worked, 'found insufficient ridge characteristics on the battery mark even to launch an accurate search on that system'.[149] There was marked variation in the number of points (or ridge characteristics) observed by the various examiners – ranging between 5 and 16. Several of the examiners were prepared to declare an identification with less than the 16 points of similarity said to be the national standard – on this, more below.

One examiner testified that the thumb 'had been deposed at least 3 times on the battery and that there were obvious signs of movement on the mark'.[150] The examiner whose identifications had been relied upon at the original trial eventually referred to two touches (for the first time in a statement in 1998, one week before the second appeal) and acceded to three touches in testimony before the Court of Appeal. The multiple touches were invoked to account for the appearance of the latent, specifically to rationalise apparent discrepancies between the latent and the reference print.

In summary, the Court concluded:

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[145] See also *R v Rowe* [2000] 12 WLUK 213, [16]; *Esat v Crown Prosecution Service* [2007] EWCA Crim 2941; *R v Shaun Patrick Doyle* [2018] EWCA Crim 2198, [8].
[146] *R v McNamee* [1998] 12 WLUK 408; [1998] EWCA Crim 3524.
[147] *McNamee*, (italics added).
[148] *McNamee.*
[149] *McNamee.*
[150] *McNamee.*

> There was much disagreement between the experts *in relation to this print* and it is impossible to know what evidence a jury would be likely to accept and what evidence they would be likely to reject. A case on 11 coincident markings [or points] is a case different from a case based on 16 coincident markings. The experts asked to give evidence on this issue, including Mr. Swann, all said that they would be satisfied that 8 or 10 matching characteristics [or points] are sufficient to prove identity. That would be likely to entitle the Crown to call evidence of such matching characteristics in respect of a particular mark. However that was not the case presented at the Appellant's trial. We note that in the current 1998 edition of Archbold at paragraph 14–97 it is said that between 10 and 15 matching characteristics on a single fingerprint is regarded as a partial identification and might be forwarded to the investigating authorities but would not be adduced in court. If that statement is intended to be a statement of law we do not think it is accurate. Evidence of fewer than 16 characteristics is not inadmissible as evidence of identification. As we were told by the experts, much depends on the quality of the print itself and the quality of the matching characteristics.
>
> We must bear in mind the considerable emphasis that the trial Judge in his summing up laid on the presence of 3, as opposed to 1 or 2 incriminating fingerprints.
>
> Having heard all the expert evidence called before us, it is impossible to say with confidence which conclusion a jury would have reached.[151]

The Court quashed the conviction.

B *R v Buckley* (1999)

The second case is not a challenge but is illuminating nonetheless. In *R v Buckley*, the substantive appeal from a conviction for aggravated burglary was abandoned by defence counsel for reasons that are not fully explained.[152] Having heard argument prior to discontinuation, the Court of Appeal elected to provide an overview of latent fingerprint evidence because of its perceived 'wider importance'. The judgment relies on a history of latent fingerprint evidence prepared by prosecution counsel. Most of that history is concerned with the introduction, acceptance and scientifically-influenced abandonment of points standards. The account offered in this decision is not entirely consistent with the approach to points expressed in *McNamee* just a year earlier, and is curiously inattentive to system implications. The Runciman Commission's concerns with the forensic sciences appear to have receded into the distant background.

The *Buckley* Court identified inconsistency in the judicial approach to admitting fingerprint evidence where an identification is made on fewer than 16 matching points.[153] It accepted that identification by latent fingerprint was premised on it having 'long been known that fingerprint patterns vary from person to person and that such patterns are unique and unchanging throughout life.'[154] The Court identified a conviction based solely on fingerprint identification being upheld on appeal in 1906 when 'there were no set criteria or standards'.[155] In 1924 New Scotland Yard introduced a 16 point standard based on research by Alphonse Bertillon.[156] The Court notes that this standard has recently been

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[151] *McNamee* (italics added).

[152] *R v Buckley* (1999) 163 JP 561. There was other evidence in the case, though Buckley offered an explanation for his fingerprint consistent with touching in the aftermath of the burglary.

[153] There is no reference to *McNamee* in this case.

[154] *Buckley*, 5. The issue of uniqueness appears from time to time and is unquestioned. The issue is not, however, whether fingerprints are unique (they are highly variable and might be unique), but rather how often latent fingerprint examiners mistakenly match or mismatch prints. Uniqueness does not eliminate errors, even though uniqueness (or variation) is fundamental to the utility of fingerprint comparison. DNA profiles are not unique, but it is their frequency of alleles (and knowledge of their distribution in relevant populations) that gives the profile value – notably statistical value. See also n 46 above.

[155] Buckley, 5. This may be a reference to the appeal in *R. v Castleton (Thomas Herbert)* (1910) 3 Cr. App. R. 74; though there were earlier trials.

[156] *Buckley*, 5. See J. Ellenbogen, *Reasoned and Unreasoned Images: The Photography of Bertillon, Galton, and Marey* (University Park, PA: Penn State University Press, 2013).

shown to be based on forged fingerprints and so 'adopted on a false basis'.[157] The 16 point requirement was accepted as a national standard in 1953, but later modified so that where a scene produced one latent with 16 points, 'any other mark at the same scene could be matched if ten ridge characteristics were identified'.[158]

Over time, according to the Court, fingerprint examiners came to a consensus that the 16 point standard was unnecessarily high:

> … considerably fewer than 16 ridge characteristics would establish a match beyond any doubt. Some experts suggested that eight would provide a complete safeguard. Others maintained that there should be no numerical standard at all. We are told, and accept, that other countries admit identification of 12, 10 or eight similar ridge characteristics and, in some countries, the numerical system has been abandoned.[159]

In 1983 fingerprint examiners agreed that 'there would be rare occasions where an identification fell below the standard, but the print was of such crucial importance in the case that the evidence about it should be placed before the Court.'[160] In 'such extremely rare cases' the evidence should be given '*only by an expert of long experience* and high standing'.[161] This approach appears to have been endorsed by Otton LJ and others in *R v Giles* and the Lord Chief Justice in *R v Charles*.[162]

In 1988 the Home Office and Association of Chief Police Officers commissioned two scientists to review the prevailing point standard(s).[163] The review concluded that 'there was no scientific, logical or statistical basis for the retention of any numerical standard'.[164] In response, the Court explains, the examiner community was working towards abandoning numerical standards in favour of 'clear procedures and protocols', and to developing nationwide training, management and audit systems. The *Buckley* Court characterises this as 'excellent work by the police and fingerprint experts'.[165]

As for admissibility, the Court held that fingerprint evidence 'is admissible … if it tends to prove the guilt of the accused.' Moreover, it 'may so tend, even if there are only a few similar ridge characteristics but it may, in such a case, have little weight.'[166] Following from its historical review and account of the 'present state of knowledge of and expertise in relation to fingerprints', the Court instructed trial judges to be cautious about admitting evidence where fewer than eight 'similar ridge characteristics' have been identified, and to exercise discretion where more than eight such characteristics are

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[157] *Buckley*, 5.
[158] *Buckley*, 5-6. Contrast the three prints in *McNamee*.
[159] *Buckley*, 6. See eg the discussion in the New Zealand Court of Appeal in *R v Buisson* [1990] 2 NZLR 542.
[160] *Buckley*, 6 (italics added).
[161] *Buckley*, 6 (italics added).
[162] Unreported cases, cited in *Buckley*. 'In R v Holt, Mitchell J, sitting at Manchester on 5th November 1996, in the exercise of his discretion, declined to permit evidence to be adduced of ten similar ridge characteristics. It is to be pointed out that Mitchell J did not have the advantage of the material which this Court has of the history of fingerprint standards this century and the subsequent decisions of this Court in R v Giles and R v Charles, to which later we shall come. In Allen (unreported, a decision of His Honour Judge Gordon at the Central Criminal Court, 30th June 1995) fingerprint evidence based on 12 similar ridge characteristics was admitted in the exercise of the judge's discretion. We are told and accept that these two decisions exemplify the different approach which is manifest in relation to this type of evidence. In Reid v DPP, (an unreported decision, on 2nd March 1996, a Divisional Court over which Leggatt LJ presided), evidence was held properly to have been admitted where there were 12 similar ridge characteristics.' It is unclear why these cases were unreported. Regardless, lawyers and judges have been reluctant to engage with *McNamee*, *Smith* and *Buckley*, let alone these unreported decisions.
[163] See I. Evett and R. Williams, 'Review of the Sixteen Points Fingerprint Standard in England and Wales' (1996) 46 *Journal of Forensic Identification* 49.
[164] *Buckely*, 7.
[165] *Buckley*, 7.
[166] *Buckley*, 8. This statement seems to contemplate the admission of opinions that do not amount to positive identification. Historically, professional associations for fingerprint examiners, such as the International Association for Identification, placed a proscription on members offering such testimony.

identified. Further, the trial judge must 'in every case' warn the jury that fingerprint evidence is an opinion, and is not conclusive.[167]

One of the remarkable features of *Buckley* is the complete judicial deference to fingerprint examiners and their shared beliefs. Another is the apparent inability (or unwillingness) to consider why standards were changing and what this might say about the conventional nature of fingerprint comparison and trial safeguards. The shifting consensus among the fingerprint examiner 'community' is interpreted as an indication of progress in a system where all seems to be functioning as it should.[168]

B *R v Smith* (2011)

In *R v Smith*, the Court of Appeal quashed a murder conviction on the basis of fresh evidence. At trial, the jury heard that a fingerprint examiner had discerned a fingerprint in what appeared to be blood found at the crime scene. This print was identified to the defendant by Gore, and that identification was verified by two other examiners. The jury heard that the examiner had originally considered the mark unsuitable for analysis, but that he had used new technology to obtain better images after Smith was charged, and was thereafter able to make the analysis, comparison and identification with Smith's fingerprints.[169] The defence briefed two fingerprint experts to review the police examiners' work, but after the Crown informed the defence that it would challenge the qualifications of their primary witness (who had completed her training overseas), only the UK-trained examiner was called.

Gore kept no working notes of his process, nor did he record the points on which he relied in making the identification. (At the insistence of the defence, a marked up set of points was eventually provided.) The examiner's report stated only:

> In forming my opinion I have considered the amount of detail, its relative position and sequence and general quality. I have no doubt that the area of friction ridge detail indicated in the photograph was made by [the appellant].[170]

Smith was convicted on the basis of a circumstantial case that was not limited to the fingerprint evidence. He sought and obtained fresh evidence for the appeal. This included statements by two former police fingerprint examiners. On appeal, there was considerable disagreement between the prosecution examiners – Gore, and those who had 'verified' his identification – and the testimony of the two new examiners called on behalf of the appellant. The Court of Appeal characterised this as 'a clear conflict between the experts'.[171] Gore's opinion that the latent print constituted a 'double touch' – which had not been disclosed at trial – assumed considerable prominence in the contest over the interpretation of alleged similarities and differences between the prints on appeal.[172]

The Court of Appeal was critical of the institutional arrangements regarding fingerprint examination in the UK. For example, the police monopoly on training and certification made it difficult for the defence to access (admissible and credible) expert assistance at trial.

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[167] *Buckley*, 8.
[168] See The Fingerprint Inquiry, n 9 above, 562, where Justice Campbell accepts that '*Buckley* did not have a significant impact on practice in England and Wales'.
[169] The examiner seems to have been aware of the investigation and the investigators' beliefs about the perpetrator when undertaking this difficult comparison.
[170] *R v Smith* [2011] EWCA Crim 1296, [19]. Compare the New Zealand case of *R v Carter* [2005] 22 NZCA 422.
[171] *Smith*, [56].
[172] Recall the emergence of multiple touches in *McNamee*.

> It is essential for the proper administration of justice that there are independent persons expert in fingerprint examination; almost all who do this are retired from police Fingerprint Bureaux. The position is in marked contrast to other forensic science disciplines. There may be good reason for this distinction; for example the fingerprint bureau of other forces may be able to provide expert evidence for the defence.[173]

The Court also criticised the prevailing practice of performing forensic analyses 'without keeping detailed notes'.[174] The lack of notes meant that 'it was not possible' to ascertain if the fingerprint examiner's reasoning was diachronically stable. The Court suggested that such practices were inconsistent with those employed in other forensic sciences.[175]

Despite the existence of circumstantial evidence against him, Smith's conviction was quashed on the basis that the fresh fingerprint evidence 'might reasonably have affected' the jury's decision. According to the Court there 'is plainly a need for the points that have arisen in this case to be the subject of wider examination.'[176] The judgment alluded to the ongoing inquiry in Scotland and the need for review in the following terms.

> We have been told that an enquiry by the Rt Hon Sir Anthony Campbell into the case of *HM Advocate v McKie* known as the Scottish Fingerprint Enquiry has heard extensive evidence in relation to fingerprint evidence in Scotland. It is not for us to comment more than we have [above] in relation to the practices that have come to our attention in this appeal. In our view, however, there is a real need for the ACPO [Association of Chief Police Officers], the Forensic Science Regulator and the recently established Fingerprint Quality Standards Specialist Group to examine as expeditiously as possible the issues we have identified, to assess the position and to ensure that there are common quality standards enforced through a robust and accountable system.[177]

The Court of Appeal recognised that 'a non numerical standard was adopted in 2001 by ACPO' with 'each police force to establish its own quality management system' that would, in time, be supported by documents issued by the Forensic Science Regulator.[178] For a common law court concerned with a decision-at-hand, this is remarkably future focused. [179]

Though ultimately successful, this appeal does not address the underlying method of fingerprint comparison or address the change from points to holistic analysis relying on ACE-V.[180] Instead, like *McNamee,* this case considers interpretive disagreements between experienced examiners, alongside poor documentation, in relation to a specific match decision. Notwithstanding some critical commentary on the institutional arrangements, defence access to expertise and current reporting practices, the decision makes no references to relevant scientific research.

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[173] *Smith*, [61].
[174] *Smith*, [61].
[175] *Smith*, [61].
[176] *Smith*, [62].
[177] *Smith*, [62].
[178] *Smith*, [8]ff. See Section 6.
[179] There are no subsequent references to McKie or The Fingerprint Inquiry, n 9 above, in English case law, just as the Runciman Commission received relatively few references in cases where forensic science evidence was central or contested.
[180] Toward the end of the twentieth century ACE-V emerged as the dominant 'method' used by latent fingerprint examiners in the UK and beyond. A free text Westlaw UK search for 'fingerprint AND "ACE-V"' and 'fingerprint AND analysis AND comparison AND evaluation AND verification' in January 2019 returned only one case where ACE-V was indirectly referenced, namely *Smith,* [20]. Though, see also *R (on the application of Mohammed) v Secretary of State for the Home Department* [2014] EWHC 972 (Admin). By comparison, the first reported references to 'ACE-V' on Westlaw US appears in the federal reports in *U.S. v Havvard*, 117 F.Supp.2d 848 (S.D. Ind. 2000) and in the state reports in *Burnett v State*, 815 N.E.2d 201 (2004). The first Australian reference appeared in *Ghebrat v R* (2011) 214 A Crim R 140, 143, 146. English (and Australian) lawyers and courts were inattentive to the (changing) procedures.

B Contemporary decisions

As of February 2019, there are no subsequent references to scientific materials, including the Forensic Science Regulator's guidance documents, in any reported decision involving a challenge to latent fingerprint evidence. There are hardly any subsequent legal citations of the cases that were most engaged with the epistemological dimensions of fingerprint evidence. *McNamee* is cited by a single case, unconcerned with fingerprints.[181] *Buckley* is only cited by *Smith*. And, as of writing, *Smith* has been cited only once since it was handed down in 2011 notwithstanding the additional issues raised in the NRC, NIST, *The Fingerprint Inquiry*, PCAST and AAAS reports.[182] That case is not concerned with fingerprint evidence.

These three cases represent the most sustained challenges and most detailed judicial engagement with the value of latent fingerprint evidence in reported English caselaw. In these decisions, any broader implications from the exposure of the changing standards and the messy backstage are either ignored or treated as unsettling but implicitly case-specific. The problems identified in these cases (eg disagreement between fingerprint examiners and practices that are inconsistent even with consensus-based protocols) are treated as though they are anomalous and without implications for other investigations and other identifications.

A SOME ISSUES ARISING FROM OUR HISTORICAL SURVEY

This study is perhaps most disconcerting in the light it casts on the limited ability of lawyers and in consequence the judiciary to evaluate and therefore constructively explore the actual value of latent fingerprint evidence. It suggests that the common law method with its intense focus on individual cases did not produce awareness of epistemological issues with latent fingerprint comparison procedures, encourage technical sophistication among trial and appellate judges, or cultivate an appreciation of legal institutional weaknesses.[183] Successive critical reports by scientific elites (particularly in the US), in conjunction with a judicial inquiry in Scotland and intervention by the Forensic Science Regulator (FSR), exerted no discernible influence on the provision and reception of latent fingerprint evidence in English courts. Here, collective judicial experience amounts to an ignorance that effectively insulates the state's fingerprint examiners (and presumably other forensic sciences) from epistemological accountability, reinforces a scientifically problematic status quo, and inadvertently places responsibility for identifying and conveying limitations (and errors) onto impecunious defendants and their lawyers – and indirectly onto jurors.[184] At no stage have latent fingerprint examiners been required by courts to provide empirical support for their opinions in ways that might illuminate their abilities, or the actual value of their testimony.

Fingerprint examiners do not disclose the most important limitations with their practices and opinions, nor have they referenced the best available research on

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[181] *R v Pendleton* [2000] 1 WLR 72, 80.

[182] *R. (on the application of Nunn) v Chief Constable of Suffolk* [2014] UKSC 37; [2015] AC 225, 229.

[183] One exception might be the revision of CrimPD and CrimPR following the Law Commission's report Expert Evidence in Criminal Proceedings. See, eg, CrimPR 19.4(e), (h), (j), CrimPD 19A.5(a), (c) and 19A.6. Whether these rules are part of the admissibility framework has yet to be determined. See also *H v R* [2014] EWCA Crim 1555, [44]; T. Ward, 'Expert Evidence and the Law Commission: Implementation without Legislation?' [2013] *Criminal Law Review* 561 and M. Stockdale and A. Jackson, 'Expert evidence in criminal proceedings: Current challenges and opportunities' (2016) 80 *Journal of Criminal Law* 344. Obligations built on decisions such as the "*Ikarian Reefer*" (1993) 20 FSR 563, 565-566; *R v Harris, Rock, Cherry & Faulder* [2005] EWCA Crim 1980, [271]ff; *R v Bowman* [2006] EWCA Crim 417, [174]ff, do not appear to have made much of an impact.

[184] See also S. Cole and G. Edmond, 'Science without precedent: The impact of the National Research Council report on the admissibility and use of forensic science evidence' (2015) 4 *British Journal of American Legal Studies* 585 and E. Cunliffe and G. Edmond, 'What have we learned? Lessons from Wrongful Convictions in Canada' in B. Berger et al (eds), *To Ensure that Justice is Done: Essays in Memory of Marc Rosenberg* (Toronto: Carswell, 2017).

performance. Anecdotal evidence suggests that fingerprint examiners are acutely aware of the concerns that have been raised by research scientists about the reliability of some aspects of fingerprint comparison. However, there is very little public information about the extent to which insights from scientific research have been incorporated into training and practice. A series of reports over the past 20 years has documented concerns about the variable quality, under-investment in and predominantly instrumental focus of forensic science training, including the training of fingerprint examiners.[185] The Scottish *Fingerprint Inquiry Report* provides some insight into the training offered to English fingerprint examiners.[186] The Forensic Science Regulator lists the development of a fingerprint interpretation standard that reflects prevailing scientific consensus about the proper expression of results as a priority in her 2019 annual report.[187] Overall, lack of transparency makes it difficult to assess whether the average examiner is equipped by her training to provide a trial court with independent assistance on the value and limitations of identification by fingerprint. From the reported cases, English lawyers and judges appear to be uniformly oblivious to shortcomings and the threat they pose to rectitude and fairness.[188] This ignorance has disturbing implications for the effectiveness of adversarial trial procedures, particularly safeguards said to uphold fundamental criminal justice values.[189]

From our perspective, the most important aspect of this review is the continuing failure of lawyers and judges to formally address the validity and reliability of latent fingerprint comparison and the proficiency of examiners. The epistemological value and dangers of this evidence – from assumptions (eg about uniqueness), the (ever-changing) methods and technology, cognitive bias (eg suggestion), and error – have never been seriously raised or considered.[190] On the face of the reported decisions, no lawyer ever seems to have asked: How accurate is latent fingerprinting? How often do latent fingerprint examiners actually make mistakes? How good are the particular examiners involved in this case? And, were cognitive risks (ranging from exposure to domain-irrelevant information to suggestive verification procedures) considered and managed in the particular identification? In the context of an adversarial system, where responsibility is delegated to the parties, in conjunction with the expectation that the state's forensic practitioners will be impartial and prosecutors attentive and restrained, such persistent oversights might be considered astounding.[191]

There does not appear to have been any reported review of the empirical support for latent fingerprint comparison before examiners' opinions were admitted as unequivocal proof of identity.[192] Even before *Castleton* was handed down in 1909, English judges

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[185] For example, Her Majesty's Inspector of Constabulary, *Under the Microscope* (Home Office, 2000), D. Blakey, *Under the Microscope Revisited* (Home Office, 2002) https://www.justiceinspectorates.gov.uk/hmicfrs/media/under-the-microscope-20020601.pdf, House of Commons Science and Technology Select Committee, *Seventh Report*, 2005 chapter 5 https://publications.parliament.uk/pa/cm200405/cmselect/cmsctech/96/9602.htm; Select Committee Report, [110]-[116].

[186] The Fingerprint Inquiry, n 9 above, eg at 40.41, 40.53.

[187] G. Tully, *Forensic Science Regulator Annual Report*, 2019 at 26. Online https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/877607/20200225_FSR_Annual_Report_2019_Final.pdf

[188] Problems are not referenced in reported descriptions of jury directions and warnings.

[189] G. Edmond and M. San Roque, 'The Cool Crucible: Forensic Science and the Frailty of the Criminal Trial' (2012) 24 *Current Issues in Criminal Justice* 51; more generally, A. Duff et al (eds), *The trial on trial*, 3 volumes, (Oxford: Hart, 2004).

[190] In *McNamee* and *Smith* issues are restricted to the specific prints. Broader issues around standards and accuracy are not seriously addressed. And, *Buckley* is presented as evidence of rigorous commitment to improvement.

[191] G. Edmond, 'Expert Evidence and the Professional Responsibilities of Prosecutors' in P. Roberts et al (eds), *Integrity in the Criminal Process* (Oxford, Hart, 2015).

[192] There were challenges in some of the early trials, but these were not pursued or reported. See Beavan, *Fingerprints*, n 10 above; Cole, *Suspect identity*, n 9 above.

accepted latent fingerprint evidence as conclusive proof of identity – presumably in relation to the many other types of routinely unreliable and speculative forms of expert and non-expert evidence they then encountered. At the beginning of the twentieth century, weak admissibility standards were incapable of holding practitioners of this nascent field accountable in epistemological terms.[193] Facially plausible assumptions were taken on trust, so that courts allowed examiners, from the very beginning, to categorically identify persons. *Castleton*, the first reported decision, was not concerned with admissibility, the value of the procedure per se, or even what a fingerprint examiner might opine. Rather, the Court accepted, following the jury's verdict, that identification by latent fingerprint on a moveable object was sufficiently probative to prove guilt.

Following early legal acceptance and *apparent* success, identification by latent fingerprint was effectively 'grandfathered', even as new standards and higher expectations arose with the emergence of scientifically-based technologies such as DNA profiling.[194] The ability to withstand the 'crucible' of adversarial proceedings seems to have deflected attention from questions of validity and reliability.[195] Courts might want to reconsider the commitment to being early adopters of new technologies, especially in criminal proceedings where procedures are not rigorously tested or understood, and where results are not expressed in empirically-informed terms.[196]

For the first time in the long history of English legal reliance on latent fingerprint evidence, the appeals in *McNamee* and *Smith* (and *Gallagher*), and less directly *Buckley*, exposed problems in the *ordinary work of examiners*. A more complex, refractory and interpretative realm featuring flexible standards and disagreement was partially, though fleetingly, exposed in these appeals. One revealing aspect of this review is the apparent inability of appellate judges to recognise the foundational epistemic implications based on engagement with individual trials and appeals. While we appreciate that a narrow focus is part of the common law method, system-wide and historical implications were not pursued in the few reported decisions that engage with 'worrying' epistemological dimensions.[197]

One important observation to draw from the most elaborate challenges, in *McNamee* and *Smith*, is that they were basically *internal* to the latent print community – restricted to disagreements between experienced UK-trained fingerprint examiners.[198] There are no references to scientific research or independent scientists in the reported decisions.[199] In the only reported case where a non-fingerprint examiner was called – the arborealist in *Barnes* – his evidence was considered to lack probative value and deemed inadmissible.[200]

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[193] Admissibility was based on early cases such as *Folkes v Chadd* (1782) 3 Dougl 157; 99 ER 589; *R v Silverlock* [1894] 2 Q.B. 766; *R v Turner* (1974) 60 Cr App R 80, 83.

[194] S. Cole, 'Grandfathering evidence: Fingerprint admissibility rulings from *Jennings* to *Llera Plaza* and back again' (2004) 41 *American Criminal Law Review* 1189.We might note that those engaged in promoting DNA profiling temporarily adopted the moniker 'DNA fingerprinting': M. Lynch et al, *Truth Machine: The Contentious History of DNA Fingerprinting* (Chicago: University of Chicago Press, 2008).

[195] Martire and Edmond, n 62 above; Edmond and San Roque, n 189 above.

[196] Contrast *R v Clarke* [1995] 2 Cr. App. R. 425, 430: 'It would be entirely wrong to deny to the law of evidence the advantages to be gained from new techniques and new advances in science.' See also *R v Robb* (1991) 93 Cr App R 161; *R v Dallagher* [2003] 1 Cr App R 195; *R v Luttrell* [2004] EWCA Crim 1344; *R v Kempster* [2008] EWCA Crim 975; *Otway v R* [2011] EWCA Crim 3; *R v Atkins and Atkins* [2009] EWCA Crim 1876.

[197] For example, in *Buckley* the arbitrary nature of the number of points. In *Smith* and *McNamee* the lack of documentation, inadequate disclosure, and changing explanations and disagreement disclosed when opinions were actually questioned.

[198] Independent scientists, particularly those with methodological and statistical sophistication have rarely been engaged.

[199] The only exception is the non-critical reference to the review by Evett and Williams, n 163 above, that questioned the foundations of the conventional point system and indirectly led to the adoption of ACE-V as the modern 'method'.

[200] Ironically, in the discussion of the arborealist's opinion the Court of Appeal makes one of its few references to validity.

While the value of the arborealist's evidence is uncertain (because it is untested), the assumption that fingerprint evidence was practically infallible deprived courts of scientific research and advice emerging from the early years of the new millennium. Judges, and especially the courts hearing the appeals in *McNamee* and *Smith*, might have been able to provide more useful assessments and guidance had the parties referred them beyond the fingerprint community to scientists, scientific research and independent advice.[201] In all of these cases, dependence on interested parties – at the heart of adversarialism – did not expose decision makers, whether jurors or judges, to the best available evidence or even the information required to make sense of (very occasionally contested) opinions about identity.[202]

Judicial responses to the admission and reliance on fingerprint evidence were predicated on the expectation that the defendant/appellant has the tools to identify any error or problem.[203] Though steeped in adversarialism, this expectation is difficult to reconcile with the state's burden of eliminating reasonable doubt. And yet, this expectation appears at the very outset of judicial consideration of fingerprint evidence. In *Castleton*, the following question is attributed to Darling J: 'Can the prisoner find anybody whose fingerprints are exactly like his?'[204] A century later in *R v Reay*, the Court noted that the appellant 'could not offer any explanation for the presence of his fingerprints'.[205] This framing accepts fingerprint examiners' conclusions as determinative.

Expecting the defendant to identify errors is not merely unrealistic (particularly in times of financial austerity), but it risks shifting the burden of proof.[206] The defence will almost never to be in a position to identify an error or understand how or why an error was made even when an error has been made.[207] Latent fingerprint comparison is an interpretative process that occurs inside the examiner's head, with documentary records of ridge analysis being scant at best. Mistakes in the subjective process of interpretation will always be made remote in time and space from the defence and may be compounded by confirmation bias when consensus among examiners is relied upon.[208] The state is obliged to present evidence in a way that represents its known value. This requires the state and the community of fingerprint examiners to engage systematically and transparently with the concerns and limitations identified by the various scientific committees who have formally reviewed fingerprint comparison.

There are a variety of structural barriers to challenging forensic evidence. It is noteworthy that the cases we have identified were worked on by some of the United Kingdom's finest criminal barristers and most eminent judges. Even these luminaries, in some instances working well-resourced trials and appeals, did not use the variety of potentially powerful rules and procedures at their disposal to explore and moderate the

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[201] Such information would need to be properly introduced into the adversarial process, and likely cannot be the subject of judicial notice: *R v Bornyk* 2017 BCSC 849; G. Edmond, D. Hamer and E. Cunliffe, 'A Little Ignorance is a Dangerous Thing: Engaging with Exogenous Knowledge not Adduced by the Parties' (2016) 25 *Griffith Law Review* 383.

[202] See PCAST report, n 46 above, 96; Edmond, n 17 above.

[203] Or, the ability to provide an explanation is innocent: *R v Cameron* [2003] EWCA Crim 817, [24].

[204] *R v Castleton (Thomas Herbert)* (1910) 3 Cr. App. R. 74, 74. The Chief Justice of Victoria (in dissent) described *Castleton* as 'most unsatisfactory' in *R v Parker* [1912] VR 152, 156.

[205] *R v Reay* [2003] EWCA Crim 1126, [21].

[206] Those who were mis-identified were rarely (if ever) in a position to identify the person who actually left the latent print or to identify an error in collection and subjective interpretation that occurred remote in time and space from the courtroom and only accessible through fragmentary documentation.

[207] We might note that at least four FBI examiners agreed with the mistaken identification in Mayfield. Agreement will not necessarily identify or eliminate errors. On the limits of peer review, see Ballantyne et al, n 55 above.

[208] A minority of examiners continue to disagree about McKie's fingerprint, for example. The resolution of scientific and technical controversy is, in part, a social accomplishment: see eg B. Latour, *Science in action* (Cambridge, MA: Harvard University Press, 1987).

scientific pretensions of latent fingerprint evidence. With access to expert reports, laboratory notes, the possibility of independent assistance (including the advice of scientists), and the opportunity to meticulously question fingerprint examiners under oath or affirmation, the criminal bar and solicitor advocates have repeatedly failed to expose questionable assumptions, the lack of scientific research, the exaggerated expression of conclusions, and the very real – now documented – risk of error.[209]

It might be tempting to think that the dearth of successful challenges, and few exposed errors suggest that cases such as *McNamee* and *Smith* (and *McKie*) are genuinely exceptional. We only need to think about the conventional legal responses to latent fingerprint evidence – discussed in previous sections – to obtain some sense of the limitations of such a conclusion. Even defendants who insisted on their factual innocence almost always elected (via counsel) to challenge the fingerprint evidence on non-epistemological grounds. Appellate judges have not been very receptive to challenges, but the major problem (for our adversarial system) is that lawyers have not prepared epistemologically sophisticated challenges for judges (and jurors) to consider. Reliance on the parties, and particularly poorly resourced defendants to identify limitations and errors following inadequate documentation and disclosure, has not worked. Courts preferred the explanations and opinions of experienced fingerprint examiners adduced by prosecutors to any inroads made by defendants in almost every case – with the conspicuous exception of cases involving police misconduct.

A critic might argue that were we to focus on the facts of each case then most or all of the outcomes would be defensible. We have not examined the case files or interviewed the participants, so it is difficult to rebut such a claim – steeped as it is in the common law method and adversarial commitments. We are not, however, persuaded by this defence of individual cases with its concomitant inattention to the institutional ignorance resulting from the failure to fulfill fundamental criminal justice objectives. What we offer, instead, is a survey demonstrating the systematic mis-understanding and mis-use of the most ubiquitous forensic science evidence of the previous century.[210] Moreover, in most of these cases we cannot actually know – for certain – whether the individuals identified and convicted were accurately identified and/or guilty. In consequence, rather than engage in speculative defences of criminal justice system performance, a more appropriate response is to reflect on the ways courts have engaged with this forensic science evidence, what that might suggest about the abilities and performance of legal actors, conventional trial safeguards and assumptions, how widespread these issues might be, and what if anything should be done to address them.

In 2017 the Forensic Science Regulator published a series of guidelines on latent fingerprint comparison.[211] Conspicuously attentive to developments in the US and *Smith*, they place an emphasis on validation, standards and quality control. On validation, for example, the *Codes of Practice and Conduct* states:

> The organisation shall demonstrate competency and understanding of the requirements for validating its processes for friction ridge detail analysis and comparison. This will be evidenced through the design and development of its validation plan and completion of an appropriate validation exercise.

And,

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[209] S. Cole, 'More than Zero: Accounting for Error in Latent Fingerprint Identification' (2005) 95(3) *Journal of Criminal Law & Criminology* 985.

[210] And, there are few reasons to believe that these issues are restricted to latent fingerprint comparison. These appear to be system problems, where the traditional forensic sciences are prominent.

[211] See also Forensic Science Regulator, *Guidance: Validation: Friction Ridge Detail (Fingerprint) Search Algorithm* (FSR-G-230, 2019).

> Validation shall be undertaken by the organisation to ensure the reliability of examination outcomes.[212]

Although the Codes are silent on the way opinions should be expressed, there is an expectation that error rates will be measured – initially 'from the validation of the methods and processes' and then through 'processes to assess consistency and variances of opinion' such as 'dip sampling, quality control, competency and proficiency tests'.[213] The Regulator's publications do not have the status of rules. They are yet to exert a discernible influence on reporting and the way courts, particularly appellate courts, respond to expert evidence adduced by the state. It is, in addition, unclear what impact the FSR guidance documents might have on procedures – such as latent fingerprint comparison – included within streamlined forensic reporting (SFR).[214] SFR encourages categorical identification, without qualification, in order to advance efficiency goals.[215]

A CONCLUSION: THE LIMITS OF ADVERSARIALISM AND COLLECTIVE LEGAL EXPERIENCE

This study shows that courts have overwhelmingly focused on adjectival issues with fingerprint comparison both before procedures had been formally evaluated and after their value was found to be lower than traditionally believed. Over more than a century of routine reliance there were no challenges that engaged with the validity and reliability of the procedure. On the few occasions where challenges were launched on epistemological grounds, the conventional legal approach to forensic science evidence, particularly the lack of explicit interest in validity and reliability, meant that lawyers and judges and presumably juries focused their attention on the wrong criteria. When it comes to forensic science evidence, courts have frequently attended to secondary issues and epiphenomena without necessarily asking more fundamental epistemological questions: Does the procedure work? How accurate it is? Was it applied appropriately? Were cognitive biases managed? And, is this particular practitioner proficient? Where forensic science evidence is in issue, courts should expect to be presented with independent evidence – usually formal scientific studies – confirming that the procedure is valid, that the practitioner is certified, and that the laboratory is appropriately accredited. Similarly, they should expect documented compliance with scientific advice, such as recommendations from the Forensic Science Regulator. Limitations and uncertainties should always be pro-actively disclosed. The use of categorical opinions should sound an alarm.

The cases discussed in this essay suggest that legal institutions did not recognise and are yet to address limitations with fingerprint evidence. Legal institutions operated on the assumption that such concerns would be aired and addressed, if necessary; but the evidence demonstrates that trial and appellate mechanisms have not led to an endogenous legal awareness of the limits of latent fingerprint comparison. Equally, lawyers and judges

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[212] Forensic Science Regulator, *Codes of Practice and Conduct: Fingerprint Comparison FSR-C-128* (Home Office, 2017), 13, [12.1.2]-[12.1.3].

[213] FSR, *Codes of Practice and Conduct*, 13, [13.1.1]-[13.1.2]. On the limits of compliance-based proficiency testing, consider PCAST report, n 46 above, 57, 68.

[214] Ministry of Justice, *Swift and Sure Justice: The Government's Plans for Reform of the Criminal Justice System* (2012). See also National Streamlined Forensic Reporting Guidance, Section 2 - SFR Guidelines for Providers of Forensic Science and a Practical Step Guide (2015) available at https://www.cps.gov.uk/legal-guidance/streamlined-forensic-reporting-guidance-and-toolkit and O. Sallavaci, 'Streamlined reporting of forensic evidence in England and Wales: *Is it the way forward?*' (2016) 20 *Evidence & Proof* 235 and Edmond, Piasecki and Carr, n 59 above.

[215] SFR was intended to reduce the number of non-meritorious challenges. This article, in contrast, suggests that there have not been enough sophisticated epistemological challenges. See also *Hunt v CPS* [2018] EWHC 3341 (Admin).

have not required information that would enable decision makers to rationally evaluate forensic science evidence. This does not mean that every conviction is factually questionable. In many cases, in conjunction with other independent evidence, the case against the defendant(s) was strong or compelling. But in almost every reported case the state exaggerated the value of its latent fingerprint evidence. Before the scientific community raised concerns about fingerprint evidence, this exaggeration may well have been unwitting. Now the community of fingerprint examiners and managers are aware of research, criticisms and recommendations. Non-disclosure and exaggeration continues. Many of these trials and appeals – and presumably many others that are not reported – generated or perpetuated unfairness within the fact-finding process, and, to markedly varying degrees, increased the risk that expert opinions would be misunderstood and wrongful convictions obtained.

Persistent failures in the understanding, use and evaluation of forensic science evidence have broader and more profound implications for adversarial criminal justice (and perhaps all legal) institutions. There are relatively few areas of legal practice and jurisprudence where we might gauge legal system performance so clearly against mainstream scientific consensus. The inability to recognise the frailties with many types of forensic science (and expert evidence) highlights courts' failures to appreciate just how frail their own practices were and are. This is a profoundly unsettling revelation. With the complacency that technical illiteracy can bring, generations of lawyers and judges have assessed the value of forensic science evidence by deferring to the very individuals and institutions whose work courts should have been evaluating. Even when epistemological and institutional implications were proliferating, like heads on the Hydra, appellate judges (in *McNamee*, *Buckley* and *Smith*) remained myopically focused on the case before them. Notwithstanding obligations in relation to disclosure and impartiality, the reports of forensic scientists did not direct lawyers to critical scientific research, limitations, uncertainties or insights about error. Not only was this often unfair to individuals suspected and accused of crimes it presumably contributed to both false guilty pleas and wrongful convictions.