

COMMONWEALTH OF MASSACHUSETTS.

# SUPREME JUDICIAL COURT.

S.J.C. No. 09478

SUFFOLK COUNTY

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COMMONWEALTH OF MASSACHUSETTS,  
Plaintiff-Appellee.

v.

TERRY L. PATTERSON,  
Defendant-Appellant.

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ON RESERVATION AND REPORT FROM AN EVIDENTIARY RULING OF THE  
SUPERIOR COURT.

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**BRIEF AMICI CURIAE OF SCIENTISTS,  
SCHOLARS, AND THE NEW ENGLAND  
INNOCENCE PROJECT**

**QUESTION PRESENTED**

Whether the Commonwealth has met its burden under *Commonwealth v. Lanigan*, 419 Mass. 15 (1994) and *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993), to establish the reliability of latent fingerprint individualization applying ACE-V methodology to simultaneous impressions.

**STATEMENT OF FACTS AND STATEMENT OF THE CASE**

Amici rely on the Statement of Facts and the Statement of the Case submitted by the Defendant-Appellant.

**STATEMENT OF AMICI INTEREST**

Amici are scholars and scientists who have studied the evidence concerning the Question Presented. Most have authored or edited scholarly publications or given presentations that address it, at least in part (for a complete list, *see* Amici Appendix). Amici represent a variety of scholarly disciplines including Biology, Forensic Science, Law, Linguistics, Mathematics, Political Science, Psychology, Science and Technology Studies, and Statistics. Collectively they have authored law review articles, legal treatises, scholarly monographs, scientific book chapters, technical conference presentations, and articles in the nation's leading scientific publication concerning, at least in part, the Question Presented. Amici also include a former FBI latent fingerprint examiner,<sup>1</sup> and two scientists who have also been trained in fingerprint comparison,

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<sup>1</sup> Mark Acree.

although they do not practice latent fingerprint examination.<sup>2</sup> With those three exceptions, the amici do not examine fingerprints for a living or claim any special ability to make latent fingerprint individualizations.

Amici are concerned by the increasing dissonance between the legal and scientific communities on the Question Presented. We respectfully suggest that this dissonance may stem from courts' lack of familiarity with the scholarly literature, the slow pace of its production, and from some fundamental misunderstandings of the nature of fingerprint individualization and the evidence advanced on its behalf. This Amicus Brief is intended to present the consensus view of the scientific community. We think that this Court has a unique opportunity to reconcile the differences between the legal and scientific communities on this issue.

The New England Innocence Project (“NEIP”) is a charitable trust, organized under the laws of Massachusetts and a 501(c)(3) tax-exempt organization, whose membership includes several Boston-area law school professors, lawyers, and members of the law firm of Goodwin Procter, LLP. NEIP provides *pro bono* legal services to identify, investigate, and exonerate through the use of DNA testing persons who have been wrongly convicted and imprisoned in the New England states, and studies the causes of such convictions.

Drs. Cole, L. Haber, R. Haber and Prof. Faigman have testified as expert witnesses on behalf of defendants in criminal cases involving fingerprint evidence. Dr. Cole was an expert witness in *United States v. Mitchell*,<sup>3</sup> and his testimony was entered into the record in this case without his knowledge or consultation. Dr. Ralph Haber was

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<sup>2</sup> Drs. Lyn Haber and Ralph Haber.

<sup>3</sup> 365 F.3d 215 (3d Cir. 2004).

an expert witness in the *Daubert* hearing in *United States v. Llera-Plaza (II)*,<sup>4</sup> and an expert witness in an equivalent *Kelly-Frye* hearing in *California vs. Arrelleno* (Superior Court of the County of Los Angeles (July 25-30, 2002)). None of the amici have been retained by either party in this case, and neither of the parties in this case wrote any portion of this Brief.

Drs. Cole and Zabell are named in applications for research funding under the National Institute of Justice's Solicitation for Proposals "Quantitative Research on Friction Ridge Patterns" (SL 000698, Feb. 25, 2005).

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<sup>4</sup> 188 F. Supp.2d 549, 559 (E.D. Pa. 2002).



## ARGUMENT

### **I. It is Far Past Time for the Reliability of Latent Fingerprint Examiners' Practices, Starting with "Simultaneous Impressions," to be Established.**

Amici believe that latent fingerprint examiners' practices could be placed on as rigorous and as carefully established a scientific basis as that of forensic DNA analysis<sup>5</sup> if only this Court would require it. The justice system is ultimately the principal consumer of forensic science, and suffers the consequences when its reliability is not established. We believe this should be done for all applications of latent fingerprint individualization, and most immediately for those techniques that are controversial, ill-defined and based upon fundamental probabilistic errors – such as individualization through “simultaneous impressions.” Finally, we offer specific suggestions as to evidentiary treatment of latent fingerprint individualization consistent with current scientific and scholarly knowledge.

#### **A. This Court's Deliberate Approach to Admission of DNA Analysis Improved the Quality and Accuracy of Forensic Science Evidence and is Equally Appropriate for Fingerprints.**

This Court has followed a distinctively careful approach to the admission of expert testimony that has served it, the criminal justice system, and the Commonwealth very well. In 1991 it reversed the admission of a DNA typing result based upon an insufficient statistical showing of the population frequency of particular alleles. *Commonwealth v. Curnin*, 409 Mass. 218, 225-227 (1991). It expressed “the hope that . . . the scientific community would ‘generally agree on a means of arriving at a conservative estimate of the probability of another person having the same alleles and

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<sup>5</sup>Michael J. Saks and Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCIENCE 892, 893 (August 2005) (“The traditional forensic sciences could and should emulate this approach [of DNA typing]. . . . Fingerprinting could be one of the first areas to make the transition to this approach because large fingerprint databases already exist.”)

thus resolve all uncertainties and variables in favor of the defense.” *Commonwealth v. Lanigan (Lanigan I)*, 413 Mass. 154, 163 (1992) (quoting *Curnin*). The following year, this Court again excluded a DNA typing result, notwithstanding then greater acceptance of DNA evidence, finding that scientific debate concerning the method of estimating subgroup population frequencies of alleles was “lively, and still very current.” *Lanigan I*, 413 Mass. 154, 162 (1992). It noted approvingly the recommendations of the National Research Council for immediate studies of population subgroups and use of a “ceiling principle” on allele frequencies in subgroups. *Id.* at 162-64. Two years later, the Court admitted DNA evidence when the “Commonwealth successfully turned to the ceiling principle in support of the admission . . . of DNA test results and of evidence of the statistical probability of a random match.” *Commonwealth v. Lanigan (Lanigan II)*, 419 Mass. 15, 25 (1994). See Michael J. Saks and Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCIENCE 892, 893 (August 2005) (describing process by which “most exaggerated claims and counterclaims about DNA evidence” were “replaced by scientifically defensible propositions”).

Carefully requiring the proponent of expert testimony to establish its reliability is particularly appropriate here for three reasons. First, unlike the “lively, and still very current” scientific debate in 1992 concerning estimation of population subgroup frequency of alleles, the overwhelming weight of scientific opinion is that the reliability of latent fingerprint individualization based upon “simultaneous impressions” has *not* been established. Although the trial court concluded that latent fingerprint individualization in general was sufficiently reliable, it granted that two of five *Lanigan* factors were met “only slightly,” and its conclusion that simultaneous impressions

satisfied *Lanigan* was based upon a five sentence explanation from a single witness.<sup>6</sup> There are no studies showing the validity of identification through simultaneous impressions, Def.'s Ex. T (*Reservation and Report* 12, Jan. 14, 2005) and no standards for its application beyond each "examiner's judgment," Tr. 5-55 – 5-56, yet the trial court found it was "supported by good grounds based on what is known." Def.'s Ex. S (*Supp. Findings of Fact* 2-4, Nov. 29, 2004).<sup>7</sup> Second, the data upon which to perform the types of studies needed to establish the reliability of latent fingerprint identification techniques, fingerprint databases and examiners, are peculiarly within the possession of one group – the government<sup>8</sup> – which has an obvious interest in the outcome of cases. The party preventing meaningful efforts to establish the validity of latent print analysis techniques, to the detriment of the criminal justice system, should not benefit from this behavior.<sup>9</sup> Third, the consequences of a deliberate approach to assessing the reliability of latent fingerprint individualization through simultaneous impressions are at worst temporary delay to determine accuracy and provide greater knowledge for the fact-finder. The consequence of business as usual acceptance of an "error free" system of claimed "individualization" through an unproven and undefined technique is bad science and a recipe for further miscarriages of justice.<sup>10</sup>

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<sup>6</sup> Testimony of Stephen Meagher, Transcript of *Daubert* Hearing at 3-60 – 3-62 (May 19, 2004).

<sup>7</sup> Exhibits are referred to according to the lettering and numbering in the Defendant-Appellant's Appendix.

<sup>8</sup> The "government" with these data is ultimately the federal government, given the number of fingerprint analyses done by the FBI. The Commonwealth relied on this expertise by offering FBI Agent Meagher as an expert witness.

<sup>9</sup> Law enforcement agencies have access to fingerprints and to professional latent print examiners. Law enforcement, operating with a premise of perfect accuracy, has a perverse incentive not to examine its own practices. As the trial court notes, the National Institute of Justice, the research arm of the Department of Justice, has already chosen not to fund one Request for Proposals concerning fingerprint research. Def.'s Ex. Q, *Findings of Fact* at 12.

<sup>10</sup> The most recent highly publicized of such cases include the FBI's mistaken identification of a fingerprint on a paper bag found after the Madrid, Spain train bombings as that of Oregon attorney Brandon Mayfield. The identification was made by a Senior Fingerprint Examiner as "100% accurate," and then "verified" by

**B. The Community of Practicing Latent Fingerprint Examiners Cannot Meaningfully Assess the Reliability of its Own Practices.**

“General acceptance within the relevant scientific community” is a “significant” factor in an admissibility analysis under *Daubert*, “and often the only [ . . . ] issue.” *Lanigan II* at 26. Because there is no obvious scientific community to evaluate the reliability of latent print individualization, such a community of scientists and scholars from different disciplines has coalesced just as did one following the emergence of forensic DNA analysis. See Saks and Koehler, *The Coming Paradigm Shift*, *supra*, 309 SCIENCE at 893 (August 2005) (“Immediately after DNA’s first courtroom appearance in the 1980s, scientists from disciplines as varied as statistics, psychology, and evolutionary biology debated the strengths and limitations of forensic DNA evidence.”).

**1. Latent Fingerprint Examiners Lack the Expertise to Establish the Reliability of Individualization.**

Latent print examiners are a community of practitioners, trained in analyzing latent prints, comparing them to exemplar prints, and making decisions about whether those prints derive from a common source finger. Only since 1997 have FBI print examiners even been required to have a bachelor’s degree, and current employees, such as Unit Chief Stephen Meagher, upon whose testimony the Commonwealth relied, need not be college graduates. Def.’s Ex. S (*Supp. Findings of Fact* at 9-10).

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Supervisory Fingerprint Specialist Michael Wieners, Unit Chief, Latent Print Unit and fingerprint examiner John T. Massey, a retired FBI fingerprint examiner with over thirty years of experience. See Les Zaitz, *Transcripts Detail Objections, Early Signs of Flaws*, OREGONIAN, May 26, 2004, at A1; Noelle Crombie & Les Zaitz, *FBI Apologizes to Mayfield*, OREGONIAN, May 25, 2004, at 1; Andrew Kramer, *Fingerprint Science Not Exact, Experts Say*, ASSOCIATED PRESS, May 21, 2004, available at <http://www.msnbc.msn.com/id/5032168>; see also Steven T. Wax & Christopher J. Schatz, *A Multitude of Errors: The Brandon Mayfield Case*, 28 CHAMPION 6 (2004). A compilation of documented fingerprint misattribution cases is in Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 1001-1018 (2005) (copy in Amici Appendix).

Amici, by contrast, are skilled at evaluating knowledge claims rather than latent prints.<sup>11</sup> The educational background and skill set for evaluating a knowledge claim, includes familiarity with the scientific method, with design of studies and experiments, and with analysis and interpretation of data in light of theory. We suggest scientists and scholars like ourselves thus constitute the relevant scientific community for the Question Presented. *See United States v. Starzecpyzel*, 880 F.Supp. 1027, 1038 (S.D.N.Y. 1995) (noting importance of general acceptance among financially disinterested parties, such as academics). Judges, with all due respect, are in no better position to scientifically validate knowledge claims than are latent print examiners.

**2. Genuinely Independent Evaluation is a Basic Step in Establishing Reliability, Yet the Closed Community of Latent Fingerprint Examiners Refuse it.**

No group of practitioners, scientists or non-scientists, is a wholly objective or trustworthy judge of its own validity. David H. Kaye, *The Nonscience of Fingerprinting: United States v. Llera Plaza*, 21 QUINN. L. REV. 1073, 1087 (2003) (“That a guild trained in an art has a set of beliefs may be some evidence that these beliefs are true, and the court should not ignore this evidence. But neither should it count very heavily in comparison with empirical validation of the claims of knowledge.”) Most drivers, for example, rate themselves as “above-average” in driving skills, which is mathematically impossible. Unlike drivers, latent print examiners may never learn about most of their

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<sup>11</sup> Three amici do have skill in fingerprint examination as well. Amicus Mr. Acree, a rare latent print examiner with a master’s degree in forensic science, does combine the ability to analyze latent prints with the ability to conduct scientific research. Mark A. Acree, *Is There a Gender Difference in Fingerprint Ridge Density?*, 102 FOR. SCI. INT’L 35 (1999). Drs. Lyn and Ralph Haber, a pair of research scientists who have been trained to make fingerprint comparisons, also combine the ability to analyze latent prints with the ability to conduct scientific research. Lyn Haber and Ralph Norman Haber, *Error Rates for Human Fingerprint Examiners*, in AUTOMATIC FINGERPRINT RECOGNITION SYSTEMS, 339 (N.K. Ratha and R. Bolle, eds., 2004).

“accidents,” false negative or false positive identifications, further worsening their own assessment of validity.

Both insiders and outsiders have characterized the community of latent print examiners as a closed community. CHRISTOPHE CHAMPOD, ET AL., FINGERPRINTS AND OTHER RIDGE SKIN IMPRESSIONS at 40 (“at present, the whole identification process is dominated by dogmatic positions”); DAVID R. ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS – AN INTRODUCTION TO BASIC AND ADVANCED RIDGEOLOGY (1999) at 3 (likening friction ridge identification science to “a divine following” and describing a “cultish demeanor”); Simon A. Cole, *Witnessing Identification: Latent Fingerprint Evidence and Expert Knowledge*, 28 SOC. STUD. SCI. 687, 703 (1998) (describing latent print examiners as an occupational group with a high degree of solidarity). The relevant scientific community cannot legitimately be “defined to include only those experts who subscribe to the same beliefs as the testifying expert,” *Canavan’s Case*, 432 Mass. 304, 314 note 6 (2000), but “must be defined broadly enough to include a sufficiently broad sample of scientists so that the possibility of disagreement exists.” *Id.*

The scope of community required by *Lanigan* is not met simply because some examiners disagree about methodology, as the trial court suggests, presumably referring to the “point counting” versus “ridgeology” debate.<sup>12</sup> *Findings of Fact* at 16. There is no dissent among professional latent print examiners on the crucial question of the reliability of latent print individualization because they are taught to believe in the reliability of

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<sup>12</sup> For the opposing sides of this debate, see, e.g., ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS; Dusty Clark, *What Is the Point?* (1999), available at [http://www.latent-prints.com/id\\_criteria\\_jdc.htm](http://www.latent-prints.com/id_criteria_jdc.htm). For an account of the debate, see Christophe Champod, *Edmond Locard -- Numerical Standards and 'Probable' Identifications*, 45 J. FORENSIC IDENTIFICATION 136 (1995).

latent print individualization in their training. David L. Grieve, *Possession of Truth*, 46 J. FORENSIC IDENTIFICATION 521, 528 (1996) (“the assumption of absolute certainty as the only possible conclusion has been maintained by a system of societal indoctrination . . .”). Dissent among latent print examiners about methodology no more establishes the reliability of latent print individualization than dissent among astrologers about astrological method establishes the reliability of astrology.

**C. Genuine “Gatekeeping” Demands that the Scientific and Scholarly Rejection of the Reliability of Latent Fingerprint Individualization be Weighed before an Even More Controversial, Wholly Untested Technique is Accepted.**

Our position on the Question Presented has been ably represented in the record by the testimony of Professor Starrs.<sup>13</sup> We stress that Professor Starrs’s views represent the scientific mainstream, and the weight of scientific and scholarly authority: the government has failed to establish the reliability of latent print individualization in general, and in particular through the use of simultaneous impressions. We represent some, but not all, of the scholars who constitute the consensus position<sup>14</sup> within the scholarly community.

Admittedly judicial authority has been almost universally at odds with the scientific mainstream,<sup>15</sup> and we are troubled by the conspicuous differences between the

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<sup>13</sup> Transcript of *Daubert* Hearing, 1-10 – 1-140, 2-3 – 2-124 (May 17 – 18, 2004).

<sup>14</sup> In attempting to construe a consensus position in the scholarly community, we give primacy to scholars’ views expressed in publication or presented at scholarly conferences.

<sup>15</sup> See, e.g., *United States v. Havvard*, 260 F.3d 597 (7th Cir. 2001); *United States v. Rogers*, 26 Fed. Appx. 171 (4th Cir. 2001) (unpub. op.); *United States v. Llera Plaza (Llera Plaza II)*, 188 F.Supp. 2d 549 (E.D. Pa. 2002); *United States v. Cline*, 188 F. Supp. 2d 1287 (D. Kan. 2002); *United States v. Merritt*, 2002 U.S. Dist. LEXIS 14711 (S.D. Ind. 2002); *United States v. Crisp*, 324 F.3d. 261 (4th Cir. 2003); *United States v. Sullivan*, 246 F. Supp. 2d 700 (E.D. Ky. 2003); *United States v. Mitchell*, 365 F.3d 215 (3d Cir. 2004).

scientific and legal communities on the question presented. With rare exceptions,<sup>16</sup> the legal decisions which answer the Question Presented in the affirmative ignore scholarly literature that addresses the Question.

The Commonwealth does not cite a single scientist or scholar who believes the reliability of latent print individualization has been established. Instead, it sweeps the essential question of reliability under the rug of “uniqueness.” Its sole scientist, Dr. Babler, testified (as the trial court correctly noted) only to the *uniqueness* of human friction ridge skin, not the reliability of latent fingerprint individualization. Def.’s Ex. Q (*Findings of Fact* 5, Oct. 7, 2004). Amici too believe human friction ridge skin is unique – but this in no way demonstrates the reliability of latent fingerprint individualization any more than the uniqueness of human faces demonstrates the reliability of eyewitness identification. No two bits of friction ridge skin anywhere may be the same, but how well, with what validity and reliability,<sup>17</sup> do latent print examiners compare and distinguish similar looking ones? How well can they compare fractional ridge detail on

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<sup>16</sup> *United States v. Crisp*, 324 F.3d. 261, 273-278 (4th Cir. 2003) (Michael, J., dissenting); *Utah v. Quintana*, 103 P.3d 168, 170-71 (Ct. App. Utah 2004) (Thorne, J., concurring). Judge Pollak initially sided with the scientific consensus in *Llera Plaza I*, and then reversed himself in *Llera Plaza II*. *Comp. United States v. Llera Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 2002) (vacated and withdrawn) *with United States v. Llera Plaza*, 188 F.Supp. 2d 549 (E.D. Pa. 2002).

<sup>17</sup> “Reliability” has a technical meaning in statistics and science: consistency or reproducibility in test results. In the *Daubert* analysis, it is often used as a synonym for “accuracy,” which statisticians and scientists would instead refer to as “validity,” that is, test results that reflect the underlying ground truth. Amici follow the convention of courts to refer to both validity and reliability under the heading of “reliability,” but would note that neither the validity *nor* the reliability of latent fingerprint examiners has been established.

This very case stunningly demonstrates both. The Commonwealth’s latent print examiner found three prints of value, while the FBI, which reexamined these prints, found only *one* print of value. FBI Latent Print Report (Feb. 17, 2005), Ltr. to Det. Lt. Kenneth F. Martin, Def.’s Brf. Addendum Pg A-29-30. This is poor reliability of examiner determination of the usability of the latent prints. Moreover, the Commonwealth’s examiner found that the prints were those of Terry L. Patterson. The FBI, by contrast, concluded that the one print of value is *not* that of Terry L. Patterson. This is a trivially small sample, but it shows zero reliability (i.e., complete disagreement). It is possible to have high reliability without validity (everyone agrees the earth is flat), yet it is impossible to have validity without reliability. Here, for example, both examiners cannot be correct in their conclusions, and a test that is wrong half the time is hardly very useful.

non-contiguous sections of friction ridge skin? How, how accurately, and how reliably across different examiners, do they make the crucial decision that impressions were made “simultaneously”? These are the propositions that must be, and have never been, tested.

## **II. Applying the Practices of Latent Fingerprint Individualization to “Simultaneous Impressions” Compounds the Scientific Shortcomings of the ACE-V “Methodology.”**

An eyewitness who sees a perpetrator several times may recall an eyebrow, an ear, a nose or a chin, and yet still not be able to identify a specific person as the criminal. No one would seriously suggest that an “identification” could then be made based only upon assembling a recognizable eyebrow, ear, nose and chin – without the eyewitness then observing the complete face of an alleged perpetrator. Yet this is precisely the claim of latent fingerprint examiners who propose using “simultaneous impressions.”

Impressions of a contiguous area of friction ridge skin, such as a fingertip, can, according to latent print examiners, be compared to an exemplar print based upon “sufficient” ridge detail. When no single contiguous area of friction ridge skin impression contains “sufficient” ridge detail (enough information), the conclusion of “individualization” cannot be reached. Advocates of “simultaneous impressions” propose that, in such circumstances, the ridge detail of impressions of multiple, non-contiguous areas of friction ridge skin, even from different fingers, be aggregated to accumulate “sufficient” ridge detail for individualization, so long as the examiner believes that the multiple, non-contiguous impressions must have been deposited simultaneously (and, therefore, presumably by the same hand).

Even within the latent print examiner community, the use of simultaneous impressions is controversial. Steve Ostrowski, *Simultaneous Impressions: Revisiting the*

*Controversy*, 13 *The Weekly Detail*, Nov. 5, <http://www.clpex.com/Articles/TheDetail/1-99/TheDetail13.htm> (“Approximately 44% of those asked reported requiring one latent to stand alone to call simultaneous impressions. One agency dictates that all impressions must stand alone.”). Even if one accredited the reliability of latent fingerprint individualization in general via the “ACE-V” (“Analysis, Comparison, Evaluation – Verification”) “methodology,” which Amici do not, *see* §II.B., *infra*, the reliability of this novel approach using “simultaneous impressions” has not been established, presents numerous untested questions, and its application in this case did not even follow establish fingerprint examiner protocol. Moreover, its underlying premise contradicts basic probability operations given the premise of fingerprint “individualization.”

**A. The Reliability of Latent Fingerprint Individualization by Simultaneous Impressions is Even Less Well Supported than Latent Fingerprint Individualization by Single Latent Prints, and Contains Even Greater Potential for Error.**

Not enough is known to warrant the conclusion that latent fingerprint individualization based on a single latent print is reliable, but even less is known about the reliability of individualizations based on simultaneous impressions.

**1. Procedures to Demonstrate a Simultaneous Image are Neither Agreed Upon nor Validated.**

Simultaneity is both a prerequisite of the method and a conclusion by the examiner. Ostrowski’s 2001 survey of fingerprint analysts, with responses from local, state and federal examiners in thirteen states and the District of Columbia, found *no labs* even had written policies on how to make identifications through simultaneous impressions. Ostrowski, *Simultaneous Impressions: Revisiting the Controversy*, *supra*, 13 *The Weekly Detail* 2-3, Nov. 5, <http://www.clpex.com/Articles/TheDetail/1->

99/TheDetail13.htm. Ashbaugh identifies several factors that must be present if discontinuous fingers in a single fingerprint impression are to be considered simultaneous. These are, first, that the substrate on which every one of the prints was laid is continuous or consistent; second, that every one of the prints is formed with the same matrix (i.e., transfer material for the impression); third, that each of the prints exhibits either similar downward pressure or anatomically reasonable variation in that pressure; fourth, that each of the prints exhibits either similar lateral pressure distortion or anatomically reasonable variation in that pressure; fifth, that separate prints make anatomical sense (for example, they represent adjacent fingers, or an opposing finger and thumb if an object was apparently grasped); and sixth, that separate prints also make purposeful sense (e.g., if a perpetrator allegedly opened a 10" wide box, the prints cannot be a left thumb and index finger on opposite sides of the box). ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS 134-135.

Detailed as these may sound, there is not a single scientific research study that establishes whether these criteria are sufficient to differentiate between a simultaneous touch and multiple touches made at different times by unknown persons. Moreover, the accuracy with which examiners can establish whether prints were laid down simultaneously must be demonstrated before an assumption of simultaneity is used to establish an identification. Both the sufficiency of these criteria (assuming they are actually used), and the accuracy of determining simultaneity, are readily amenable to testing, yet neither has been tested.

**2. Examiners are not Required to Document and Do Not Document the Criteria Used to Establish Simultaneity.**

While the method in abstract could easily be tested, its application in any specific case cannot be, because most examiners do not make bench notes of their analysis of the latent. It is therefore impossible to determine the criteria an examiner used to determine simultaneity, as well as whether the steps in their practices were applied properly, for example whether – as per ACE-V – the initial analysis of the subject latent is conducted without knowledge of prints to which it would be compared (the exemplar).

### **3. Spatial Position Measurement within Simultaneous Fingerprints Is Inadequate and Untested.**

In the Analysis stage of ACE-V, an examiner of a single latent fingerprint may note the presence of “Galton minutiae” such as ridge endings and bifurcations on the ridge path, the location of other features, such as the core, one or more deltas, and accidental features such as scars. To be useful for subsequent comparison purposes, each of these features has to be spatially located relative to the other features in the same latent print. Locations can be specified by coordinates, ridge counts, or a distance/direction metric. The more such features that can be described by their relative locations, the greater the probability of an accurate conclusion when the latent is subsequently compared to an exemplar print, because each of these relative features adds more information.

This procedure is by definition impossible with a simultaneous fingerprint in which none of the discontinuous images themselves has sufficient detail for comparison. This presents three problems. First, in a simultaneous image, just as with a very poor quality latent of a single finger with only a few details, only a few spatial relations among the features can be specified. The less distinct the features or the fewer the number of ridges between them, the more uncertain the spatial comparisons become. Second, no

research has been performed to demonstrate that if only two poor quality, discontinuous areas from a single finger are present in a latent, examiners accurately identify or exclude by accumulating points across the discontinuities in the print. Third, and most seriously, features such as Galton details cannot be spatially related to one another in discontinuous parts of a simultaneous image, *because they are not all on the same finger*. There is no way to count the number of intervening ridges between a ridge ending on the first finger and a ridge ending on the second finger, any more than there would be a way for the eyewitness who saw only an ear to estimate the width of a perpetrator's face. Since there's no way to measure spatial relations between portions of unrelated fingerprints, there's no way to gather data to determine the accuracy of such identification claims.

**4. The Probability of Chance Hits Increases in Accumulating Features in Poor Quality Simultaneous Latent Prints.**

If only a few features are identified in a poor quality simultaneous print, what is the probability that the same features will be found in an exemplar? Without spatially constraining the features, the probability of finding a feature in the exemplar corresponding to one in the latent increases – because one is only looking for similar features, not similar features similarly spatially constrained. Accumulating these ill-specified correspondences across fingers increases the probability of a random hit that in fact does not show correspondence.

**5. The Error Rate for Conclusions of Individualization from an Accumulation of Agreement is Unknown and Untested.**

There has been no research on the effects of accumulation on accuracy of identification conclusions. Research results from a variety of fields suggest that the more difficult the stimulus being analyzed, the more likely the analysis will contain errors.

Further, accumulation is used because – and only because – no single finger contains sufficient quality to individualize. The paucity of discernable detail in each point increases a chance correspondence with more suspects. Finally, it is more difficult to exclude suspects with more discontinuity, more distortion, and poorer spatial location. Since simultaneous images requiring accumulation of agreement are inherently of lower quality, and therefore more difficult, it is highly likely that the error rate with the use of simultaneous images will be higher than for single-finger fingerprint images of better quality (the error rate of which is also presently unknown).

**6. Examiner Accuracy in Discriminating between a Discrepancy and a Difference is Untested.**

After an examiner has found a number of corresponding points in agreement, he must also account for every point in disagreement between the latent image and the exemplar. The ACE-V method contains a default decision rule: if any differences are found that cannot be accounted for or explained, then the examiner cannot conclude there is an identification. John Thornton, *The One-Dissimilarity Doctrine in Fingerprint Identification*, 32 INT'L CRIM. POLICE REV. 89 (1977).

There is no evidence that the One-Dissimilarity Doctrine is or can be applied accurately with simultaneous prints. This must be demonstrated to show examiners can differentiate between the same and different donors when so many variables are present, each with such a large range of variability.

**7. The Fingerprint Profession has no Stated Procedures to Compare Simultaneous Impressions to Exemplar Fingerprints**

There is not a single manual, treatise, handbook, textbook or regulatory standard that describes the comparison procedures for simultaneous latent prints to exemplar

prints. Ashbaugh discusses how to analyze a simultaneous impression to be sure it is truly simultaneous; however, he does not describe how to compare that image to anything. In fact, he suggests that an examiner, when presented with a simultaneous image, look for a better trained expert to help him. ASHBAUGH, QUANTITATIVE-QUALITATIVE FRICTION RIDGE ANALYSIS 135. Ostrowski's survey found no common policy among labs as to whether an identification through simultaneous impressions could be made when sufficient ridge detail was present in a single print, or whether it could be made only when no one print had sufficient detail. ("Ultimately, it comes down to each examiner.") Interestingly, one agency reported it "reassign[ed] cases to other examiners who have certainty [sic] to call a simultaneous impression." Ostrowski, *Simultaneous Impressions: Revisiting the Controversy, supra* , 13 The Weekly Detail 3

**B. The ACE-V "Methodology" Describes, But Does Not Establish, the Reliability or Validity of General Latent Fingerprint Identification Practices.**

"ACE-V" ("Analysis, Comparison, Evaluation – Verification") is an acronym rather than a methodology. Sandy L. Zabell, *Fingerprint Evidence*, 13 J. L. & POL'Y 143, 178 (2005). Its accuracy could be measured by testing experienced examiners comparing pairs of prints in which the true donor is known. To reflect "real world" conditions, this experiment would use latent fingerprints of the range, types and difficulty found in typical case work, examiners would be representative of the range of training, experience and working conditions of those in the field, and the pairings should sample the range of conclusions typically offered by examiners.<sup>18</sup>

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<sup>18</sup> Privately available proficiency tests, though lacking some of these characteristics, are available for less than \$350 per examiner. *See*

No such study has been conducted. After nearly a century of practice, no properly designed, controlled, and conducted study of the accuracy of latent print individualizations exists. Lyn Haber and Ralph Norman Haber, *Error Rates for Human Fingerprint Examiners*, in *AUTOMATIC FINGERPRINT RECOGNITION SYSTEMS* 331 (N. K. Ratha and R. Bolle eds., 2004). The absence of such studies has been noted in the literature since at least 1997 (DAVID FAIGMAN, ET AL, *MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY* (1<sup>st</sup> ed. 1997)), was stated in open court in the *Daubert* hearing in *U.S. v. Mitchell* in 1999, and has been recognized by courts. *United States v. Llera Plaza (Llera Plaza I)*, 179 F. Supp. 2d 492, 506 (E.D. Pa. 2002) (vacated and withdrawn) (“On the record made in *Mitchell*, the government had little success in identifying scientific testing that tended to establish the reliability of fingerprint identifications”);<sup>19</sup> *United States v. Llera Plaza (Llera Plaza II)*, 188 F. Supp. 2d 549, 565 (E.D. Pa. 2002) (“But on the present record I conclude that the proficiency tests are less demanding than they should be. To the extent that this is the case, it would appear that the tests can be of little assistance in providing the test makers with a discriminating measure of the relative competence of the test takers.”); *United States v. Crisp*, 324 F.3d. 261, 273-274 (4th Cir. 2003) (Michael, J., dissenting) (“The government did not offer any record of testing on the reliability of fingerprint identification. . . . Indeed it appears that there has not been sufficient critical testing to determine the scientific validity of the technique. . . . The government did not introduce studies or

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<http://www.collaborativetesting.com/catalogue/06CatalogueForensicsTests.pdf><http://www.collaborativetesting.com/catalogue/06CatalogueForensicsTests.pdf> (accessed August 9, 2005).

<sup>19</sup> Although this decision, *Llera Plaza I*, was vacated and withdrawn, in *Llera Plaza II* the court stated “I concluded in the January 7 opinion [*Llera Plaza I*] that *Daubert*’s testing factor was not met, and I have found no reason to depart from that conclusion.” *United States v. Llera Plaza*, 188 F.Supp. 2d 549, 564 (E. D. Pa. 2002).

testing that would show that fingerprint identification is based on reliable principles or methods.”); *United States v. Sullivan*, 246 F. Supp. 2d 700, 704 (E.D. Ky. 2003) (“The court further finds that, while the ACE-V methodology appears to be amenable to testing, such testing has not yet been performed.”). As one federal appellate judge recently remarked, “The government has had ten years to comply with *Daubert*. It should not be given a pass in this case.” *United States v. Crisp*, 324 F.3d 261, 272 (4th Cir. 2003) (Michael, J., dissenting.)

**1. Latent Fingerprint Examiners Assert A Higher Power Of Discrimination Than Provided By DNA Analysis, Yet Without Any Similar Underlying Verification or Studies.**

Latent print examiners testify as expert witnesses to “individualization.” This is “the process of matching a latent print to one person as its source to the exclusion of all other people in the world.” Def.’s Ex. Q (*Findings of Fact* at 3-4). This is an extraordinarily strong claim to make, stronger even than the random match probability conclusions of most forensic DNA analysts. Moreover, latent print examiners claim to do this with absolute certainty (100% certainty) and infallibility (zero error rate).<sup>20</sup>

**2. No Blind Controlled Study To Validate the Practices of Actual Fingerprint Examiners Has Ever Been Done, Because The Party Controlling Examiners and Fingerprints Refuses To Do So.**

How likely is it that the latent print examiner’s testimony will be correct? Obviously, the most accurate way of assessing the reliability of latent fingerprint individualization would be to know how many times they were correct when they offered

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<sup>20</sup> The trial court, like many other courts, does not credit this claim, *Findings of Fact* at 22, yet does not propose to restrict latent print examiners’ testimony on this point. Latent print examiners apparently still believe the claim, as evidenced by the testimony of Mr. Meagher, a leader in the profession. This seems dangerously likely to mislead jurors.

their evidence in criminal trials. Unfortunately, we cannot assess reliability in this manner because in criminal trials the ground truth (the true origin of the latent print) cannot be known with certainty. *In re Winship*, 397 U.S. 358 (1970) (Harlan, J., concurring) (“in a judicial proceeding in which there is a dispute about the facts of some earlier event, the factfinder cannot acquire unassailably accurate knowledge of what happened.”).

When deriving an accuracy rate from real-world use of the technique is not possible, a scientist would normally conduct a simulation. The evaluator would design an exercise in which the ground truth *is* known. Other than that, the evaluator would try to make the exercise resemble real practice as closely as was practicable.<sup>21</sup>

### **3. Latent Fingerprint Examiners Purport To Individualize Latent Prints Based On Ridge Characteristics Without Any Population Studies Determining the Frequency of These Characteristics.**

If latent print examiners claimed merely “identifications,” this area might not be an issue.<sup>22</sup> However, as the court correctly notes, latent print examiners are mandated by their professional guidelines to phrase all conclusions which implicate the defendant as “individualizations.” Scientific Working Group on Friction Ridge Analysis Study and *Technology Standards for Conclusions* ver. 1.0 Sept. 11

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<sup>21</sup> In laying out this formulation of how a validation study for latent fingerprint individualization might be conducted, we are well aware that such studies might not be appropriate for all knowledge claims that might face courts. What is needed is the “appropriate validation” for the specific knowledge claim. Edward J. Imwinkelried, *The Meaning of “Appropriate Validation” in Daubert v. Merrell Dow Pharmaceuticals, Inc., Interpreted in Light of the Broader Rationalist Tradition, not the Narrow Scientific Tradition*, 30 FLA. ST. U. L. REV. 735 (2003). In the case of latent fingerprint individualization, though, we think there is no disputing that the sort of testing methodology we describe is the “appropriate validation.”

<sup>22</sup> “Identification” is a rather ambiguous term in forensic science. It is sometimes used in a manner synonymous with “individualization,” but other times it is used in a weaker sense, such as “identified as blood type A” or even a weaker sense still, e.g., “the substance was identified as cocaine.” KEITH INMAN & NORAH RUDIN, *PRINCIPLES AND PRACTICE OF CRIMINALISTICS: THE PROFESSION OF FORENSIC SCIENCE*, 122 (2001).

[http://www.swgfast.org/Standards\\_for\\_Conclusions\\_ver\\_1\\_0.pdf](http://www.swgfast.org/Standards_for_Conclusions_ver_1_0.pdf), last accessed May 26, 2005 (mandating that latent print examiners are permitted to testify to only three possible conclusions: individualization, inconclusive, or exclusion.).

“Individualization” inevitably implies the existence of studies of the frequency of the various ridge details in various populations, or how else would the examiner know that the appearance of certain consistent ridge details between a latent and a known print warrants the conclusion that the potential donor pool has been reduced to one? This is, of course, how forensic DNA analysts can generate estimates of the size of the potential donor pool of DNA profiles, and this Court carefully required that these estimates be generated in a reliable manner. *Lanigan I*, 413 Mass. 154 (1992). The process of generating, refining and demonstrating the accuracy of these estimates required studies, presentations and scrutiny by peers, and the establishment of professional standards. *See* JANE CAMPBELL MORIARTY, *PSYCHOLOGICAL AND SCIENTIFIC EVIDENCE IN CRIMINAL TRIALS*, §11:44-11:57.

Astonishingly, conclusions of latent fingerprint individualization do not rest upon such studies because none have been conducted. Instead, latent print examiners *intuit* when the amount and rarity of the consistent ridge detail is “sufficient” to warrant the conclusion that the potential donor pool has been reduced to one – just as they intuit when prints were deposited “simultaneously.” They are supposed to determine sufficiency based on “training to competency,”<sup>23</sup> but no one has any basis from which to intuit such a judgment. *See* Zabell, *Fingerprint Evidence, supra*, at 155-156. As

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<sup>23</sup> Scientific Working Group on Friction Ridge Analysis Study and Technology, *Friction Ridge Examination Methodology for Latent Print Examiners*, (2002). §3.3.1 (“Individualization occurs when a latent print examiner, trained to competency, determines that two friction ridge impressions originated from the same source, to the exclusion of all others.”).

Champod *et al.* note:

The point is that Ashbaugh evokes the need to eliminate all other possible donors in the world but does not say how this can be done. Essentially, this is because it cannot be done. Certainly it cannot be done by scientific means but, even leaving science to one side, no one person can attain and retain comprehensive knowledge of the prints of every person in the world. It has to be an inference, be it scientific (which it cannot be) or otherwise. The conclusion has to be as Stoney eloquently put it, a “leap of faith”; as such, it is ultimately obscure.

CHAMPOD ET AL., FINGERPRINTS at 33 (citations omitted).

**4. Every Latent Print Examiner Determines For Themselves How Much Similarity Is “Sufficient” to Individualize A Print, Yet Each Purports to “Verify” Every Individualization Using an Indefinable Measure of Similarity.**

The claim of “individualization” rests upon the concept of “sufficiency.” Latent print examiners claim that they can effect conclusions of “individualization” when “two friction ridge impressions contain[] sufficient quality (clarity) and quantity of friction ridge detail in agreement.” Scientific Working Group on Friction Ridge Analysis Study and Technology *Friction Ridge Examination Methodology for Latent Print Examiners* ver. 1.01, §3.3.1, Aug. 22 (available at: [http://www.swgfast.org/Friction\\_Ridge\\_Examination\\_Methodology\\_for\\_Latent\\_Print\\_Examiners\\_1.01.pdf](http://www.swgfast.org/Friction_Ridge_Examination_Methodology_for_Latent_Print_Examiners_1.01.pdf), last accessed August 17, 2005). Insufficient ridge detail in a contiguous area is the reason simultaneous impressions are used at all, so what is the definition of the crucially sufficient concept of “sufficient”? “Sufficiency” according to practitioner guidelines, “is the examiner’s determination that adequate unique details of the friction skin source area are revealed in the impression.” *Id.* §1.5.

The best that the US latent fingerprint profession can produce is that a latent

fingerprint analyst “knows it when he sees it.”<sup>24</sup> Reliability is ensured through “verification” by another analyst who, too, knows it when she sees it. How can the validity of a “method” predicated on individual standards for each practitioner ever be tested?

Even “verification” by latent fingerprint examiners of every “individualization” departs from basic scientific principles. In “verification,” another examiner, often a supervisor, from the same agency “verifies” the work of the examiner. Not only is this done knowing who made the identification, it is done knowing who the suspect is, as exemplar print cards typically show the identity of the person whose prints are on the card, and has more accurately been characterized as “ratification.”<sup>25</sup>

##### **5. Existing Proficiency Test Data Suggest Fingerprint Examinations have a Discernible Error Rate.**

There are very limited proficiency test data concerning latent fingerprint individualization, that the Commonwealth did not offer, which suggest at least a minimum error rate. Fingerprint analysis can be studied as a matching task, between a latent print and a known “rolled” fingerprint card, that is either a “target” (i.e., having the same finger that produced the latent) or a “distracter” (i.e., having fingers that did not

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<sup>24</sup> Continental European examiners have another solution which, from a scientific standpoint, is neither better nor worse. They define “sufficiency” as a set number of corresponding ridge characteristics. *European Fingerprint Standards*, 28 FINGERPRINT WHORLD 19 (2002) (Reporting fingerprint point standards ranging from 8 [Bulgaria] to 16 [Italy, Cyprus, Gibraltar] points, as well as some countries with no set standard). These standards at least provide something to test, but the numbers have been arbitrarily, rather than empirically, generated. Further, the claim that any of these standards form a basis for reliable “individualizations” has been falsified; erroneous attributions have occurred under even the highest standards. Shelley Jofre, *Falsely Fingered*, U.K. GUARDIAN, July 9, 2001

<sup>25</sup> *United States v. Llera-Plaza (Llera-Plaza II)*, 188 F. Supp. 2d 549, 559 (E.D. Pa. 2002) (“As to ACE-V itself, Dr. Haber offered the thought that ‘verification’ was a misnomer for the final stage: a procedure in which a second fingerprint examiner knows the result arrived at by a previous examiner, and is asked to go over the same ground, would be better described as ‘ratification.’”)

produce the latent). Collaborative Testing Services, Inc. (CTS), which conducts proficiency tests for forensic accrediting agencies, has conducted an annual proficiency test of professional fingerprint examiners and reported its results to the American Society of Crime Lab Directors. Def.'s Exs. 3 and 4, Vol. II. In its 9508 test, photographs of seven "bloody" latent prints and "full-rolled" 10 print cards from four subjects were used. Def.'s Ex. 3. Five of the seven latents were "targets" (i.e., from one of fingers printed on the full-rolled cards), three were from one individual and two from another. The other two latents were "distracters."

Data were obtained from fingerprint examiners at 156 labs using these seven latents. Examiners were allowed three responses: individualize, inconclusive, or exclude. CTS compiled the data as a function of judgment for each latent print, and then asked what proportion of the total number of responses were correct, false-positives, etc. Seven latent prints were examined by 156 labs for a total of 1,092 responses ( $156 \times 7 = 1,092$ ). A more appropriate analysis (conceiving of the latents as non-random or "fixed" in statistical terminology) is to analyze the data with each examiner as the unit of analysis, in order to determine individual error rate. Amici re-scored the original data that way, using as a "hit" a correct match to the appropriate finger on the appropriate 10-point card of the five targets. False-positives were defined as a claimed match to any finger on any of the 10-point cards of the two distracter prints (i.e., the wrong person), while misidentifications of targets (i.e., identifying any of the latents to the correct person but wrong finger) were conservatively scored as misses rather than false-positives.

The results are a mean hit-rate of 80% and a mean false-alarm rate of 11% (the standard-error of the mean is 2% in both cases). That is, on average examiners correctly

identified a latent 4 out of 5 times, and incorrectly identified a print to the wrong person slightly over 1 in 10 times. This mean performance is not inconsistent with matching tasks with (different) photographs of the same highly-similar objects (e.g., faces) more generally, and also is consistent with the results of a much-better controlled and designed experiment of matching photographs of prints to photographs on new prints of the same fingers that one of the Amici obtained with naive undergraduates. M. E. Torry and J. R. Vokey, *Fingerprint Matching and Naive Observers*, Address at Banff Annual Seminar in Cognitive Science Banff, Alberta (May 14, 2005) (available at: <http://people.uleth.ca/~vokey/pdf/basicsposter2005.pdf>) ; J. R. Vokey, J. M. Tangen and J. Boychuk, *On the Identification of Latent Fingerprints*, Address at Annual Meeting of the Canadian Society for Brain, Behaviour and Cognitive Science St. John's, Newfoundland and Labrador (June 12-14, 2004), (available at: <http://people.uleth.ca/~vokey/pdf/bbcs2004.pdf>) ; J. Boychuk and J. R. Vokey, *On the Psychophysics of Fingerprint Identification*, Address at Banff Annual Seminar in Cognitive Science Banff, Alberta (April 30, 2004), available at: <http://people.uleth.ca/~vokey/pdf/BASICS2004.pdf> ; Tangen, J.M., Vokey, J.R. and Allan, L.G., *What's In a Fingerprint? A PCA Approach to Fingerprint Identification and Categorisation*, Address at Joint Meeting of the Experimental Psychology Society and the Canadian Society for Brain, Behaviour, and Cognitive Science Cambridge, England (July 20, 2000).

While existing proficiency data are insufficient for a robust measure of the reliability of latent print individualization, they are not reassuring. They are flatly inconsistent with the strength of latent print examiners' testimony as currently given,

namely that when a conclusion of individualization has been reached the potential donor pool has been effectively reduced to one, that the error rate is zero, or even that the error rate is “low” or “extremely low.” Def.’s Ex. Q, *Findings of Fact* at 19.

**6. Known Cases Of Latent Print Misattribution – in the Same Lab at Issue in This Case – Starkly Demonstrate An Error Rate.**

Given that latent print evidence has been used in court for nearly a century now in the United States, the number of known cases of latent print misattribution is relatively low. Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985 (2005) (discussing 22 such cases)(copy in Amici Appendix). Amici suspect that latent print individualization may not be wildly inaccurate, but if the likelihood that a latent print misattribution will be exposed is low, then known cases of misattribution necessarily constitute only a small portion of *actual* cases of misattribution.

We believe that the likelihood of exposure *is* low for several reasons. First, latent fingerprint evidence has been treated as infallible in our criminal justice system for almost the entire period of its use. *Utah v. Quintana*, 103 P.3d 168, 171 (Utah Ct. App. 2004) (Thorne, J. concurring) (“In essence, we have adopted a cultural assumption that a government representative’s assertion that a defendant’s fingerprint was found at a crime scene is an infallible fact . . .”); L. Haber and R. N. Haber, *Error Rates for Human Fingerprint Examiners*, in AUTOMATIC FINGERPRINT RECOGNITION SYSTEMS 339 (N. K.

Ratha and R. Bolle eds., 2004). It requires extraordinary evidence to convince criminal justice system personnel that a latent fingerprint individualization is erroneous.<sup>26</sup>

The recent case of misattribution cited by the trial court, *Commonwealth v. Cowans*, is a case in point. Had the true perpetrator not left recoverable DNA (widely considered the most powerful form of forensic evidence) at the scene of the crime, it is extremely unlikely that Cowans would have been able to prove his innocence and prove that what had been presumed to be a *correct* latent print individualization was in fact an *erroneous* latent print individualization. Indeed, the Commonwealth's assertion that "that practitioner error is easily revealed" would come as some surprise to Stephan Cowans. Neither the verifying examiner nor his own experts detected the error, and his case is by no means unique in that regard. Cole, *More Than Zero*, 95 J. CRIM. L. & CRIMINOLOGY 985, 1025. In his case, revealing a practitioner error required: the sheer luck of the true perpetrator leaving recoverable DNA at the crime scene, the good fortune of that DNA being preserved after his conviction, the acceptance of biohazard duty in prison in order to pay for post-conviction DNA testing, the responsibility of the court in approving such testing, and the upstanding behavior of the Commonwealth in ordering his immediate release.

Second, it is unlikely that all latent print misattributions are made known to the public and reported in either case law or the media. ANDRÉ MOENSSENS ET AL.,

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<sup>26</sup> For example, in the 1988 Michael Cooper case, an interrogator who expressed doubts about the guilt of a suspect who had been (falsely) implicated by latent print evidence reports being told "something very close to fingerprints do not lie. Get your ass back in there." *Cooper v. Dupnik*, 963 F.2d 1220, 1232 (9th Cir. 1992). In the 1997 Shirely McKie case in Scotland, a psychiatrist who formed the opinion that McKie was telling the truth reports being told that he must be wrong because his conclusion necessarily implied that the latent print evidence was false, which would be "unthinkable." *Inquiry Call Into Prints Case*, BBC NEWS, June 23, 2003, available at <http://news.bbc.co.uk/1/hi/scotland/3012294.stm> (last visited Aug. 15, 2005).

SCIENTIFIC EVIDENCE IN CIVIL AND CRIMINAL CASES 516 (4th ed. 1995) (referring to “a great number of criminal cases [in which] an expert or consultant on fingerprint for the defense has been instrumental in seriously undermining the state’s case by demonstrating faulty procedures used by the state’s witnesses or by simply showing human errors in the use of fingerprint evidence” not all of which appear to have been reported in the case law or the media.). While defense experts have exposed a number of misattributions, in several cases defense consultants have also *corroborated* latent print individualizations that were determined to be erroneous. *State v. Caldwell*, 322 N.W.2d 574 (Minn. 1982). *See also* David Weber & Kevin Rothstein, *Man Freed After 6 Years: Evidence Was Flawed*, BOSTON HERALD, Jan. 24, 2004, at 4 (*Commonwealth v. Stephen Cowans*); Les Zaitz, *Transcripts Detail Objections, Early Signs of Flaws*, OREGONIAN, May 26, 2004 (*Brandon Mayfield*).

Third, misattributions may not be equal across cases. Of particular relevance here, a recent study shows 60% of known cases of misattribution derive from homicide cases. *Cole, More Than Zero* at 1018. Even controlling for the more frequent appearance of latent print evidence in homicide cases, homicides are still greatly overrepresented among known cases of misattribution. This suggests either that misattributions are more likely to occur in homicide cases, or merely that they are more likely to be *exposed* in homicide cases. If the former is true, it may be because examiners are under greater pressure to reach individualizations in homicide cases. If the latter is true, then the true number of misattributions would be significantly higher than the number of known cases.

Documented misattributions undermine latent print examiners' assertion that their error rate is zero, and judicial conclusions that it is "vanishingly small," *United States v. Havvard*, 117 F. Supp. 2d 848, 854 (S.D. Ind. 2000), aff'd 260 F.3d 597 (7th Cir. 2001), "negligible," *United States v. Crisp*, 324 F.3d 261, 269 (4th Cir. 2003), "microscopic," *United States v. Mitchell*, 365 F.3d at 241 n.20, or even "very low," Def.'s Ex. Q, *Findings of Fact* at 22, without offering any evidence, calculations, or explanation of what leads to this characterization. *United States v. Crisp*, 324 F.3d 261, 274 (Michael, J., dissenting) ("an error rate must be demonstrated by reliable scientific studies, not by assumption.").

**C. The Practice in This Case Did Not Follow The Protocol For Analysis Through "Simultaneous Impressions."**

An independent audit of the latent fingerprint identification unit responsible for conducting the analysis at issue in this very case recently concluded that ACE-V "is a methodology that has become an industry standard and one that the Boston Police Department needs desperately to institute as soon as reasonably possible." Ron Smith & Associates, Inc. Letter to Capt. Thomas Dowd, Supervisor, Identification Division Boston Police Department (October 5, 2004) at 35 (Copy Attached in Appendix). Even accepting, for the sake of argument, the reliability of this method, it was not the practice of this unit to use it.

Moreover, by the terms of ACE-V itself, individualization through "simultaneous impressions" is impossible. Latent print examiners are mandated by their professional guidelines to phrase all conclusions which implicate the defendant as "individualizations." Scientific Working Group on Friction Ridge Analysis Study and Technology *Standards for Conclusions* ver. 1.0 Sept. 11

[http://www.swgfast.org/Standards\\_for\\_Conclusions\\_ver\\_1\\_0.pdf](http://www.swgfast.org/Standards_for_Conclusions_ver_1_0.pdf), last accessed May 26, 2005 (mandating that latent print examiners are permitted to testify to only three possible conclusions: individualization, inconclusive, or exclusion.) Insufficient detail must produce an “inconclusive” result. There is no protocol for aggregating inconclusive data to yield “individualization.” The prints in this case have been independently analyzed by the FBI and all but one was found to be of no value (that one excluded Terry Patterson). *See* Def.-Appellant’s Brief, Addendum at A-29 (FBI Latent Print Report, Feb. 17, 2005). If in fact this is an error free method, adding information of no value cannot yield an informative result.

**III. This Court Should Forthrightly Reject Fallacious Arguments that the Reliability of Latent Fingerprint Individualization Techniques has been Established.**

Courts asserting that the reliability of latent fingerprint individualization has been established rely on several arguments that misconstrue the hypothesis at issue, the process of scientific testing, or basic practices in social science research. As noted earlier, §I.C., *supra*, the uniqueness and permanence of friction ridge skin implies nothing about the accuracy of fingerprint Identification.

**A. Adversarial Testing is not Scientific Testing.**

Some courts have asserted that presentation of latent print testimony in court, by virtue of the adversarial process, constitutes testing of the reliability of that testimony. *United States v. Havvard*, 260 F.3d 597, 601 (7th Cir. 2001). This is simply wrong; the ground truth in a trial (i.e., who actually deposited a given impression) is not known. *United States v. Llera Plaza*, 179 F. Supp. 2d 492, 505 (E.D. Pa. 2002) (vacated and withdrawn) (“‘Adversarial’ testing is not. . . what the Supreme Court meant when it

discussed testing as an admissibility factor”); Zabell, *Fingerprint Evidence* at 169 (“it need hardly be said that mere courtroom use does not constitute validation.”). Belief in “adversarial testing” has led courts “to excuse fingerprint . . . analysis from the more careful scrutiny that scientific expert testimony must now withstand under *Daubert* . . . .” *United States v. Crisp*, 324 F.3d 261, 272 (Michael, J., dissenting.). If *Daubert* means anything at all, it must mean that ‘adversarial testing’ is not a substitute for other indicia of validity.

**B. Testability of Latent Fingerprint Analysis is not Testing.**

Recently, some courts have concluded that latent print evidence passes muster on the testing prong because it is testable, although it has not been tested. *United States v. Sullivan*, 246 F. Supp. 2d 700 (E.D. Ky. 2003); *United States v. Mitchell*, 365 F.3d 215 (3d Cir. 2004). *Daubert* recognizes actual, as opposed to potential, testing as a reliability factor. *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579, 593 (U.S. 1993) (“Ordinarily, a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested.”) Latent fingerprint examiners have been testifying for nearly a century to conclusions that are phrased in the strongest imaginable terms (individualization). It is hardly too soon to expect that their claims be tested rather than testable.

**C. The Unpublished “50K” Study Prepared in Expectation of Litigation to Show the Uniqueness of Fingerprints Demonstrates Nothing About the Reliability of Latent Print Examination.**

Some courts have asserted that the reliability of latent print individualization is supported, at least in part, by an unpublished study, known colloquially as the “50K study,” performed by the FBI in preparation for the *Mitchell Daubert* hearing. *United*

*States v. Mitchell*, 365 F.3d 215 (3d Cir. 2004). The trial court, in this case, credits Dr. Stoney's trenchant and fundamental criticisms of the study, but nonetheless treats the study as somehow supporting the reliability of latent print individualization. Def.'s Ex. Q, *Findings of Fact* at 6, 19.

This study concerns the individuality (or uniqueness) of human friction ridge skin, not the reliability of latent print individualization.<sup>27</sup> Moreover, this study has been severely criticized in the scholarly literature by numerous scholars from a variety of perspectives and disciplines. James L. Wayman, *When Bad Science Leads to Good Law: The Disturbing Irony of the Daubert Hearing in the Case of U.S. v. Byron C. Mitchell*, 4 BIOMETRICS IN THE HUMAN SERVICES USER GROUP NEWSLETTER, Jan., 2000, (available at: [http://www.engr.sjsu.edu/biometrics/publications\\_daubert.html](http://www.engr.sjsu.edu/biometrics/publications_daubert.html)); Stoney, *Measurement of Fingerprint Individuality*; Christophe Champod and Ian W. Evett, *A Probabilistic Approach to Fingerprint Evidence*, 51 J. FORENSIC IDENTIFICATION 101 (2001); Sharath Pankanti, Salil Prabhakar and Anil K. Jain, *On the Individuality of Fingerprints*, 24 IEEE TRANSACTIONS ON PAMI 1010 (2002); David H. Kaye, *Questioning a Courtroom Proof of the Uniqueness of Fingerprints*, 71 INTERNATIONAL STATISTICAL REVIEW 521 (2003); Zabell, *Fingerprint Evidence*. No scholar has defended the "50K study" in the scholarly literature or suggested it shows the *reliability*

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<sup>27</sup> The study's author admits as much.

Agent Meagher, denounces as "ill-informed" and "inappropriate" any effort to construe the "50K Study" as measuring error rate: "First, let me state what the study is not about and that may assist in clarifying some of the criticism. This is not a study on error rate or an effort to demonstrate what constitutes an identification." Letter from Stephen Meagher, FBI Agent, to James Randerson (Jan. 29, 2004) (on file with the author) (in response to James Randerson and Andy Coghlan); see also James Randerson & Andy Coghlan, *Forensic Evidence Stands Accused*, 181 NEW SCIENTIST 6 (2004).  
Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 1047, n. 314 (2005).

of latent fingerprint individualization, yet none of these *published* critiques has been cited, or even acknowledged, by any court addressing the question presented.

**D. The FBI Survey from the *Mitchell* case Shows Examiner Error Rate, the Absence of Credible, Scientifically Valid Proficiency Testing, and the Need for Such Testing.**

Some courts have interpreted the results of a 1999 survey of state crime laboratories, conducted by the FBI in preparation for the *Daubert* hearing in *Mitchell*, as supporting the reliability of latent print identification. *United States v. Mitchell*, 365 F.3d 215 (3d Cir. 2004). In fact, it does the opposite; it disproves both the reliability of examiners (i.e., agreement between examiners and labs) and their validity (i.e., accuracy). The FBI circulated two latent prints at issue in the case and the ten-print card of the defendant, Byron Mitchell, to fifty-two forensic laboratories. As the trial court correctly states, none of the laboratories attributed the latent prints to anyone other than Byron Mitchell, although not all of them attributed the prints to Mitchell (at least not on the first iteration of the survey). The trial court, though acknowledging that false negatives were produced in the study, asserts that “no jurisdiction returned a false positive result” and that this “does suggest that the error rate for ACE-V methodology is quite low.” Def.’s Ex. Q, *Findings of Fact* at 22.

According to its creator, however, the survey was designed to assess uniqueness of prints, not reliability of identification. “The concept of the survey was to support the basic premise of uniqueness. It had nothing to do with their ability to accurately compare or not.”<sup>28</sup> Of course, since the examiners had no opportunity to attribute the latents to anyone other than Mr. Mitchell, it is difficult to understand how the laboratories could

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<sup>28</sup> Testimony of Stephen Meagher at *Daubert* Hearing, Vol. IV, 4-46 – 4-47 (May 20, 2005).

have committed any so-called “false positives,” so the supposed finding of “no false positives” is of little empirical value.

Indeed, that this “study” would even be offered into evidence as the state-of-the-art of fingerprint validity research is perhaps what is most disturbing. Lawson aptly summarizes the lessons of this “experiment.”

The Mitchell experiment is significant in three important ways, as it highlights: 1) the lack of accuracy [i.e., reliability] among fingerprint examiners, specifically with regard to latent prints which are almost always the most incriminating type of fingerprint evidence used in a criminal case, e.g., the latent print found on the murder weapon; 2) the lack of scientific methodology employed within the “forensic science community,” evidenced by how Mr. Meagher administered the “survey” portion of the Mitchell experiment, the excuses he gave for the inaccurate results, and his attempt to “correct” the mistakes by telling the examiners what their findings should have been; and 3) the lack of any scientific study to establish the scientific validity of fingerprint identification was confirmed by the FBI’s mid-trial, haphazard “Mitchell Experiment” done in order to prove that fingerprint evidence is reliable. This experiment, albeit unintentionally, emphasized the fact that no real studies exist which scientifically analyze the accuracy of fingerprint identification.

Tamara Lawson, *Can Fingerprints Lie?: Re-Weighing Fingerprint Evidence In Criminal Jury Trials*, 31 AM.CRIM. L. J. 1, 42 (2003).

**E. The 1999 Mitchell Case No Longer Represents The Scientific and Scholarly Knowledge Concerning Latent Fingerprint Identification.**

While many courts (including the trial court) have simply entered the *Mitchell* hearing into the record as if it represents the current state of knowledge, the vast majority of scholars who have taken the trouble to make sufficient study of the problem to express any opinion at all have corroborated the position taken by Mr. Mitchell’s experts. Nearly everyone with a scientific background who has examined the Question Presented is in

general agreement with our view.<sup>29</sup> See 2 DAVID FAIGMAN, ET AL, MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY §27-2.3.1 at 386 (2nd ed. 2002). (“Woe to fingerprint practice were such [*Daubert* admissibility] criteria applied.”); Michael Saks, *Merlin and Solomon: Lessons from the Law’s Formative Encounters with Forensic Identification Science*, 49 HASTINGS L. J. 1069, 1106 (1998) (“By conventional scientific standards, any serious search for evidence of the validity of fingerprint identification is going to be disappointing. . . . A vote to admit fingerprints is a rejection of conventional science as the criterion for admission. A vote for science is a vote to exclude fingerprint expert opinions.”); James E. Starrs, *Judicial Control Over Scientific Supermen: Fingerprint Experts and Others Who Exceed the Bounds*, 35 CRIM. L. BULL. 234 (1999) (“Instead of meaning incapable of error, fingerprint identifications are declared to be infallible on account of the uniqueness of fingerprints to each person . . .”); David A. Stoney, *Measurement of Fingerprint Individuality*, in ADVANCES IN FINGERPRINT TECHNOLOGY 327, 383 (H. C. Lee and R. E. Gaensslen eds., 2001) (“From a statistical viewpoint, the scientific foundation for fingerprint individuality is incredibly weak.”); Jennifer L. Mnookin, *Fingerprint Evidence In An Age of DNA Profiling*, 67 BROOK. L. REV. 13 (2001) (“In the case of fingerprinting, the general rate of error is simply not known.”); SIMON A. COLE, SUSPECT IDENTITIES: A HISTORY OF FINGERPRINTING AND CRIMINAL IDENTIFICATION (2001); David L. Faigman, *Is Science Different for Lawyers?* 297 SCIENCE 339 (2002) (fingerprinting has “not been seriously tested”); Paul Giannelli, *Fingerprints Challenged!* 17 CRIM. JUST. 33, 35 (Spring 2002)

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<sup>29</sup> One dissenter is André Moenssens. See Moenssens, *Fingerprint Identification: A Valid Reliable “Forensic Science”?* 18 CRIM. JUST. 31 (2003). Amici respectfully suggest that an examination of this article shows that Professor Moenssens confuses the uniqueness of human friction ridge skin with the reliability of latent fingerprint individualization.

(“In its interpretation of *Daubert*, *Plaza I* is a well-written opinion. *Havvard* is not.”); Robert Epstein, *Fingerprints Meet Daubert: The Myth of Fingerprint “Science” is Revealed*, 75 SO. CAL. L. REV. 605, 657 (2002) (“Having considered the various indicators of reliability set forth by the Supreme Court in *Daubert*, it is evident that at the present time, latent fingerprint identifications do not constitute reliable evidence.”); Jessica M. Sombat, *Latent Justice: Daubert’s Impact on the Evaluation of Fingerprint Identification Testimony*, 70 FORDHAM L. REV. 2819, 2825 (2002) (“the result Judge Pollak reached when he excluded expert testimony concerning fingerprints [in *Llera Plaza I*] was fair.”); *Recent Case*, 115 HARV. L. REV. 2349, 2352 (2002) (“Fingerprint expert testimony does not survive application of the Daubert factors . . .”); Lyn Haber and Ralph Norman Haber, *Error Rates for Human Fingerprint Examiners*, in AUTOMATIC FINGERPRINT RECOGNITION SYSTEMS 339 (N. K. Ratha and R. Bolle eds., 2004) (“no data have been collected on how accurately latent print examiners match different images of the same finger.”); Donald Kennedy, *Forensic Science: Oxymoron?* 302 SCIENCE 1625 (2003) (Fingerprinting’s “reliability is unverified either by statistical models of fingerprint variation or by consistent data on error rates.”); David H. Kaye, *The Nonscience of Fingerprinting: United States v. Llera Plaza*, 21 QLR 1073, 1087 (2003) (“As *Llera-Plaza I* so clearly reveals, this [the evidence advanced in support of the admissibility of latent fingerprint individualization] does not satisfy *Daubert*.”); Jennifer L. Mnookin, *Fingerprints: Not a Gold Standard*, 20 ISSUES IN SCI. & TECH. 47 (2003) (“Judge Pollak’s first opinion [restricting latent fingerprint individualization testimony] was the better one.”); Tamara F. Lawson, *Can Fingerprints Lie? Re-weighing Fingerprint Evidence in Criminal Jury Trials*, 31 AM. J. CRIM. L. 1, 65 (2003)

(“Currently fingerprint analysis is under attack because of the lack of study done on the accuracy of the examiners . . .”); Tara Marie La Morte, *Sleeping Gatekeepers: United States v. Llera Plaza and the Unreliability of Forensic Fingerprinting Evidence under Daubert*, 14 ALB. L.J. SCI. & TECH. 171, 173 (2003) (discussing “strong indications that the fingerprinting field should not survive a rigorous Daubert analysis.”); JANE CAMPBELL MORIARTY, PSYCHOLOGICAL AND SCIENTIFIC EVIDENCE IN CRIMINAL TRIALS, §12:15 (2004) (“The assumption of the validity of fingerprinting rests upon law, rather than science.”); Simon A. Cole, *Grandfathering Evidence: Fingerprint Admissibility Ruling from Jennings to Llera Plaza and Back Again*, 41 AM. CRIM. L. REV. 1189, 1215 (2004) (“It is clear that no studies exist that measure the accuracy of fingerprint examiners when they make conclusions of identification.”); Nathan Benedict, *Fingerprints and the Daubert Standard for Admission of Scientific Evidence: Why Fingerprints Fail and a Proposed Remedy*, 46 ARIZ. L. REV. 519, 538 (2004) (“ . . . judges have generally relied on their instincts and the long history of judicial acceptance of fingerprint evidence to admit it without serious consideration of the science behind it.”); Sandy L. Zabell, *Fingerprint Evidence*, 13 J. L. & POL’Y 143, 178 (2005) (“*ACE-V is an acronym, not a methodology.*”) (Original emphasis).

#### **IV. Evidentiary Implications of the Lack of Reliability**

The Court has several options in crafting an appropriate evidentiary rule to address the shortcomings of latent fingerprint examiners’ testimony.

##### **A. Preclude Testimony based on the Simultaneous Impressions Method of Individualization.**

Amici believe that the shortcomings of the simultaneous impressions method, in terms of its lack of specification, validation, standards for implementation, quantifiability,

and general acceptance combine to leave its reliability far from established. Acceptance of simultaneous impressions testimony would suggest other types of identification testimony could be based on aggregating multiple separate characteristics.

**B. Preclude Testimony Concerning “Zero Error Rate” of Latent Fingerprint Identification and Identification with “100% Confidence.”**

Amici believe that the absence of controlled proficiency tests, the evidence from the limited proficiency testing, and the demonstrable cases of latent fingerprint misattribution establish a non-zero error rate that cannot be entirely ascribed to “practitioner error.” The trial court concluded as much, rejecting the claim of zero error rate. Def.’s Ex. Q, *Findings of Fact* at 22. Equally improper under these circumstances is testimony of identification with “100% confidence,” which is clearly misplaced in a system that produces errors. Whatever testimony by latent print examiners is admitted, the Court should preclude any latent fingerprint identification testimony concerning methodological accuracy of “zero error rate” and identifications with “100 % confidence,” as these mischaracterize the practices at issue and give a demonstrably false impression to the fact-finder.

**C. Preclude Testimony Concerning Fingerprint “Individualization” or “Matches” without Testimony Concerning Population Base Rates for Fingerprint Characteristics or Proficiency Test Data for Examiners.**

Amici believe that testimony in terms of “individualization” or “matches,” without the underlying study of the base rates of the characteristics from which such conclusions are ostensibly drawn, or proficiency tests data for examiners, is misleading and fundamentally unsound. This does not mean that testimony detailing the comparison of prints by examiners would have to be excluded. This is the approach that some courts

have taken with the forensic science of handwriting identification, which similarly lacks a corpus of research that would permit valid statements of individuation. *See United States v. Hines*, 55 F.Supp.2d 62 (D. Mass. 1999) (District Court admitted expert testimony identifying similarities and differences between known and unknown documents, but excluded document examiner’s inferences of authorship based on those similarities.); *United States v. Santillon*, 1999 WL 1201765 (N.D. Cal. 1999) (Same); *United States v. Rutherford*, 104 F.Supp.2d 1190 (D.Neb. 2000) (Same); *United States v. Brown*, No. CR-184ABC (C.D. Cal. Dec. 1, 1999); see also *United States v. Fuji*, 152 F.Supp.2d 939 (N.D. Ill. 2000) (District Court excluded handwriting expertise in its entirety under *Daubert* and *Kumho Tire.*); *United States v. Saelee*, 162 F.Supp.2d 1097 (D.Alaska, 2001) (Same). Under *Daubert*, no length of history or amount of veneration is enough without testing, when such testing is eminently doable.

**D. Instruct the Fact Finder on the Absence of Data Concerning Population Base Rates and the Absence of Proficiency Tests of Latent Fingerprint Examiners.**

Even if the Court finds the reliability of latent fingerprint individualization has been established, the testimony of latent print examiners inevitably suggests that there is a basis for their conclusions – either in population base rate studies, proficiency data, or both. These implications are untrue, and fact-finders should be made aware of them. A jury instruction about the meaning of “expert testimony” should, in this case, be accompanied by one explaining that the typical inference that would flow from such a description do not apply. *See, e.g., Utah v. Quintana*, 103 P.3d 168, 170 (Utah Ct. App. 2004) (Thorne, J. concurring) (“trial courts should be directed to instruct juries about the existing weaknesses of fingerprint examiner training and identification protocol”).

## CONCLUSION

For the foregoing reasons, Amici respectfully urge the Court to reverse the decision of the trial court finding that latent fingerprint individualization using ACE-V methodology as applied to simultaneous impressions is sufficiently reliable to be admitted in accordance with *Commonwealth v. Lanigan*, to preclude testimony by fingerprint examiners concerning a “zero error rate” or “100% confidence” of latent fingerprint identification, to preclude testimony by fingerprint examiners concerning “individualization” or “matches” of latent fingerprints without testimony concerning population base rates for fingerprint characteristics or proficiency test data for examiners, and to require that testimony by latent fingerprint examiners be accompanied by a jury instruction concerning the absence of data concerning population base rates and the absence of proficiency tests of latent fingerprint examiners.

Respectfully submitted,

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DATED:

Certification of Service and Compliance with Appellate Rules

I hereby certify that this brief complies with the MA Rules of Appellate Procedure, and that I have today mailed two copies each of the brief and Appendix, first class prepaid postage, to John H. Cuhna, Jr., Cuhna & Holcomb, P.C., One State Street, Suite 500, Boston, MA 02109-3507, and to David E. Meier, Assistant District Attorney, Chief of the Homicide Unit, Suffolk County District Attorney, One Bullfinch Place, Boston, MA 02114.

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