

BOOK REVIEW

Forensic identification and criminal justice: forensic science, justice and risk, by Carole McCartney

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Judging only by its table of contents, Carole McCartney's latest book might appear merely a straightforward catalogue of cases and literature discussing the uses of forensic fingerprint and DNA identification technology in the criminal justice context. Upon closer examination, however, the reader encounters a powerful lens offered by McCartney through which to reveal modern society's unhesitant and largely unscrutinized embrace of these technologies. McCartney borrows the concept of the 'risk society', taken from the 1997 book *Policing the Risk Society* by R. V. Ericson and K. D. Haggerty,¹ to describe how our burgeoning preoccupation with the identification and elimination of risk has fueled, and been fueled by, the use of ostensibly 'fail-safe risk technologies' (p. xiv).

The book's six chapters discuss (1) the legal landscape—cases, statutes and institutions—governing the use of forensic fingerprinting and DNA evidence in the UK; (2) the use of fingerprint and DNA typing and analysis in criminal investigations, including mass screenings and non-consensual sampling from criminal defendants; (3) the limitations on the admissibility of fingerprint and DNA evidence in criminal trials; (4) the development of large-scale forensic identity databases; (5) the state of development of forensic identity technologies and databases in other countries and (6) the 'issues and prospects' for '[t]he future of forensic identification'. McCartney's sources of information consist of court cases, statutes, popular press, academic literature and personal interviews with 14 anonymous respondents 'chosen for their intimate involvement with the criminal justice system, policy developments and fingerprinting and DNA analysis'.²

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¹ The term 'risk society' was originally coined by Ulrich Beck in *Risk Society: Towards a New Modernity* (New Delhi: Sage 1992).

² While these interviews are surely valuable in that they presumably reflect the uncensored opinions of those actually in the field, McCartney reveals nothing of the roles or motivations of the interviewees. This decision, while understandable, limits the persuasive effect of the interview excerpts peppered throughout the book. Some readers may also conclude that

McCartney's thought-provoking central thesis is that the emerging 'technological tyranny' borne of our obsessive desire for certainty and rectitude is deeply problematic. To begin with, the technologies are not as infallible as they seem, as evidenced by reports of malfeasance, contamination, misinterpretation, fundamentally incorrect scientific assumptions and inaccurate or misleading match statistics. The imperfections of DNA and fingerprint evidence, while in themselves not a reason to abandon the forensic use of such evidence, are particularly dangerous precisely because of their perceived infallibility. Second, even assuming the technologies are reliable, their unfettered use may threaten important values other than accuracy and security, such as privacy and fairness. Finally, the elimination of risk and pursuit of certainty are uniquely dangerous as proffered justifications for ever-more-oppressive social control measures—such as vast national DNA databases—because they can never fully be attained. In the end, the more we pursue certainty and security, the more we realize how uncertain and insecure we are. The more uncertain and insecure we feel, the more willing we are to sacrifice core liberal democratic values in the name of certainty and security.

McCartney dutifully acknowledges the competing voices, including liberal ones, insisting that the pursuit of certainty and accuracy through forensic identification technology is laudable. These proponents of the risk-management approach argue not only that security is paramount, particularly in a post-9/11 world, but also that the use of forensic science actually enhances freedom by making the criminal justice process less subjective. See discussion *infra*. In the end, rather than attempt to reconcile these rival positions or fully rebut the apologists, McCartney modestly proposes more explicit quality control standards for forensic laboratories and, more broadly, for 'the formation of a (hitherto missing) normative ethical position' (p. 155) to identify, prioritize and protect the competing values implicated by forensic identification technology. While she eventually calls for institutions to adopt a 'normative criminal justice model based upon fairness and the enhancement of freedom', (p. 210) a proposal mirrored by the recent Nuffield Report, see discussion *infra*, she leaves for another day the specifics of how to convince such institutions, not to mention the public itself, to adopt such a human rights approach.

In each chapter, McCartney ably supports her central thesis and, along the way, points out several fascinating paradoxes inherent in the quest for certainty in criminal justice through the use of forensic science. In the section on criminal investigations, McCartney insightfully observes that the modern trend towards public distrust of the State has, ironically, forced the State to increase its reliance on more detached, oppressive methods—such as wide scale citizen DNA sampling—that only serve to exacerbate such distrust. As one interviewee explained, '[y]ou are not going to get admissions [from suspects] these days, the use of informants is not as effective as it was, even societal factors such as the public not relating to the police as they once did . . . as other things have fallen away, forensic evidence is what is left' (p. 32). Even where police have the ability to conduct more traditional investigations, McCartney explains that once the State succeeds in recovering fingerprints or DNA from a crime scene, both police and defense attorneys tend to neglect follow-up investigation pp. 63, 183).

In one sense, this shift in law enforcement from 'reactive investigation' to future-oriented 'management' of 'risk' (p. 188) could be viewed as a positive development for those who have traditionally been unfairly targeted by police. For example, police are less likely to unjustifiably arrest a minority as a suspect in a robbery based merely on his race and his proximity to the crime scene if fingerprints or DNA at the scene match someone else. In another sense, however, the shift from

McCartney's reliance on the excerpts leaves certain parts of the book with a subjective and anecdotal feel that detracts from the credible scientific ethos otherwise characterizing her writing.

individualized suspicion, a bedrock constitutional principle in the USA,³ to a purely probabilistic assessment of someone's risk to public safety based on fingerprint or DNA match statistics, presents an equal or greater risk of profiling and discrimination. While the individual minority may not be rounded up as a suspect based on an officer's racist hunch, all black men in a certain area without an alibi could be deemed suspects because the DNA profile found at the scene suggests that the perpetrator is black. Later in the book McCartney discusses the current development of 'Identikits', a facial composition software providing a description of a suspect's ethnicity and hair colour based on information in his DNA profile (p. 191). McCartney notes that DNA is qualitatively different from other biometric identifiers, such as fingerprints or iris scans, because it allows police to use such genetic profiling as a crime-solving technique (p. 154). Absent a requirement of individualized suspicion, basing arrests on such genetic profiling would be legal and even encouraged, particularly if modern trends towards quantifying burdens of proof, such as probable cause and reasonable doubt, continue.⁴

McCartney's next chapter examines the use of forensic science in criminal trials in the modern era of risk management. McCartney argues, correctly, that the criminal trial is not merely an attempt to 'search for and establish the truth' (p. 69). Rather, it is also a type of 'civic theatre that allows us to define who we are as people' (p. 68). To that end, trials are just as much about the fairness and dignity of the process as about the confidence with which we can proclaim the 'truth' at the end. Indeed, as McCartney notes, scholars routinely debate the epistemological question of whether the 'facts' of a crime have an 'independent, static quality' allowing them to be discovered at all or whether facts are merely products of the trial process subject to continuing interpretation and reformulation (p. 69).

Society's recent preoccupation with certainty and rectitude, McCartney contends, threatens to stifle the debate over these questions. The more the criminal trial is viewed solely as a means of establishing facts with certainty, the larger the role forensic science will play in determining the outcome of trials. This trend, what Mirjan Damaska would call the 'creeping scientization of factual inquiry',⁵ is not neutral. The enthusiasm of judges, prosecutors and the public for admitting scientific evidence against criminal defendants has, unfortunately, translated into a profound lack of scrutiny by all sides regarding whether, how and for what limited purpose such evidence should be presented to the jury.

McCartney first points to the lack of experts called by the defense and the lack of vigorous cross-examination of the State's experts by defense attorneys (p. 78). While McCartney appears to suggest that this failure by the defense bar to challenge DNA and fingerprint evidence is due mostly to a defeatist attitude based on a mistaken belief in the evidence's infallibility, the matter is considerably more complex. In the USA, the admissibility of novel scientific evidence turns in large part on whether it is 'generally accepted' in the relevant scientific community as reliable.⁶ One question that

³ See, e.g. *Ybarra v. Illinois*, 444 U.S. 85, 91 (1979) (holding that search of tavern patron was unreasonable under Fourth Amendment where justification for search was probable cause that bartender had bought narcotics from one of the patrons in the bar; probable cause must be 'particularized with respect to th[e] person' arrested).

⁴ See, e.g. Jack B. Weinstein & Ian Dewsbury, *Comment on the Meaning of "Proof Beyond a Reasonable Doubt,"* 5 Law, Probability, & Risk 167, 172–173 (2006) (supporting the adoption of a jury instruction that would suggest a possible quantification of proof beyond a 'reasonable doubt' as 95%).

⁵ Mirjan Damaska, *Evidence Law Adrift* 143 (1997).

⁶ See *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923) (allowing admission of novel scientific evidence if methodology has 'gained general acceptance' within the relevant scientific community). The US Supreme Court has since adopted a different standard for federal cases, centred on the method's scientific validity as established through a series of factors, including general acceptance by the scientific community, peer review, testability and existence of a known error rate. *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993). The states are split between *Daubert* and *Frye*.

arises is what the relevant scientific community is. Forensic DNA and fingerprinting science are by nature derivative of other disciplines—statistics, molecular biology, population genetics and the like. As courts have recognized in the DNA context, the relevant scientific community for admissibility purposes should be broader than merely forensic scientists because ‘[t]here is no question but that forensic scientists accept—no qualifier is necessary—forensic DNA evidence and believe that the time has come for its use as powerful evidence in criminal trials’. *United States v. Porter*, 618 A.2d 629, 634–635 (D.C. 1992) (quoting *People v. Axell*, 1 Cal. Rptr.2d 411, 423 (Ct. App. 1992)).

The problem is that the broader scientific community has largely ignored the methodologies used by state-sponsored forensic fingerprint and DNA analysts. Whether this blindness is a result of ignorance or apathy is unclear. What is clear is the dearth of scientific literature in non-forensic journals discussing government laboratories’ methods of collecting, analysing and particularly interpreting DNA and fingerprint evidence. With this lack of defense-friendly publications comes a lack of independent experts upon whom defense attorneys would be likely to call at trial.

A case in point on the need for more robust published debate and peer review within the scientific community is the California Supreme Court’s recent decision in *People v. Nelson*.⁷ *Nelson* involved the question whether the State’s method of determining the statistical significance of a ‘cold hit’ DNA match from a database was generally accepted in the relevant scientific community. The defense presented evidence that a genuine controversy existed among statisticians about how to express the statistical significance of such a cold hit. Some scientists argued that the significance could be accurately expressed simply by the ‘random match probability’ (RMP) or the chance that a random person selected from the population would match the profile. Others argued that the RMP is misleadingly small and that the jury must instead be told the ‘database match probability’ (DMP), meaning the chance, given the RMP, of finding a match through a trawl of that particular database. Still others argued that no statistic could overcome the so-called ‘ascertainment bias’ of having found the original match through a database trawl and that only additional testing at other loci could be used to generate accurate match statistics.

In support of the defense’s argument that the question was a scientific one that required the Court to determine whether a genuine scientific controversy exists, 54 preeminent statisticians, population geneticists and forensic scientists—including luminaries such as Sir Alec Jeffries himself⁸—signed a letter to the Court.⁹ In response, the State correctly pointed out that none of the scientists had actually published any articles critiquing the Federal Bureau of Investigation’s (FBI) statistics.¹⁰ Whether or not this criticism was fair or relevant, it was made. And, ultimately, the Supreme Court of California agreed with the State, holding that the question was not one of general acceptance of a scientific method, but merely one of relevance. Because the RMP is potentially relevant to determining the match statistics in a cold hit case, the State was free to report it, apparently without any other number, to the jury.

A full account would examine, therefore, how the broader scientific community has abdicated its duty to provide meaningful peer review of the one-sided state-sponsored studies used to jus-

⁷ 78 Cal.Rptr.3d 69 (Cal. 2008).

⁸ As McCartney points out, Sir Jeffries was an early proponent of a comprehensive national DNA database for the UK, on the condition that a ‘hit’ should not be considered conclusive or sufficient evidence of guilt and that the database be bifurcated into convicted criminals and non-criminals (p. 145).

⁹ See *People v. Nelson*, 2008 WL 2455122 (Apr. 17, 2008) (Letter Brief of Amici Curiae Regarding Supporting Letter from Amici Scientists).

¹⁰ *People v. Nelson*, 2008 WL 1696775 (Feb. 14, 2008) (Respondent’s Response to Briefs of Amici Curiae).

tify admission of the State's forensic evidence.¹¹ Just as McCartney argues that the 'reluctance of criminal justice professionals to critically engage with the science of forensic DNA identification "has given this evidence form a degree of legitimacy"' that remains unearned (p. 207), she would presumably view the reluctance of statisticians, biologists and geneticists to critically engage the science as equally problematic.

Another barrier to meaningful defense challenges to bad science, which McCartney acknowledges, is the inequity of current rules of discovery (p. 80). While McCartney portrays the problem as one primarily of timing, another major problem is that state officials often refuse to perform basic tasks—such as calculation of a false-positive rate or pairwise comparisons of the profiles in state-run DNA databases—that would shed much-needed light on the accuracy of the State's match statistics. Numerous defendants have argued in American courts that DNA laboratories should have to report an error, or false-positive rate, to the jury because such a rate—typically 1 in 10 000 or higher—would nearly always dwarf the infinitesimal RMP, typically 1 in 1 trillion or smaller. If the ultimate question is whether the defendant matches the profile because he is the source or because of an alternative reason, the State misleads the jury by suggesting that the only alternative theory is the highly unlikely possibility of a random match. The much more accurate answer would be to say that the most likely alternative is false positive due to incompetence, unavoidable contamination, malfeasance or some other reason encompassed in the laboratory's error rate.¹² Again, courts have rejected these challenges, in large part because so few scientists from other disciplines write articles critiquing forensic laboratories' refusal to report an error rate or the prosecution's use of the RMP rather than the much larger false-positive rate to express the likelihood that a match is due to some reason other than the defendant being the evidence source.¹³

Another example of the State's failure to disclose information critical to a meaningful assessment of the accuracy of DNA match statistics is the FBI's patent refusal to allow pairwise comparisons of profiles for potential matches in its own CODIS database or even in databases run by states that contract with the FBI. Defendants in the USA used to argue, until enough appellate courts finally disagreed with them, that use of the product rule to produce such small RMPs, such as 1 in 1 quintillion, must be based on inaccurate assumptions about the independence of the 13 genetic markers used by the FBI and nearly all state laboratories to generate forensic DNA profiles. These arguments have gained new life as a result of recent pairwise comparisons of profiles in existing DNA databases. For example, in 2001, an analyst in Arizona's state crime laboratory conducted such pairwise tests and determined that, among 65 000 profiles in the State database, 122 pairs matched at 9 of the FBI's 13 'loci', or tested locations along the nuclear DNA strand, and 20 pairs matched at

¹¹ McCartney laments the 'lack of interest in legal issues by the forensic science community' (p. xxi) but ultimately concludes that this gap 'is perhaps best filled by legal and sociological experts' (p. xxi). While she may be correct, legal experts cannot meaningfully debate the admissibility of certain scientific methodologies without first enlisting the help of the broader scientific community to provide much-needed peer review.

¹² See, e.g. Jonathan J. Koehler, *When Do Courts Think Base Rate Statistics Are Relevant?*, 42 *Jurimetrics* 373, 394–395 & n. 118 (2002) (noting that false-positive rate estimates in the early 1990s based on a study of a California DNA laboratory were between 0.0008 and 0.01 but that courts typically view such evidence as irrelevant in a given case because the rates are seen as laboratory specific).

¹³ While McCartney does discuss the possibility of 'weaknesses' in DNA evidence due to 'human errors' or 'laboratory failures', she does not discuss what types of errors would actually lead to a false match. When defendants point out potential contamination in a laboratory, e.g. the prosecution typically argues in response that contamination would most likely lead to a false exclusion, not false inclusion, of a suspect. The most relevant error rate, then, in challenging DNA evidence is the false-positive rate. See William C. Thompson, *How the Probability of a False Positive Affects the Value of DNA Evidence*, 48 *J. Forensic Sci.* 47 (2003).

10 loci.¹⁴ In July 2006, similar tests on the Illinois and Maryland databases, with 220 000 and 30 000 profiles, respectively, showed close to 1000 other pairs of profiles matching at 9 or more loci and 3 pairs matching at all 13 FBI loci. Ibid. Yet the FBI refuses to conduct such pairwise comparisons in the CODIS database or to allow independent researchers to do the same.¹⁵ In the absence of more robust review from the scientific community, the most effective challenges to the FBI's methods have, ironically, arisen from the work done by government officials themselves.¹⁶

McCartney also discusses the well-known issue of whether lay juries are sufficiently able to understand fingerprint and DNA evidence. She explains how DNA can be a double-edged sword for the prosecution: on the one hand, there exists the tyranny of the so-called 'CSI effect', as a result of which jurors insist upon DNA evidence before voting to convict; on the other hand, there is the so-called 'white-coat syndrome' (p. 99), the Svengali-like effect of DNA evidence often disproportionate to the evidence's actual probative value in a given case. McCartney reports that juries are a full 33 times more likely to convict when the government presents DNA evidence (p. 99). And of course, the CSI effect could turn into a liability for the defense as well; 'with no DNA evidence to confirm mistaken identification, proving innocence may become difficult with juries expecting forensic evidence to support alibis' (p. 206).

McCartney does not offer a solution to the lay jury problem. Should we move to a more inquisitorial system? Should we, as some have suggested, give jurors a written primer on DNA evidence before they start the case and later give them special interrogatories that stop them from misinterpreting the science?¹⁷ Should we ensure that jurors have a certain education level before being allowed to sit in a case with DNA or fingerprinting evidence? While such reforms may seem relatively inoffensive, they run afoul of pedigreed concepts such as the right to a general verdict, the right to serve on a jury and the right to a zealous defense through adversarial testing of every aspect of the government's case.

McCartney briefly touches upon recent defense challenges to fingerprint evidence, a field that is being meaningfully critiqued in American courts for the first time in 100 years. But she leaves out critical recent events calling the entire field into question, including the arrest and later vindication of Oregon (USA) attorney Brandon Mayfield, a much-publicized victim of a perfect storm of post-9/11 hysteria and questionable science. Mayfield was identified by the FBI as a suspect in the 2004 Madrid train bombings after the FBI claimed that he 'matched' fingerprints found on a bag in Spain

¹⁴ Jason Felch & Maura Dolan, *How Reliable Is DNA in Identifying Suspects?*, Los Angeles Times, July 20, 2008, <http://www.latimes.com/news/local/la-me-dna20-2008july20,0,5133446.story>.

¹⁵ Ibid. See also Edward J. Ungvarsky, *What Does One in a Trillion Mean?*, GeneWatch, Vol. 20, No. 1 (Feb. 2007). Calling a pairwise study of CODIS 'a matter of some urgency', Stanford University statistician Keith Devlin expects that CODIS 'will contain not just one but several pairs that match on all 13 loci, contrary (and how!) to the prediction made by proponents of the currently much-touted RMP that you can expect a single match only when you have on the order of 15 quadrillion profiles'. Keith Devlin, *Damned Lies*, Devlin's Angle, MAA online (Oct. 2006), available at http://www.maa.org/devlin/devlin_10_06.html.

¹⁶ Two recent examples from the USA are the Arizona laboratory's own pairwise comparison studies showing that its database contains many more profile matches at nine or more loci than were previously thought possible, see discussion *supra*, and the Armed Forces DNA Identification Laboratory's large-scale collection of mitochondrial DNA (mtDNA) sequences, a project that some have argued suggests that the FBI's current mtDNA forensic database is insufficiently representative. See, e.g. Frederika A. Kaestle, Ricky A. Kittles, Andrea L. Roth, & Edward J. Ungvarsky, *Database Limitations on the Evidentiary Value of Forensic Mitochondrial DNA Evidence*, 43 Am. Crim. L. Rev. 53 (2006).

¹⁷ See, e.g. David H. Kaye et al., *Statistics in the Jury Box: How Jurors Respond to Mitochondrial DNA Match Probabilities*, 4 J. Empirical Legal Studies 797 (2007).

containing detonating materials. Later, the FBI acknowledged that Mayfield was not involved and had been merely one of 20 persons, found in a database, whose prints were ‘similar’ to those found on the bag.¹⁸ McCartney does note the celebrated McKie Scotland Yard case, in which a police officer was charged with perjury for claiming that she never stepped foot inside a crime scene even though government experts claimed that a fingerprint found on the scene matched McKie. McKie was cleared after several other experts came forward who stated with equal force that the prints did not match McKie. McCartney does not mention, however, the Justice Minister’s telling admission to the press in 2002 that fingerprint identification is ‘not an exact science’.¹⁹ Such statements surely give pause to certainty junkies in the risk society seeking refuge in forensic science.

McCartney argues near the end of the criminal trial chapter that courts ‘need to demand independent corroborative evidence’ before convicting a defendant on the basis of forensic identity evidence alone. But McCartney does not explain why such a requirement is justified. Is it because such evidence is too likely to have been the result of human error or malfeasance? Surely one could say the same about non-scientific evidence of all kinds. Is it that the presence of the defendant’s DNA or fingerprints at a crime scene is too often consistent with innocence? Surely the defendant could explain this to the jury, if true.

Perhaps, McCartney’s call for individualized corroborative evidence is animated by the same concern underlying the US constitutional ‘individualized suspicion’ requirement—the notion that we, as a society, do not abide criminal convictions based simply on probabilities. In the oft-cited case *People v. Collins*, 438 P.2d 33 (Cal. 1968), the California Supreme Court reversed convictions of a man and woman accused of robbery where the prosecutor’s evidence consisted of the fact that the couple matched a broadcast lookout, along with mathematical evidence ostensibly showing that the probability of a bearded black man driving a yellow car with a white woman with a ponytail was 1 in 12 million. *Ibid.* at 37. Aside from noting obvious flaws in the calculation itself, the Court also concluded that such probabilistic evidence, standing alone, comes close to invading the province of the jury:

The prosecution’s approach . . . could furnish the jury with absolutely no guidance on the crucial issue: Of the admittedly few such couples, which one, if any, was guilty of committing this robbery? Probability theory necessarily remains silent on that question

[T]he prosecutor told the jurors that the traditional idea of proof beyond a reasonable doubt represented “the most hackneyed, stereotyped, trite, misunderstood concept in criminal law.” He sought to reconcile the jury to the risk that, under his “new math” approach to criminal jurisprudence, “on some rare occasion . . . an innocent person may be convicted.” “Without taking that risk,” the prosecution continued, “life would be intolerable . . . because . . . there would be immunity for the Collinses, for people who chose not to be employed to go down and push old ladies down and take their money and be immune because how could we ever be sure they are the ones who did it?”

¹⁸ See Apology Note from United States Government to Brandon Mayfield, Washington Post, Nov. 29, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/11/29/AR2006112901155.html?nav=rss_nation/nationalsecurity.

¹⁹ Simon A. Cole, *The “Opinionization” of Fingerprint Evidence*, 3 *BioSocieties* 105, 105 (2008) (citing a 2002 BBC News report).

In essence this argument of the prosecutor was calculated to persuade the jury to convict defendants whether or not they were convinced of their guilt to a moral certainty and beyond a reasonable doubt.

Ibid. at 40–41. While McCartney does not cite *Collins* or related literature on probabilistic determinations of guilt or innocence,²⁰ she does warn readers of the intangible costs of the ‘scientific appropriation of the criminal process’ (p. xxi). This fear of appropriation of the jury’s function, above and beyond concerns with the fallibility and inscrutability of statistics in the courtroom, is precisely what gave the *Collins* Court pause.

McCartney’s next, and perhaps most arresting, group of insights comes in the chapter on forensic identity databases. She starts with a chilling reminder of the current state of database development in the UK and USA, including compulsory DNA sampling from all arrestees for recordable offenses in the UK; proposals for complete citizen DNA databases in Australia, the UK, and the USA (p. 147); the proposed development of a National Identity Register in the UK requiring identification cards and eventually compulsory fingerprinting (p. 198) and the suggestion by Michigan’s Commission on Genetic Privacy (USA) suggesting that DNA samples be stored for all newborns (p. 146). As of the writing of this review, the state of affairs in the USA is even more startling; 13 states already collected DNA samples from all arrestees, and the Justice Department is poised to initiate a program of mandatory DNA sampling from all federal arrestees.²¹

The book discusses a deep and unexpected schism among progressives on whether comprehensive citizen DNA databases are hurtful to the cause of freedom. McCartney points, e.g. to scholars who argue that use of forensic surveillance techniques provides a needed level of objectivity that will decrease racial profiling. Such objectivity would not only result in ‘better justice’ by directing law enforcement away from innocent would-be suspects or by exonerating those already convicted of an offense they did not commit but also ‘save time’ and money by rendering criminal investigations more accurate and efficient. The voices embracing database development for these reasons are as varied as communitarian scholar Anatai Etzioni (p. 133) and the Innocence Project.²²

While it is certainly the case that the groups who have suffered under a society not driven by certainty and rectitude are those easily suspected by the majority—namely, criminal defendants and minorities (the latter constituting a disproportionate percentage of the former)—McCartney correctly points out that minorities will likely fare no better under a technology-driven, risk-management regime. McCartney eloquently argues that development of comprehensive citizen databases could just as easily exacerbate racial profiling if it allowed the government to categorize individuals on the basis of exhibiting certain ‘suspicious’ genetic markers or sharing genetic characteristics with known

²⁰ See generally Laurence H. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 Harv. L. Rev. 1329, 1330 (1971) (discussing potential dangers of using mathematical tools—‘numerical jurisprudence’—to determine outcomes in civil and criminal trials).

²¹ Randal C. Archibold, *Justice Department Details Program for Collecting DNA from People in Federal Custody*, New York Times, Apr. 19, 2008. Available at <http://www.nytimes.com/2008/04/19/us/19immig.html>.

²² McCartney mentions the Innocence Project as an example of the benefits of forensic DNA testing in the criminal arena but never points out the difference between inclusion and exclusion. To be clear, no inherent conflict exists between supporting the efforts of the Innocence Project and voicing concerns over the use of ‘match’ statistics to arrest and prosecute citizens. For example, while inaccurate match statistics may lead a jury to convict an innocent man based on a mistaken belief that the evidence profile is exceedingly rare, inaccurate match statistics do not call into question an exclusion, which reflects that the suspect simply lacks an allele present in the evidence sample.

criminals (p. 147). This makes sense; surely, the more the government learns about its citizens—their habits, ethnicity, pathologies, physical or mental infirmities and arguable predispositions—the easier it becomes to create a ‘suspect’ list based on such already-known information. Quoting Barbara Hudson, McCartney notes that ‘[p]eople can be and are excluded from shopping malls, made subject to curfews, coercively recruited to behavioural programmes, all because of who they are and what they look like’ (p. 147). And certainly those minorities who have done nothing wrong could still be falsely arrested in the modern ‘suspect society’ driven by risk assessment rather than individualized suspicion; McCartney rightly contends that those who would say that the innocent have nothing to fear forget that the State determines who is ‘innocent’ and who is not (innocence being a legal category rather than an ontological one) (p. 156).

One irony not explored by McCartney harkens back to the DNA match statistics debate. In theory, defense-minded folks who lament the use of the product rule or small size of the racially categorized databases used by the FBI to estimate allele frequencies should be the first to celebrate the development of large-scale national databases. First, such databases will give researchers tools needed to confirm what several independent experts have maintained all along—that RMPs are calculated based on false premises about the independence of forensic DNA markers and cannot, as a matter of common sense as well as good science, reflect reality. Second, as databases approach the size of the population, innocent database members will be less likely to be falsely targeted as suspects based on a coincidentally matching profile.²³

An issue on which there appears to be little debate, however, is the very real threat to privacy posed by development of national DNA databases. With access to a person’s entire genetic strand, the government can determine her ‘[p]hysique and ethnic origins’, sexual orientation, as well as whether she suffers from alcoholism, schizophrenia or a genetic predisposition to criminality (p. 153). McCartney warns that such information could be used for a variety of malevolent purposes, including denial of insurance coverage (p. 144). It is surely not paranoid to ponder whether the US government is capable of much worse given its role in unconscionable campaigns such as the Tuskegee syphilis study, which lasted 40 years and came to light only by the actions of a whistleblower at the US Public Health Service in 1972.²⁴ Indeed, even a staunchly conservative federal appellate judge in the USA in a celebrated 2004 dissent explained why courts must recognize a citizen’s legitimate expectation of privacy in his DNA profile:

If collecting DNA fingerprints can be justified on the basis of the plurality’s multi-factor, gestalt high-wire act, then it’s hard to see how we can keep the database from expanding to include everybody. Of course, anyone who already has to give up bodily fluids for alcohol or drug testing—airline pilots, high school athletes, customs inspectors and people suspected of driving while intoxicated—would be easy prey under the mushy multi-factor test. But, with only a little waggling, we can shoehorn the rest of us in. As the plurality notes, blood is taken from us from the day we are born pretty much till the day we die, and on many days in between. What exactly happens to that blood after it leaves our veins? Most of us don’t know or care, presuming (if we consider it at all)

²³ If an evidence profile has an RMP of 1 in 10 million, and the database contains 100 million profiles, one would expect to find at least 10 matching profiles. State officials would need to find corroborative evidence of guilt before accusing any particular one of these 10 matching individuals of being the perpetrator. But if the database contained only 30 000 profiles and produced a ‘cold hit’ with an RMP of 1 in 10 million, the attention of state officials would be concentrated solely on the one unlucky matching individual.

²⁴ James H. Jones, *Bad Blood: The Tuskegee Syphilis Experiment* (New York: Free Press, 1993).

that whatever isn't used for testing is discarded. But what if Congress were to require medical labs to submit the excess blood for DNA fingerprinting so it can be included in CODIS?

Perhaps my colleagues in the plurality feel comfortable living in a world where the government can keep track of everyone's whereabouts, or perhaps they believe it's inevitable given the dangers of modern life. But I mourn the loss of anonymity such a regime will bring.

United States v. Kincade, 379 F.3d 813, 973 (9th Cir. 2004) (Kozinski, J., dissenting).

Perhaps, the most telling indicator of how oppressive forced DNA sampling would be is the fact that police officers themselves, according to McCartney, are often loathe to provide samples to government officials for use in police DNA elimination databases (p. 141). In addition, many of McCartney's interviewees stated that they would not feel comfortable having anyone's DNA samples in the hands of the Forensic Science Service (FSS) if it were to become privatized. While the FSS is still a government-owned company as of this writing, the British government has allowed at least five private firms access to the national DNA database.²⁵ It is no wonder then that a recent study by the UK Human Genetics Commission found 'widespread mistrust' among Britons when presented with evidence of the vastness of the national DNA database.²⁶ While government argues that there is no privacy violation from providing private firms access to the databases because the profiles remain anonymous,²⁷ government officials have relied on precisely the opposite argument in other contexts. California state officials, e.g. have recently argued that making database profiles available to independent experts to run pairwise comparisons would violate the privacy of the offenders in the database, though the profiles would be anonymous.²⁸

McCartney includes a brief chapter on the development of databases in other jurisdictions. While no jurisdiction has yet ventured as far as the legislature of the UK, which permit the non-consensual DNA sampling of all citizens arrested for a 'recordable' offense (p. 178), McCartney observes that any country's DNA databases can be used by international police forces such as Interpol (p. 170) and that data sharing between countries obviously 'nullifies much regulation and protection' within any given country (p. 136). McCartney reports that while plans for a pan-European DNA database are still in development, cross-border data sharing is pervasive (p. 167).

The final chapter of the book, more predictive than prescriptive, offers a glimpse into the next wave of forensic identification technologies. She briefly discusses new biometric technologies, such as iris scans and facial recognition (pp. 189, 199), and newer forms of DNA analysis, such as mtDNA analysis (p. 191), low copy number DNA analysis, Y-short tandem repeat (Y-STR) testing and single

²⁵ Christopher Hope, *Millions of Profiles from DNA Database Passed to Private Firms*, Daily Telegraph, July 25, 2008, <http://www.telegraph.co.uk/news/newstopics/politics/lawandorder/2459976> (hereinafter Hope (2008)).

²⁶ Nigel Morris, *Curse of the DNA Register*, The Independent, July 30, 2008, <http://www.independent.co.uk/news/uk/home-news/curse-of-the-dna-register-880307.html>.

²⁷ A spokesman for the National Policing Improvement Agency defended the British government's disclosure of DNA profiles to private firms by arguing that the profiles are 'completely anonymous' and 'no identifiable in any way. After approval, they were made available for authorized research purposes demonstrating clear, potential operational benefit to the police in terms of detecting and solving crime'. Hope (2008).

²⁸ Editorial, *Should We Trust DNA?*, San Francisco Chronicle, July 28, 2008, at B4.

nucleotide polymorphism (SNP) testing (p. 193).²⁹ She also speaks of new investigative tools such as covert sampling of suspects' DNA (p. 195) and 'familial' searching of DNA databases.

To the extent McCartney offers any solution to the technological tyranny, it is twofold. First, she calls for strengthening the ethical standards that apply to forensic identification laboratories, given that '[t]he involvement of humans is normally at the root of problems with both fingerprinting and DNA' (p. 204). She notes in particular the lack of a regulatory body analogous to the British Medical Association to punish 'errant forensic scientists' in the UK (p. 203). She makes a good case that the UK must retain 'the highest standards of quality and integrity' so as not to discourage other countries from following their lead in developing ever-more-comprehensive DNA databases (p. 178).

Her second, more ambitious solution is for institutions to adopt a 'strong human rights commitment' and a 'normative criminal justice model based upon fairness and the enhancement of freedom' (p. 210). McCartney herself acknowledges that government officials are unlikely to have such a dramatic change of heart in favour of preserving civil liberties at the potential expense of public safety. But before dismissing McCartney's goal as quixotic, one should first consider last year's Nuffield Report, which echoes McCartney's call for a rights-based approach:

The protection of the public from criminal activities is a primary obligation of the state. In a liberal democracy, such as the United Kingdom, it is also necessary to protect several fundamental ethical values and to respect modern legislation on human rights. . . . We broadly endorse a rights-based approach that both recognizes the fundamental importance to human beings of respect for their individual liberty, autonomy, and privacy, and the need, in appropriate circumstances, to restrict these rights either in the general interest or to protect the rights of others.

It is clear that well-functioning forensic databases have the potential to promote the public interest to a significant degree, but to argue convincingly that this justifies overriding identifiable personal interests or rights requires a number of further steps.

Nuffield Council on Bioethics, *The Forensic Use of BioInformation: Ethical Issues*, Executive Summary, at xiii (2007) (hereinafter Nuffield Report).³⁰

But before convincing governmental institutions and statesmen to value privacy and human dignity as highly as national security, McCartney and other would-be reformers must first convince the public to do the same. As observed in a review of *Policing the Risk Society*, 'police work is mutating from the brute face of enforcement to the "softer" face of compliance through encouragement of self-surveillance'.³¹ McCartney herself notes that through policies such as fingerprinting children who receive library cards, citizens are becoming 'acclimatized' to a culture without privacy (p. 110).

²⁹ Professor Erin Murphy compares the 'first generation' of scientific evidence, including fingerprints, with the 'second generation', such as DNA and biometric technologies, the latter of which she claims are characterized by unique traits that make their use in a certainty-obsessed legal culture particularly problematic. Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 Cal. L. Rev. 721 (2007).

³⁰ Indeed, the Nuffield Report mirrors a number of McCartney's concerns, including limiting DNA sampling to those arrested for 'recordable' offenses; prioritizing the collection of DNA and fingerprints from crime scenes, rather than individuals; ensuring that consent to voluntary sampling may be revoked at any time for any reason; the disproportionate number of ethnic minorities in current nationwide databases; avoidance of the 'prosecutor's fallacy'; limiting familial searching to cases where the technique is both necessary and proportionate; discouraging police from routinely attempting to infer ethnicity of a perpetrator from an evidence sample DNA profile and establishing ethical protocols to govern data sharing between databases across different countries.

³¹ Craig Jones, Book Review, *Policing the Risk Society*, 23 Queen's L.J. 527, 529 (1998).

The same is true in the USA; Judge Kozinski observes in his *Kincade* dissent that every whittling away of privacy actually tends to decrease the public's expectation of privacy, thus justifying subsequent privacy invasions.³² Until the public is weaned off its dependence on promises of certainty and security, no amount of government reform will save it from the tyranny of technology.

³² Judge Kozinski uses J. Edgar Hoover's insidious development of a national fingerprint database in the 1920s as an example and posits that '[t]he suggestion that law enforcement agencies . . . must destroy the fingerprints of those who were wrongfully arrested . . . would today be greeted by reactions ranging from apathy to a disdainful snigger. Why? Because we have come to accept that people—even totally innocent people—have no legitimate expectation of privacy in their fingerprints, and that's that'. *Kincade*, 379 F.3d at 873 (Kozinski, J., dissenting).