

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss:

SUPERIOR COURT DEPARTMENT
NO(S):

COMMONWEALTH

v.

CONDITIONAL OPPOSITION TO COMMONWEALTH'S
MOTION FOR COURT ORDER FOR MAJOR SET OF CASE PRINTS

The defendant opposes the Commonwealth's Motion for Court Order for Major Set of Case Prints, unless the Court also orders that the Commonwealth comply with the following conditions, all designed to reduce or eliminate biasing information that could lead to unreliable and inaccurate results:

- (1) The analysis must be conducted by an analyst who has not yet received any potentially biasing information, written or oral, about the case, including but not limited to police reports, witness statements, and any information about prior fingerprint or palm print analysis of the questioned samples.
- (2) The Commonwealth may not provide the examiner with any such potentially biasing information at any point prior to the completion of the examiner's analysis and written report of such analysis.
- (3) The examiner must conduct a "linear" examination, first examining the evidence samples and documenting findings about the evidence and only then proceeding to examine and make comparisons to the Defendant's finger and palm print exemplars.
- (4) The examiner must engage in a target-blind "print lineup" in conducting the comparison, comparing the evidence samples to at least six total sets of

known fingerprints, but without knowing which set of known prints belongs to the Defendant.

- (5) The so-called “verification” stage of the fingerprint analysis protocol must be “blind,” meaning the analyst who is designated to conduct the verification must not know of the opinion of the initial analyst nor possess any of the potentially biasing information referenced above and must follow the protocols outlined in paragraphs (3) and (4) above.

See generally Elizabeth J. Reese, “Techniques for Mitigating Cognitive Biases in Fingerprint Identification,” 59 UCLA L.Rev. 1252 (2012).

If the Court orders the Commonwealth to comply with these conditions, the Defendant does not oppose the Commonwealth’s request for an order that he provide a set of major case prints. If, however, the Court does not order compliance with these conditions, the Defendant objects to the taking of his case prints, as any resulting analysis will be flawed and potentially erroneous, thus compromising the Defendant’s rights to due process and a fair trial under the Massachusetts and federal constitutions.

I. Background

When the Defendant was arrested for the instant matter in Ohio, a full set of fingerprints was taken from him there. A fingerprint analyst from the Ohio Attorney General’s office then conducted an analysis of three latent palm prints supposedly recovered from physical evidence in the case—plastic trash bags in which the Defendant’s daughter’s body was wrapped—and compared those palm prints to the known prints of the Defendant, ultimately opining that the Defendant’s prints matched

the latent prints. The Commonwealth now seeks to have the Defendant submit another set of finger and palm prints in the Commonwealth of Massachusetts and to have Massachusetts State Trooper Christopher Dolan conduct a second analysis of the same evidence, again comparing the Defendant's known prints to the latent palm prints. Based on communications between Trooper Dolan and an expert retained by the defense, it is clear that Trooper Dolan is aware of the analysis that occurred in Ohio and the opinion reached by the Ohio analyst. Trooper Dolan is also likely aware of additional information about the case against the Defendant that is unnecessary to the process of conducting an objective palm print analysis, but that could bias his analysis and skew his ultimate opinion. See Argument infra.

II. Argument

For decades, cognitive psychologists have identified contextual bias as a source of error in human decision-making. See Reese, supra at 1258-1261. "Contextual bias . . . occurs when decisionmakers are influenced by exposure to extraneous information that is not necessary to make the decision at hand." Id. at 1260. Since the issuance of the 2009 National Academy of Science Report, *Strengthening Forensic Science in the United States A Path Forward*, National Academies Press (2009), the forensic science community has begun to recognize the impact of contextual bias on the interpretation of forensic evidence results. "The forensic science disciplines are just beginning to become aware of contextual bias and the danger it poses. The traps that can be created by such biases can be very subtle, and typically one is not aware that his or her judgment is being

affected.” *Strengthening Forensic Science in the United States A Path Forward*, National Academies Press, p.185 (2009).

In the specific field of fingerprint analysis, the problem of contextual bias has been well demonstrated. In one famous study, five forensic fingerprint examiners with a mean of 17 years of experience in the field were asked to render a comparison opinion about a latent print and a known fingerprint. See Dror et al., “Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications,” *Forensic Science Int’l* 156, 74-78 (2006). However, before conducting the analysis, the analysts were told that the latent print was the fingerprint from the Madrid train bombing that had been erroneously matched to that of Brandon Mayfield. See *id.* at 76. In reality, the five examiners were not provided with the prints from the Mayfield case, but instead were given a latent and known print that each examiner had previously examined in a real case and had called a match. See *id.* Remarkably, after examining these prints under the belief that they were the misidentified prints from the Mayfield case, four of the five examiners changed their original opinions; three opined the prints did not match and one found there was insufficient information to render an opinion. Only one examiner held to his original opinion that the prints were a match.

A follow-up study, in which six fingerprint experts were asked to evaluate a latent and suspect print when the prints they were shown were actually ones they had previously called either a match or exclusion in a real case, showed that biasing contextual information caused a significant percentage of the examiners to change their original opinions. See Dror & Charlton, “Why Experts Make Errors,” *Journal of Forensic Identification* 56, 600-616 (2006). These studies dramatically demonstrate “that

fingerprint identification decisions of experts are vulnerable to irrelevant and misleading contextual influences” and “that the extraneous context in which fingerprint examinations occur can determine the identification decision.” Dror et al., supra at 76.

More specifically, the Mayfield case showed how one examiner’s initial opinion, if conveyed to other examiners, can impact the opinions of the latter examiners. After the initial mis-identification by the first FBI fingerprint examiner, two additional FBI examiners aware of the finding of the first one reached the same erroneous conclusion. See Dror & Cole, “The Vision in ‘Blind’ Justice: Expert Perception, Judgment, and Visual Cognition in Forensic Pattern Recognition,” *Psychonomic Bull. & Rev.* 17, 161-167 at 162-163 (2010). Indeed, so did the expert appointed on behalf of Mayfield, who also knew of the prior examiners’ conclusions. See id. Because “subsequent examinations may be biased by the initial examination,” “a[n] internal FBI report . . . recommended that verifications be performed ‘blind’ in ‘designated cases.’” Id. at 163.

In fact, the Scientific Working Group on Friction Ridge Analysis, Study and Technology has adopted a Standard that *requires* the use of blind verification in certain situations, including situations involving “strong contextual influence,” and *suggests* blind verification in other circumstances. See SWGFAST Document #14, “Standard for the Application of Blind Verification of Friction Ridge Examinations” (issue date Nov. 14, 2012), http://www.swgfast.org/documents/blind-verification/121124_Blind-Verification_2.0.pdf (last visited September 3, 2015). According to that SWGFAST Standard, “the blind verifier is provided with no, or limited, contextual information, and has no expectation or knowledge of the determinations or conclusions of the original

examiner.” Id. The purpose of such blind verification is to “minimize[] the influences of any context information that might lead to invalid results.” Id.

In the instant case, the Commonwealth is effectively seeking to have a Massachusetts fingerprint examiner verify or confirm the match conclusion already reached by an Ohio fingerprint examiner. In order to eliminate or at least minimize the impact of contextual information that could bias the Massachusetts examiner, including but not limited to the fact that an examiner in Ohio already determined that the palm prints from the evidence match that of the Defendant, this Court should order that the Commonwealth comply with the procedural requirements set forth above. Not only are these proposed procedures in line with the applicable SWGFAST Standard, but they are also supported by the scientific literature. See Dror et al., “Cognitive Issues in Fingerprint Analysis: Inter- and Intra-expert Consistency and the Effect of a ‘Target’ Comparison,” *Forensic Science Int’l* 208, 10-17 at 12 (2011) (study finding “the importance of examining the latent mark in isolation, prior to being exposed to any potential comparison print” to ensure a “more objective analysis, driven by the actual latent mark, and to minimize the external influences that may bias the process of analysis the latent mark itself”); Miller, “Procedural Bias in Forensic Science Examinations of Human Hair,” 11 *Law and Hum. Behav.* 157, 160-161 (1987) (finding evidence lineup procedure for forensic hair analysis significantly reduced number of inaccurate conclusions, showing this procedure can mitigate cognitive biases that influence forensic scientists); Risinger & Saks, “The *Daubert/Kumho* Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion,” 90 *Calif. L. Rev.* 1, 47-50

(2002) (advocating use of “evidence lineups” in forensic science); Reese, 59 UCLA L. Rev. at 1272 (arguing for “evidence lineups” in fingerprint examinations).

It is important to note that the impact of contextual bias is “a natural and automatic feature of human cognition that can occur in the absence of self-interest and operate without conscious awareness.” Kassin et al., “The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions,” *J. of Applied Research in Memory & Cognition* 2, 42-52 at 44 (2013). Thus, errors that result from such biasing information do not reflect any ill-intent on the part of the examiners. “Bias and other cognitive influences unconsciously affect hard-working, honest, and dedicated forensic experts, thus creeping in without the experts’ awareness.” Dror & Cole, supra at 162. “Cognitive biases affect all examiners, not just ‘bad apples.’” Id. It is the unconscious nature of these biasing effects, however, that make them so pernicious when they enter the courtroom. As Dror and Cole stated, “Even more than an honestly mistaken eyewitness, an honestly mistaken expert is the least culpable and thus, potentially, the most dangerous kind of witness that can testify in a legal proceeding.” Dror & Cole, supra at 162. Because of this grave danger that unconscious contextual bias will taint the Massachusetts fingerprint examiner’s opinion, which the Commonwealth will then present to a jury without any awareness on the examiner’s part, failing to take steps to prevent that occurrence jeopardizes the Defendant’s constitutional rights to due process and a fair trial. Thus, if this Court grants the Commonwealth’s requested order that the Defendant submit his finger and palm prints for comparative evaluation, this Court should also order that the Commonwealth and its expert follow the procedures set forth herein in order to safeguard those rights.

Respectfully submitted,

By his Attorney:

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COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss:

SUPERIOR COURT DEPARTMENT
NO(S):

COMMONWEALTH

v.

MOTION FOR DISCOVERY OF INFORMATION
REGARDING FINGERPRINT ANALYSIS

Now comes the defendant in the above-entitled matter and requests that the Court order the Commonwealth to provide counsel for the Defendant with the following information:

- (1) The name, address, curriculum vitae, and list of publications of any fingerprint examiner whom the Commonwealth intends to call at trial. See Mass. R. Crim. P. 14(a)(1)(A)(vi).
- (2) Any reports authored by such examiners regarding their evaluation of the evidence in this case. See id.
- (3) If no such report was authored, the substance of the opinion of such examiners and the basis for that opinion. See id.; see also Mass. R. Crim. P. 14(a)(2).
- (4) The entire case file of any fingerprint analyst or the fingerprint department of any laboratory in which such analysis was performed, including but not limited to the following: any and all measurements, notes, worksheets, sketches, diagrams, photographs in digital files (or color copies if digital files were not used), raw data, and calculations generated by, taken or relied upon by any forensic expert who conducted any testing or analysis in this case. See Commonwealth v. Heang, 458 Mass. 827, (2011) (noting that such information “shall be provided in discovery so that defense counsel will have an adequate and informed basis to cross-examine the forensic . . . expert at trial”).
- (5) Documentation and Copies of any information provided to such examiners prior to or during the course of such evaluation, including but not limited to police reports, witness statements, statements of the defendant, and communications or correspondence in any form (letters, emails, memoranda

and/or other communications) received from or sent to any law enforcement officer or representative of the District Attorney's office.

As grounds for the request made in paragraph 5, the Defendant asserts that such information is exculpatory in that it constitutes information that could create cognitive bias on the part of the examiner impacting the reliability of the examiner's conclusions. In order to properly challenge the reliability of any fingerprint examiner's opinion, though a motion to exclude, cross-examination, and/or the presentation of expert testimony on the issue of cognitive bias, it is essential that the Commonwealth disclose the requested information. See Argument, below.

I. BACKGROUND

When the Defendant was arrested for the instant matter in Ohio, a full set of fingerprints was taken from him there. A fingerprint analyst from the Ohio Attorney General's office then conducted an analysis of three latent palm prints supposedly recovered from physical evidence in the case—plastic trash bags in which the Defendant's daughter's body was wrapped—and compared those palm prints to the known prints of the Defendant, ultimately opining that the Defendant's prints matched the latent prints. The Defendant is unaware at this point of what information was presented to the Ohio analyst prior to or during the course of that palm print analysis. In addition, it is unclear whether the Commonwealth intends to call that examiner to testify at the trial in the instant matter.

On September 2, 2015, The Commonwealth filed a motion with this Court seeking a court order to the Defendant to provide a major set of case prints, ostensibly for the purpose of having a Massachusetts State Police fingerprint examiner conduct a

second analysis to determine whether, in his opinion, the palm prints on the trash bag are consistent with those of the Defendant. The Commonwealth indicated in the affidavit in support of its motion that the examiner would be Trooper Christopher Dolan. Counsel for the Defendant was aware that Trooper Dolan was fully cognizant of the conclusions drawn by the Ohio examiner. The Defendant then filed a “Conditional Opposition,” arguing that permitting this second evaluation by an examiner who knows the opinion of the Ohio examiner and without requiring a second examiner to follow certain procedures designed to eliminate or at least limit the impact of contextually biasing information will result in an unreliable conclusion. After hearing, this Court (Page, J.) allowed the Commonwealth’s motion.

II. ARGUMENT

For decades, cognitive psychologists have identified contextual bias as a source of error in human decision-making. See Elizabeth J. Reese, “Techniques for Mitigating Cognitive Biases in Fingerprint Identification,” 59 *UCLA L.Rev.* 1252, 1259-1261 (2012). “Contextual bias . . . occurs when decisionmakers are influenced by exposure to extraneous information that is not necessary to make the decision at hand.” *Id.* at 1260. Since the issuance of the 2009 National Academy of Science Report, *Strengthening Forensic Science in the United States A Path Forward*, National Academies Press (2009), the forensic science community has begun to recognize the impact of contextual bias on the interpretation of forensic evidence results. “The forensic science disciplines are just beginning to become aware of contextual bias and the danger it poses. The traps that can be created by such biases can be very subtle, and typically one is not aware that his or her

judgment is being affected.” *Strengthening Forensic Science in the United States A Path Forward*, National Academies Press, p.185 (2009).

It is important to note that the impact of contextual bias is “a natural and automatic feature of human cognition that can occur in the absence of self-interest and operate without conscious awareness.” Kassin et al., “The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions,” *J. of Applied Research in Memory & Cognition* 2, 42-52 at 44 (2013). Thus, errors that result from such biasing information do not reflect any ill-intent on the part of the examiners. “Bias and other cognitive influences unconsciously affect hard-working, honest, and dedicated forensic experts, thus creeping in without the experts’ awareness.” Dror & Cole, “The Vision in ‘Blind’ Justice: Expert Perception, Judgment, and Visual Cognition in Forensic Pattern Recognition,” *Psychonomic Bull. & Rev.* 17, 161-167 at 162 (2010). “Cognitive biases affect all examiners, not just ‘bad apples.’” *Id.* It is the unconscious nature of these biasing effects, however, that make them so pernicious when they enter the courtroom. As Dror and Cole stated, “Even more than an honestly mistaken eyewitness, an honestly mistaken expert is the least culpable and thus, potentially, the most dangerous kind of witness that can testify in a legal proceeding.” *Id.*

In the specific field of fingerprint analysis, the problem of contextual bias has been well demonstrated. In one famous study, five forensic fingerprint examiners with a mean of 17 years of experience in the field were asked to render a comparison opinion about a latent print and a known fingerprint. See Dror et al., “Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications,” *Forensic Science Int’l* 156, 74-78 (2006). However, before conducting the analysis, the analysts were told that

the latent print was the fingerprint from the Madrid train bombing that had been erroneously matched to that of Brandon Mayfield. See id. at 76. In reality, the five examiners were not provided with the prints from the Mayfield case, but instead were given a latent and known print that each examiner had previously examined in a real case and had called a match. See id. Remarkably, after examining these prints under the belief that they were the misidentified prints from the Mayfield case, four of the five examiners changed their original opinions; three opined the prints did not match and one found there was insufficient information to render an opinion. Only one examiner held to his original opinion that the prints were a match.

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More specifically, the Mayfield case showed how one examiner’s initial opinion, if conveyed to other examiners, can impact the opinions of the latter examiners. After the initial mis-identification by the first FBI fingerprint examiner, two additional FBI examiners aware of the finding of the first one reached the same erroneous conclusion. See Dror & Cole, “The Vision in ‘Blind’ Justice: Expert Perception, Judgment, and

Visual Cognition in Forensic Pattern Recognition,” *Psychonomic Bull. & Rev.* 17, 161-167 at 162-163 (2010). Indeed, so did the expert appointed on behalf of Mayfield, who also knew of the prior examiners’ conclusions. See *id.* Because “subsequent examinations may be biased by the initial examination,” “a[n] internal FBI report . . . recommended that verifications be performed ‘blind’ in ‘designated cases.’” *Id.* at 163.

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In the instant case, whether the Commonwealth presents testimony from a Massachusetts fingerprint examiner who was aware of the Ohio examiner’s initial conclusions or from the initial examiner, or from some other examiner, it is critical to the Defendant’s ability to challenge the reliability of the testifying analyst’s conclusions to know what type of potentially biasing information that examiner received prior to or during the expert’s analysis. Without knowing the requested information, the Defendant will not be able to mount an effective challenge, either through a motion to exclude the

opinion, cross-examination, or presentation of his own expert testimony, to the Commonwealth's expert opinion testimony. Particularly because the palm print analysis appears at this point to be the only real physical evidence tying the Defendant to the murder of his daughter, and thus, inferentially, to the murder of his wife with which he is charged, denying this discovery request would undermine the Defendant's constitutional rights to due process, cross-examination, and effective assistance of counsel.

Respectfully submitted,

By his Attorney:

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COMMONWEALTH OF MASSACHUSETTS

HAMPSHIRE, ss:

SUPERIOR COURT DEPARTMENT
No.

COMMONWEALTH

v.

EX PARTE MOTION FOR FUNDS FOR PSYCHOLOGIST

The Defendant in the above-entitled matter moves this Court, pursuant to M.G.L. c.261, §27C, to authorize expenses in the amount of three thousand dollars (\$3,000.00) in order to retain an expert in the field of cognitive psychology to help prepare his case.

The Defendant states the following:

- (1) The defendant has been indicted for breaking and entering with the intent to commit a felony and larceny, and as a habitual offender.
- (2) The funds requested are “reasonably necessary to assure (him) as effective a ... defense as he would have if he were financially able to pay.” G.L. c.261, §27C(1); Commonwealth v. Lockley, 381 Mass. 156, 164 (1980).
- (3) The funds requested are necessary and material to his defense and are required to preserve his rights under the Fifth, Sixth and Fourteenth Amendments to the United States Constitution and Article XII of the Declaration of Rights.

Respectfully submitted,

By his Attorney:

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COMMONWEALTH OF MASSACHUSETTS

HAMPSHIRE, ss:

SUPERIOR COURT DEPARTMENT
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v.

AFFIDAVIT IN SUPPORT OF EX PARTE
MOTION FOR FUNDS FOR PSYCHOLOGIST

I, Paul R. Rudof, based upon knowledge, information and belief, do hereby state:

1. I am the Public Defender Co-counsel at the Committee for Public Counsel Services. In that capacity, I supervise, co-counsel, and second-seat trial attorneys within the CPCS Public Defender Division in a variety of cases. Sometimes I co-counsel cases with Public Defender trial attorneys when their cases involve unique or complex legal, factual, or forensic issues.
2. In the above-captioned case, I am co-counseling the matter with Attorney Jennifer Rosenthal, who was assigned to represent the Defendant in this matter. The Defendant has been indicted for breaking and entering in the daytime with the intent to commit a felony and larceny, and has been indicted as a habitual offender.
3. The only actual evidence in this case linking the Defendant to the crimes is a fingerprint examiner's opinion that the Defendant's fingerprint matches a single, partial latent print found at the crime scene. One of the reasons I became involved in this case is because it appears to involve a unique forensic issue—the potential impact of contextual bias on the forensic fingerprint analysis. More specifically, because the fingerprint analyst was aware, prior to reaching his match conclusion, that the computer database of fingerprints, AFIS, ranked the Defendant's print as the closest possible match to the partial latent print from the crime scene, I believed it was possible that the AFIS ranking constituted contextual information that could have biased the examiner to reaching his match conclusion.
4. Based on my concern that contextual bias could have played a role in the fingerprint analyst's ultimate conclusion, I contacted a number of experts in the field of the impact of contextual bias on forensic analysis. Several such experts indicated to me that the AFIS ranking could have resulted in this type of bias, and thus could make the examiner's conclusion incorrect or unreliable. These experts directed me to a particular peer-reviewed,

- published study that supported the notion that AFIS ranking can impact a fingerprint analyst's conclusions. See Dror et al., "The Impact of Human-Technology Cooperation and Distributed Cognition in Forensic Science: Biasing Effects of AFIS Contextual Information on Human Experts," 57 J. Forensic Sci. 343 (March 2012).
5. One of the experts in the field of the impact of contextual bias on forensic examinations, Dr. Jeffrey Kukucka, agreed to consult with me and Attorney Rosenthal on this specific case. Dr. Kukucka is an assistant professor in the Psychology Department at Towson University in Maryland. Dr. Kukucka has a Master's Degree in Forensic Psychology from John Jay College of Criminal Justice and a Ph.D. in Psychology from the CUNY Graduate Center. He has published articles in the specific field of cognitive biases in forensic analysis.
 6. Dr. Kukucka has agreed to work at the CPCS approved rate of \$180.50 / hour for expert psychologists. Initially, his work will involve reviewing the discovery in the case, reviewing the relevant literature in the field, and writing an affidavit in support of a motion for a Daubert / Lanigan hearing on the admissibility of the Commonwealth's fingerprint expert's opinion. Dr. Kukucka estimates that this initial work will consume approximately 15 hours. Thus, I am requesting that the Court authorize an initial expenditure to cover this work in the amount of \$3,000.00.
 7. If it becomes necessary for Dr. Kukucka to testify at a Daubert / Lanigan hearing or at trial, I will need to seek authorization to expend additional funds to cover Dr. Kukucka's travel and time needed for such testimony.
 8. Given that the fingerprint testimony is the only evidence against the Defendant and that the admissibility and reliability of that testimony is questionable in light of the research in Dr. Kukucka's field of expertise, I believe that retaining an expert such as Dr. Kukucka is absolutely vital to defending this case. If my client had available funds to pay for these expert services, there is no question that I would advise him to spend those funds on these services.

Signed on this ____ day of October 2015, under the pains and penalties of perjury.

Paul R. Rudof

COMMONWEALTH OF MASSACHUSETTS

HAMPDEN, ss.

SUPERIOR COURT DEPARTMENT
NO.

COMMONWEALTH

v.

MEMORANDUM OF LAW IN SUPPORT OF
MOTION TO EXCLUDE LATENT PRINT OPINION TESTIMONY

The proponent of expert testimony bears the “burden to establish that [the expert’s] opinion is reliable.” Commonwealth v. DiCicco, 470 Mass. 720, 25 N.E.3d 859, 868 (2015). To demonstrate the reliability of the opinion, the proponent must show both that (1) “the testimony is the product of reliable principles and methods;” and (2) “the expert has reliably applied the principles and methods to the facts of the case.” Mass Guide to Evid., § 702.¹ See Commonwealth v. Lanigan, 419 Mass. 15, 26 (1994). In the instant case, it is this second foundational requirement that the Commonwealth cannot establish, because the latent print analysts whom the Commonwealth seeks to call at trial did not apply scientifically valid methodology in their analysis of the palm prints. Specifically, the analysts failed to shield themselves from exposure to highly biasing, task-irrelevant information, thus allowing

¹ In fact, the proponent of expert testimony must establish three additional foundational requirements to be permitted introduce such testimony: (1) that the testimony will assist the trier of fact; (2) that the expert is qualified in the relevant field; and (3) that the facts and data on which the expert relied are sufficient to render an opinion. See Mass Guide to Evidence § 702. The Defendant does not contest that the two analysts are qualified in the field of latent print analysis or that they possessed sufficient facts and data on which to base an opinion about the latent prints in this case. And though the Defendant does contest the relevance of this evidence - i.e., that it will “assist the trier of fact” -- because it concerns latent prints from an uncharged homicide, not from the murder charge that will be before the jury, the Defendant has raised that objection in a separate, previously filed motion, entitled Motion *In Limine* to Exclude Evidence of Uncharged Homicide.

contextual bias to undermine the reliability of their conclusions. Additionally, the analysts did not utilize a linear approach to their analysis, thus enabling a second source of cognitive bias to detract from the reliability of their judgments.

A. Method of Latent Print Analysis

The method that latent print examiners utilize to reach an opinion as to whether or not a particular person is the source of a print left on evidence is described by the acronym “ACE-V”, which stands for Analysis, Comparison, Evaluation, and Verification. See id. at 629-630. In the first step of this method, the analyst separately analyzes the latent print, as well the known print, to determine suitability for comparison and to document distinctive features of each. See id. See also National Academy of Science Report, *Strengthening Forensic Science in the United States A Path Forward*, National Academies Press at 137-138 (2009) (hereafter, “NAS Report”).²

Assuming that the images are suitable for comparison, the analyst next visually compares the noted features of each. See NAS Report at 138. “At the completion of the comparison, the examiner performs an evaluation of the agreement of the friction ridge formations in the two prints and evaluates the sufficiency of the detail present to establish an identification (source determination).” Id. Lastly, a second examiner then conducts the same procedure in an effort to verify the first examiner’s conclusion. See id.

In Commonwealth v. Patterson, the Supreme Judicial Court found that a trial judge did not commit an abuse of discretion in concluding that “latent fingerprint identification theory and the use of ACE–V to match a latent impression to a fully inked fingerprint” constitute reliable principles and methodology. See 445 Mass. 626, 644 (2005). Five years later, in Commonwealth v. Gambora, the SJC revisited the question of the reliability of the ACE-V

² Available at <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>.

method in light of the 2009 NAS Report. 457 Mass. 715, 724 & 727 (2010). Among the concerns with ACE-V raised in the NAS Report and recognized by the Court in Gambora is “the subjective nature of the judgments that must be made by the fingerprint examiner at every step of the ACE–V process, including an examiner’s ultimate conclusion that a latent print is ‘individualized’ to a specific, identified, known print.” Id. at 725. Additionally, the Court noted the NAS Report’s concern with the impact of “unintentional examiner bias.” Id. The SJC extrapolated on the concern about bias, stating, “this type of contextual cognitive bias also may affect the final, ‘verification’ stage of the ACE–V process, where a second fingerprint examiner repeats the first three steps (analysis, comparison, evaluation), because the second examiner may be aware of the first examiner’s conclusion of ‘match.’” Id. at 725 n.13. Ultimately, the Court in Gambora stated that “the issues highlighted in the NAS report are important, and deserve consideration,” but declined to “undertake such consideration in this case” in light of the nature of the opinion testimony and the other evidence establishing the defendant’s connection to the door pull from which the latent print was lifted. Id. at 727-729. But it is precisely the presence of cognitive bias in the instant case that renders unreliable the opinions of the two examiners the Commonwealth seeks to call.

B. Contextual Bias: Exposure to Task-Irrelevant Information

“Contextual bias . . . occurs when decision-makers are influenced by exposure to extraneous information that is not necessary to make the decision at hand.” Elizabeth J. Reese, “Techniques for Mitigating Cognitive Biases in Fingerprint Identification,” 59 *UCLA L.Rev.* 1252, 1260 (2012). For decades, cognitive psychologists have identified contextual bias as a source of error in human decision-making. See id. at 1258-1261 (2012). Indeed, contextual bias is “a natural and automatic feature of human cognition that can occur in the absence of self-

interest and operate without conscious awareness.” Kassin et al., “The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions,” *J. of Applied Research in Memory & Cognition* 2, 42-52 at 44 (2013). See also NAS Report, *supra* at 185 (“The traps that can be created by such biases can be very subtle, and typically one is not aware that his or her judgment is being affected.”). Thus, errors that result from exposure to task-irrelevant, biasing information do not reflect any ill-intent on the part of the decision-maker. See Dror & Cole, “The Vision in ‘Blind’ Justice: Expert Perception, Judgment, and Visual Cognition in Forensic Pattern Recognition,” *Psychonomic Bull. & Rev.* 17, 161-167 at 162-163 (2010 (“Bias and other cognitive influences unconsciously affect hard-working, honest, and dedicated forensic experts, thus creeping in without the experts’ awareness.”). Yet it is the very unconscious nature of these biasing effects that make them so pernicious when they enter the courtroom: “Even more than an honestly mistaken eyewitness, an honestly mistaken expert is the least culpable and thus, potentially, the most dangerous kind of witness that can testify in a legal proceeding.” *Id.* at 162.

Since the issuance of the NAS Report, the forensic science community has begun to recognize the impact of contextual bias on the interpretation of forensic evidence by forensic experts. “The forensic science disciplines are just beginning to become aware of contextual bias and the danger it poses.” NAS Report, *supra* at 185. This growing awareness of the problem of contextual bias likely stems from a proliferation of research demonstrating the ability of biasing, task-irrelevant information to affect a forensic analyst’s conclusions. According to a 2015 article written by the leading researcher in the field, Dr. Itiel Dror, ten years prior there were “practically no studies at all” on these issues, whereas in the preceding five years, over fifty published papers authored by thirty-five different researchers concerning cognitive bias in forensics had appeared in scientific journals. Dror, “Cognitive Neuroscience in Forensic

Science: Understanding and Utilizing the Human Element,” Phil. Trans. R. Soc. B 370 (2015).

In addition to the concerns about contextual bias voiced in the NAS Report, in 2011, the Scientific Working Group on Friction Ridge Analysis Study and Technology (“SWGFAST”) issued Document #14, the “Standard for the Application of Blind Verification of Friction Ridge Examinations.”³ Although limited to the verification stage of ACE-V, this document at least acknowledges the risks of exposure to task-irrelevant information, prescribing a “blind” process for verification in which the verifier has “no, or limited contextual information” and “no expectation or knowledge of the determinations or conclusions of the original examiner” and conducts the work “in an environment that minimizes the influences of any context information that might lead to invalid results.” Id.

In 2015, the U.S. National Commission on Forensic Science voted to adopt a document entitled “Ensuring that Forensic Analysis is Based Upon Task-Relevant Information.”⁴ And in September of 2016, the President’s Council of Advisors on Science and Technology published a report (“PCAST Report”) entitled “Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods.”⁵ The PCAST Report stated, “[S]tudies have shown that cognitive bias may be a serious issue in forensic science.” Id. at 31. In the section discussing the validity of latent print analysis, the Report found that the general methodology (ACE-V) is “foundationally sound,” but noted that “there are a number of important issues related to its validity as applied,” including “confirmation bias” (or “circular reasoning”) and “contextual bias” (when examiners’ judgements are “influenced by irrelevant information about

³ Available at http://www.swgfast.org/documents/blind-verification/121124_Blind-Verification_2.0.pdf.

⁴ Available at <https://www.justice.gov/ncfs/file/641676/download>.

⁵ Available at https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf.

the facts of a case”). Id. at 102 (emphasis added).

The problem of contextual bias has been well demonstrated in the specific field of latent print analysis. This is hardly surprising, because “people are particularly vulnerable to contextual bias when performing tasks that require subjective judgment.” National Commission on Forensic Science, “Ensuring that Forensic Analysis is Based Upon Task-Relevant Information,” supra. See also Dror, “The Ambition to be Scientific: Human Expert Performance and Objectivity,” *Science & Justice* 53 (2) at 81-82 (2013) (“When opinion and subjectivity are involved, then the possibilities for error, contextual influences and biases increase.”). And as noted in the NAS Report and Gambora, latent print analysis involves subjective judgment at every stage. 457 Mass. at 725. Indeed, studies have demonstrated the immense subjectivity of latent print analysis, by showing, for example, that even among highly experienced examiners, multiple examiners looking at the same print find a highly variable number of minutia present (inter-examiner inconsistency) and even the same examiner looking at the same print on two separate occasions often finds a different number of minutia each time (intra-examiner inconsistency). See Dror et al., “Cognitive issues in fingerprint analysis: Inter- and intra-expert consistency and the effect of ‘target’ comparison,” *Forensic Science Int’l* 208 at 10-17 (2011).

One striking study showing the impact of biasing, task-irrelevant information on latent print analysis involved five examiners with a mean of seventeen years of experience in the field who were asked to render a comparison opinion about a latent print and a known fingerprint. See Dror et al., “Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications,” *Forensic Science Int’l* 156, 74-78 (2006). Before conducting the analysis, the analysts were told that the latent print was the fingerprint from the Madrid train bombing that had been erroneously matched to an individual named Brandon Mayfield, a recent and infamous

fingerprint error known to all the examiners (and much of the world) See id. at 76. In reality, the five examiners were not provided with the prints from the Mayfield case, but instead were given a latent and known print that each examiner had previously examined in a real case and had called a match. See id. Remarkably, after examining these prints under the belief that they were the misidentified prints from the Mayfield case, four of the five examiners changed their original opinions; three opined the prints did not match and one found there was insufficient information to render an opinion. Only one examiner held to his original opinion that the prints were a match. See id.

In the instant case, both experts who analyzed the three latent palm prints whom the Commonwealth seeks to call to testify to their opinions were exposed to highly biasing, task-irrelevant information, thus undermining the scientific validity of their methodology and the reliability of their opinions. Pivovar, the Ohio examiner, was “briefed on the investigation” into the Defendant’s alleged involvement in the two homicides before she had even received photographs of the latent prints or the Defendant’s known prints. While the police reports do not recount the details of that briefing – factual issues that can be teased out at an evidentiary hearing, it is almost certain that such a briefing contained some information about the crimes, the Defendant, and the reasons he had become a suspect and was about to be the subject of a search warrant for his prints. A police report makes clear that the day before she began her analysis of the palm prints, Pivovar was informed by BCI Special Agent Cory Momchilov that the police would be seeking and then executing search warrants that morning in order to obtain known prints from the Defendant. That report further states that on July 22, 2014, when it was determined that the search warrants would not be executed “until late afternoon/early evening,” the BCI Crime Lab Director, Michael Velten, decided to direct “lab personnel,” presumably

Pivovar, to “stay after hours to perform the print analysis.” That information could only have communicated to Pivovar the urgency and importance of her task, and likely that the arrest of the Defendant hinged on her reaching an identification conclusion. And it appears that the arrest warrant for the Defendant was obtained after and as a result of Pivovar’s initial conclusion, reached during her after-hours examination on July 22, that the Defendant was the source of one of the palm prints. In short, the government’s use of an analyst so exposed to highly biasing, task-irrelevant information significantly undermines the reliability of her later conclusions about the latent prints. This Court, therefore, should exclude her testimony.

Regarding Dolan, at the time he conducted his analysis, he was already aware of Pivovar’s analysis and her conclusions. Thus, he was effectively, though not technically, acting as a verifier to her original conclusions. As discussed above, even the latent print examiner community (SWGFAST) recognizes that such verification should be conducted in a “blind” fashion, without knowledge of the prior examiner’s conclusions. That was not done here. Moreover, Dolan knew much more about the case and the Defendant beyond Pivovar’s conclusions about the latent prints. Dolan personally took the Defendant’s rolled prints at the Ludlow jail; thus, he was obviously aware that the Defendant had been charged and was detained. He knew the nature of the charge, the location, and date of the crime. And, given that Dolan was accompanied to the jail the day he took the prints by Trooper Konstantakos, the case agent on the case, and that Dolan had been assigned the case all the way back in November of 2014, he almost certainly knew much more about the investigation. Thus, this failure to adhere to a scientifically valid procedure renders Trooper Dolan’s ultimate conclusions unreliable and thus inadmissible.

C. Confirmation Bias: Failure to Conduct Linear Analysis

In addition to exposure to task-irrelevant information, a second source of cognitive bias appears to have tainted the analysis in this case. As the PCAST Report noted, one of the reasons latent print analysis can become invalid “as applied” is if the analyst utilizes a procedure that allows for “confirmation bias” to occur. See PCAST Report at 104. The Report explains,

Work by FBI scientists has shown that examiners typically alter the features that they initially mark in a latent print based on comparison with an apparently matching exemplar. Such circular reasoning introduces a serious risk of confirmation bias. Examiners should be required to complete and document their analysis of a latent fingerprint before looking at any known fingerprint and should separately document any additional data used during their comparison and evaluation.

Id. See also Dror, “Cognitive Neuroscience in Forensic Science: Understanding and Utilizing the Human Element,” *Phil. Trans. R. Soc. B* 370 (2015) (noting that “reference sample” – here, the known print – can be source of cognitive bias because “if not used correctly [it] can cause circular or backward reasoning, i.e. from the suspect to the evidence, rather than from the evidence to the suspect”). In other words, if the analyst engages in a back and forth, or circular, analysis of the latent print and the known print, the analyst is more likely to see the similarities in the latent print and known print and ignore the differences.

Aware of this problem, scientists have proposed an approach to forensic analysis that would avoid this type of circular reasoning. As explained in Dr. Dror’s supporting affidavit, this approach is referred to as “Linear Sequential Unmasking.” See Dror Affidavit, attached, at 4. Under this approach, the examiner first looks at the latent print in isolation and documents all of his or her findings about that print, then examines the known print, also in isolation, and documents all findings about the known print, and only then compares the two. See Dror et al., “Context Management Toolbox: A Linear Sequential Unmasking (LSU) Approach for Minimizing Cognitive Bias in Forensic Decision Making, *J. Forensic Sciences*, 60(4), 1111-1112 (2015). The FBI, the U.S. National Commission on Forensic Evidence, and the U.K. Forensic

Regulator have all adopted a linear sequential unmasking approach to latent print analysis. See Dror Affidavit, attached, at 4.

Unfortunately, it appears that neither examiner in this case followed a linear sequential unmasking approach to analyzing the latent prints. Nothing in the discovery provided indicates that they did, even though linear documentation is a critical component of the approach. And the “Latent Prints Method Manual” from the lab in which Pivovar works actually endorses a “back and forth examination,” which seems entirely contrary to the purpose of linear analysis. Thus, this second source of potential cognitive bias further vitiates the scientific validity of the analysis conducted by the Commonwealth’s two examiners. For this additional reason, this Court should exclude their testimony.

Respectfully submitted,

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