

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need:

Examiner Reliability Study: Black/White Box Study on Footwear and Tire Examiners

Describe the need:

Evaluate the diversity of the interpretations provided by trained footwear/tire examiners when conducting comparisons of footwear/tire impression evidence test samples. Additionally, evaluate the diversity of the conclusions provided by trained footwear/tire examiners versus those provided by laypersons when conducting comparisons of footwear/tire impression test samples. Note: This portion of the study should only be performed after OSAC publishes a new articulation standard. The research outcomes should do some or all of the following: (1.) Quantify intra-examiner, inter-examiner and examiner-layperson variability as a function of the quality/quantity of the evidence provided, (2.) Quantify intra-examiner, inter-examiner and examiner-layperson variability as a function of the test taker's education and discipline-specific training and experience, (3.) Identify aspects of the exam process and evidence that are sources of consistency in reporting conclusions, (4.) Identify aspects of the exam process and evidence that are sources of variability in reporting conclusions, (5.) Elucidate the process by which examiners assess and interpret footwear/tire impression evidence (e.g., quality, sufficiency, etc.). Note: Practitioner involvement in providing subject matter expertise during the planning phase of this research is highly encouraged in order to ensure that the research outcomes have applicability to casework, and the test samples are as realistic as possible under the research constraints.

Keyword(s):

Footwear, Tires, Conclusions, Variability, Accuracy, Error

Submitting subcommittee(s):

Footwear & Tire Subcommittee

Date Approved:

February 23, 2021

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

FBI Footwear Black Box Study

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

- Jacqueline A. Speir, Nicole Richetelli, Lesley Hammer. Forensic Footwear Reliability: Part I—Participant Demographics and Examiner Agreement. J Forensic Sci, Vol. 65, No. 6 (2020). doi: 10.1111/1556-4029.14553
- Nicole Richetelli, Lesley Hammer, and Jacqueline A. Speir. Forensic Footwear Reliability: Part II—Range of Conclusions, Accuracy, and Consensus. J Forensic Sci, Vol. 65, No. 6 (2020). doi: 10.1111/1556-4029.14551
- Nicole Richetelli, Lesley Hammer, and Jacqueline A. Speir. Forensic Footwear Reliability: Part III—Positive Predictive Value, Error Rates, and Inter-Rater Reliability. J Forensic Sci, Vol. 65, No. 6 (2020). doi: 10.1111/1556-4029.14552
- L. Hammer, K. Duffy, J. Fraser, N. Nic Daeid. A study on the variability in footwear impression comparison conclusions. Journal of Forensic Identification. Vol 63, No. 2 (2013). pp. 205-218.
- B. T. Ulery, R. A. Hicklin, J. Buscaglia, M. A. Roberts, Accuracy and reliability of forensic latent fingerprint decisions. Proceedings of the National Academy of Sciences of the United States of America. Vol. 108, No. 19 (2011). pp.7733–7738.
- B. T. Ulery, R. A. Hicklin, M. A. Roberts, J. Buscaglia. Measuring what latent fingerprint examiners consider sufficient information for individualization determinations. PLOS ONE. Vol. 9, No. 11(2014). e110179 pp. 1-16.
- R. A. Hicklin, J. Buscaglia, M.A. Roberts, S. B. Meagher, W. Fellner, M. J. Burge, M. Monaco, D. Vera, L.R. Pantzer, C.C. Yeung, T. N. Unnikumaran. Latent Fingerprint Quality: A Survey of Examiners. Journal of Forensic Identification. Vol. 61, No. 4(2011). pp. 385-418.
- G. M. Langenburg. A Performance Study of the ACE-V Process: A Pilot Study to Measure the Accuracy, Precision, Reproducibility, Repeatability, and Biasability of Conclusions Resulting from the ACE--V Process. Journal of Forensic Identification. Vol. 59, No. 2(2009). pp. 219-256.
- H. Majamaa, & A. Ytti. A Survey of the Conclusions Drawn of Similar Footwear Cases in Various Crime Laboratories. Forensic Science International. Vol. 82, No. 1 (1996). pp.109-120.
- National Research Council. Strengthening Forensic Science in the United States: A Path Forward; The National Academies Press: Washington, D.C. (2009). Chapter 5, p.148.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at <https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest>? Is your research need identified by NIJ?

Yes.

5. In what ways would the research results improve current laboratory capabilities?

The results of this research would be considered by the footwear/tire examiner community, laboratories and accrediting bodies in order to implement necessary changes to the methodology, standard operation procedures, training programs and other quality assurance practices to reduce examiner error and minimize intra-/inter-examiner variation in reporting conclusions.

6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Examinations of footwear/tire impression can be extremely complex, and the factors influencing a comparison are not static from case to case. The variables at play are the value of the evidence (i.e., quality, quantity, clarity and

limitations) and the examiner’s education, training and experience. As such, a degree of variation in opinion is expected. The results of this research would provide a better understanding of factors that influence the comparative and decision-making process. Those factors include: the quality of the evidence; class characteristics and randomly acquired characteristics (quality, quantity, clarity, complexity, number and size); the examiner’s education, training and experience; examiner certification and laboratory accreditation; and peer review.

7. In what ways would the research results improve services to the criminal justice system?

The research results would provide the ability to understand (and if possible, quantify) the conditions/factors that influence the examiner’s ability to analyze footwear/tire impression evidence and accurately interpret their findings. Further, the results would be extremely valuable in promoting transparency, objectivity, and the communication between experts and laypersons, particularly within the criminal justice system.

8. Status assessment (I, II, III, or IV):

II

| | Major gap in current knowledge | Minor gap in current knowledge |
|---|--------------------------------|--------------------------------|
| No or limited current research is being conducted | I | III |
| Existing current research is being conducted | II | IV |

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.