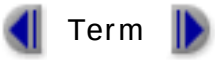



COMMONWEALTH *vs.* Terry L. PATTERSON.

SJC-09478

September 7, 2005. - December 27, 2005.

Present: Marshall, C.J., Greaney, Ireland, Spina, Cowin, Sosman, & Cordy, JJ.

*Evidence,* Fingerprints, Scientific test, Expert opinion.

INDICTMENTS found and returned in the Superior Court Department on October 27, 1993.

After review by this court, 432 Mass. 767 (2000), a pretrial motion to suppress evidence was heard by *Margaret R. Hinkle,* J., and a question of law was reported by her to the Appeals Court.

The Supreme Judicial Court granted an application for direct appellate review.

*John H. Cunha, Jr.* (*Helen Holcomb & Charles Allan Hope* with him) for the defendant.

*Donna Jalbert Patalano,* Assistant District Attorney, for the Commonwealth.

The following submitted briefs for amici curiae:

*Robert C. Cosgrove,* Assistant District Attorney, for District Attorney for the Berkshire District & others.

*David M. Siegel, Stanley Z. Fisher, & Daniel Givelber* for New England Innocence Project & others.

*Lisa J. Steele* for National Association of Criminal Defense Lawyers & others.

*LaDonna J. Hatton & Christopher Pohl,* Special Assistant Attorneys General, for Secretary of Public Safety.

CORDY, J.

In 1995, Terry L. Patterson was convicted of the murder of a Boston police detective. [FN1] His conviction was based in large part on the expert testimony of a member of the Boston police latent fingerprint section, who used the most common method of latent fingerprint identification, ACE-V, [FN2] to determine that four latent impressions found on the victim's vehicle were left by Patterson. While no single latent impression, on its own, could reliably be matched to its allegedly corresponding finger, the fingerprint examiner based his testimony on the cumulative similarities observed between the impressions and their corresponding fingers. The examiner opined that the four impressions could be analyzed collectively because he believed them to be simultaneous impressions, that is, impressions of multiple fingers made by the same hand at the same time.

After this court set aside Patterson's convictions on a ground not relevant to this appeal, see *Commonwealth v. Patterson,* 432 Mass. 767, 768 (2000), Patterson moved to exclude all fingerprint evidence from his retrial because, in his view, the Commonwealth's latent fingerprint identification evidence was unreliable and thus inadmissible under *Daubert v. Merrell Dow Pharms., Inc.,* 509 U.S. 579 (1993) (*Daubert* ), and *Commonwealth v. Lanigan,* 419 Mass. 15 (1994) (*Lanigan* ). After conducting an evidentiary hearing, a Superior Court judge denied Patterson's motion and reported the issue to the Appeals Court. We granted Patterson's application for direct appellate review to determine whether the judge abused her discretion in finding that the Commonwealth had established the reliability of its latent fingerprint identification evidence.

Consistent with the decisions of other courts that have considered the issue since *Daubert,* we conclude that the underlying theory and process of latent fingerprint identification, and the ACE-V method in particular, are sufficiently reliable to admit expert opinion testimony regarding the matching of a latent impression with a full fingerprint. In this case, however, the Commonwealth needed to establish more than the general reliability of latent fingerprint identification. It needed to establish that the theory, process, and method of latent fingerprint identification could be applied reliably to simultaneous impressions not capable of being individually matched to any of the fingers that supposedly made them. On the record before the judge below, the Commonwealth failed to meet its burden. [FN3]

1. *Background.* Before addressing the legal claims, we will briefly lay out the theory behind and modern application of latent fingerprint identification as well as the factual history of this case. We rely principally on the findings of fact made by the motion judge in connection with Patterson's motion to exclude the fingerprint evidence and on the transcript of the previous trial.

a. *Latent fingerprint identification theory.* Fingerprint evidence has been used extensively in criminal investigations and trials for more than one hundred years. Fingerprints are left by the deposit of oil on contact between a surface and the friction ridges of a finger. Latent fingerprints are fingerprint impressions that are not visible to the naked eye without chemical enhancement. These latent print impressions are almost always partial and may be distorted due to less than full, static contact with the object and to debris covering or altering the latent impression.

The theory behind latent fingerprint identification, called "individualization," is that a positive identification can result from the comparison of two fingerprints containing sufficient quality and quantity of detail. The underlying premise of this theory is the uniqueness and permanence of human friction ridge arrangements--that no two fingers, even on the same hand of the same person, contain the same ridge pattern. This uniqueness begins during prenatal development, when a template of the ridge patterns appears on the skin, and absent damage to the template, remains in the same exact form throughout one's life. A fingerprint should accordingly only match one finger of one person in the world.

b. *The process of identification (ACE-V).* The uniqueness of two full fingerprints does not, in and of itself, prove that one small portion of a fingerprint cannot mirror one portion of another fingerprint. And because latent print impressions left at crime scenes are often partial impressions of a full fingerprint, subject to significant distortions, it is a question of significant dispute as to how much detail in the latent print must be demonstrable to assert reliably its identity with a known fingerprint. Consequently, law enforcement and forensic scientists have endeavored to create and refine the method by which they identify the true "owner" of latent print impressions. A latent fingerprint impression lifted from a crime scene is compared to a full exemplar print taken from the suspect under controlled circumstances by dipping his finger in ink and slowly impressing his entire finger on a card in order to ensure full transcription of the finger. Matches of a latent print to a full print are made in several ways. A latent print can be processed through a computerized system that compares it to a rather large database of known full prints. Alternatively, a set of a suspect's fully inked fingerprints can be given to an examiner for comparison purposes. Either way, the fingerprint examiner ultimately compares the latent print to its potentially matching full print using a method known as ACE-V (analysis, comparison, evaluation, and verification). [FN4]

In the analysis stage of ACE-V, the examiner looks at the first of three levels of detail ("level one") on the latent print. Level one detail involves the general ridge flow of a fingerprint, that is, the pattern of loops, arches, and whorls visible to the naked eye. The examiner compares this information to the exemplar print in an attempt to exclude a print that has very clear dissimilarities. At this stage, the examiner also looks for focal points--or points of interest--on the latent print that could help prove or disprove a match. Such focal points are often at the boundaries between different ridges in the print. The examiner will then collect level two and level three detail information about the focal points he has observed. Level two details include ridge characteristics (or Galton Points) like islands, dots, and forks, formed as the ridges begin, end, join or bifurcate. Level three details involve microscopic ridge attributes such as the width of a ridge, the shape of its edge, or the presence of a sweat pore near a particular ridge.

In the comparison stage, the examiner compares the level one, two, and three details of the focal points found on the latent print with the full print, paying attention to each characteristic's location, type, direction, and relationship to one another. The comparison step is a somewhat objective process, as the examiner simply adds up and records the quantity and quality of similarities he sees between the prints. In the evaluation stage, by contrast, the examiner relies on his subjective judgment to determine whether the quality and quantity of those similarities are sufficient to make an identification, an exclusion, or neither.

While some jurisdictions require (or used to require) a minimum number of Galton point similarities to declare an individual match between a latent and full print, most agencies in the United States no longer mandate any specific number. [FN5] Rather, the examiner uses his expertise, experience, and training to make a final determination. There is a rule of examination, the "one-discrepancy" rule, that provides that a nonidentification finding should be made if a single discrepancy exists. However, the examiner has the discretion to ignore a possible discrepancy if he concludes, based on his experience and the application of various factors, that the discrepancy might have been caused by distortions of the fingerprint at the time it was made or at the time it was collected.

Assuming a positive identification is made by the first examiner, the verification step of the process involves a second examiner, who knows that a preliminary match has been made and who knows the identity of the suspect, repeating the first three steps of the process.

c. *Simultaneous impressions.* The ACE-V method is usually employed to match one latent fingerprint impression to one fully inked fingerprint. Often, however, a person leaves latent impressions of multiple fingers on objects that he touches. Such fingerprint impressions left by the same person at the same time are referred to as simultaneous impressions. A difficulty arises when no single latent impression in the cluster of simultaneous impressions has a sufficient quantity or quality of similar detail to be matched reliably to a single fully inked fingerprint using the ACE-V approach. In such cases, some fingerprint examiners have applied the ACE-V method to identify suspects based on the aggregate number of similarities between latent and full impressions of multiple fingers.

For example, assume five latent fingerprint impressions are found on a table in a manner that suggests they were left by a person placing his full hand down on that table. If each of those prints had only three points of similarity of moderate quality relative to a corresponding fully inked fingerprint, an examiner who requires eight similarity points of moderate detail to make an identification would not be able to match any individual impression to any individual fully inked fingerprint. If the examiner applied ACE-V collectively to the simultaneous impressions, however, he might conclude that fifteen points of similarity (five fingers with three similarity points per finger) between the impressions left on the table and a suspect's hand signifies a definite match. A fingerprint examiner would first have to use his expertise, experience, and training to determine whether the several latent impressions were in fact created simultaneously. In doing so, the examiner apparently may take into account the distance separating the latent impressions, the orientation of the impressions, the pressure used to make the impression, and any other facts the examiner deems relevant. The record does not, however, indicate

that there is any approved standardized method for making the determination that two or more print impressions have been made simultaneously.

d. *Factual history.* On September 26, 1993, the body of Detective John Mulligan of the Boston police department was found in his truck outside a Walgreens store in the Roslindale section of Boston. Detective Mulligan, who performed paid security work for the store, had been shot five times at extremely close range. Detective Mulligan's department-issued sidearm was missing from his holster. A store employee saw Detective Mulligan asleep in his truck at 3:30 *A.M.* and found him dead with a bloodied face fifteen minutes later. Several witnesses recalled seeing two black men near the Walgreens in the early morning of September 26, but none could offer more than a very vague and general description of those men. On October 27, 1993, Patterson was indicted for armed robbery, two counts of possession of a dangerous weapon, and the murder of Detective Mulligan. At trial, the Commonwealth argued that two men, one of whom was Patterson, happened on the sleeping detective and seized the opportunity to rob him of his firearm.

The Commonwealth introduced evidence, through the testimony of Robert Foilb of the Boston police latent fingerprint section, that four latent fingerprint impressions recovered from the window of the driver's door of Detective Mulligan's truck were made simultaneously by four fingers on Patterson's left hand as he closed the driver's door. Foilb explained that the location of the print impressions in relation to each other and the direction and manner in which they each streaked on the glass reinforced his belief that they were left by multiple fingers of the same hand at the same time. Comparing these prints to inked fingerprints of all ten of Patterson's fingers, Foilb concluded that the four prints corresponded to the little finger, ring finger, middle finger, and index finger of Patterson's left hand.

On cross-examination, Foilb testified that the locally accepted norm for successfully matching a latent print to a full fingerprint was eight points of similarity. He conceded that none of the four latent fingerprints contained enough similarity with the fully inked print of Patterson's corresponding finger to satisfy this generally accepted minimum norm and be individually matched. Notwithstanding this concession, Foilb opined that he could conclusively determine that the four simultaneous print impressions were those of Patterson because the sum of the points of similarity on the four fingers, which he determined respectively to be six, five, two, and zero, totaled thirteen--thus exceeding the eight point similarity standard. He testified that the similarities found in simultaneous impressions "can be counted as a total number because there is no other way to have those fingerprints put on an object."

On February 1, 1995, a jury convicted Patterson on all charges. On December 6, 2000, his convictions were reversed because of a conflict of interest that deprived Patterson of the effective assistance of counsel at trial. See *Commonwealth v. Patterson,* 432 Mass. 767, 781 (2000). Noting that "the evidence was sufficient to support the convictions," *id.* at 768, this court remanded the case to Superior Court for a new trial. See *id.* at 781.

On October 11, 2002, Patterson filed a motion in limine to exclude all fingerprint evidence from his retrial. The Commonwealth sought to offer latent fingerprint identification evidence similar to the evidence it presented at Patterson's first trial for the purpose of placing him at the scene of the crime, including testimony regarding the four supposedly simultaneous impressions. [FN6] Patterson argued that the Commonwealth's latent fingerprint identification failed to meet the *Daubert* reliability standard governing the admissibility of expert opinion testimony that this court adopted in *Lanigan, supra.* He also contended that the ACE-V methodology was an unreliable application of the theory of latent fingerprint identification. Finally, he argued that even if the judge found the ACE-V process to be reliable in matching one particular latent print of a finger to a fully inked print of the same finger, this method was still unreliable when applied to cases of simultaneous impressions in which none of the individual prints could be separately matched. In May, 2004, a judge in the Superior Court held a *Daubert-Lanigan* hearing over five days, which included live testimony from two witnesses, affidavits, previously recorded expert testimony from other cases, and a large number of exhibits. [FN7] The Commonwealth offered live testimony of Supervisory Fingerprint Specialist Stephen Meagher of the

Federal Bureau of Investigation (FBI) and transcripts of testimony given at a similar hearing, see *United States v. Mitchell,* 365 F.3d 215 (3d Cir.2004), by Royal Canadian Mounted Police Fingerprint Examiner David R. Ashbaugh and noted biological anthropologist Dr. William J. Babler. Patterson offered the live testimony of George Washington University professor of forensic sciences James E. Starrs and the transcripts of testimony of David Stoney, a doctor of forensic sciences from the University of California at Berkeley, and Simon A. Cole, who has a doctorate in science and technology from Cornell University, also given in the *Mitchell* case.

e. *The judge's original order.* On October 12, 2004, the motion judge issued a detailed order (original order) denying Patterson's motion. In her order, the judge explained that the admissibility of expert testimony depended on the reliability of the theory and methodology that the expert used to reach an opinion. The judge relied on the test established in *Daubert* to determine the reliability of latent fingerprint identification theory and the ACE-V methodology. While recognizing that the test for reliability was flexible and did not necessarily require an examination of all or even most of the five factors that *Daubert* recognized as potentially relevant to such an inquiry, she carefully and thoroughly applied each factor to latent fingerprint identification theory and to the ACE-V methodology. Those factors are: (1) whether the testimony's underlying theory and application is generally accepted in the relevant scientific-technical community, (2) whether the theory and application have been or can be subjected to testing, (3) whether they have been subjected to peer review and publication, (4) whether the application has an unacceptably high known or potential error rate, and (5) whether the application is governed by recognized standards.

The judge first concluded that both latent fingerprint identification theory in general and the ACE-V methodology in particular are generally accepted in the fingerprint examiner community. [FN8] For support, she pointed to an FBI survey of fifty-three domestic and foreign jurisdictions that confirmed the unanimous and long-standing acceptance of latent fingerprint identification theory. Similarly, she found that there existed "overwhelming support for ACE-V in the forensic identification community." She rejected Patterson's contention that the community was not broad enough to count as a relevant community for *Daubert* purposes. Finally, the judge noted the long and virtually universal history of court acceptance of fingerprint identification evidence.

Despite recognizing that *Lanigan* posited that "general acceptance" would often be the only factor necessary to the inquiry, the judge proceeded to address the other *Daubert* factors, beginning with the testability of latent fingerprint identification theory and the ACE-V methodology. She concluded that, although the theory underlying latent fingerprint identification-- uniqueness and permanence of fingerprints--is testable and has been successfully tested, the notion that a person can be positively identified from an individual latent fingerprint impression that contains sufficient quantity and quality of ridge detail is somewhat less testable. The judge noted that ACE-V defies easy testing because it does not require a minimum number of similarities, but rather operates on a subjective sliding scale. The judge also explained that an FBI study that matched 50,000 simulated latent prints against 50,000 full prints with no false positives was not particularly helpful. She considered it to be a flawed test because the simulated latent prints were not subject to real world distortions. The judge ultimately discounted the testability problem, however, because the print matches used in court are usually accompanied by expert testimony that establishes the number of similarities observed between the latent and full print and can form the basis of testing by the opposition's independent examiner.

The judge next concluded that the ACE-V methodology had been subjected to limited peer review in forensic publications and during the process of formalizing the ACE-V guidelines by the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST). [FN9] However, the judge disagreed with the Commonwealth that the verification procedure, which she described as illusory, constituted peer review, and thus found that this factor only slightly favored admission of the evidence.

Turning to error rate, the judge found the ACE-V error rate for false positive identifications to be very low. Relying largely on an extensive FBI survey in which no State agency returned a false positive

when attempting to match a set of latent prints against seventy million full ten-prints records, the judge noted that recent high profile cases of misidentification do not alter the over-all low error rate. She similarly discounted evidence of poor scores that examiners sometimes receive on routine proficiency tests administered by their respective agencies.

Finally, the judge concluded that ACE-V is controlled by appropriate standards despite the lack of a uniform, minimum number of similarities requisite to declaring a match. The judge determined that the rigorous qualification and training standards normally required for FBI fingerprint examiners help to control the operation of ACE-V, which itself is a relatively uniform procedure. With the *Daubert* factors generally favoring admission, the judge denied Patterson's motion to exclude the Commonwealth's fingerprint evidence identifying Patterson as the person who left four simultaneous impressions on the door of the victim's truck.

f. *The judge's supplemental order.* On November 29, 2004, the judge issued a four-page supplemental order, in which she acknowledged that her previous decision "did not explicitly address the reliability of the process of making an identification based on 'simultaneous' impressions." She concluded that the application of ACE-V to simultaneous impressions was sufficiently reliable to be admitted. This conclusion was based primarily on Agent Meagher's testimony that the use of simultaneous impressions positively to identify a person "involves the exact process involved in individualizing a single latent print, simply applying ACE-V to the composite of level one, two, and three detail of multiple prints from the same hand." The judge added that the use of a fingerprint examiner's judgment to determine whether multiple impressions were deposited simultaneously does not make the process unreliable. The judge also noted that Agent Meagher testified that the use of ACE-V in situations of simultaneous impressions was generally accepted in the community of fingerprint examiners, and found that fingerprint examiners in Great Britain sometimes use a similar approach. The judge acknowledged, however, that one of the Commonwealth's witnesses, Royal Canadian Mounted Police Fingerprint Examiner David Ashbaugh, was of the view that the application of ACE-V to simultaneous impressions is a "hodgepodge" approach not based on any science. Finally, the judge found that the absence of a specific peer-reviewed study or published article validating the use of ACE-V in situations of simultaneous impressions is not fatal to its admissibility, as reliability can be shown through other *Daubert* factors.

To the extent that the judge performed a separate factor-by-factor *Daubert* analysis of the application of ACE-V to simultaneous impressions, her analysis was implied and brief. This is apparent when her supplemental order is compared to her painstaking review of the record in her original order. The most plausible reading of the judge's supplemental order is that she found the application of ACE-V to simultaneous impressions sufficiently reliable because she concluded that it did not differ in any significant way from the use of ACE-V to match a single latent fingerprint impression.

g. *Reservation and report.* On January 14, 2005, the judge reserved and reported her orders to the Appeals Court because, in her view, the question of admissibility of fingerprint evidence in this case is both important and doubtful. See Mass. R.Crim. P. 34, 378 Mass. 905 (1979).

2. *Discussion.* Trial judges serve a gatekeeper function with respect to expert opinion testimony based on specialized knowledge. See *Lanigan, supra* at 26. "If the process or theory underlying [an] ... expert's opinion lacks reliability, that opinion should not reach the trier of fact." [FN10] *Id.*

a. *Standard of review.* We review a judge's *Lanigan* decision for abuse of discretion. See *General Elec. Co. v. Joiner,* 522 U.S. 136, 141-143 (1997); *Canavan's Case,* 432 Mass. 304, 311-312 (2000). While our review under this standard is deferential and limited, it is not perfunctory. A judge's findings must apply the correct legal standard to the facts of the case and must be supported by an examination of the record. See *id.* at 312 ("applying an abuse of discretion standard on appellate review will allow trial judges the needed discretion to conduct the inherently fact-intensive and flexible *Lanigan* analysis, while preserving a sufficient degree of appellate review to assure that *Lanigan* determinations are consistent with the law and supported by a sufficient factual basis in the particular case").

b. *The* Lanigan *analysis.* In *Daubert,* the United States Supreme Court announced a new test to govern the admissibility in Federal courts of expert testimony based on scientific, technical, and other specialized knowledge.

> [FN11] While the most common pre-*Daubert* test, set forth in *Frye v. United States,* 293 F. 1013 (D.C.Cir.1923) (*Frye* ), required the theory and methodology in question to be generally accepted by a relevant scientific community, the new, more flexible standard laid out five factors that a court might consider in a determination of reliability in the totality of the circumstances. *Daubert, supra* at 593-594. The *Frye* general acceptance test became simply one of the five factors in the *Daubert* test. See *Lanigan, supra* at 25 ("In its *Daubert* opinion, the Court recognized that general acceptance ... was a relevant factor in determining ... admissibility.... But such acceptance, the essential ingredient of the *Frye* principle, is not the sole test" [citation omitted] ).

Massachusetts historically hewed to the *Frye* general acceptance test. See *Lanigan, supra* at 24, quoting *Commonwealth v. Curnin,* 409 Mass. 218, 222 (1991) ("Our test ... has usually been ... 'whether the community of scientists involved generally accepts the theory or process' "). In *Lanigan, supra* at 25-26, however, we adopted, in part, the new *Daubert* standard. In so doing, we cautioned that "general acceptance in the relevant ... community will continue to be the significant, and often the only, issue." *Id.* at 26.

*Lanigan* 's progeny make clear that general acceptance in the relevant community of the theory and process on which an expert's testimony is based, on its own, continues to be sufficient to establish the requisite reliability for admission in Massachusetts courts regardless of other *Daubert* factors. See *Commonwealth v. Sands,* 424 Mass. 184, 185-186 (1997) ("party seeking to introduce scientific evidence may lay a foundation either by showing that the underlying scientific theory is generally accepted within the relevant scientific community, *or* by showing that the theory is reliable or valid through other means" [emphasis added] ); *Canavan's Case, supra* at 310 (*Lanigan* 's partial adoption of *Daubert* was merely "to account for [the] circumstance" where "strict adherence to the *Frye* test" caused otherwise reliable evidence to be excluded because it had not yet become generally accepted). See also *Commonwealth v. Senior,* 433 Mass. 453, 458-459 (2001) (same). Where general acceptance is not established by the party offering the expert testimony, a full *Daubert* analysis provides an alternate method of establishing reliability. See *Lanigan, supra* at 26 ("proponent of scientific opinion evidence may demonstrate the reliability or validity of the underlying scientific theory or process by some other means, that is, without establishing general acceptance"). See also *Commonwealth v. Sands, supra* at 186 n. 1 (the absence of general acceptance is simply "a factor for the court to consider" in its subsequent *Daubert* analysis).

c. *Reliability of latent fingerprint identification and ACE-V in general.* The judge acted well within her discretion in concluding that latent fingerprint identification theory is generally accepted in the community of fingerprint examiners. [FN12] At the hearing, the Commonwealth presented a 1999 survey, conducted by Agent Meagher, confirming that the top law enforcement agencies in all fifty States, the District of Columbia, Canada, and England accept the theory of latent fingerprint identification. Each jurisdiction reported

that it accepted the use of both fully recorded and latent fingerprints as a positive means of identification. This survey is a sufficient basis on which the judge could have concluded there to be general acceptance of the theory in the fingerprint examiner community. See *United States v. Mitchell,* 365 F.3d 215, 241 (3d Cir.2004) ("The answer" to whether fingerprint identification is generally accepted in forensic community "is yes, as demonstrated by the results of the FBI's survey of state agencies"). Other evidence before the judge, and findings reported in other cases, reveal that fingerprint experts from countries around the world also accept and apply the theory of latent fingerprint identification. See *id.* at 222; *United States v. Llera Plaza,* 188 F.Supp.2d. 549, 555, 566-567 (E.D.Pa.2002).

The judge's additional conclusion that the ACE-V methodology used to compare a latent fingerprint impression to a fully inked fingerprint is generally accepted is also adequately supported by the record. Agent Meagher represented, and it was not disputed, that ACE-V is the standard methodology used throughout the United States and other parts of the world. Supporting Agent Meagher's testimony, the record establishes that SWGFAST has, after multiple levels of debate and peer review by its own members and the International Association for Identification (IAI), adopted and published fingerprint identification standards setting forth the ACE-V methodology.

Notably, Patterson does not dispute the assertion that the fingerprint examiner community generally accepts either latent fingerprint identification theory or the ACE-V methodology. Rather, he argues that this community is not sufficiently broad to constitute "a relevant scientific community" for purposes of gauging general acceptance, and that the problem is acute because the fingerprint examiner community lacks financially disinterested academics and is prone to stifling dissent.

Given that *Lanigan* applies to technical evidence as well as scientific evidence, *Canavan's Case,* 432 Mass. 304, 313 (2000), we do not concern ourselves with whether fingerprint examiners are scientists or technicians. See *United States v. Mitchell, supra* at 241 (rejecting argument that "there is no scientific community that generally accepts fingerprint identification" because "the scientific/nonscientific distinction is irrelevant after [*Kumho Tire Co.* v. *Carmichael,* 526 U.S. 137 (1999) ]"); *United States v. Llera Plaza, supra* at 563, quoting Fed.R.Evid. 702 ("the fingerprint community's 'general acceptance' of ACE-V should not be discounted because fingerprint specialists ... have 'technical ... knowledge' ... rather than 'scientific ... knowledge' ... and hence are not members of what *Daubert* termed a scientific community"). A technical community, or a community of experts who have some other specialized knowledge, can qualify as a relevant *Daubert* community in the same way a scientific community can.

We are, however, cognizant of the need to define the relevant community. In *Canavan's Case,* this court explained that "[a] relevant scientific community must be defined broadly enough to include a sufficiently broad sample of scientists so that the possibility of disagreement exists," and we cautioned trial judges not to "define the 'relevant scientific community' so narrowly that the expert's opinion will inevitably be considered generally accepted." *Id.* at 314 n. 6. In the context of technical forensic evidence, the community must be sufficiently broad to permit the potential for dissent.

The judge properly ensured that the technical community in which latent fingerprint identification and ACE-V is generally accepted is broad enough to include "some practitioners who acknowledge flaws in the methodology" and tolerant enough to allow "some, albeit, limited room for dissent." For example, the guidelines and standards developed by SWGFAST committees are subject to repeated discussion, critique, and debate by the entire SWGFAST community and by members of the IAI. Additional room for disagreement lies in the ongoing debate over how many points of similarity, if any, are needed to conclusively make a match. See *United States v. Llera Plaza, supra* at 567. Further, as we will discuss below, even one of the fingerprint examiners whose testimony in the *Mitchell* case was offered by the Commonwealth--David Ashbaugh--registered objection to the particular application of ACE-V that the Commonwealth is seeking to use in this case.

We cannot conclude that the judge abused her discretion in finding that the community allowed enough room for and had enough debate to be considered a relevant technical community. This finding has support in the unanimity with which modern courts have concluded that latent fingerprint identification theory and ACE-V are generally accepted by the fingerprint examiner community and that that community qualifies as a relevant community for *Daubert* purposes. Cf. *Commonwealth v. Senior,* 433 Mass. 453, 461-462 (2001) ("Given the evidence of reliability presented by the Commonwealth, and the admissibility of similar evidence in other jurisdictions, the judge did not abuse his discretion in finding that the evidence ... was sufficiently reliable"). See, e.g., *United States v. Mitchell, supra* at 241 (concluding fingerprint identification is generally accepted in forensic community); *United States v. Crisp,* 324 F.3d 261, 268-269 (4th Cir.2002), cert. denied, 540 U.S. 888 (2003), quoting *United States v. Starzecpyzel,* 880 F.Supp. 1027, 1038 (S.D.N.Y.1995) (rejecting claim that general acceptance of fingerprint identification in expert community should be discounted because community "is devoid of financially disinterested parties such as academics"); *United States v. Sullivan,* 246 F. Supp.2d 700, 702-703 (E.D.Ky.2003) ("ACE-V methodology easily satisfies the general acceptance factor of *Daubert.* ... *Daubert* requires the court to consider whether ACE-V has been accepted by a substantial portion of the pertinent scientific or technical community"); *United States v. Llera Plaza, supra* at 563-564 (accepting as relevant community fingerprint specialists with technical or specialized knowledge). The defendant has given us no reason to reject the common judicial wisdom that considers the fingerprint examiner community a relevant community for *Daubert* purposes.

Because both latent fingerprint identification theory and the use of ACE-V to match a latent impression to a fully inked fingerprint are generally accepted by a sufficiently broad community of technical experts, the judge had an adequate basis for concluding that ordinary single impression latent fingerprint identification is reliable, and did not need to examine the other *Daubert* factors. Her original order is affirmed.

d. *Reliability of latent fingerprint impression (and ACE-V) applied to simultaneous impressions.* While establishing that the reliability of latent fingerprint identification and ACE-V is necessary to admit the Commonwealth's fingerprint evidence, it is not sufficient. Rather, the evidence can only be admitted if, in addition to the reliability of the theory

and process in general, the process is reliable when applied to the specific issue about which the expert is proposing to testify. See *Kumho Tire Co.* v. *Carmichael, supra* at 153-154 ("specific issue before the court was not the reasonableness *in general* of [the expert's method]. Rather, it was the reasonableness of using such an approach ... to draw a conclusion regarding *the particular matter to which the expert testimony was directly relevant* "); *Canavan's Case, supra* at 311-312, quoting *State v. Alberico,* 116 N. M. 156, 169 (1993) (rejecting de novo standard of review in *Lanigan* cases because that standard incorrectly assumes that "application of a particular scientific method would not vary from case to case and thus would be worthy of a judicial stamp of approval or rejection as a matter of law").

In this case, the Commonwealth proposes to call a State trooper, trained in fingerprint examination, to testify that he used the ACE-V methodology positively to identify Patterson as the person who left four latent simultaneous impressions on the victim's truck, despite the fact that the application of ACE-V to any of the individual latent impressions would not have led to a match. Such testimony is based on the theory that once a group of latent impressions are identified as simultaneous impressions, an otherwise unacceptably small number of similarities between each of the impressions and its allegedly corresponding fully inked fingerprint can form the basis for a collective determination as to whether the entire group of latent impressions matches a corresponding group of full fingerprints. To gain admission of the trooper's testimony, then, the Commonwealth must establish that adding up similarity points of simultaneous impressions is a reliable way to use ACE-V to effectuate latent fingerprint identification.

Instead of engaging in the deliberate factor-by-factor analysis that she undertook with respect to the more general theory and application of latent fingerprint identification, however, the judge assumed the reliability of the application of ACE-V to simultaneous impressions because it "involves the exact process" simply applied to a "composite" record of the detail of "multiple prints from the same hand." In doing so, the judge appeared to endorse the Commonwealth's position that any added potential for error in the identification process caused by applying ACE-V to simultaneous impressions is relevant only to the weight of evidence and not its reliability and, therefore, is not relevant to its admissibility.

In support of the judge's conclusion, the Commonwealth points to our recent decision in *Commonwealth v. Gaynor,* 443 Mass. 245 (2005), upholding the admission of deoxyribonucleic acid (DNA) evidence. [FN13] In that case, we suggested that the defendant's arguments attacking the reliability of particular DNA tests (regarding "mixed sample" testing) failed in part because "the issues raised by the defendant went to the weight of the evidence, not its admissibility." *Id.* at 267. The Commonwealth seizes on these statements to argue that once ACE-V is found to be generally reliable, any application of it also must be sufficiently reliable to be admitted in evidence.

The Commonwealth has misread *Commonwealth v. Gaynor, supra.* Our comments presupposed a finding that the particular application of the DNA test used was reliable. See *id.* at 265 ("The *judge's findings* that [Cellmark Diagnostic Laboratories'] methodology in reporting tests of a mixed sample with an identifiable primary contributor

in the same way it reports tests of a single source sample conforms to the recommendations of the [National Resource Council], and *that Cellmark's methodology in dealing with the presence of mixtures or technical artifacts is generally accepted within the scientific community, were made with record support and well within his discretion* " [emphasis added] ). The opinion noted with emphasis that the reliability of mixed sample testing was considered reliable because it was generally accepted in its own right, not by mere virtue of the reliability of single sample testing. [FN14]

Consistent with our opinion in *Commonwealth v. Gaynor, supra,* we recognize that applying ACE-V to simultaneous impressions sufficiently alters the process to require its own reliability inquiry. An examiner must first determine whether the impressions were simultaneously left at the scene, and then apply ACE-V not to a single finger but to multiple separate sections of a whole hand. Notwithstanding contentions that the enlargement of the zone of comparison does not change the process, the process is fundamentally altered when an examiner is asked to make a determination, as he was in this case, that a particular latent impression matches a particular full fingerprint despite the absence of enough similarity to determine a match solely by comparing those two prints.

Arguments that the application of ACE-V to simultaneous impressions is simply an extension of ACE-V in general prove too much. Under this theory, any impressions--whether simultaneous or not--that an examiner believed to be left by the same person could be subject to ACE-V testing free from a *Daubert* inquiry. Likewise, because each full hand print is apparently unique, it would follow that, under this theory, an examiner could subject impressions from two different hands (that did not contain enough similarities on their own to declare a match) to this cumulative analysis without requiring a separate *Daubert* inquiry. [FN15]

In *Commonwealth v. Gaynor, supra,* we did not hold that judges should abdicate their role in reviewing various applications of generally accepted methodologies on which experts base their opinions. To the contrary, we noted that the "determination of the reliability of the testing process entails a fact-based inquiry, including questions of credibility." *Id.* at 264. While questions of credibility are traditionally left for the jury, we explained that, in this context, this inquiry was the responsibility of the judge. See *id.,* citing *Commonwealth v. McNickles,* 434 Mass. 839, 850 (2001) ( "analysis calls on a judge to determine whether testing was properly performed").

It is beyond doubt that *Daubert* and *Lanigan* envision that the jury will decide the ultimate question of the conclusiveness of the results of a reliable application of a methodology, see *Daubert, supra* at 594-595 ("The focus [of the *Daubert* inquiry], of course, must be solely on principles and methodology, not on the conclusions that they generate"), because even reliable procedures can lead to incorrect results. A judge's evidentiary determination that a particular application is reliable simply allows the jury to determine whether such an application led to a reliable result, taking into account all of the facts at hand. Judges, however, need not admit (and juries need not wrestle with) every application of a testing method--no matter how dubious-- merely because another application of the method has been deemed reliable. See *Commonwealth v. McNickles,*

*supra* (accepting distinction between reliability of general method of testing DNA and reliability of particular application of that test). See also *Commonwealth v. Curnin,* 409 Mass. 218, 222 n. 7 (1991) ("Future challenges should focus on the soundness ... of the particular testing process ... and, if raised, on the proper implementation of that process in the given case"). Otherwise, the traditional role of judges as gatekeepers--protecting juries from evidence that had little chance of being reliable--would be significantly and needlessly diminished. See *Commonwealth v. McNickles, supra* at 850 ("judge's gatekeeper role under *Commonwealth v. Lanigan, supra,* includes the obligation to determine whether the testing at issue was conducted properly [and not just whether the testing method is theoretically reliable]").

In sum, the procedure that we adopted in *Lanigan* includes ensuring not only the reliability of the abstract theory and process underlying an expert's opinion, but the particular application of that process. The question of the reliability of ACE-V as applied to single latent impressions is distinct from the question of the reliability of ACE-V as applied to simultaneous impressions. The application of ACE-V to simultaneous impressions must therefore be subjected to its own *Daubert* analysis. We now proceed with that analysis.

i. *General acceptance of applying ACE-V to simultaneous impressions.* As we have explained, if the Commonwealth establishes that the application of ACE-V to simultaneous impressions is generally accepted in the fingerprint examiner community, the evidence is properly admitted. The judge found that "according to [Agent] Meagher, the use of ACE-V ... to make individualization determinations from simultaneous impressions is generally accepted in the community of qualified fingerprint examiners." Unlike his testimony in the single impression context, however, Agent Meagher's testimony is conclusory and unsupported by any evidence, let alone an extensive multi-jurisdictional survey. The Commonwealth did not present evidence that any domestic agency or jurisdiction--save for the now disbanded Boston police fingerprint unit and the State police--relies on simultaneous impressions for identification purposes. Likewise, with the exception of Great Britain, there is no evidence in the record that any foreign jurisdiction applies ACE-V to simultaneous impressions. With regard to Great Britain, one of the Commonwealth's own experts, David Ashbaugh, a noted fingerprint examiner, described its use as a "weird doctrine." [FN16] He further explained that the application of ACE-V to simultaneous impressions was one of several uses of ACE-V in England that "has resulted in a hodgepodge of doctrine that is far removed from the truth." Ashbaugh suggests that this application of ACE-V "require[s] a certain leap of faith" and has "no supporting rationale."

Moreover, the Commonwealth did not present evidence that SWGFAST, IAI, or any other fingerprint examination society accepts or recommends the application of ACE-V to simultaneous impressions. At best, the record lacks evidence of widespread acceptance of the application of ACE-V to simultaneous impressions by the fingerprint examiner community. [FN17] Because the Commonwealth has failed to carry its burden of proving general acceptance, we turn to the four remaining *Daubert* factors.

ii. *Testing.* We judge this factor by inquiring whether this application of ACE- V can be or has been tested. The judge's supplemental order noted that no specific study or scientific

article has validated the application of ACE-V to simultaneous impressions. Agent Meagher testified that he was "not aware of any studies that have been performed to validate the application of ACE-V to simultaneous impressions to make an identification." Neither is this court.

In her original order, the judge explained her concern that the subjectivity involved in the ACE-V process means the process itself defies easy testing. Such concerns are exacerbated when simultaneous impressions are involved. There are presently no formalized standards governing an examiner's determination that impressions have been simultaneously made, leaving that determination largely to the judgment of the examiner. [FN18]

The judge explained, however, that most important to her determination of the potential testability of latent fingerprint identification was that the one-discrepancy rule makes even subjective evaluations testable because any single discrepancy is enough to disprove a match. The one-discrepancy rule is, unfortunately, less than it appears. Fingerprint examiners can and often do ignore one or more discrepancies in a match or in simultaneous impression matches. They do so by reasoning that the discrepancy was created by a distortion or unnatural alteration of the impression.

The judge also noted that any particular result of the ACE-V process is testable by virtue of the in-court adversary process. That is, an independent examiner can challenge the conclusion of the Commonwealth's expert based on the specific criteria articulated by that expert used to declare a match. See *United States v. Havvard,* 260 F.3d 597, 601 (7th Cir.2001). However, adversary testing is not what the Supreme Court meant when it discussed testing as an admissibility factor. See *Commonwealth v. Curnin,* 409 Mass. 218, 222 n. 7 (1991), citing *United States v. Two Bulls,* 918 F.2d 56, 61 (8th Cir.1990) (until questions of reliability are determined by judge, "jury should not be given the evidence and allowed to determine the validity and soundness of the process because evidence of this character has too great a potential for affecting a jury's judgment"). Concluding that a test is reliable merely because testimony based on its results can be cross-examined in front of a jury puts the cart before the horse. In the absence of any real testing of ACE-V, at least as applied to simultaneous impressions, we conclude that this factor favors exclusion.

iii. *Peer review and publication.* In her original order regarding latent fingerprint identification, the judge correctly concluded that the verification process of ACE-V was seriously flawed and did not constitute peer review under *Daubert.* We share the judge's consternation with the current verification process. Nevertheless, she found this factor to favor admission, though only slightly, because "limited" review exists on the reliability of ACE-V in forensic publications and because the SWGFAST guidelines outlining ACE-V underwent peer review. With respect to its application to simultaneous impressions, however, the Commonwealth has not introduced evidence of any scientific-technical publication discussing its reliability. Further, the record contains no evidence that SWGFAST, IAI, or any other forensic identification society has promulgated peer-reviewed standards relating to the application of ACE-V to simultaneous impressions. This factor thus also favors exclusion.

iv. *Known or potential error rate.* We do not quarrel with the motion judge's conclusion that the ACE-V method of fingerprint individualization has a low error rate when used to match a latent fingerprint to a fully inked print of the same finger. We agree that the concern is solely with the rate of false positives. See *United States v. Mitchell,* 365 F.3d 215, 239 (3d Cir.2004) ( "rate of false negatives is immaterial to the *Daubert* admissibility of latent fingerprint identification offered to prove positive identification"). The FBI survey and its study of matches between 50,000 latent and full prints, although not without flaws, provide adequate support for the judge's conclusion.

However, the Commonwealth has produced no evidence establishing a similarly low error rate when ACE-V is applied to simultaneous impressions. Neither the FBI survey nor the study involved simultaneous impressions. The record contains no studies regarding the ability of a fingerprint examiner to use simultaneous impressions to effectuate a positive identification and we have not been made aware of any. [FN19] We recognize, as the motion judge explained, that "the absence of a specific study ... does not preclude a finding of admissibility." Nonetheless, the absence of any experimentation here, without any other evidence of a low error rate, does not help the Commonwealth. See *Canavan's Case,* 432 Mass. 304, 315 (2000) ("We cannot conclude that the ... mere assertion that a methodology is reliable is sufficient to pass the *Lanigan* test absent any other evidence showing its reliability"). In the absence of evidence pertaining to the error rate, we conclude that this factor, at best, does not affect our ultimate decision concerning admissibility.

v. *Standards controlling the technique.* The judge concluded that there was no scientific basis for requiring a minimum number of matching points for an individualization. We agree. We are not concerned that this leaves the "evaluation" stage of ACE-V open to the subjective determinations of a fingerprint examiner. A wide variety of experts whose testimony is generally admitted at trial use their education, training, and knowledge to opine on matters about which there does not exist an objective standard. In such instances, "the expert is operating within a vocational framework that may have numerous objective components, but the expert's ultimate opining is likely to depend in some measure on experiential factors that transcend precise measurement and quantification." *United States v. Llera Plaza,* 188 F.Supp.2d 549, 571 (E.D.Pa.2002).

The degree of subjectivity in a fingerprint examiner's ultimate conclusion that a latent print matches a fully inked print seems "of a substantially more restricted compass" than, say, "an electrical engineer's testimony that fire in a clothes [dryer] was caused by a thermostat malfunction." *United States v. Llera Plaza, supra* at 570, citing *Maryland Cas. Co.* v. *Therm-O-Disc,* 137 F.3d 780 (4th Cir.1998). An examiner follows an objective method laid out in guidelines and standards adopted by SWGFAST. Additionally, the one-discrepancy rule (while not perfect) provides an objective benchmark for examiners. As the motion judge explained, whether a discrepancy is explainable or unexplainable depends on six factors, most of which are objective. [FN20] The manner in which an examiner's opinion is guided by objective factors makes this process acceptable.

It appears, however, that a fingerprint examiner's opinion regarding the individualization of simultaneous impressions is less bounded by objective factors. Most importantly,

although Agent Meagher testified that the ACE-V process does not vary when applied to simultaneous impressions, the record does not establish that either SWGFAST or the IAI has adopted formal guidelines regarding the individualization of simultaneous impressions. There is no standard procedure in place to which an examiner must conform his methods.

The judge also found that the "rigorous qualifications and training requirements for FBI fingerprint examiners ... help control operation of the ACE-V methodology." Common sense dictates that higher academic and professional standards increase the chances that an expert will properly follow the objective criteria and properly employ his subjective consideration to the facts at hand. This consideration, however, is irrelevant here, where the Commonwealth does not propose to call an FBI examiner as its expert. The Commonwealth's proposed expert is a State trooper, and the original fingerprint examiner was a member of the now disbanded Boston police fingerprint unit. No showing has been made as to the qualifications required for employment and retention at either of these law enforcement agencies. We shall not simply assume that the requirements or expert's qualifications are as substantial as those of the FBI or its fingerprint examiners. See *United States v. Llera Plaza, supra* at 566 ("Whatever may be the case for other law enforcement agencies, the standards prescribed for qualification as an FBI fingerprint examiner are clear.... The uniformity and rigor of these FBI requirements provide substantial assurance that, with respect to certified FBI fingerprint examiners, properly controlling qualification standards are in place and are in force").

Moreover, the Commonwealth does not contend that FBI examiners have confirmed the result of the State examination. To the contrary, in response to a request for confirmation, the FBI issued a report indicating that the simultaneous impressions at issue here were not "of value," apparently concluding that a positive identification could not properly be made using those impressions.

In these circumstances, we conclude that the lack of accepted explicit universal standards controlling the application of ACE-V to simultaneous impressions counsels against admission of this evidence.

3. *Conclusion.* Evidence of fingerprint individualization determined by application of the ACE-V method to single latent fingerprint impressions meets the *Lanigan-Daubert* reliability standard. The general acceptance of this application of ACE-V by the fingerprint examiner community leads us to this conclusion. However, the application of ACE-V to simultaneous impressions cannot rely on the more usual application of ACE-V for its admissibility, but must be independently tested against the *Lanigan-Daubert* standard. On the record before the motion judge, the Commonwealth has not yet established that the application of the ACE-V method to simultaneous impressions is generally accepted by the fingerprint examiner community or that a review of the other *Daubert* factors favors admission of evidence based on such an application. Consequently, we vacate the judge's supplemental order and remand the case for further proceedings consistent with this opinion.

*So ordered.*

FN1. Patterson was also convicted of armed robbery and two counts of possession of a dangerous weapon.

FN2. ACE-V stands for "analysis, comparison, evaluation, and verification." It is the standard methodology used in the United States and many other parts of the world. See *infra* at part 1.b.

FN3. We acknowledge amicus briefs filed by Mark Acree, Robert Bradley, Simon

A. Cole, David L. Faigman, Stephen E. Fienberg, Paul C. Giannelli, Lyn Haber, Ralph N. Haber, Donald Kennedy, Jennifer L. Mnookin, Joelle Anne Moreno, Jane C. Moriarty, D. Michael Risinger, John R. Vokey, Sandy L. Zabell, and The New England Innocence Project; National Association of Criminal Defense Lawyers, Massachusetts Association of Criminal Defense Lawyers, and the Committee for Public Counsel Services; the district attorneys for the Berkshire, Cape and Islands, Norfolk, northern, northwestern, and Plymouth districts; and the Secretary of Public Safety.

FN4. Although the term ACE-V was not coined until at least 1995, when the Scientific Working Group on Friction Ridge Analysis, Study, and Technology (SWGFAST) documented standards for comparing prints, the steps performed under ACE-V are essentially the same steps performed by fingerprint experts over the last hundred years.

FN5. Similarly, Great Britain no longer requires a specific number of Galton points for an examiner to declare a match. For many years, England had required sixteen Galton point matches to make a positive identification. See *United States v. Llera Plaza,* 188 F.Supp.2d 549, 555, 567 (E.D.Pa.2002). In 1999, however, the British Court of Appeal (Criminal Division) concluded that fewer than sixteen matching points were needed. See *id.* at 566, quoting

*Regina v. Buckley,* 143 SJ LB 159 (1999) ("If there are fewer than eight similar ridge characteristics, it is highly unlikely that a judge will exercise his discretion to admit such evidence.... If there are eight or more similar ridge characteristics, a judge may or may not exercise his or her discretion in favour of admitting the evidence"). According to the *Llera Plaza* court, the British Court of Appeal explained that a national consensus had developed "that considerably fewer than 16 ridge characteristics would establish a match beyond any doubt." *Id.* at 567. Additionally, the Court of Appeal had forecast that any type of numerical requirement might be done away with in the near future. The British court cited a 1988 study, commissioned by the Home Office and the Association of Chief Police Officers (ACPO), which concluded "that there was no scientific, logical or statistical basis for the retention of any numerical standard." *Id.* at 567-568. In 1994, based partially on this study, the ACPO issued a report recommending a completely nonnumerical approach to fingerprint identification. After a fingerprint evidence project board studied the issue in anticipation of a new nationwide system, it recommended the change be made. See *id.* at 568. In 2001, two years after the *Buckley* decision, the new nonnumerical system was adopted. The *Buckley* decision indicates that the nationwide adoption of this plan obviates a bright-line judicial requirement that a positive identification use a specific number of similarities. See *United States v. Llera Plaza, supra,* quoting *Regina v.*

*Buckley, supra* ("If and when [the project board plan is adopted], it may be that fingerprint experts will be able to give their opinions unfettered by any arbitrary numerical thresholds").

FN6. Because the Boston police fingerprint unit's latent print section has been suspended from operation, the Commonwealth proposed to offer almost the identical evidence but this time through Detective Lieutenant Kenneth Martin of the State police.

FN7. The Commonwealth initially argued that the *Daubert-Lanigan* hearing should be limited to determining the reliability of the application of ACE-V to simultaneous impressions. The Commonwealth asserted that the general reliability of latent fingerprint identification and ACE-V could be established without recourse to a hearing. The Commonwealth altered that position in early 2004 after it came to light that a man had been wrongfully convicted of armed assault with intent to murder based largely on an erroneous "match" of his fingerprint to a latent print at the crime scene. See *Commonwealth v. Cowans,* 52 Mass.App.Ct. 811 (2001); Man Freed in 1997 Shooting of Officer, Boston Globe, Jan. 24, 2004, at A1.

FN8. The judge used the terms "fingerprint community," "community of

fingerprint examiners," and "forensic identification community" interchangeably. Other courts have identified the relevant community in some form of one or more of such terms and we perceive no distinction between these characterizations of the group at issue. See *United States v. Mitchell,* 365 F.3d 215, 236, 241 (3d Cir.2004) ("fingerprint examiner community" and "forensic identification community"); *United States v. Llera Plaza,* 188 F.Supp.2d 549, 551-552, 563 (E.D.Pa.2002) ("fingerprint examiner community" and "fingerprint community"); *United States v. Sullivan,* 246 F.Supp.2d 700, 703 (E.D.Ky.2003) ("fingerprint analysis and forensic science fields").

FN9. The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) was established in 1995. Sponsored by the FBI laboratory, the working group includes forty fingerprint experts from various Federal, State, and local agencies throughout North America. Its mission is to formalize and document guidelines and standards that are generally accepted and applied by fingerprint examiners. Its committees develop guidelines and standards, which are subject to critique and debate by all SWGFAST members and, after publication in the Journal of Forensic Identification and presentation at the International Association for Identification, by all members of the fingerprint examiner community. After modification of its guidelines based on this review, SWGFAST republishes them as formal standards. SWGFAST has adopted

ACE-V as the standard by which to examine latent fingerprints.

FN10. To be admissible, testimony must be relevant as well as reliable. The relevance of identification evidence such as fingerprint analysis is clear and unquestioned by the parties. We thus concentrate on the reliability prong. Accord *United States v. Mitchell,* 365 F.3d 215, 235 (3d Cir.2003) ("the fit inquiry in the case of fingerprint identification is not a significant factor, because identity evidence is the archetypal relevant evidence in criminal cases").

FN11. Although *Daubert v. Merrell Dow Pharms., Inc.,* 509 U.S. 579 (1993) (*Daubert* ), itself spoke in terms of scientific knowledge, the Supreme Court, in *Kumho Tire Co.* v. *Carmichael,* 526 U.S. 137, 145, 157 (1999), recognized that the *Daubert* standard was equally applicable to expert testimony based on technical or other specialized knowledge. We adopted this same standard in *Canavan's Case,* 432 Mass. 304, 313-314 (2000).

FN12. The fingerprint examiner community consists primarily of fingerprint examiners from local, State, Federal, and foreign law enforcement agencies as well as independent or retired examiners. Some of these examiners, such as David Ashbaugh, may spend a significant portion of their time writing,

lecturing, and teaching. See, e.g., *United States v. Crisp,* 324 F.3d 261, 268-269 (4th Cir.), cert. denied, 540 U.S. 888 (2003) (indicating that fingerprint examiners themselves are expert community that suffices for *Daubert* purposes). Also included are scientists from other fields, such as Dr. Babler, who study the underlying premises of fingerprint examination. The fingerprint community has formed a number of associations and professional groups better to share information and experience, and better to control the standards of their profession. In addition to SWGFAST, many examiners belong to the International Association for Identification (IAI). Founded in 1915, IAI has over 5,000 members. The IAI has established several fingerprint examiner certification programs, publishes the peer-reviewed Journal of Forensic Identification, and awards grants to promote the advancement of forensic science as a profession.

FN13. Although the Commonwealth suggests that *Commonwealth v. LeClaire,* 28 Mass.App.Ct. 932 (1990), accepted evidence of simultaneous impressions, that case is clearly distinguishable. In that case, one of the simultaneous impressions, the thumbprint, was clear and could, on its own, be matched to the defendant. *Id.* at 933-934.

FN14. Similarly, our second suggestion in *Commonwealth v. Gaynor,* 443

Mass. 245, 266, 267 (2005), that attacks on the reliability of the specific testing at issue should go to the weight of the evidence followed our analysis of a partially distinct application of the recommended DNA test used by a DNA processor (use of a smaller sample size than set by the manufacturer's test kit) and findings that "Cellmark had conducted validation studies that supported the reliability of testing based on amounts smaller than recommended by the manufacturers" and that the distinct application "has done all that is reasonably possible to eliminate [the] potential" for distortions.

FN15. We cannot surmise the limiting principle by which the Commonwealth's argument would lose force in a case where a fingerprint examiner applied ACE-V to impressions that he believed were left simultaneously and represented two fingers on each hand and two toes on each foot.

FN16. Although Ashbaugh did not testify at the hearing below, the Commonwealth offered his 1999 testimony at the *Daubert* hearing in the *Mitchell* case. See *United States v. Mitchell,* 365 F.3d 215 (3d Cir.2004).

FN17. Although in the course of this appeal we have been made aware of an article on simultaneous impressions that allegedly bolsters Meagher's

assertion, see Ostrowski, Simultaneous Impressions: Revisiting the Controversy, The Detail (Nov. 05, 2001), an article not in evidence before the judge, the article merely confirms our view that application of the ACE-V methodology is not yet generally accepted in the fingerprint examiner community. In contrast to the FBI survey regarding fingerprint identification generally, the article explains that the author conducted a survey on simultaneous impressions that received only eighteen responses from local, State, and Federal latent print examiners in thirteen States and the District of Columbia. In comparison to the one hundred per cent acceptance of ACE-V methodology in the FBI survey, Ostrowski's survey makes clear that just over fifty per cent of those surveyed would use two or more simultaneous impressions that cannot be identified on their own as the basis for a positive identification. Approximately forty-four per cent of those asked reported requiring at least one of the latent prints to be individually matched in cases of simultaneous impressions and one responding agency requires that each print impression must stand alone. Particularly in light of the extremely small sample in Ostrowski's survey, this hardly amounts to general acceptance in the relevant community.

FN18. While David Ashbaugh has proposed several "objective" criteria to use to determine the simultaneity of latent impressions, see Ashbaugh,

Quantitative-Qualitative Friction Ridge Analysis 134-135 (1999), it is unclear whether the determination of simultaneity in this case was made using the test Ashbaugh suggests.

FN19. The only information provided to us on this narrow issue comes from a postargument letter, which describes a recent National Institute of Science and Technology study that recommends computer identifications only be made by independent individualization of separate fingerprints of simultaneous impressions. While not the basis for our decision, this information adds to our concern that the application of ACE-V in the case at bar may be prone to far more error than the normal use of ACE-V.

FN20. These factors are: the condition of the actual friction ridges, the deposition pressure (how hard the finger was placed on the object), the lateral pressure (if the finger was moved after being placed on the object), the texture of the substrate being touched, the method used to process the fingerprint, and the method used to preserve the image.

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