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Jennifer L. Mnookin

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FINGERPRINT EVIDENCE IN AN AGE OF DNA PROFILING*

Jennifer L. Mnookin[†]

INTRODUCTION

In 1894, Mark Twain published the novella *Pudd'nhead Wilson*.¹ The book tells the story of two baby boys of the same age born in a small Missouri town in 1830, one the son of respected parents, and the other, though only 1/32nd black, born a slave.² When the two boys were just a few months old, the slave boy's mother, terrified by the thought that her newborn son could someday be sold "down the river" into terrible conditions, swapped the one child for the other, their race and their identities exchanged in a single instant.³ The white boy's mother had died shortly after giving birth, and no one, not even his father, noticed the switch. From that day on, the slave woman's baby was raised as a white child, the nephew of the town's most prominent resident, while the other boy was brought up as her son and as a slave. The book also tells the story of a man who moved to the town to try to be a lawyer, but who got off on the wrong foot; he was instantly declared by the townsfolk to be an empty-headed fool and was known henceforth as Pudd'nhead Wilson.⁴

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† Associate Professor of Law, University of Virginia School of Law. I am grateful to Simon Cole, Neal Feigenson, and participants in the Brooklyn Law School Symposium, *DNA: Lessons From the Past—Problems for the Future*, for helpful comments. Thanks to Betsy Scott and Stuart Shapley for helpful research assistance.

¹ MARK TWAIN, *THE TRAGEDY OF PUDD'NHEAD WILSON* (7th ed. 1964) (1894).

² *Id.* at 29.

³ *Id.* at 36-37.

⁴ *Id.* at 26.

Over time, Pudd'nhead came to be viewed as a likeable oddball, a man with eccentric and eclectic hobbies. One of these hobbies, what Twain calls "a fad without a name," involved asking people to leave the marks of their fingers on narrow glass strips that Pudd'nhead would carefully label, file, and pore over.⁵ Everyone in town had been subjected, often multiple times, to Pudd'nhead Wilson's fascination with fingermarks, and they indulged his strange obsessions with bemusement and affection. They viewed it, as Twain writes, as "old time childish 'puttering' and folly."⁶

This odd pastime of Pudd'nhead's turned out to provide the key to solving a murder and preventing the wrongful conviction of two innocent men. The town's most prominent citizen was stabbed to death.⁷ All the circumstantial evidence pointed to two strangers in town, a certain man and his twin brother, as the vicious culprits.⁸ Pudd'nhead, representing the twins in his first-ever legal assignment, revealed the true murderer, thanks to the smudgy whorls and lines left by a bloody hand on the weapon used to commit the crime. He told everyone in the courtroom about how fingerprints provided the ultimate signature, a "physiological autograph" that could not be "counterfeited," disguised or changed over time, a signature that had "no duplicate . . . among the swarming populations of the globe."⁹

Through an in-court demonstration in which Pudd'nhead proved that he could identify people just by seeing the marks left by their fingers, the lawyer showed that he was no Pudd'nhead after all. And he showed the rapt audience who had really left those bloody marks on the knife: not the two strangers, but the murdered man's own supposed nephew.¹⁰ Even more shocking, Pudd'nhead used his extensive fingerprint records to show the astonished townspeople that the murdered man's nephew wasn't actually his nephew at all,

⁵ *Id.* at 27-28.

⁶ TWAIN, *supra* note 1, at 158.

⁷ *Id.* at 141.

⁸ *Id.* at 148.

⁹ *Id.* at 158-59.

¹⁰ *Id.* at 164.

but rather, the son of a slave boy whose identity had been switched with the nephew's at the tender age of eight months.¹¹

Thus Pudd'nhead's eccentric obsession with fingerprints not only determined the real murderer's identity but also brought to light the cradle switching of so many years earlier. In Twain's novella, fingerprints were the key to the truth; once they were revealed, all doubts disappeared. While the truth revealed by the fingerprints shocked everyone, the prints spoke with an authority that no one questioned. When the novella was published in 1894, fingerprinting was only used to solve fictional crimes; it had not yet been used by the police in the United States to create an identification system for criminals, nor was it used as evidence in courts of law.¹² And yet, in the novel, fingerprints already operated as an extraordinarily stable marker of identity, more fixed and permanent than status, name, or even race. Fingerprints could reveal peoples' true identity, even if they did not know it themselves. Fifteen years later, when fingerprints made their way into the American courtroom as evidence, they quickly came to be seen as an enormously powerful kind of proof, often deemed as certain and as persuasive as they seemed in Twain's novella.

This Article will examine the history of fingerprint evidence as well as contemporary challenges to this important form of legal proof. The overall story this Article will tell is that scrutiny of expert evidence does not take place in a cultural vacuum. What seems obvious, what needs to be proven, what can be taken for granted, and what is viewed as problematic all depend on cultural assumptions and shared beliefs, and these can change over time in noticeable and dramatic ways. Whatever the ostensible legal standard used, it is filtered through these shared beliefs and common practices. When

¹¹ TWAIN, *supra* note 1, at 163-64.

¹² Fingerprinting began to be used by the police for criminal identification in the first decade of the twentieth century, though it was used earlier in India. See SIMON A. COLE, *SUSPECT IDENTITIES: A HISTORY OF FINGERPRINTING AND CRIMINAL IDENTIFICATION* (2001) (providing an excellent recent cultural history focusing on the emergence of fingerprinting as a system of criminal identification). Throughout this Article, I build and draw upon Cole's work, though I focus more exclusively on the courtroom setting and more explicitly on the legal admissibility of the new technique. See also COLIN BEAVAN, *FINGERPRINTS: THE ORIGINS OF CRIME DETECTION AND THE MURDER CASE THAT LAUNCHED FORENSIC SCIENCE* (2001) (discussing the history of fingerprinting).

forms of evidence comport with broader understandings of what is plausible, they may be especially likely to escape careful scrutiny as legal evidence, no matter what the formal legal standard used to evaluate them looks like. While commentators have often criticized the legal system for being too conservative in admitting expert evidence, the problem may be quite the reverse: we may need to be more worried about quick and widespread acceptance of a new technique leading to its deep and permanent entrenchment.

Moreover, this Article will suggest that the often-disparaged "battles of the experts" can have a useful and productive aspect. Although competing, contradictory experts may create substantial practical difficulties for a lay jury that lacks the expertise to choose between the experts' different claims, these same battles may bring to light limitations in research and problematic assumptions that otherwise would escape the notice of experts and judges alike. Those who have advocated "neutral experts" as a solution to the difficulties of expert evidence in a lay jury system should therefore take heed from the history of fingerprinting.

The first and second Parts of this Article will survey the early history of fingerprinting evidence, showing how rapidly fingerprinting was accepted by courts and what limited scrutiny it received. Then, the third Part will briefly turn to a more recent form of forensic identification, DNA profiling, to show how there are certain surprising similarities between the legal reception of fingerprinting at the beginning of the twentieth century and the early reception of DNA identification techniques. Finally, the fourth Part will show how challenges to DNA profiling, in conjunction with doctrinal shifts in the standards governing the admissibility of expert evidence, have now opened the door to new challenges to fingerprinting evidence, threatening to destabilize a form of proof that has long been considered one of the most authoritative forms of evidence.

I. THE EARLY RECEPTION OF FINGERPRINT EVIDENCE

Twain's representation of forensic fingerprint identification foreshadowed, in certain important respects,

aspects of how fingerprint evidence was actually used in real American courtrooms, a practice which began fifteen years after Twain's novella was published. In fact, there are four significant similarities between the fictional portrayal of fingerprint evidence in Twain, and its genuine use in the second and third decade of the twentieth century. This Section will provide an overview of the history of fingerprinting by exploring each similarity in turn.

A. *Rapid Acceptance with Minimal Scrutiny*

First, in real courtrooms just as in the novella, fingerprints were accepted as an evidentiary tool without a great deal of scrutiny or skepticism. In *Pudd'nhead Wilson*, the attorney simply asserted the individuality of fingerprints.¹³ The public gathered in the courtroom and the jury, with Pudd'nhead's guidance, looked at the lines and swirls of their own prints and those of their neighbors. But Pudd'nhead offered no systematic proof that fingerprints truly differed from person to person, nor did he explain to what degree fingerprints differed from one another. Similarly, in the earliest cases in which fingerprint evidence was used in court, there was no careful proof that a fingerprint could uniquely identify a person, that fingerprints were both distinctive and distinguishable. This critical premise was typically asserted rather than established.

Let us look, for example, at the first case in the United States in which fingerprints were introduced in evidence, the 1910 trial of Thomas Jennings for the murder of Clarence Hiller.¹⁴ There was some circumstantial evidence linking Jennings to the crime. He was found by the police a few hours after the murder with a freshly fired revolver containing cartridges that matched those found near the dead body. Moreover, he was identified by eyewitnesses as the intruder in

¹³ TWAIN, *supra* note 1, at 159 ("Taken finger for finger, your patterns differ from your neighbor's . . . One twin's patterns are never the same as his fellow twin's patterns.").

¹⁴ The case was tried in 1910, and was appealed partly on the basis of the admission of the fingerprint evidence. *People v. Jennings*, 96 N.E. 1077 (Ill. 1911). The conviction was upheld and Jennings was executed on February 16, 1912.

several other home break-ins in the neighborhood that same evening. These were certainly suspicious circumstances, but probably not sufficient for a conviction, and the Hiller family could not definitely identify Jennings.¹⁵ However, the Hiller family had just finished painting their house, and on the railing of their back porch, four fingers of a left hand had been imprinted in the still-wet paint.¹⁶ The prosecution wanted to introduce expert testimony concluding that these fingerprints belonged to none other than Thomas Jennings.

Four witnesses testified for the prosecution that they had, in the course of their work with various Bureaus of Identification, looked at thousands of fingerprints, and all concluded that the fingerprints on the rail were made by the defendant's hand. The judge allowed their testimony, and Jennings was convicted. The defendant argued on appeal that the prints were improperly admitted, but this argument was unsuccessful. Citing such authorities as the *Encyclopedia Britannica* and a treatise on handwriting identification, the court emphasized that "standard authorities on scientific subjects discuss the use of finger prints as a system of identification, concluding that experience has shown it to be reliable."¹⁷ On the basis of these sources and the witnesses' testimony, the court was prepared to conclude "that there is a scientific basis for the system of finger print identification . . . [and] that this method of identification is in such general and common use that the courts cannot refuse to take judicial cognizance of it."¹⁸

What was striking in *Jennings*, as well as the cases that followed it, is that courts largely failed to ask the difficult questions of the new identification technique. Just how confident could fingerprint identification experts be that no two fingerprints were really alike? The witnesses in *Jennings* claimed to have personally looked at several thousand fingerprints—but even if the several thousand were all different, that hardly proved that *all* fingerprints are different.

¹⁵ *Id.* at 1078-80.

¹⁶ *Id.* at 1080.

¹⁷ *Id.*

¹⁸ *Id.* at 1082.

Moreover, when evaluating prints in the context of criminal identification, examiners had access to full sets of ten complete prints; in the forensic context, by contrast, they typically had fewer, often only one (though in the *Jennings* case, four prints were available). Even if no two people had identical *sets* of fingerprints, this did not establish that no two people could have a *single* identical print, much less an identical *part* of a print. These are necessarily matters of probability, but neither the court in *Jennings* nor subsequent judges ever required that fingerprinting identification be placed on a secure statistical foundation. How many similarities, how many points of resemblance, between two prints were necessary in order to declare a match? Although loose norms developed on this question, no definitive answer was ever developed by American fingerprint examiners, nor did judges require a minimum number of points of resemblance in order for fingerprints to be admissible evidence. Determining whether there was a match was simply left to the judgment of the expert examiner. What were the chances that two partial fingerprints might in fact match, and yet come from different people? To this day, fingerprint examiners have never been required to give an answer to this question, and to this day, they remain incapable of providing an answer that is rooted in a persuasive statistical model of fingerprint variation.

In addition, in any system of human evaluation, there is the possibility of error: what were the chances that a fingerprint examiner might erroneously declare a match (a false positive) or erroneously think that two prints did not match when they actually did (a false negative)? Neither the judge in *Jennings* nor those who considered fingerprint evidence throughout the decade following *Jennings* expressed concern about any of these matters. This failure to scrutinize fingerprinting is quite extraordinary: based only on interested participants' say-so, judges basically accepted the notion that the new technique worked flawlessly. To be sure, in *Jennings*, there were four full prints left in the paint, not one.¹⁹ But even so, it is remarkable that the judge in *Jennings* felt so confident about fingerprinting as a viable identification technique that he saw the reliability of the system as a fair subject for judicial

¹⁹ *Jennings*, 96 N.E.2d at 1082.

notice.²⁰ His main grounds for this confidence, in addition to the experts' testimony, was that fingerprinting was already so widely used in a variety of other contexts.²¹

As we have seen, the important differences between using fingerprints as a criminal identification method and using fingerprints for forensic identification suggest that the legitimacy of the former should not have been sufficient to imply the legitimacy of the latter. But quite apart from this point, the judge in *Jennings* was simply overstating the extent of the acceptance of fingerprinting outside the courtroom at the time. Though a number of prison bureaus and police departments were using fingerprints to identify criminals and suspected criminals (the FBI, for example, began fingerprinting in 1904), they all used fingerprinting as a supplement to the Berthillon system of anthropomorphic identification, rather than as a stand-alone identification method.²² According to Simon Cole, the author of a recent book-length study of criminal identification systems, the only American institutions that identified people on the basis of fingerprints alone prior to 1910 were civil, rather than criminal. The military, in particular, regularly took recruits' fingerprints.²³ In 1910, the same year as the *Jennings* trial, fingerprinting was used for the first time as the exclusive basis for criminal identification, to detect recidivist prostitutes in New York.²⁴

So fingerprinting was accepted in court because of its widespread use in other arenas; and yet, in these other arenas, it was not yet viewed even by its advocates as sufficiently authoritative to stand on its own for important matters like the identification of felons and criminal recidivists. In fact, it was over the course of the second and third decades of the century that fingerprinting came to dominate anthropometry as the

²⁰ For another early example of grounding judicial acceptance on broader acceptance, see *State v. Cerciello*, 90 A. 1112, 1114 (N.J. 1914) (admitting fingerprints on the basis that those "progressive and scientific tendencies of the age [that] are manifest in every other department of human endeavor, cannot be ignored in legal procedure.").

²¹ *Jennings*, 96 N.E. at 1082-83.

²² COLE, *supra* note 12, at 152.

²³ *Id.* at 153. Fingerprinting was used by itself for the purpose of criminal identification in a number of other countries. See also *id.* at 153.

²⁴ *Id.* at 153-54.

preferred method of criminal identification. This was precisely the same period in which fingerprinting evidence came to be uniformly accepted as forensic evidence as well. It seems fair to suggest that while the early court cases accepting fingerprinting drew authority from fingerprinting's widespread use outside the forensic arena, judicial acceptance of fingerprinting as evidence in criminal cases may have helped to increase its perceived authority and reliability outside of the courtroom as well.

In all events, the *Jennings* decision proved quite influential. In the years following *Jennings*, courts in other states admitted fingerprints without any substantial analysis at all, relying instead on *Jennings* and other cases as precedent.²⁵ By 1918, a court considering whether palm prints also ought to be admissible could opine, "Were we dealing here with a finger print impression . . . our course would be easy, for the courts of this country, and of England as well, have paved the way for the recognition of this science as an evidentiary element in criminal prosecutions."²⁶ With respect to palm prints, the court described how the papillary ridges on the human hand are, like those on the fingers, "persistent, continuous and unchanging."²⁷ In deeming palm prints admissible, the court reached what it called "[an] undisputable conclusion that there is but one physiological basis underlying this method of identification; that the phenomenon by which identity is thus established exists, not only on the bulbs of the fingertips, but . . . on all parts and in all sections and subdivisions of the palmar surface of the human hand."²⁸

Once again, this judge failed to ask the hard questions. Just because there are unchanging permanent marks on the palms of hands does not necessarily mean that everyone's palms are identifiably different. Furthermore, even if palm marks are different, it does not necessarily mean that experts can identify these differences with a high degree of accuracy. But by this point—just seven years after the first reception of fingerprints as evidence in the United States—the evidential

²⁵ See, e.g., *McGarry v. State*, 200 S.W. 527 (1918), *People v. Sallow*, 100 Misc. 447, 453, 165 N.Y. Supp. 915, 918 (N.Y.C. Gen. Sess. N.Y. County 1917).

²⁶ *State v. Kuhl*, 175 P. 190, 191 (Nev. 1918).

²⁷ *Id.* at 193.

²⁸ *Id.* at 194.

legitimacy of fingerprints was so deeply entrenched that palm prints seemed but a straightforward analogical extension of accepted doctrine.²⁹

In *Pudd'nhead Wilson*, once fingermarks were explained to the court, their authority seemed almost self-evident. Similarly, in actual courts, judges expressed remarkably little skepticism about the authority of fingerprints, accepting them as legal evidence with tremendous speed and little skepticism.³⁰ Occasionally, *Pudd'nhead Wilson* itself was even cited as an authority by judges!³¹ Judges were as confident as Twain that they had located "God's finger print language," that voiceless speech and the indelible writing" that could provide "unquestionable evidence of identity in all cases."³²

B. *In-Court Experiments to Amaze and Persuade*

As mentioned earlier, Pudd'nhead Wilson provided an in-court demonstration of his skill at identifying fingerprints. He asked for several people in the courtroom to run their fingers through their hair and then press them against a window, while the defendants did the same. He then asked the same people and the defendants to repeat the exercise, on a different window and in a different order. All of this was to

²⁹ Later, in an even greater analogical stretch, fingerprint identification also became a justification for the admissibility of expert evidence about toolmark identification. See, e.g., *State v. Clark*, 287 P. 18, 20 (Wash. 1930) (admitting a toolmark identification expert's testimony about whether a particular knife was used to cut some branches by noting, "Courts are no longer skeptical that by the aid of scientific appliances the identity of a person may be established by finger prints. . . The edge on one blade differs as greatly from the edge on another blade as the lines on one human hand differ from the lines on another. This is a progressive age. The scientific means afforded should be used to apprehend the criminal.") *Id.*

³⁰ This analysis is based on a review of appellate cases and the periodical literature. It is of course possible that there were isolated instances where a judge at trial rejected fingerprint evidence, but the exclusion was never appealed. (If, for example, the prosecution's fingerprint evidence was excluded and the defendant acquitted, obviously there could be no appeal!) However, if the exclusion of fingerprint evidence at trial had occurred with any frequency, it seems very likely that the legal periodical literature would have noted it in passing; neither my own research nor Cole's has turned up early examples of fingerprinting's evidentiary exclusion.

³¹ See, e.g., *Stacy v. State*, 292 P. 885, 886 (Okla. Crim. App. 1930); *Kuhl*, 175 P. at 191-92.

³² *Moon v. State*, 198 P. 288, 290 (Ariz. 1921) (quoting FREDERICK A. BRAYLEY, *FINGER PRINTS IDENTIFICATION* (1910)); *Kuhl*, 175 P. at 193 (same).

take place while Pudd'nhead turned his back.³³ The experiment was a tremendous success; when it was completed, "he moved to his place through a storm of applause."³⁴ Not only did he succeed in identifying the defendants and three others by their fingermarks, but this experiment enormously enhanced Pudd'nhead's credibility and the credibility of his claims about the new technique. Pudd'nhead's experiment made the onlookers believe both that fingerprints really were different from one another (never mind that such a small sample size provided quite limited proof in this regard!) and, perhaps even more important, that Pudd'nhead really could do what he said he could: identify people by comparing their fingerprints.

Although there is no particular reason to believe they were inspired by Twain's depiction, actual fingerprint examiners offered demonstrations very similar to Pudd'nhead's. Instead of simply asserting their expertise and the amazing power of identifying a person from a mark left by the fingertips, experts often tried to show the jury this power firsthand. These were, as historian Simon Cole has argued, "dazzling demonstrations" that made believable and persuasive a technique that seemed almost magical in its abilities.³⁵ For example, in *Moon v. State*,³⁶ the expert witness was permitted to perform a fingerprint examination on the twelve jurymen. Each juror made two prints on separate pieces of cardboard while the expert was out of the room. When the expert returned, he developed the prints with powder and successfully paired them off. The appellate court found no error in the trial court's having permitted the experiment, declaring it a "demonstration impressive and convincing."³⁷ The court concluded: "It seems to have been a fair proposition, fairly conducted, and tended . . . to illustrate the methods of the system of finger print identification and the truth of the claim that invisible finger prints can be developed and identity of the maker revealed by simple process to positive certainty."³⁸ In the first two decades of the use of fingerprinting in court, when it

³³ TWAIN, *supra* note 1, at 161.

³⁴ *Id.*

³⁵ COLE, *supra* note 12, at 190-94.

³⁶ 198 P. 288 (Ariz. 1921).

³⁷ *Id.* at 291.

³⁸ *Id.*

was still a relatively novel form of evidence, every appellate judge who considered the issue found that offering in-court demonstrations of the power of fingerprinting was acceptable and legitimate, a useful way to show jurors the power of the technique.³⁹

Moreover, sometimes even the offer to test was quite convincing, as the following perhaps apocryphal but nonetheless revealing excerpt from a cross-examination of a fingerprint expert suggests:

Q: Now all this no doubt sounds very nice; bifurcations, deltas, islands, abrupt terminations, loops that are loops and loops that are something else, but the question is—can you prove that you can identify a person by his fingerprints? If you can how are you going to do it?

A: Yes, sir. I would be only too glad to prove by a demonstration that I can identify a person by his fingerprints. I accept any reasonable test that you may suggest.

Q: Now, please remember that you are upon oath. Do you mean to tell the court and jury, that in this gathering that fills this room you could identify two prints that were alike out of the whole number here gathered?

A: Yes, sir; I could without a doubt, but I fear it would try the patience of the Court. However, I will offer a suggestion upon the same lines. I am willing to have the jurymen each make an impression of their left thumb, they putting some private mark upon it so that they can identify it. I will retire with an officer or with counsel if he so desires and during my absence one or more jurymen can make an impression of their thumb on another paper without any marks to identify it. On my return I will identify the prints that are alike.

By the prosecutor: If the Court pleases, I think this a very fair proposition, and on the part of the state, we agree to have this test made.

By Mr. Sharp: that is all very well for you to say. No doubt you are on the inside and know how the trick is done, but I—

Prosecutor (interrupting): If your Honor pleases, I positively object to the word "trick" as applied to my office, myself, or my

³⁹ For other examples of in-court experiments, see *People v. Chimovitz*, 211 N.W. 650 (Mich. 1927) (describing another fingerprint experiment on the jurors themselves); *Stacy v. State*, 292 P. 885 (Okla. Crim. App. 1930) (permitting expert to pair and identify prints other than the defendant before the jury); *Hopkins v. State*, 295 S.W. 361 (Ark. 1927) (describing how each juror made a print of one finger, and then one juror made a second print which was identified by the expert in an in-court experiment; court found the experiment was perfectly permissible, but reversed on other grounds).

attachés. He invited this test and I consider his refusal to have it made an acknowledgment on his part that the testimony of our witness is undisputed.

By Mr. Sharp: You can think what you please. I have seen more astonishing things done by a so-called "mind-reader" and I do not propose to risk the life of my client by such a performance; this is a trial, not a side-show.⁴⁰

Thus, not only could in-court demonstrations be enormously persuasive, but the willingness of fingerprint examiners to be tested by the jury was powerful evidence of their confidence and their technique.

Fingerprint examiners' willingness, even their eagerness, to undergo in-court testing stood in pointed contrast to handwriting identification experts. Handwriting experts also testified about identifying from marks—not from fingermarks—but from signatures and other documents, using their expertise to link a writing with an author. Handwriting experts, however, never offered to prove their expertise through in-court experiments, and in fact, on those occasions when the opposing party endeavored to test their expertise through a demonstration in court, handwriting experts nearly always refused, claiming that theirs was an exacting science that could not be performed in mere minutes as a show for the jury. They argued that such tests were unreasonable and misleading, for the process of rendering an opinion on authorship was not something that could be done in an instant and upon a careless glance. Rather, they had to study the document in detail, look at it under a magnifying glass or even a microscope, and measure, examine, and study the writing scientifically.⁴¹

While the reluctance of handwriting examiners to subject themselves to in-court testing may have been justifiable—not all forms of knowledge are well-suited to near-instantaneous demonstration—their refusal to submit to in-court testing inevitably had a negative affect on their perceived credibility. By contrast, the fingerprint examiners' willingness

⁴⁰ *Finger-Print Testimony in Court*, 63 LITERARY DIGEST 22, 22-23 (1919) (reprinted from *Finger-Print Magazine*, Aug. 1919).

⁴¹ See generally ALBERT S. OSBORN, *QUESTIONED DOCUMENTS* (1910) (providing a detailed description of the procedures used by experts in handwriting evidence in the same period).

to be tested enhanced the credibility of their claims considerably. It may also have helped to blind judges and juries to that which these fabulous floor shows failed to prove: that just because an expert could take carefully inked prints and successfully identify which of a dozen people had made the print, it said little about (1) whether *all* fingerprints were in fact unique; or (2) whether under the less-than-perfect conditions of real-life fingerprint identification, when prints were potentially smudged or only partially preserved, they could identify prints with the same degree of confidence.

C. *Showing the Jurors the Evidence for Themselves*

The third similarity between the use of fingerprint evidence in *Pudd'nhead Wilson* and in actual courts is that the fingerprints themselves, as much as the expert opinion about the fingerprints, seem to constitute the evidence. Fingerprint examiners generally did not simply assert that they believed they had found a match; they nearly always presented images of the prints themselves to the jury, so the jury could see the match for itself. While fingerprint evidence was always presented through an expert, the expert's real role was to teach the jury to see the match directly. Thus, the jury examined the fingerprints found at the scene of the crime and the fingerprints of the defendant, and saw for itself that they matched one another.

It is important to emphasize just how powerful this kind of dramatic demonstrative evidence could be. The jurors saw, or at least seemed to see, nature displayed directly. They became witnesses to now visible traces of the crime itself. Enlarged images of fingerprints could appear both natural and neutral, a more objective form of proof than mere witness testimony or even expert ruminations. Seeing the marks directly could transform fingerprinting from a dubious theory, "an abstract explanation" perhaps difficult for the jury to grasp, to an obvious, perhaps even incontestable, truth.⁴² As one court described, quoting with approval the state's attorney,

⁴² *Moon*, 198 P. at 291.

It might well be that until a juryman witnessed this demonstration he would never believe that a plain porcelain slab would reveal the incriminating finger print, but having seen their own finger prints developed from invisible impressions on sheets of paper, it was no longer a question of speculation; it was to the jurymen a fact as common place as radium or wireless or flying in the air.⁴³

Another judge wrote,

The witness does not testify. The physical facts speak for themselves; no fears, no hopes, no will of the prisoner to falsify or to exaggerate could produce or create a resemblance of her finger prints or change them in one line, and therefore there is no danger of error being committed or untruth told.⁴⁴

Though this judge was describing why requiring the defendant to provide a fingerprint did not violate his Fifth Amendment right against self-incrimination, this belief that fingerprints were "physical facts [that] speak for themselves," without risk of lies or exaggeration, was more broadly applicable.

Fingerprint examiners generally testified with blown-up images of the prints themselves, the various points of resemblance marked to make identification clear and for ease of reference in their testimony.⁴⁵ The use of enlarged photographs to reveal sameness and difference through intricate patterns and minutiae was a technique that other forms of experts had used in the past, especially experts in handwriting identification evidence.⁴⁶ Document experts routinely presented juries with blown-up images of signatures, carefully marked for the expert to guide the jury through a lesson on handwriting identification. These experts were self-conscious about the fact that their visual evidence practically spoke for itself; the goal was to have visual exemplars that

⁴³ *Id.* at 291.

⁴⁴ *People v. Sallow*, 100 Misc. 447, 165 N.Y.S. 915 (N.Y.C. Gen. Sess. N.Y. County 1917).

⁴⁵ Interestingly, Simon Cole reports that some present-day fingerprint examiners now use a generic chart of two matching fingerprints in place of the actual prints at issue in the case. See Simon Cole, *Witnessing Identification: Latent Fingerprinting Evidence and Expert Knowledge*, 28 SOC. STUD. SCI. 687, 692 (1998) [hereinafter Cole, *Witnessing Identification*].

⁴⁶ On the history of handwriting identification evidence, see Jennifer L. Mnookin, *Scripting Expertise: Handwriting Identification Evidence and the Judicial Construction of Reliability*, ___ VA. L. REV. ___ (forthcoming 2001).

made the expert's conclusion seem positively self-evident. Fingerprint experts saw that the use of visual depictions of fingerprints could be a powerful rhetorical strategy, and they were right.

D. *A Language of Fact, Not Opinion*

From its earliest uses as legal evidence, fingerprint identification was generally presented in the language of certainty, rather than in the language of opinion. Pudd'nhead does not simply say that he believes he knows whose prints are on the knife. It's not simply his opinion; it's a fact, a natural truth, indisputable and certain. The typical, though not exclusive, practice in the late nineteenth century was for experts to testify as to their opinion.⁴⁷ But from the very beginning, fingerprint examiners resisted this norm. In *Jennings*, for example, one of the grounds upon which the defendant claimed error on appeal was that the experts failed to qualify their judgments as mere opinion, but rather testified "that the two sets of prints were made by the fingers of the same person."⁴⁸ The appellant complained that failing to testify in the form of an opinion was improper and constituted error, but the court disagreed, holding:

While it is usual for expert witnesses to testify that they believe or think, or in their best judgment, that such and such a thing is true, no rule of law prevents them from testifying positively on such subjects. It is for the jury to determine the weight to be given to their testimony.⁴⁹

Speaking in the language of certainty—rather than the language of possibility or probability—became the standard operating procedure for fingerprint identification evidence. One of the hallmarks of fingerprint identification evidence is the now-institutionalized reluctance of fingerprint examiners to testify in the language of probability. According to the norms of the professional community, identifications must be certain and absolute, or they must not be made at all. In fact, the

⁴⁷ 2 WIGMORE, EVIDENCE §§ 1218-1919 (1904).

⁴⁸ *Jennings*, 96 N.E. at 1077.

⁴⁹ *Id.*

primary professional organization for fingerprint examiners, the International Association for Identification, passed a resolution in 1979 making it professional misconduct for any fingerprint examiner to provide courtroom testimony that labeled a match "possible, probable or likely" rather than "certain."⁵⁰

This emphasis on certainty was aided by the visual strategies the experts used. To whatever extent the fingerprints spoke for themselves, the expert could make it seem that he or she was just reporting the facts. He could present himself as a spokesperson for nature rather than an interpreter of evidence. Note, for example, how one fingerprint examiner describes the technique and its power:

This science must not be confused with "palmistry," that pretended art by which the charlatan and faker for a consideration pretends that he can foretell future events. Nor is it to be confounded with the operations of the Handwriting Expert, who is only able at the best to give an opinion as the possibility of two writings having been made by the same person. It has no connection with the Bertillon System of identification, which depends upon measurements taken from certain members and portions of the human body, relying especially upon the length of certain bones.

Any or all of these methods are subject to error, and there is always an element of doubt in their findings that make their conclusions unreliable. Two experts in any or all of these methods, can and do disagree because their conclusions are based entirely upon possibilities. The finger-print expert has only facts to consider; he reports simply what he finds. The lines of identification are either there or they are absent. If two prints are identical in every particular, they were made by the same person. If they are different, they were not made by the same person.

No matter how many finger print experts may be engaged in the labor of comparing two prints, their verdict must be the same.⁵¹

Very occasionally, courts resisted fingerprint examiners' insistence upon speaking in a language of certainty rather than probability. While the court recognized in a 1930 case

⁵⁰ Resolution VII, 29 Identification News (Aug. 1979). The next year the resolution was amended to make it clear that it applied only to examiners who made a probabilistic identification on their own initiative (rather than, say, under threat of a contempt citation). See Resolution VII Amended, Identification News 3 (Aug. 1980).

⁵¹ *Fingerprint Testimony in Court*, *supra* note 40, at 22.

that fingerprint evidence was generally admissible, it balked at the experts' testimony because it was not in the form of an opinion. The experts testified

to the ultimate fact that the finger prints on the broken pieces of glass were the finger prints of the appellant . . . It is to be noticed that the expert witnesses were not asked to express an opinion on the subject. . . . [W]e are not disposed to change the rule which has been established in this court for many years to the effect that while an expert may be permitted to express his opinion, or even his belief, he cannot⁵² testify as to the ultimate fact that must be determined by the jury.

The case provoked an outraged dissent, arguing first that whether the fingerprints matched was not the ultimate fact in the case, but rather, whether the defendant was guilty of the crime charged. In addition,

[f]inger printing is based on the law of nature, or upon a universally recognized physical fact. All authorities on the subject recognize that the finger prints of no two persons are the same. In all the thousands of finger prints now in the repositories of the United States Army, United States Navy, insurance companies, or in the bureaus of investigation of every city throughout the entire world, there has never been found the finger prints of any two persons exactly the same. . . . Finger printing is a science. Finger prints are subject to classification. Finger prints are universally recognized as a means of identification throughout the world.⁵³

The opinion in this case was very unusual, the perspective of the dissent far more the norm. Generally, fingerprint examiners were allowed to testify about identity as if it were fact, not opinion.

Overall, what we see in the early history of fingerprinting is enormously rapid acceptance by courts without a great deal of careful scrutiny. Sometimes experts would show their own prowess and the power of fingerprint identification by offering in-court experiments, where the juries could witness firsthand the miracles of fingerprinting. The use of visual representations of the fingerprints themselves, carefully marked to emphasize the points of similarity, was

⁵² *State v. Steffen*, 230 N.W. 536, 538 (Iowa, 1930).

⁵³ *Id.* at 539-40 (DeGraff, J., dissenting).

part and parcel of the presentation of fingerprint evidence in court. Finally, from the earliest use of fingerprinting, experts attempted to distinguish their knowledge from other forms of expert testimony, by declaring that they offered not opinion but fact, not probability but certainty—and notwithstanding the occasional exception, courts permitted them to testify in this way.

II. UNDERSTANDING FINGERPRINTING'S EASY ACCEPTANCE

This history of fingerprinting as legal evidence raises an obvious question: why was fingerprinting so readily accepted by courts? We have seen that judges were willing, even eager, to declare fingerprinting admissible; why is it that they did not subject the new identification technique to more scrutiny?

Law professor Michael Saks has addressed this question in a recent article on the history of forensic science.⁵⁴ Saks argues that early twentieth century courts simply were not in the habit of scrutinizing scientific evidence, relying mostly on an informal, and implicit, “marketplace test” in which those who succeeded in making a living from their expertise presumably had sufficient expertise to testify in court.⁵⁵ Courts’ nonchalant acceptance of fingerprinting, Saks argues, stemmed from their failure to recognize that fingerprinting had no external commercial marketplace, and ought therefore to be subject to more serious scrutiny.⁵⁶ Moreover, the judicial habit of relying on precedent created a snowballing effect: once a number of courts accepted fingerprinting as evidence, later courts simply followed their lead rather than investigating the merits of the technique for themselves.⁵⁷

⁵⁴ Michael J. Saks, *Merlin and Solomon: Lessons from the Law's Formative Encounters with Forensic Identification Science*, 49 HASTINGS L.J. 1069 (1998).

⁵⁵ *Id.*; see generally David L. Faigman et al., *Check Your Crystal Ball at the Courthouse Door, Please: Exploring the Past, Understanding the Present and Worrying about the Future of Scientific Evidence*, 15 CARDOZO L. REV. 1799 (1994) (providing a more detailed description of the “commercial marketplace test”).

⁵⁶ Saks, *supra* note 54 at 1104.

⁵⁷ *Id.* at 1105.

As far as it goes, Saks' explanation is certainly correct. In the early twentieth century, there was no doctrinally mandated gatekeeping approach to expert evidence like those that apply today, whether the *Daubert v. Merrell Dow Pharmaceuticals* test of reliability and validity,⁵⁸ or the *Frye v. United States* test of general acceptance⁵⁹ in the relevant scientific community. There was no clearly defined standard for how "expert" an expert had to be; determining expertise was thought to be a concrete matter, determined case-by-case, depending on the "fitness of the individual witness, as shown by the circumstances of his experience."⁶⁰ Moreover, the determination of both the qualifications of the particular expert and the admissibility of the expert's testimony were generally thought to be within the trial judge's discretion, reviewable either not at all or only for abuse of discretion.⁶¹ But even though there were not clearly articulated rules for determining the admissibility of expert evidence, we should not believe that courts allowed all forms of expert testimony.⁶² We still need some further explanation for why courts felt no need to scrutinize fingerprinting with any care. I will offer three further explanations, none of them fully satisfying on its own, but in combination can help to explain why fingerprinting became accepted, routinized, and even deemed infallible without much careful scrutiny by judges.

First, fingerprinting and its claims that individual distinctiveness was marked on the tips of the fingers had inherent cultural plausibility. The notion that identity and even character could be read from the physical body was widely shared, both in popular culture and in certain more professional and scientific arenas as well. Berthillonage, for example, the measurement system widely used by police departments across the globe, was based on the notion that if people's bodies were measured carefully, they inevitably

⁵⁸ *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993).

⁵⁹ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

⁶⁰ 2 WIGMORE, EVIDENCE § 560 (1904).

⁶¹ See *id.* at § 561. Of course, according to *G.E. v. Joiner*, 522 U.S. 136 (1977), the standard of review for determinations of admissibility of expert evidence remains abuse of discretion.

⁶² For a case study of a form of expert testimony that only gradually came to be accepted by courts, see Mnookin, *supra* note 46.

differed one from the other. Similarly, Lombrosion criminology and criminal anthropology, influential around the turn of the century, had, as its basic tenet, that born criminals differed from normal, law-abiding citizens in physically identifiable ways.⁶³ Many thought that criminality could be located by taking pictures and making measurements. For example, eugenicist Francis Galton, one of the developers of an early fingerprint classification system, believed composite photographs of criminals could reveal the existence of criminal archetypes.⁶⁴

More generally, the very belief in nature's infinite variety meant that just as every person was different, just as every snowflake was unique, every fingerprint must be distinctive too, if it were only examined in sufficient detail. Individual distinctiveness was taken for granted, and it was further believed that this distinctiveness was inevitably marked upon the human body if one only knew where to look. The idea that upon the tips of fingers were minute patterns, fixed from birth and unique to the carrier made cultural sense; it fit with the order of things. It was, to borrow Jack Balkin's phrase, a cultural meme, one destined to flourish and spread.⁶⁵

One could argue, from the vantage point of one hundred years of experience, that the reason fingerprinting seemed so plausible at the time was because its claims were true, rather than because it fit within a particular cultural paradigm or ideology. But this would be the worst form of Whig history. Many of the other circulating beliefs of the period, such as, for example, criminal anthropology, are now quite discredited. The reason fingerprinting was not subject to scrutiny by judges was not because it obviously "worked." In fact, as discussed below, it may have become obvious that it worked in part precisely because it was not subject to careful scrutiny.

The second reason fingerprinting was easily assimilated as legal evidence was, quite simply, because it was visible. As mentioned earlier, fingerprints turned jurors into virtual witnesses who could peer upon the prints and see the swirls

⁶³ See, e.g., NICOLE HAHN RAFTER, *CREATING BORN CRIMINALS* 110-112 (1997).

⁶⁴ ALLAN SEKULA, *THE BODY AND THE ARCHIVE* 39 (1986).

⁶⁵ On the notion of cultural memes, see JACK BALKIN, *CULTURAL SOFTWARE* (1998).

and whois for themselves. They could even peer down at their own fingertips for comparison. Just as this visibility of the evidence offered a way of persuading juries of the identity of two prints, it also offered a way of persuading judges of the legitimacy of the technique. All jurors and judges had to do was believe the evidence of their own eyes. Although learning to see a match required skill and judgment, experts used enlarged images with the similarities between prints carefully numbered, to help the jurors see the identification firsthand.

Given that matches were so visible, that they could be brought into focus before the court and jury, it is not surprising that judges failed to take the step from noticing a match to asking difficult interpretive questions about the meaning of a match. In fact, for non-scientific evidence of identity, judges did not (and still do not) require evidence about base rates as a prerequisite to admissibility. If someone testifies that the perpetrator had a mole, or was wearing a green shirt, or walked with a golden cane, we require no evidence of just how often people have moles or wear green shirts or carry canes in order to allow the testimony. We can, perhaps, distinguish between these forms of ordinary identity evidence and fingerprinting by suggesting that we do not need evidence about base rates because jurors have some intuition, as part of their everyday common sense, about how often people have any of these traits. But how much faith can we have that these juror intuitions are accurate? In fact, these forms of lay identity evidence raise both of the same potential problems as fingerprinting: observation errors and errors in evaluating the frequency of occurrence. That is, a lay observer might think the perpetrators of some crime were an interracial couple (and hence that they "match" the characteristics of the interracial couple charged with the crime) when in fact they were not. Or the factfinder might, upon hearing the witness' testimony, misestimate the frequency of interracial couples.⁶⁶ Similarly, with fingerprinting, there are potential problems resulting from both mistaken evaluations of whether a match exists and

⁶⁶ I draw this example, obviously, from the now-classic opinion in *People v. Collins*, 438 P.2d 33 (Cal. 1968), a leading case on the dangers of statistical evidence. See generally Lawrence Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HARV. L. REV. 1329 (1971) (describing problems with the legal use of statistical evidence).

from inadequate knowledge of the likelihood that someone other than the defendant might also match. With lay identity evidence, these concerns are generally understood to go to the weight of the evidence rather than its admissibility.

My point in illustrating the similarity between the limits of what was understood about fingerprinting and the problems of lay identity evidence is that judges could have understandably believed, based on the early examiners' thousands of datapoints, that even if fingerprinting was not perfect, it offered better proof of identity than lay identification testimony. To be fair, this argument is a bit disingenuous; there is little evidence that early judges even noticed the problems with defining and interpreting fingerprint matches, much less chose to dismiss them as insignificant or as affecting weight rather than admissibility. However, in *People v. Roach*,⁶⁷ the judge did offer this kind of logic:

The fact that error may sometimes result in effecting identification by this means affords no reason for the exclusion of such evidence. Mistakes may also occur in effecting identification by personal appearance, casual meeting, by handwriting, or by one's voice heard in the dark or over the telephone, but evidence of this character is admissible and its weight is to be determined by the jury.⁶⁸

Generally, however, fingerprint experts claimed to offer *certain* knowledge, facts rather than opinions, incontestable proof of identity rather than a shared characteristic that suggested identity. If fingerprinting had not made such strong claims for its own authority, the judicial acceptance without scrutiny, by analogy to other forms of identification evidence, would have made more sense. But this insistence that fingerprinting was fundamentally different because it was infallible ought to have invited judges to demand additional proof of its infallibility. It was, in part, the dazzling visual power of the fingerprint match that blinded judges to the need to ask difficult questions about a match's meaning.

⁶⁷ 215 N.Y. 592, 109 N.E. 618 (1915).

⁶⁸ *Id.* at 605, 109 N.E. at 623.

Moreover—and this is the third explanation for fingerprinting's rapid assimilation into legal evidence—the strong claim of certain, incontestable knowledge made fingerprinting especially appealing, not only to prosecutors but to judges as well. There was an especially powerful fit between fingerprinting and what the legal system wanted science to provide. As I argue elsewhere, in the late nineteenth century, legal commentators and judges saw in expert testimony the potential for a particularly authoritative mode of evidence, a kind of knowledge that could have been and should have been far superior to that of mere eyewitnesses, whose weaknesses and limitations were beginning to be better understood.⁶⁹

Courtroom observers and judges aspired to have “the light of scientific truth,” as one writer described it, shine directly into the courtroom.⁷⁰ Legal writers hoped that science, with its privileged access to the natural world, could provide certainty and objectivity. As one commentator colorfully asserted, the ideal expert evidence would occupy “an exalted and honorable throne in the realm of truth,” for his “recognized and enlightened conclusions [would be] as much a matter of fact as the law of gravitation and the motion of heavenly bodies.”⁷¹ Judges and legal commentators were in search of methods for making authoritative judgments, trustworthy and credible mechanisms by which the jury could determine facts. The holy grail was evidence that could simultaneously be definite and dispositive, a way to find the truth beneath the contradictions of witnesses.

Expert evidence held out the promise of offering such a superior method of proof, rigorous, disinterested, and objective. But in practice, scientific evidence almost never lived up to these hopes. Instead, at the turn of the century, as one lawyer griped, the testimony of experts had become “the subject of everybody's sneer and the object of everybody's derision. It has become a newspaper jest. The public has no confidence in expert testimony.”⁷² Experts perpetually disagreed. Too often,

⁶⁹ Jennifer L. Mnookin, *Images of Evidence*, (1999) (unpublished Ph.D. dissertation, M.I.T.) (on file in M.I.T. Library and with the author).

⁷⁰ *Poore's Reply to Kinney*, 4 AM. LAW. 204, 204 (1896).

⁷¹ H.C. White, *The Medical Expert*, 3 CASE W. RES. L. REV. 27, 27-28 (1897).

⁷² Henry Wollman, *Physicians-Expert Witnesses. Some Reforms*, 17 MEDICO-LEGAL J. 20, 20 (1899).

experts were quacks or partisans, and even when they were respected members of their profession, their evidence turned out to be inconsistent and conflicting. Nineteenth century judges and commentators were frustrated and disillusioned by the actual use of expert evidence in court, and often said so in their opinions. As one judge wrote in 1899,

It seems that if a person is called as a witness to support one side of a controversy by [expert] opinion evidence, he is quite likely to espouse such side with all the zeal of blind partisanship . . . inducing a mental condition of entire incapability of giving an independent, impartial opinion, and capability only of acting in the line which the interest of the one side suggests, with as much certainty as the hypnotized follows the mental suggestion of the hypnotizer.⁷³

Even if experts did not become zealous partisans, the very fact of disagreement was a problem. It forced juries to choose between competing experts, even though the central justification for using expert testimony was that the jury lacked the expertise to make its own determination. Learned Hand bemoaned this problem in an article on expert testimony in 1901.

The trouble, is that it is setting the jury to decide, where doctors disagree. The whole object of the expert is to tell the jury, not facts, as we have seen, but general truths derived from his specialized experience. But how can the jury judge between two statements each founded upon an experience confessedly foreign in kind to their own? It is just because they are incompetent for such a task that the expert is necessary at all. . . . What hope have the jury, or any other layman, of a rational decision between two such conflicting statements each based upon such experience.⁷⁴

⁷³ *Baxter v. Chicago & N.W. Ry. Co.*, 80 N.W. 644, 653 (Wis. 1899); see also Arthur J. Eddy, *What Reforms in the Nature of Expert Testimony are Advisable*, 58 ALB. L.J. 251, 251 (1898) (noting "It is amazing the number of hard things which the courts of last resort have said about expert testimony; a volume quite as large as the Illinois Statutes could be compiled of condemnatory phrases and languages."). See also E.E.S. Wood, *Medical Testimony*, 7 AM. LAW. 92, 94 (1899).

⁷⁴ Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 54-55 (1901). For a recent version of this criticism about present-day expert testimony, see Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535 (1998).

Instead of shining the great light of science into the courtroom, expert evidence at the turn of the century was deemed, in practice, to be an embarrassing spectacle, reflecting badly on science and law alike.

In this context, fingerprinting seemed to offer something astonishing. Fingerprinting—unlike the evidence of physicians, chemists, handwriting experts, surveyors or engineers—seemed to offer the kind of solid, indisputable evidence that was hoped for from science. Writers on fingerprinting routinely emphasized that fingerprint identification could not be erroneous, or that its results were both consistent and certain. Unlike so much other expert evidence, which could be and generally was disputed by other qualified experts, fingerprint examiners seemed always to agree. Generally, the defendants in fingerprinting cases did not offer fingerprint experts of their own. Because no one challenged in court either fingerprinting's theoretical foundations or, for the most part, its actual operation in any particular instance, the technique came to seem especially powerful. Fingerprinting therefore offered precisely the kind of scientific certainty that judges and commentators, weary of the perpetual battles of the experts, yearned for.

Fingerprinting gained tremendous authority from the claim that a match could not be made erroneously. Initial challenges to this claim only resulted in increasing fingerprinting's clout. For example, an article published in 1911 told the story of a man who was charged with loitering with an intent to commit a felony, and whose fingerprints were introduced at the trial to prove he was a recidivist; his prints had been taken at the time of his last conviction. But the defendant claimed he was not the same person whose fingerprints were shown, and had papers indicating that he was in the army at the time of conviction. This was quite a shock: "This event was naturally disconcerting, for identification by finger-prints had been regarded as infallible; and many declared (and not without reason) that this single failure should discredit the whole system."⁷⁵ But the belief in the infallibility of fingerprinting survived the ordeal: it turned

⁷⁵ James W. Garner, *Infallibility of Finger-Print Evidence*, 11 J. CRIM. L. & CRIMINOLOGY 275 (1911).

out that the army papers had been stolen. The message was clear: if the fingerprints contradicted other evidence in a case, the other evidence must be erroneous.

That fingerprints could provide certain, definite matches was not contested in court. In the early trials in which fingerprints were introduced, defendants argued that fingerprinting was not a legitimate form of evidence, but typically defendants did not introduce fingerprint experts of their own.⁷⁶ Fingerprinting somehow avoided the spectacle of clashing, competing experts whose contradictory testimony befuddled jurors and frustrated judges. Instead, the evidence that a defendant's fingerprints matched those found at the scene of a crime was typically uncontested.

And because it was uncontested, fingerprint evidence came to be seen as uncontestable. Fingerprinting grew to have cultural authority that far surpassed that of any other forensic science. It came to be seen as an especially powerful, especially compelling form of evidence, one that simply could not be challenged as erroneous.⁷⁷ Because the reliability of fingerprinting was not challenged in court, it came to have a great deal of epistemological authority—both within the courtroom *and* outside it. That fingerprinting is generally viewed as a tremendously reliable technique hardly needs to be established—it is common knowledge, almost beyond dispute.

To give just a limited sense of the extent to which fingerprint identification has been seen as certain and infallible, consider just two examples. First, Simon Cole details how, in 1992, investigators uncovered widespread fingerprint fabrication by New York State policemen, forty cases over eight years. Many of the fabrications were amateurish and would

⁷⁶ For one partial exception, see *Johnson v. State*, 249 S.W. 1056 (Tex. 1923), a murder case in which an expert testified for the prosecution that there was insufficient basis to compare bloody handmarks on the axe to those of the defendant. In a motion for new a trial, appellant attached the affidavit of a fingerprint expert, who said that the marks on the axe did not match either the defendant or his alleged co-conspirator. The appellate court denied the motion, on the grounds that the expert's opinion was not newly discovered evidence; it is, however, an instance of a defendant offering the expert opinion of a fingerprint examiner in his own behalf, albeit too late.

⁷⁷ Defendants could challenge fingerprint evidence in other ways: they could argue that their presence at the scene of the crime did not prove that they were the perpetrator; they could argue that they were framed and their fingerprints planted so as to incriminate them falsely, and so forth. But it was not viewed as credible to argue that the fingerprints declared to be a match were not, in fact, a match.

have been easily detected upon careful inspection, but not a single one was challenged by the defense. As Cole writes,

the scandal revealed the extent of the trust extended to fingerprint examiners, how little defense attorneys scrutinize fingerprint evidence, and how rare is the retention of an expert by the defense. In their confessions, the troopers themselves acknowledged that they chose to fabricate fingerprint evidence because they knew it would go unquestioned, because it was so thoroughly trusted.⁷⁸

Second, when DNA identification methods were first used, their inventors called the new technique "DNA fingerprinting," purposefully attempting to piggyback on the tremendous power that fingerprinting was known to have.⁷⁹ We thus see that fingerprinting's easy acceptance resulted, in part, from the fact that it seemed to offer a genuine version of the idealized vision of scientific evidence: certain, secure knowledge of identity, free of embarrassing disagreements between so-called experts. To quote again from the expert mentioned earlier, "No matter how many finger print experts may be engaged in the labor of comparing two prints, their verdict must be the same."⁸⁰

This leads to an ancillary question: why *weren't* there disputes among fingerprint examiners? Why didn't fingerprinting follow the pattern of nearly every other form of expertise used in the courtroom, in which competing experts often sharply disagreed? Simon Cole takes up this question, and his answer is quite suggestive: he emphasizes the professional culture and shared norms of fingerprint examiners. Fingerprint examiners created norms of identification that were so conservative that they precluded disagreement. Very rapidly, he argues, fingerprint examiners recognized that the way to maintain their authority was to maintain unanimity, and the way to maintain unanimity was

⁷⁸ COLE, *supra* note 12, at 274-81.

⁷⁹ One early DNA profiling case criticized the term for exactly this reason: "We elect not to use the descriptive phrase 'DNA fingerprinting' because . . . the word fingerprinting tends to suggest erroneously that DNA testing of the type involved in this case will identify conclusively, like real fingerprinting, the one person in the world who could have left the identifying evidence at the crime scene." *Commonwealth v. Curnin*, 565 N.E.2d 440, 441 n.2 (Mass. 1991).

⁸⁰ *Finger-Print Testimony in Court*, *supra* note 40, at 22.

to allow only conservative interpretations of a match.⁸¹ Therefore, fingerprint examiners were only supposed to declare a match if they were entirely certain about it.

Moreover, they did not simply have to be certain themselves; they also had to believe that every other qualified fingerprint examiner would agree with them. They were supposed to gain actual confirmation from colleagues, or at a minimum, imagine another qualified fingerprint examiner looking over their shoulder, and declare a match only if they were confident this real or virtual examiner would agree with them.⁸² When they had any doubt, experts were to refrain from making an identification, declaring only that the prints were "inconclusive." To the extent that examiners' conclusions truly were this conservative, it meant that any time a print examiner declared a match, there simply *was* no one who would disagree—by definition, every qualified examiner would also find that the prints in question matched. The examiners thereby policed their own conclusions, and through such effective self-policing, guaranteed that there was no one who could challenge their matches in court.⁸³

Cole's explanation is fascinating, but not fully explanatory. The power of these norms is clear, but how did they emerge, and just how widespread did they become? Even if fingerprinting had more cultural authority because of this conservative approach to determining matches, and hence fingerprint examiners were better off on average, how did these conservative norms come into being in the first place? Without any central, official organization of fingerprint experts, how did experts overcome the typical collective action problems that would make such norms hard to instantiate? And even if these norms were widespread, why didn't individual fingerprint experts opt out, recognizing that they might be able to profit from a willingness to make an identification that others were reluctant to make? There might have been reputational costs to challenging these norms, but we might have expected some experts to be willing to increase business even at some

⁸¹ Cole, *Witnessing Identification*, *supra* note 45.

⁸² *Id.*

⁸³ *Id.*

potential cost to their reputation.⁸⁴ Given that there was no mechanism by which to enforce the fingerprint examiners' norms apart from potential reputational sanctions, why didn't some experts violate the norms? Why weren't there experts willing to rely on fewer points of identification, or to explain away a seeming divergence between prints as an artifact? Perhaps most significantly, why weren't there defense experts in fingerprinting?

Part of the answer must be that the early experts worked for the police, typically emerging from the police bureaus of identification, and hence were naturally allied with the prosecution. But this cannot be a fully satisfactory explanation, for some fingerprint experts could have broken ranks and gone into business for themselves. Yet another part of the explanation may lie in the kinds of cases in which fingerprints were used: many of the early cases involving fingerprinting were robberies and murders. Perhaps defendants in these cases did not generally have the means to pay for experts of their own. This too, cannot be a complete explanation, for even if the average defendant could not afford to challenge the fingerprint evidence introduced against him, surely there would have been a number of well-endowed defendants who could.

Another part of the answer may simply lie in just how quickly fingerprinting came to be seen as authoritative: once fingerprinting was generally viewed as incontestable, why waste time trying to challenge it? If fingerprinting was seen to be, as one judge put it, "a law of nature" and "a universally recognized physical fact,"⁸⁵ for a defense attorney to spend time and effort attempting to challenge it would perhaps have been seen as quixotic, nothing more than tilting at windmills. This explanation, though it verges on the tautological, may also be the most persuasive. Fingerprint evidence was accepted so quickly and so thoroughly that reasonable people, even reasonable defendants and reasonable defense attorneys, simply thought it was beyond dispute. For whatever

⁸⁴ Look, for example, at expert evidence in general: many well-qualified experts have been willing to say things in court that might not pass muster with their colleagues.

⁸⁵ *Steffen*, 230 N.W. at 539 (DeGraff, J., dissenting).

combination of reasons—the norms of the fingerprint community, the experts' ties to the prosecution and the apparatus of the state, the great cultural authority of fingerprinting, defendants' resources and their attorneys' expectations—defense experts in fingerprinting simply did not emerge in the early history of fingerprinting evidence.

Although some present-day defendants do retain a fingerprint expert of their own, what is striking, even astonishing, is that no serious effort to challenge either the weight or admissibility of fingerprint evidence ever emerged—until 1999.⁸⁶ One consequence of DNA profiling and its admissibility into court is that it has opened the door to challenging fingerprinting. Some of the limitations on fingerprinting research became more obvious and more visible only after DNA profiling was subjected to a series of legal challenges. Such challenges prompted additional research into population genetics and the statistical foundation of a match probability and led to increased specificity in defining precisely how to determine when two DNA profiles “matched.”⁸⁷

III. LESSONS FROM THE PAST

We have thus seen that fingerprinting became established and believed without rigorous testing of its claims. Now, it is easy to tell a just-so story about this history, a story that would make it relatively unimportant for modern-day analysts of expert evidence. We could say that nineteenth century judges did not scrutinize fingerprinting (or other forensic sciences) carefully; luckily for all of us, in the case of fingerprinting, their instincts were right. Therefore, we need not worry about our predecessors' failure to test fingerprinting evidence, first because fingerprint identification evidence turns out to work just fine, and second because now we *do* scrutinize expert evidence with greater care by requiring that its proponent show that it is generally accepted⁸⁸ or scientifically

⁸⁶ The first *Daubert* challenge to fingerprinting was *U.S. v. Mitchell*, No. 96-407 (E.D. Pa. 1999).

⁸⁷ See *infra* Part III.B.

⁸⁸ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923). General acceptance is the touchstone of the *Frye* test, based on a 1923 case involving an early version of the

reliable⁸⁹ before deeming it admissible. Therefore, we present-day interlocutors of evidence need not see any warnings that apply to us in this history. We can see the origins of fingerprint evidence as offering nothing more than a confirmation of our greater sophistication about science. We can largely dismiss the turn-of-the-century history of fingerprinting as simply an illustration of the problems of another era.

But this story, intuitively appealing as it may be, is not as obvious as it appears. Perhaps surprisingly, if we look at the earliest history of DNA profiling, we can see some striking similarities to the judicial response to fingerprinting. DNA profiling has spurred an enormous amount of legal commentary; I am not attempting to provide a complete or detailed history of its use. Instead, I will focus on two of the earliest opinions admitting DNA profiling to show that some of the very first judges who confronted the technique tended to admit it with limited scrutiny.

A. *The Initial Judicial Response to DNA Evidence*

Let us take as a starting point the first appellate criminal case in which the admissibility of DNA evidence was challenged: *State v. Andrews*.⁹⁰

First, just as the early fingerprint cases relied primarily on the testimony of police identification experts—hardly impartial assessors of fingerprinting!—the prosecution in this case relied substantially on the testimony of forensic scientists who worked at Lifecodes, the company whose DNA identification tests were at issue in the case.⁹¹ When the appellant objected to these witnesses as having “a built-in bias

lie detector. Although not terribly influential at the time, the *Frye* test—whether a novel form of evidence was generally accepted in the relevant scientific community—became the dominant test for examining the admissibility of expert evidence in the 1970s and 1980s.

⁸⁹ Requiring a showing of scientific reliability through a variety of criteria is the approach taken by *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993), the Supreme Court's 1993 ruling on the question of how to determine the admissibility of expert evidence.

⁹⁰ 533 So. 2d 841 (Fla. 1988).

⁹¹ To be sure, the prosecution did also introduce the evidence of one academic expert, a molecular geneticist, but this expert seems to have testified primarily on the general (and uncontroversial) principles underlying DNA sequencing. *Id.* at 849 n.9.

because their reputations and careers are based on DNA comparison work," the court dismissed their concern, saying: "Neither *Frye* nor our evidence code require impartiality. . . Further, the point would not appear substantial here given that . . . DNA comparison work has a number of uses in fields other than forensic medicine such as diagnosis and treatment of disease."⁹²

While the court is surely correct that the testimony of interested experts should not be dismissed out-of-hand, there might be a legitimate concern that experts with a professional and financial stake in the admissibility of a novel technique are not well positioned to assess its merits objectively. In addition, the court's blasé assumption that because DNA comparison had been widely used in other fields, it need not be concerned with the experts' biases, seems, at a minimum, problematic. Just as in the early fingerprinting cases, when courts failed to recognize important differences between the forensic and criminal identification uses of the technique, the *Andrews* court draws excessive comfort from the fact that DNA comparison is used for non-forensic purposes as well. In addition, if the court had taken seriously the *Frye* test, which requires a technique to be "generally accepted" by the relevant expert community,⁹³ it would have been difficult to admit DNA profiling so quickly. As of 1988, the community that "generally accepted" the particular protocols and procedures for forensic identification used by companies like Lifecodes were the scientists at Lifecodes itself. The procedures and protocols had, in fact, been subjected to very little outside scrutiny.⁹⁴

To be sure, the use of DNA profiling for paternity testing, medical diagnosis, and genetic testing did provide support for the notion that the principles underlying the test were already generally accepted. But it told the court nothing about the distinctive problems of using the test for forensic identification. For example, forensic samples may be limited in quantity because they are drawn from traces of biological material left at the crime scene; in other settings, the

⁹² *Id.*

⁹³ *Frye*, 293 F. at 1014.

⁹⁴ William C. Thompson & Simon Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*, 75 VA. L. REV. 45, 56 (1989).

necessary genetic material can be taken directly from the test subject in whatever quantity is needed. Similarly, crime scene samples may be aged, deteriorated, or contaminated with other substances or even with blood other than that of the perpetrator's, and any of these could plausibly have effects on the accuracy of testing.⁹⁵

Moreover, as William Thompson and Simon Ford pointed out in an important early article assessing the new technique, the acceptable error rate might be quite different in a research laboratory than in a forensic setting where someone's liberty is at stake.⁹⁶ Because the court was impressed that DNA has had "extensive nonjudicial use," it did not examine the ways in which *judicial* use might raise new questions and problems. Just as the use of fingerprinting for identifying criminal recidivists provided a powerful rhetorical justification for its use as legal evidence, notwithstanding the important differences between the two spheres, the use of DNA profiling for nonjudicial purposes blinded the earliest judges to certain key questions about its use as legal evidence. The divide between general and well-accepted principles and the practical application for forensic identification was not confronted.

Moreover, like the early judges in the fingerprinting cases, the judge in *Andrews* seems to have been influenced by a general belief in the uniqueness of human characteristics. But to move from this general belief that everyone's DNA, taken in its entirety, is distinctive, to the belief that unique identification can emerge from a set of particular genetic probes, requires several leaps. First, there must be proof that the sections of DNA examined by the probes are truly polymorphic—that is to say that in these regions of the DNA (known as "junk DNA"), there is in fact high variability among individuals. Although when *Andrews* was decided, there was research showing the existence of polymorphic portions of

⁹⁵ *Id.* at 56.

⁹⁶ *Id.* at 56-57 ("Research scientists can tolerate relatively high rates of error and unreliability in their procedures. Scientific experiments which produce a finding of interest are usually repeated. . . . The situation in a forensic laboratory is quite different. Tests are often not repeated. . . . The most dangerous errors, those which falsely incriminate someone on whom suspicion has already focused, are likely to go unchallenged.").

DNA, little was known about the polymorphism of the specific probes used in DNA typing. The limited research that had been done had been conducted by Lifecodes itself, which obviously had a large stake in the findings.⁹⁷ Moreover, when courts were beginning to declare the first kind of DNA typing used in court (restriction fragment length polymorphisms, or RFLP), little research had been completed on either the relevant population genetics or the extent to which polymorphism might vary across population subgroups.⁹⁸ Nor was there substantial proof that the various probes produced results that were statistically independent. But the *Andrews* court raised none of these concerns.

In fairness to the *Andrews* court, the defense at trial had introduced no experts of its own, so part of the problem was that the defense failed to educate either the trial judge or the appellate bench about the difficult questions raised by the new technology. Perhaps this lapse can explain the lack of scrutiny. The trial judge heard from impressive-sounding prosecution experts about an impressive-sounding technique, while the opposing party attacked the novel technique only through cross-examination, and perhaps itself failed to understand the most difficult questions raised by the new identification method. Note that this failure to introduce defense experts, shared in a number of the earliest cases on DNA, marks another similarity with the early fingerprint cases.⁹⁹

However, in the case of DNA profiling, defendants soon offered their own experts to challenge the new technique. In *People v. Wesley*, for example, an extensive and "sharply contested" hearing was held on the question of DNA typing's admissibility, producing a transcript over one thousand pages long.¹⁰⁰ Although in this case the trial judge wrote a lengthy opinion that took seriously the defense's concerns about the

⁹⁷ *Id.* at 72.

⁹⁸ This later became a very significant issue in assessing DNA profiling. See, e.g., Richard C. Lewontin & Daniel L. Hartl, *Population Genetics in Forensic DNA Typing*, 254 SCI. 1745 (1991).

⁹⁹ For other DNA profiling cases in which defendants did not introduce expert evidence on the topic, see, e.g., *People v. Huang*, 154 A.D.2d 706, 707, 546 N.Y.S.2d 901, 902 (2d Dep't 1989); *Spencer v. Commonwealth*, 384 S.E.2d 775, 782 (Va. 1989); *Commonwealth v. Rodgers*, 605 A.2d 1228 (Pa. Super. Ct. 1992).

¹⁰⁰ *People v. Wesley*, 140 Misc.2d 306, 533 N.Y.S. 2d 643 (N.Y. Co.Ct. 1988).

new technique, we can still see some striking similarities between the court's approach to DNA profiling and the response of judges to fingerprinting nearly a century earlier.

First, the court's enthusiasm about the potential for the new technology almost seems to overwhelm its objectivity. Judge Harris writes:

[I]f DNA Fingerprinting proves acceptable in criminal courts, [it] will revolutionize the administration of criminal justice. Where applicable, it would reduce to insignificance the standard alibi defense. In the area of eyewitness testimony, which has been claimed to be responsible for more miscarriages of justice than any other type of evidence, again, where applicable, DNA Fingerprinting would tend to reduce the importance of eyewitness testimony. And in the area of clogged calendars and the conservation of judicial resources, DNA Fingerprinting, if accepted, will revolutionize the disposition of criminal cases. In short, if DNA Fingerprinting works and receives evidentiary acceptance, it can constitute the single greatest advance in the "search for truth," and the goal of convicting the guilty and acquitting the innocent, since the advent of cross-examination.¹⁰¹

His profound and zealous enthusiasm is reminiscent of those early legal commentators who were so deeply taken with "God's finger print language," those who were searching for scientific evidence that could offer decisive, reliable evidence to trump conflicting eyewitness accounts. On the one hand, such eager rhetoric is understandable: if DNA profiling could be relied upon to identify individuals from trace quantities of genetic material, it could offer a tremendously powerful form of proof. But at the same time, the judge's degree of enthusiasm suggests that, in his desire to believe that the new technique worked, he might inadvertently fail to take sufficient notice of its limitations or uncertainties.

The judge in *Wesley* placed enormous significance on his belief, based on the expert testimony, that DNA profiling simply could not produce an erroneous result. As he understood it, the test would necessarily produce either a correct answer, or no answer at all. He writes:

¹⁰¹ *Id.* at 308, 533 N.Y.S.2d at 644.

A matter of extreme significance . . . is that it is impossible under the scientific principles, technology and procedures of DNA Fingerprinting (outside of an identical twin), to get a "false positive"—i.e., to identify the wrong individual as the contributor of the DNA being tested. If there were insufficient DNA for the test, or if the test, or any of its steps, were performed improperly, no result at all would be registered—in other words, the autoradiograph would be blank.¹⁰²

Again, we see a parallel to the claim that fingerprinting was an error-free method of identification that could produce certain, incontestable knowledge.

The judge's statement on this matter is worth examining in more detail. First, his belief that it is impossible "to identify the wrong individual as the contributor of the DNA being tested"¹⁰³ is simply incorrect. DNA profiling does not claim to provide more than a probability, a statistic describing the odds that DNA taken from a random person would match the DNA in question. If the random match probability is, for example, one in ten million, that does not necessarily mean that the suspect is the source of the DNA in question. Rather, it suggests there is only a one-in-ten-million chance that some randomly-selected person would have matching DNA. (We would therefore expect to find a number of matches in a several hundred million person pool such as the population of the United States.) In other words it is possible—though the higher the random match probability, the less probable it is—for DNA profiling correctly to find a match at several loci, and for the source DNA nonetheless to have come from someone other than a suspect.¹⁰⁴ In fact, in a 1999 case in England, precisely such an occurrence took place. Raymond Easton was charged with burglary after authorities made a "cold hit" with

¹⁰² *Id.* at 319-320, 533 N.Y.S.2d at 652.

¹⁰³ *Id.* at 320, 533 N.Y.S.2d at 652.

¹⁰⁴ To be fair, the judge does seem partly to recognize this limitation. In the final sentence of the paragraph quoted above, he writes, "Under the undisputed testimony received at the hearing, no 'wrong' person, within the established powers of identity for the test, can be identified by the DNA Fingerprinting test." *Id.* When the judge writes of "the established powers of identity for the test," he is presumably referring to the random match probability. But this too is an odd sentence, for the point is that it is possible, not likely but possible, for the test to work properly and nonetheless match the wrong person, because the person truly does match the source at the tested loci. Presumably, in the judge's parlance, this would be the wrong person, but not the "wrong" person, whatever "wrong" in quotation marks is supposed to mean.

his DNA in a DNA database.¹⁰⁵ His DNA matched the crime scene DNA at six loci. Because there was only a one in thirty-seven million chance that a randomly selected person's DNA would match, Raymond Easton was charged with burgling a house 200 miles from where he lived. However, after Easton, who had advanced Parkinson's disease and was unable even to drive a car, offered an alibi for the night in question, the DNA was eventually tested at four more loci. This more sophisticated test showed there was no DNA match after all.¹⁰⁶ All charges were dropped. This case illustrates one kind of error that can be made with DNA: the tests may reveal a genuine match, even though the suspect did not in fact leave the source DNA. To be sure, the bigger the denominator in the match probability, the less probable such a false match becomes. Moreover, when significant, non-DNA evidence corroborates the DNA evidence, any risk of error is further reduced. Still, we can see that the early judges' confidence was, at a minimum, somewhat overblown.

In addition, the judge's belief that any error in the process would lead to no result at all, rather than an erroneous result, is simply misplaced. This again strongly resembles the way fingerprint advocates described the technique as offering straightforward fact rather than contestable opinion. For obvious reasons, the notion of a technique that could not generate an erroneous false positive was appealing, and the judge in *Wesley* clearly deemed this important to his judgment; recall that he termed it "a matter of extreme significance."¹⁰⁷ The prosecution experts' insistence that false positives were impossible ought to have set off alarm bells for the judge, not reassure him. Any human process is capable of errors. At a minimum, there is always the possibility of outright fraud; falsifying a match altogether. Moreover, it is possible for the source DNA to contaminate the suspect's DNA and potentially lead to an erroneous finding. A sample could also be misread or

¹⁰⁵ See Richard Willing, *Mismatch Calls DNA Tests Into Question*, USA TODAY, Feb. 8, 2000, at 3A; James Chapman & Julie Moulton, *DNA Test Blunder Nearly Landed Me in Jail*, DAILY MAIL (London), Feb. 11, 2000, at 23.

¹⁰⁶ Chapman & Moulton, *supra* note 105.

¹⁰⁷ *Wesley*, 140 Misc.2d at 319, 533 N.Y.S.2d at 652.

misinterpreted.¹⁰⁸ In the earliest proficiency tests of DNA profiling techniques, one laboratory, Cellmark, made one error in the fifty samples it analyzed, by declaring a match where none existed.¹⁰⁹ Instead of being inherently impossible, false positives turn out to be a fact of life.

This brief survey shows that some of the judges who first examined the admissibility of DNA profiling were inclined to admit it with great enthusiasm and with an incomplete understanding of the potential pitfalls in applying this powerful and exciting new technology. Put simply, the earliest courts that confronted DNA profiling were nearly as dazzled by its claims and power as their forbears were dazzled by fingerprinting.

B. *Challenges to DNA Evidence*

But there is an enormous difference between the history of DNA profiling and the history of fingerprinting. In the case of DNA profiling evidence, increasingly sophisticated defense challenges to the new technology continued to emerge, with extremely credentialed university scientists as experts. These experts challenged the infallibility of the new technique on a variety of dimensions, from the appropriateness of assumptions about population genetics, to the care with which laboratories developed standards and executed procedures. The controversy spilled from the courtroom into the scientific arena, as leading geneticists and biologists aired their disagreements in the pages of *Science* and other journals.¹¹⁰ The debate then spread into the public policy arena as well, as the National Research Council convened two distinguished panels to try to sort through the issues and questions that had arisen and to generate consensus. A number of courts even held DNA evidence inadmissible.¹¹¹

¹⁰⁸ For a general discussion of the possibility of error, see, e.g., NATIONAL RESEARCH COUNCIL, *THE EVALUATION OF FORENSIC DNA EVIDENCE* 80-85 (1996).

¹⁰⁹ See, e.g., Roger Parloff, *More DNA Tests Facing Challenges*, MANHATTAN LAW., June 20, 1989, at 1; Thompson & Ford, *supra* note 94.

¹¹⁰ Compare, e.g., R.C. Lewontin & Daniel L. Hartl, *Population Genetics in Forensic DNA Typing*, 254 SCI. 1745 (1991) with Ranajit Chakraborty & Kenneth K. Kidd, *The Utility of DNA Typing in Forensic Work*, 254 SCI. 1736 (1991).

¹¹¹ For a list of trial and appellate courts that held DNA inadmissible between

The substance of the disagreements about DNA evidence has been documented at tremendous length. I will describe them below, in quite general terms and schematically, to provide the flavor of the controversy and to show, in the next section, that the dimensions along which DNA evidence was challenged resemble the arguments presently being levied against fingerprinting.

1. Determining Whether Two Autoradiographs Match

The critical issue in evaluating DNA evidence is determining whether two samples match. But what exactly are the proper criteria for declaring a match? This issue arose in two different ways in *People v. Castro*, the first DNA case in which a judge ended up excluding, in part, the DNA evidence.¹¹² First, Lifecodes, the company that analyzed the DNA, had reported that it determined matches both through visual comparison, and by measuring the matches and ensuring that they matched, within a particular standard of error. However, two of the bands in the case did not "match" according to the laboratories' own definitions of how a match should be measured.¹¹³ Furthermore, it seemed that Lifecodes was using different definitions of a match for determining, on the one hand, whether the suspect's DNA matched that from the crime scene, and on the other hand, how frequently a particular

1989 and 1993, see William C. Thompson, *Evaluating the Admissibility of New Genetic Identification Tests: Lessons from the "DNA War,"* 84 J. CRIM. L. & CRIMINOLOGY 22, n.5 (1993).

¹¹² *People v. Castro*, 144 Misc.2d 956, 545 N.Y.S.2d 985 (N.Y. Sup. Ct. 1989). *Castro* was an extraordinary case, in part because the scientists testifying for both sides decided to hold a meeting, without any lawyers present, to discuss Lifecodes' DNA evidence. They ended up agreeing that, while DNA had significant promise as a forensic technique, the particular tests performed in the case were not scientifically reliable enough to determine whether there was or was not a match. Faced with united experts, the trial judge held that while DNA forensic identification did meet the *Frye* standard of admissibility, the evidence of a match would not be inadmissible in this instance because "[t]he testing laboratory failed in several major respects to use the generally accepted scientific techniques and experiments for obtaining reliable results." *Id.* at 980, 545 N.Y.S.2d at 999.

¹¹³ See, e.g., Eric Lander, *DNA Fingerprinting: Science, Law and the Ultimate Identifier*, in *THE CODE OF CODES: SCIENTIFIC AND SOCIAL ISSUES IN THE HUMAN GENOME PROJECT* 191 (Daniel J. Kevles & Leroy Hood eds., 1992); Roger Parloff, *How Barry Scheck and Peter Neufeld Tripped Up the DNA Experts*, AM. LAW. 50 (1989).

definitions would render the resulting statistical determination about random match probability invalid.¹¹⁴

Second, while Lifecodes' experts said that a blood sample taken from the defendant's wristwatch matched the victim's DNA, there appeared to be two extra bands on the watch sample that did not appear on the victim's autorad. Lifecodes' experts testified that these extra bands were "most likely bacterial or plasmid."¹¹⁵ This raised another important question about how to define a match: when could extra bands, or the lack of a band, be explained away as a testing error, the result of contamination or some other artifact, and when did it mean that there was no match or that the test was inconclusive? In combination, these concerns made Lifecodes' evaluation of matches seem disturbingly subjective.

A third concern about how to interpret a match did not arise in *Castro*, but did arise in subsequent cases. Sometimes, DNA samples in different lanes on the electrophoretic gel may migrate at different speeds; as a result, two samples from the same person may not match because one of them has shifted in a systematic way. Whether and how to recognize and correct for bandshifting also became an issue.¹¹⁶ All three issues related to how to determine whether two samples significantly resembling each other actually matched. Autorads were not, as it turned out, self-interpreting.

2. The Problems of Population Genetics

To determine the meaning of a match, scientists must be able to provide information about how frequently such a match occurs. This will depend on how frequently each allele is found in the population, and how to combine the likelihood of

¹¹⁴ *Castro*, 144 Misc.2d at 977, 545 N.Y.S.2d at 998. To see why this issue matters, imagine that someone testified that both the suspect and the perpetrator had red hair, and that only one in twenty people had red hair, but that "having red hair" was defined differently for the purpose of determining, on the one hand, that the suspect "matched" the perpetrator, and on the other, the likelihood that someone had red hair.

¹¹⁵ *Id.* at 976, 545 N.Y.S.2d at 997.

¹¹⁶ See David H. Kaye, DNA Identification: Some Lingering and Emerging Evidentiary Issues, 1.4, in Proceedings from the Seventh International Symposium on Human Identification 12 (1997); Committee on DNA Forensic Science: An Update, National Research Council, The Evaluation of Forensic DNA Evidence (1996).

each of the alleles into one combined statistic. If loci were inherited independently, the probabilities could be multiplied according to the product rule, but if loci were not independent, using the product rule would result in inaccurate probabilities that underestimated the frequency with which matches would occur in the actual population.¹¹⁷

Scientists (and defense attorneys) began to challenge the laboratories' assumptions about how to make these calculations. On the first issue, for example, some scientists argued that there might be concerns about population substructure. In other words, the frequency of allele distribution over a large population (for example, Caucasians), might not reflect the frequency of allele distribution among some ethnic subpopulations, like Greek-Americans, if in fact, Greek-Americans choose mates among other Greek-Americans rather than from the population as a whole. If there were some reason to believe that the perpetrator was a Greek-American, the overall population frequencies might not accurately reflect the frequencies within this sub-population.¹¹⁸ (There could be a similar concern when multiple suspects were genetically related.) The basic critique was that the statistics presented by laboratories in court were not based on sufficient study of actual allele distribution in various ethnic subpopulations; therefore these statistics might significantly misrepresent the real-world frequency with which a match would occur. More generally, attorneys succeeded in persuading courts that valid and reliable statistical measures of the meaning of a match were a necessary prerequisite to the admissibility of DNA.

3. Concerns About Error Rates

Although, as we have seen, early proponents of DNA claimed that it had an error rate of zero, early proficiency tests suggested otherwise. This led to increased concern about determining error rates and establishing ongoing proficiency

¹¹⁷ See David H. Kaye & George F. Sensabaugh, *Reference Guide on DNA Evidence*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 485, 524-28 (2d ed. 2000). These two issues are whether a population is in Hardy-Weinberg equilibrium and linkage equilibrium, respectively.

¹¹⁸ *Id.* at 526-27; Lewontin & Hartl, *supra* note 98, at 126-28.

tests. It also led to continued attention to the issue of what jurors should be told. If, for example, a laboratory made false positive identifications one percent of the time in proficiency tests, should the jury be told at all about an enormously low random match probability—say 1 in 500 million—when there was a one percent chance that this result was reached in error? Some commentators argue that any numbers with which the jury is presented should be reduced to account for the chance of a laboratory error.¹¹⁹

Eventually, sufficient closure was reached about all of these issues for courts to feel comfortable admitting DNA profiling evidence once again. But there is no doubt that the DNA wars forced the new technique's proponents to pay much greater attention to both their laboratory procedures and the scientific basis for their statistical claims than they had at the outset. Moreover, as a result of this experience, courts continue to scrutinize new DNA techniques with care.

With fingerprinting, by contrast, there was never any such challenge to the claims of fingerprint examiners. This leads to an important and interesting question: why the difference? Why was fingerprinting unchallenged when DNA provoked the "DNA wars"? Or, to phrase it differently, could we imagine that DNA might have gone down the same path as fingerprinting? One could argue that the increasing attention to the admissibility of expert evidence in the late 1980s and early 1990s, combined with the enormous significance of the new technique, meant that DNA profiling inevitably was going to receive serious and significant scrutiny both inside and outside the courtroom. It may have been contingent and serendipitous that biologist Eric Lander agreed to testify for the defense in *Castro*, the first case in which the judge restricted the use of DNA evidence in court. But by this argument, even if the particular circumstances of the defense challenges to DNA were not predictable, that such challenges would have emerged somewhere and somehow *was* predictable. Increasingly significant defense challenges would have eventually forced courts to rethink their fast acceptance of the

¹¹⁹ See, e.g., Jonathan J. Koehler, *On Conveying the Probative Value of DNA Evidence: Frequencies, Likelihood Ratios, and Error Rates*, 67 U. COLO. L. REV. 859 (1996).

technique; this would have been the inevitable consequence of the adversary process in action.

In my view, such an assumption is far too sanguine. To be sure, imagining such "what-ifs" necessarily has a fanciful quality. Still, even if we assume that some defense attorneys would have eventually mounted robust critiques of, for example, the population genetics assumptions underlying DNA, the courts might not have chosen to confront those challenges directly if they had been delayed just a few years. With an ever-growing number of precedents holding DNA admissible, and DNA continually growing in importance as an investigative tool, judges might have been extremely reluctant to dislodge it because of concerns about laboratory practices and population statistics. Some courts might well have relied on the numerous precedents supporting admissibility, without grappling with the challenges.¹²⁰ Moreover, even judges who were uncomfortable eliding the challenges would have had a plausible doctrinal hook with which to avoid serious discussion of the issues: they could have argued that these matters, however important, went to the weight of the evidence rather than its admissibility.

It is even possible that these defense challenges could never have emerged. In the history of fingerprinting, we see a form of evidence that became so rapidly and uniformly accepted that even the defense bar failed to probe it in significant ways. Is it so implausible that with DNA there might have been a short-lived window of opportunity? That is, if DNA had not been challenged significantly within a relatively brief period, might it not have become so embedded, so deeply believed, that it would not have been challenged at all? At a minimum, it is plausible to tell the story of the challenges to DNA and the eruption of the DNA wars as having a degree of cultural contingency.

¹²⁰ Some courts faced with challenges to handwriting evidence after *Daubert*, for example, did exactly this. On handwriting evidence, see generally D. Michael Risinger & Michael J. Saks, *Science and Nonscience in the Courts: Daubert Meets Handwriting Identification Expertise*, 82 IOWA L. REV. 21 (1996); D. Michael Risinger, *Handwriting Identification*, in DAVID FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE (2d ed. forthcoming 2002); Mnookin, *supra* note 46.

IV. CURRENT CHALLENGES TO FINGERPRINTING

The final section of this Article is built upon a strange irony. As it turns out, the challenges to DNA profiling have, along with some doctrinal changes in our approach to expert evidence, newly opened the door to admissibility challenges to the fingerprint, that seemingly most robust form of evidence. DNA profiling—initially called by its supporters “DNA fingerprinting” so as to capture metaphorically some of the extraordinary power of its namesake—could have planted the seeds for fingerprinting’s downfall as legal evidence.

In the last two years, there have been at least sixteen legal challenges to the reliability of fingerprint evidence.¹²¹ So far, none of them has been successful. To date, no judge has ruled that fingerprinting is insufficiently reliable to pass muster under either *Daubert* or the relevant state standard. In fact, those judges that have issued written opinions on the matter have uniformly supported fingerprinting’s validity, sometimes in strong terms. As one judge wrote: “The court’s decision may strike some as comparable to a breathless announcement that the sky is blue and the sun rose in the east yesterday”¹²²—that is to say, an exercise in stating the obvious. The same court went on to express its belief “that latent print identification is the very archetype of reliable expert testimony.”¹²³ And yet the very existence of these legal challenges is quite extraordinary, especially given the entrenched and widespread belief in fingerprinting’s authority. It is therefore worth examining the claims made by those arguing for the exclusion of fingerprint evidence.

Fingerprinting critics level three main arguments. First, fingerprint examiners have not established objective and proven standards for evaluating whether two prints “match.” Second, the error rate for fingerprinting as a technique has been inadequately studied. Third, there is no statistical

¹²¹ The first champion of the fingerprinting challenges was Robert Epstein, a federal defender in Philadelphia. He brought the first case in 1999: *United States v. Mitchell*, No. 96-407 (E.D. Pa. 1999). For a complete list of challenges, see, e.g., a web site maintained by a latent fingerprint examiner: http://onin.com/fp/daubert_links.html (last visited Nov. 19, 2001).

¹²² *United States v. Havvard*, 117 F. Supp. 2d 848, 849 (S.D. Ind. 2000).

¹²³ *Id.* at 855.

foundation for assessing the likelihood that two people might have prints with any given number of corresponding characteristics. This lack of statistical foundation is especially troubling in cases involving distorted and smudged fingerprints.¹²⁴ We will examine each argument in more detail.¹²⁵

The first claim is that fingerprint examiners in the United States have not developed uniform standards for determining what counts as a sufficient basis for an identification. In some countries, fingerprint examiners require a certain number of "points of identification" before declaring a match; England, for example, requires sixteen such points, while France requires twelve. While individual fingerprinting agencies in the United States may have norms about point standards, there is no minimum number of points required for courtroom testimony about an identification, and practices among fingerprint examiners vary.¹²⁶ Moreover, some leading examiners reject the point-counting method altogether, arguing that it oversimplifies the complex information provided by a fingerprint by focusing exclusively on the location of particular characteristics.¹²⁷ The lack of objective standards means that determining a match is necessarily subjective; it is based on the personal judgment of the examiner rather than intersubjective criteria that remain the same from print to print and from examiner to examiner. Note the similarity between this argument and the criticisms of Lifecodes' practices in *Castro*, that focused on the inadequacy of declaring DNA matches simply through subjective visual inspection.¹²⁸

¹²⁴ For examples of these arguments, see, e.g., Memorandum of Law in Support of Mr. Choi's Motion to Exclude the Government's Latent Fingerprint Identification Evidence, *United States v. Choi*, No. 96 Crim. 118 (E.D. Pa. 1996) [hereinafter *Choi Memorandum*].

¹²⁵ These arguments are drawn from the briefs in *United States v. Choi*, and *United States v. Mitchell*, both of which were authored by Robert Epstein. There has been enough interest in these cases that Epstein has conducted seminars for defense attorneys and has prepared a compact disc with the materials used in these cases.

¹²⁶ Simon Cole, *What Counts for Identity: The Historical Origins of the Methodology of Latent Fingerprint Identification*, 22 *SCI. IN CONTEXT* 139 (1999).

¹²⁷ *Id.*

¹²⁸ *Castro*, 144 Misc.2d at 977, 545 N.Y.S. at 998.

Similarly, critics also argue that fingerprint examiners in practice violate a significant tenet of the field, the "one dissimilarity doctrine."¹²⁹ According to this doctrine, if there is even one genuine dissimilarity between two prints, the prints cannot be said to have come from the same finger. The problem, of course, is in the "fudge" word, "genuine." What counts as a genuine dissimilarity and how can an examiner recognize it? In practice, as some examiners acknowledge, an examiner who is convinced that two prints come from the same finger will be tempted to explain away any seeming dissimilarity as an artifact, the result of distortion in the print, or dirt, or a scar.¹³⁰ Without clearly articulated standards for determining when a characteristic can be said to "match," separating distortions from genuine differences becomes both subjective and subject to manipulation. (We see here a similarity to the arguments about interpreting band-shifting and the issue of when and how extra bands could be explained away.) Both of these arguments also go generally to the "existence and maintenance of standards controlling the technique's operation," one of the factors mentioned in *Daubert* as an appropriate criterion for evaluating the reliability of scientific evidence.¹³¹

The second major argument leveled by those challenging fingerprinting is that the error rate for fingerprinting has received insufficient attention and study. Error rate is also one of the factors mentioned explicitly in the *Daubert* opinion.¹³² In the case of fingerprinting, the general rate of error is simply not known, although there have been a small number of publicized instances of erroneous identification. Some proficiency tests, however, indicate that the error rate may be substantial. In a 1995 proficiency test conducted by a private company, but designed and assembled by the International Association of Identification, only forty-four percent of the 156 fingerprint examiners received a perfect score.¹³³ Even more disconcerting for a technique that claims to

¹²⁹ Choi Memorandum, *supra* note 124, at 26-27.

¹³⁰ *Id.* at 27 (citing John I. Thornton, *The One-Dissimilarity Doctrine in Fingerprint Identification*, 306 INT'L CRIM. POLICE REV. 89 (March 1977)).

¹³¹ *Daubert*, 509 U.S. at 594.

¹³² *Id.*

¹³³ David Grieve, *Possession of Truth*, 5 J. FORENSIC IDENT. 521, 523-24 (1996).

provide certain and absolute proof of identity, thirty-four test takers, or twenty-two percent, made an erroneous identification, incorrectly finding a match when none existed.¹³⁴

The government's response to this argument is, as argued in the *Mitchell* case for example, that the error rate for fingerprint identification is zero, because fingerprints are unique and permanent and can be accurately distinguished from one another.¹³⁵ Fingerprint examiners make this same argument that, although practitioners may on rare occasions misapply the science of fingerprinting and make errors, the error rate of the *science* of fingerprinting is zero.¹³⁶ Of course, what *Daubert* must mean when it refers to an error rate is the error rate in practice; to speak of the idealized error rate that would exist if all examiners were perfect all the time is irrelevant, indeed practically meaningless. The same argument could be made of eyewitness testimony, a notoriously unreliable form of evidence. People are all distinct from one another in observable ways; therefore the theoretical error rate of eyewitness identification is zero, though in practice observers may frequently make errors.

The third criticism of fingerprint evidence is that it has never been placed on a secure statistical foundation. Fingerprint examiners have no statistical basis for determining the probability that a match really indicates that both prints come from the same human being. This is viewed as especially problematic when they examine partial, smudged prints that provide less information from which to draw a conclusion. How likely is it that two people could have four points of resemblance, or five or six or eight or ten? Is the chance of two partial prints from different people matching one in a hundred, one in a hundred thousand, or one in a billion? No fingerprint examiner can honestly answer that question, even though the answer is of course critical to evaluating the

¹³⁴ *Id.* at 524. A total of forty-eight erroneous identifications were made by participants. Subsequent proficiency tests have also revealed significant numbers of errors. See discussion in Choi Memorandum, *supra* note 124, at 21-23.

¹³⁵ Government's Combined Report to the Court and Motions In Limine Concerning Fingerprint Evidence, *United States v. Mitchell*, No. 96-407, (E.D. Pa. 1999).

¹³⁶ For one example of this argument, see <http://www.clpex.com/Articles/TheDetail/TheDetail1.htm> (last visited Nov. 19, 2001).

probative value of the evidence of a "match." As the fingerprint expert who wrote the chapter on fingerprinting in *Modern Scientific Evidence* argued, tested probability models "simply do not exist for fingerprint pattern comparisons."¹³⁷ And although there have been a variety of attempts to place fingerprinting on a secure statistical foundation, experts view them as flawed and ordinary examiners frequently do not even know they exist.¹³⁸ Many fingerprint experts are even philosophically opposed to the development of probabilistic models, taking it as a principle that fingerprinting should provide certain and absolute, rather than probabilistic, identification.¹³⁹

Thus, we see that in the last two years, fingerprinting is facing serious challenge for the first time since it was introduced into the American courtroom. After a hundred years of near-universal acceptance, the scientific basis for forensic fingerprint identification is facing sustained critiques. But why now? The timing of these challenges is the result of two phenomenon: first, the Supreme Court's 1993 *Daubert* opinion on the admissibility of expert evidence and, more generally, the increasing focus on judicial gatekeeping of expert evidence; and second, the controversies over DNA. I am not arguing that these two developments were strictly necessary for challenges to fingerprinting to emerge, or that in combination they made such challenges inevitable. But together, these developments created a climate in which such legal challenges became more thinkable: that is to say, a climate in which fingerprinting's limitations became more visible and obvious, and in which legal challenge to a well-established, long-accepted form of scientific proof was doctrinally imaginable.

First, the move toward focusing on reliability and validity of evidence rather than using a proxy criterion like "general acceptance" made fingerprinting a more plausible target. So long as the dominant standard for assessing expert evidence was the *Frye* test, which focused on whether a novel

¹³⁷ David Stoney, *Fingerprint Identification*, in MODERN SCIENTIFIC EVIDENCE, *supra* note 120, at § 21-2.3.1.

¹³⁸ COLE, *supra* note 12, at 261. *See also id.*

¹³⁹ *See generally* Cole, *supra* note 126 (arguing that mainstream fingerprint examiners take as a basic tenet a belief in certain, rather than probabilistic, identification).

technique was generally accepted by the relevant scientific community,¹⁴⁰ it would have been extremely difficult to dislodge a form of evidence that had such deep and longstanding institutional support. Of course fingerprinting was accepted by the relevant scientific community, especially if that community was defined as fingerprint examiners. Even if the community were defined more broadly—perhaps as forensic scientists in general—it would have been nearly impossible to argue that fingerprinting was not generally accepted. After all, fingerprinting was not just generally accepted; it was universally accepted, forensic science's gold standard.

Even before *Daubert*, a number of judges were beginning to approach the question of the admissibility of expert evidence as a question of reliability and its assessment, rather than presuming that general acceptance was the central issue.¹⁴¹ *Daubert* solidified this trend by making helpfulness and validity the touchstones for the evaluation of expert evidence in federal court, and by making it explicit that judges were expected to act as gatekeepers and to evaluate the merits of contested expert evidence.¹⁴² *Daubert* provided judges with a partial checklist of the matters to which they might look in assessing reliability: whether the theory had been tested or falsified; whether there was a known error rate; whether there were accepted standards for the technique's operation; whether the technique had been peer reviewed; and finally, whether it was generally accepted in the relevant scientific community.¹⁴³ Though proxies like general acceptance and peer review were still legitimate criteria for judges to use, *Daubert* made it clear that judges were supposed to assess whether the substance of the expert evidence was adequately reliable.¹⁴⁴

The *Daubert* approach offers two significant doctrinal advantages for anyone attempting to launch a challenge to fingerprint evidence. First, the views of the relevant community are no longer dispositive, but are just one factor among many. There is a good argument that, for a question

¹⁴⁰ *Frye*, 293 F. at 1014.

¹⁴¹ See, e.g., *United States v. Downing*, 753 F.2d 1224 (3d Cir. 1985). The successful challenges to DNA profiling evidence also evince this tendency.

¹⁴² *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993).

¹⁴³ *Id.* at 580.

¹⁴⁴ *Id.* at 597.

like the reliability of fingerprinting, the views of fingerprint examiners should carry only limited weight. We would hardly expect polygraph examiners to be the most objective or critical observers of the polygraph, or those who practice hair identification to argue that the science was insufficiently reliable. When there is challenge to the fundamental reliability of a technique through which the practitioners make their living, there is good reason to be especially dubious about "general acceptance" as a proxy for reliability. For a debate about which of two methods within a field was superior, the practitioner's views might well be a useful proxy. (Although even here, one might want to inquire whether, in selecting one approach over another, the practitioners might have interests other than accuracy of outcome in selecting one approach over the other). But when there is an argument that the field itself is inadequate, the participants' perspective should be a starting point, not the end of the discussion.

The second advantage of the *Daubert* approach is that it offers no safe harbor for techniques with a long history. *Frye* itself wrote about "novel" scientific techniques,¹⁴⁵ and many jurisdictions found that it indeed applied only to new forms of expert knowledge, not to those with a long history of use. Under *Frye*, this limitation made sense: if a form of evidence had been used as legal evidence for a long while, that provided at least *prima facie* evidence of general acceptance. Even under *Daubert*, judges need not reexamine a form of expertise each time it is used, for that would be a waste of judicial resources. However, the key question under *Daubert* is reliability, and if there are new arguments that a well-established form of evidence is unreliable, judges should not dismiss these arguments with a nod to history.¹⁴⁶

Daubert, then, made it imaginable that courts would revisit a long-accepted technique that was clearly generally accepted by the community of practitioners. But it was, I would suggest, the controversies over DNA profiling that made the weaknesses in fingerprinting significantly more visible, more obvious to critics, legal commentators, and defense lawyers alike. We have already seen the striking resemblance between

¹⁴⁵ *Frye*, 293 F. at 1014.

¹⁴⁶ *Daubert*, 509 U.S. at 584, 590.

the main arguments made by those challenging fingerprinting, and the arguments that led to the vituperative clashes over DNA. The debates over DNA raised issues that had never been resolved with fingerprinting; indeed, they provided a blueprint to show what a challenge to fingerprinting would look like. And the metaphoric link between the two identification techniques made the parallels only more obvious. Let me be clear: I am not claiming that the controversies over DNA were a necessary precondition to challenges to fingerprinting. Even without the so-called DNA wars, challenges to fingerprinting might have emerged after *Daubert*. But DNA brought to light problems that had been lurking in the shadows around fingerprinting. They made the problems far easier to see and invited defense attorneys to recognize that fingerprinting might not fare so well if subjected to a particular kind of scientific scrutiny.

Of course, fingerprinting has fared all right so far. Those judges who have considered the issue have continued to allow fingerprint evidence even in cases involving smudged and distorted prints. What is most striking about the judicial response to date is that, for the most part, judges faced with these challenges do not seriously attempt to confront the challenges offered by the defense. In *United States v. Mitchell*,¹⁴⁷ the first judge who held a *Daubert* hearing on the issue ruled from the bench and said almost nothing about whether or how the evidence passed muster under *Daubert*. The judge essentially concluded only that the evidence was "highly probative and substantially outweighs any danger of unfair prejudice to the defendant."¹⁴⁸ The judge in *Mitchell* did not even permit the defense experts who were not themselves fingerprint examiners—historian Simon Cole and forensic science professor James Starrs—to testify at trial, ruling that to qualify as an expert, defense experts would have to be latent fingerprint examiners.¹⁴⁹ When a party is trying to argue that a profession's fundamental approach and standards are problematic, it is deeply troubling to hold that only members of the profession are qualified to testify because trenchant

¹⁴⁷ No. 96-407 (E.D. Pa 1999).

¹⁴⁸ Transcript at 4, *United States v. Mitchell*. This is, of course, the test under Rule 403 of the *Federal Rules of Evidence*.

¹⁴⁹ *Id.*

criticism is far more likely to come from outsiders than from members of the guild. A magistrate judge who issued an unpublished ruling also avoided applying *Daubert* altogether: the report and recommendation described fingerprinting techniques, the defense's critiques of the methodology, and the *Daubert* standard, but then failed to apply the test to the technique.¹⁵⁰

In *United States v. Havvard*,¹⁵¹ the one published opinion analyzing fingerprinting under *Daubert*, the judge did, at least nominally, apply the *Daubert* criteria to fingerprinting. He argued that fingerprinting has indeed been tested by one hundred years of use "in adversarial proceedings with the highest possible stakes—liberty and sometimes life."¹⁵² But this argument is circular: it says that we know the technique is reliable because we have long used and trusted it. While long use may indeed provide an imperfect but not irrelevant form of testing, it will only do so if we are confident that errors and testing failures would in fact have been noticed. The judge argued that standards for controlling the technique of fingerprinting exist because of "professional training, peer review, criticism, and presentation of conflicting evidence."¹⁵³ But the problem with this argument is that, while it is fair to say that all of these institutional mechanisms are *designed* to create standards for controlling the technique, what is needed is evidence that they *work*: that fingerprint examiners actually use consistent criteria for determining what counts as a match.

The judge also argued that the error rate, though unknown, must certainly be low; indeed, when fingerprinting "is subject to fair adversarial testing and challenge" the error rate must be "vanishingly small."¹⁵⁴ To be sure, some erroneous identifications might be exposed upon examination by an opposing expert. But the problems with fingerprinting could be more structural. That is to say, there might be certain kinds of error that examiners regularly make, so that multiple examiners would all find a match when in fact the print came

¹⁵⁰ *United States v. Alteme*, No. 99-8131 (S.D. Fla. 2000), available at http://onin.com/fp/daubert_links.html (last visited Nov. 19, 2001).

¹⁵¹ 117 F. Supp. 2d 848 (S.D. Ind. 2000).

¹⁵² *Id.* at 854.

¹⁵³ *Id.*

¹⁵⁴ *Id.*

from someone other than the suspect. Moreover, the judge's argument does not alleviate the defense's most fundamental challenge: that we simply do not know the statistical probability that two or more people could *each* have prints that match the partial smudged latent print under evaluation.¹⁵⁵

Overall, what is most striking about the judicial response to the challenges to fingerprinting is a general reluctance to admit that assessing fingerprinting under *Daubert* raises tricky issues. It is easy to see why judges are reluctant to *exclude* fingerprinting: it is a long-used technique, an extremely valuable form of evidence to prosecutors, and one in which the public has enormous faith. What is harder to understand is why judges are so reluctant to acknowledge that determining whether fingerprint evidence should survive scrutiny under *Daubert* is, at a minimum, a difficult question. Fingerprinting's claims and assumptions are clearly surprisingly unproven, and yet the trial court judge in *Havvard* ended up concluding that "latent print identification is the very archetype of reliable expert testimony under [*Daubert* and *Kumho Tire*]."¹⁵⁶ Although arguing that fingerprinting should be admissible under the legal standards is a plausible view, calling it the "archetype of reliable expert testimony" misunderstands either the defense's critique, the *Daubert* standards, or both. Rather, the question the technique raises is: Just how reliable should a form of evidence have to be to pass muster under *Daubert*?

I would suggest that what is driving both the outcomes and the reasoning of these early opinions is the concern that if fingerprinting does not survive *Daubert* scrutiny, neither will a great deal of other evidence that we currently allow. Rejecting fingerprinting would, judges fear, tear down the citadel. It would simply place too many forms of expert evidence in jeopardy. Even to allow that fingerprinting is a close case would put at risk too many other forms of evidence that strike judges as being noticeably less scientific, objective, or

¹⁵⁵ As the first published opinion on fingerprinting, now affirmed on appeal, *Havvard* may prove influential. Unfortunately, it was decided on a very thin evidentiary record: the defense offered no experts, and even failed to introduce into evidence important documents such as the proficiency tests discussed earlier at notes 134-37 and accompanying text.

¹⁵⁶ *Havvard*, 117 F. Supp. 2d at 855.

empirically grounded than fingerprinting.¹⁵⁷ Judges prefer, instead, to uphold fingerprinting without careful scrutiny, perhaps telling themselves that *Daubert* was not intended to bring about massive transformations in the range of admissible evidence. This interpretation is not pure speculation: as the trial judge in *Havvard* wrote,

[T]he error rate for fingerprinting is certainly far lower than the error rate for other types of opinions that courts routinely allow, such as opinions about the diagnosis of a disease, the cause of an accident or disease, whether a fire was accidental or deliberate in origin, or whether a particular industrial facility was the likely source of a contaminant in groundwater.¹⁵⁸

Moreover, like almost everyone else, judges who are assessing fingerprinting most likely believe deeply in fingerprinting. Rightly or wrongly, the technique continues to have enormous cultural authority. Dislodging such a prior belief will require, at a minimum, a great deal of evidence, more than the quantity needed to generate doubt about a technique in which people have less faith. As these challenges continue, some judge some place may well decide that fingerprinting evidence, especially when it is only a partial, smudged latent print, simply does not pass muster under *Daubert*, at least not until fingerprint examiners can offer some valid statistical basis for declaring the probability that two prints match. This is, perhaps, the better view, if the *Daubert* criteria are taken seriously.

One could therefore criticize these judges for being ostriches, for burying their heads in the sand instead of executing their duties under *Daubert* in a responsible way. However, their reluctance to apply *Daubert* strictly to

¹⁵⁷ To complicate slightly, *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), makes clear that judges do have a gatekeeping obligation with respect to all expert evidence, not simply scientific evidence, but also allows that the mechanism for assessing reliability might vary from field to field. Moreover, even *Daubert* presents its criteria as a partial set of guidelines rather than a checklist.

¹⁵⁸ *Havvard*, 117 F. Supp. 2d at 854-55. See also the written report of the magistrate judge in *United States v. Alteme*, No. 99-88131 (D. Fla. 2000) (noting that the defense argument "proves too much," in that if it were sufficient to preclude the fingerprint evidence, "large categories of scientific and technical testimony would be inadmissible. At a minimum, it would be necessary to eliminate the defense of insanity, since virtually all psychiatric opinions are subjective, in whole or in part.")

fingerprinting reflects a deeper and quite problematic issue that pervades assessments of expert evidence more generally. *Daubert* provides one vision of how to assess scientific expert evidence: basically, with the standards of the scientific method (at least in an idealized and perhaps somewhat naïve version that may or may not bear any great resemblance to the ways science is conducted in practice). But surely this idealized version of the scientific method cannot be the only way to generate legitimate knowledge. How, then, do we evaluate other forms of knowledge, tacit knowledge, craft knowledge, knowledge based on experience, or hybrid knowledge, part science, part craft, like fingerprinting? When judges refuse to rule on fingerprinting in careful *Daubert* terms, they just may be, knowingly or not, enacting a kind of rebellion against the notion that a certain vision of science provides the only legitimate way to provide reliable knowledge, or even the only way to produce reliable scientific knowledge.¹⁵⁹

¹⁵⁹ Readers may argue that *Kumho Tire* explicitly acknowledges that other approaches will be necessary for evaluating non-scientific knowledge. Even the *Daubert* decision itself envisions its inquiry as a “flexible” one. The problem with this argument is, first, that judges cannot easily decide that fingerprinting is something wholly other than science. Judges have, in practice, self-consciously hedged their bets on this issue; from the bench decision in *Mitchell*, the first challenge to fingerprinting, to the appellate opinion in *Havvard*, judges elect not to take a position on whether fingerprinting is scientific. See Transcript, *United States v. Mitchell*, (Sep. 13, 1999) (noting “there is no clear line dividing” scientific knowledge and technical or other specialized knowledge and “therefore, this court does not feel compelled by any case authority to make that distinction in the case before us”); *United States v. Havvard*, 2001 WL 804134 at *3 (taking no position on whether fingerprinting is ‘scientific,’ but arguing that even if it is not, this is no basis for exclusion). The *Havvard* appellate opinion is especially odd in this regard: it argues that “the standards of *Daubert*. . . are not limited in application to ‘scientific’ testimony alone. Therefore the idea that fingerprint comparison is not sufficiently ‘scientific’ cannot be the basis for exclusion under *Daubert*.” *Havvard*, 2001 WL 804134 at *3 (citations omitted). The Court’s approach is almost a non-sequiter: while the *Daubert* gatekeeping obligation is supposed to apply to all expert evidence, that hardly means that expert evidence cannot be excluded for being insufficiently scientific, if in fact the proffered evidence is science. Such a view would vastly limit the scope of *Daubert*. While it is true that under *Kumho Tire* there may be alternative ways to evaluate non-science (for if non-science were judged only by whether it was science it would invariably necessarily fail), presumably judges need to understand what kind of expert evidence they are assessing in order to properly assess it.

The second problem with viewing *Kumho Tire* as a legitimate escape valve for judges assessing fingerprinting is that well-accepted methods by which to evaluate the authority of non-scientific knowledge simply do not yet exist. Some have argued for “experience” as an alternative criterion, but this argument is quite problematic,

Whether such a rebellion is to be admired or criticized is beyond the scope of this Article, which has already ventured rather far afield from the early history of fingerprinting. But it does suggest a basic lesson that we can draw from this history: the legal rule we ask judges to apply to expert evidence will not, in and of itself, control outcomes. No matter what the formal legal rule, determinations of admissibility will end up incorporating broader beliefs about the reliability of the particular form of evidence, and about the legitimacy of various ways of knowing.

More generally, this historical look at the origins of fingerprint evidence starkly suggests that “culture” cannot be extricated from determinations of expertise and reliability. If a form of evidence conforms to cultural expectations and generally-shared conceptions, judges may not scrutinize it carefully. Determinations of validity are not made in a vacuum; our ideas of the plausible and our notions of the persuasive dramatically affect how skeptically we view a new technique. When faced with a kind of evidence that fits with our assumptions about the world we all may be Pudd’nheads. And just as it was far from obvious whether Pudd’nhead was a fool or a genius until the novel’s denouement, it is hard to say whether the judicial reluctance to rigorously scrutinize fingerprint evidence under the *Daubert* criteria reflects a woeful lack of scientific understanding or, rather, a profound practical wisdom about the limits of evaluating legal evidence through a narrowly scientized lens.

because experience does not necessarily produce knowledge (think, for example, of psychics with decades of experience) and we could frequently have very experienced scientists offering scientific evidence thought to fail *Daubert* thus pitting “experience” against “scientific validity.” See, e.g., Edward J. Imwinkelried, *The Next Step after Daubert: Developing a Similarly Epistemological Approach to Ensuring the Reliability of Non-Scientific Testimony*, 15 CARDOZO L. REV. 2271, 2292-94 (1994). See also D. Michael Risinger, *Preliminary Thoughts in a Functional Taxonomy of Expertise for the Post-Kumho World*, 31 SETON HALL L. REV. 508 (2000) (discussing an effort to provide a taxonomy of expertise). Overall, the fingerprint opinions are not carefully articulated efforts to provide an alternative basis for determining reliability. The judges’ approach to fingerprinting reliability comes closer to Justice Stewart’s view of obscenity: they know it when they see it. *Jacobellis v. Ohio*, 378 U.S. 184, 197 (1964).

The second lesson from this history is that there may be a *productive* aspect to battles between expert witnesses. A constant leitmotif in the history of expert evidence has been the call for the use of neutral experts. Many see neutral experts as a panacea, both to prevent the jury from having to decide between different views on matters about which it lacks knowledge, and to ensure that valid science comes before the tribunal. Learned Hand, for example, called explicitly for unanimity of expert opinion. In a 1901 article supporting the use of court-appointed neutral experts, Hand wrote: "[The jury] will do no better with the so-called testimony of experts than without, except where it is unanimous. If the jury must decide between such they are as badly off as if they had none to help."¹⁶⁰ He was far from the first to call for this solution. In the century since, neutral experts have been so frequently recommended as a cure for the problems of expert evidence that the only wonder is that we have in practice budged so little from our adversarial approach to expert testimony. Early fingerprint experts were not neutral experts, in the sense that they were called by a party rather than appointed by the court, but they do provide one of our only examples of a category of expert scientific knowledge from which the typical adversarial battles were largely absent.

From one perspective, fingerprinting is indeed a success story in that it has been viewed as an especially authoritative form of evidence for nearly a hundred years. So perhaps one lesson we can draw is that unanimity of expert evidence does indeed produce cultural authority. But the history of fingerprint evidence also shows us that while it is easy to disparage "battles of the experts" as expensive, misleading, and confusing to the factfinder, these battles may also reveal genuine weaknesses in proffered expert knowledge. It is, perhaps, precisely because of the lack of these challenges that fingerprinting was long viewed as a paragon of certainty, as the most secure and incontestable form of knowledge. Ironically, had defense experts in fingerprinting emerged from the beginning, fingerprint evidence might have lower cultural status but be even more trustworthy than it is today.

¹⁶⁰ Hand, *supra* note 74, at 56.