

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need:

Validation of Interpretation Scales for Footwear and Tire Forensics

Describe the need:

A footwear/tire interpretation scale may include one or more levels each of (1) support for the same source, (2) support for different sources, and (3) inconclusive. For example, the current SWGTREAD Range of Conclusions standard has two levels related to support for different sources, four levels related to support for the same source, and one level describing inconclusive as "lacks sufficient detail." Note: The OSAC Footwear and Tire Subcommittee is currently revising this standard. Therefore, it is recommended that this research be performed after a new articulation standard has been proposed by OSAC.

Any interpretation scale requires validation. In general, validation requires two activities: (1) performance testing -- the collection and analysis of test data to understand how well something performs, and (2) application of performance thresholds -- prespecifying minimum acceptable performance requirements and assessing whether these requirements have been met. The second activity involving prespecifying minimum acceptable requirements may be difficult because all the stakeholders, including representatives of the general public, may need to decide what the minimum requirements are based on what is acceptable in a criminal-justice system.

Validation of an interpretation scale consists of three elements: (1) determining to what extent the interpretation language represents the opinions reached by examiners, (2) determining the accuracy of examiners' source interpretations when using the scale (in the form of false positive and false negative error rates) and whether this accuracy changes with different interpretation scales, and (3) determining how understandable the conclusions are to various stakeholders including lay persons, defense attorneys, prosecutors, judges, and investigators, and whether stakeholders infer the same meaning as that intended to be conveyed by the expert.

The second element above, i.e., determining error rates, is usually the result of "black-box" studies. Such studies are currently being undertaken but would also be part of the validation process for a particular interpretation scale.

Keyword(s):

Footwear, Tire, Conclusion Scale, Interpretation Scale, Validation, Scientific Basis

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)

Articulation standard

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)?

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)

- "Range of Conclusions Standard for Footwear and Tire Impression Examinations." SWGTREAD Scientific Working Group for Shoeprint and Tire Tread Evidence, March 2013, https://treadforensics.com/images/swgtread/standards/current/swgtread_10_conclusions_range_201303.pdf.
- Thompson, William (2018) "How Should Forensic Scientists Present Source Conclusions?," Seton Hall Law Review: Vol. 48 : Iss. 3 , Article 9. Available at: <https://scholarship.shu.edu/shlr/vol48/iss3/9>
- Bradford T. Ulery, R. Austin Hicklin, JoAnn Buscaglia, and Maria Antonia Roberts. "Accuracy and reliability of forensic latent fingerprint decisions." Proceedings National Academy of Sciences May 10, 2011 108 (19) 7733-7738; <https://doi.org/10.1073/pnas.1018707108>
- 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

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?

An interpretation scale that's appropriately validated would allow for universal application in laboratory procedures when reporting source interpretations for evidence evaluation.

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

The research results would provide a much better scientific, quantitative, empirically tested understanding of interpretation scales. This would provide greater confidence that a particular scale will result in reliable outcomes, as well as provide a methodology for continued development and improvement of interpretation scales.

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

A validated interpretation scale would result in interpretations and their articulation that are more reliable and better understood by stakeholders who are non-experts, including triers of fact. This will result overall in better decisions in the criminal-justice system.

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

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	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.