

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need: White Box Studies on Bloodstain Pattern Analysts

Describe the need:

SEE ALSO ATTACHED ADDENDUM for additional details.

A written method to determine the mechanism(s) by which a bloodstain pattern was created does not currently exist. Bloodstain pattern classification accuracy and reproducibility are expected to be limited without a validated written procedure for analysts to follow.

The referenced Bloodstain Pattern Classification Process Map is an attempt to codify the decision-making process for the conversion of observed characteristics into causal mechanisms. One research approach is to establish what definitions, observations and measurements are needed to make good decisions at each of the sequential binary choices in the process map. Research is necessary to improve and change the existing process map and lead to the development of a validated process. In support of method development, additional terminology to describe bloodstains in a non-mechanistic way need to be established. Additional descriptive terms would ensure classifications are based upon objective, physical characteristics, which would minimize subjectivity.

Another research approach is to explore alternatives to the sequential process map and seek methods with a lower error rate for bloodstain pattern classification.

See also the research need for white box studies for bloodstain pattern classification, which may also support method development.

Keyword(s):

Bloodstains, Bloodstain Patterns, Conclusions, Classification, Analysis, Variability, Accuracy, Error, Reproducibility, White box

Submitting subcommittee(s): Bloodstain Pattern Analysis **Date Approved:** March 1, 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)

Standard in progress: Bloodstain Pattern Classification Standard. White box studies should lead to more reliable standards.

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)?

Please refer to the Bloodstain Pattern Analysis Bibliography.

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)

- Arthur, RM, Cockerton, S.L., de Bruin, KG, and Taylor, MC, A novel, element-based approach for the objective classification of bloodstain patterns, Forensic Sci Int, 2015: p.220-228.
- Hicklin, et al. Pending publication...
- Laber TL, Taylor MC, Kish PE. The Reliability of Current Methods of Sequencing Bloodstain Patterns. The Journal of BPA. 2014;30(1):10.
- Osborne, NKP, Taylor, MC, and Zajac, R, Exploring the role of contextual information in bloodstain pattern analysis: A qualitative approach, Forensic Sci Int, 2016: p. 1-8.
- Osborne, NKP, Taylor, MC, Healey, M and Zajac, R, Bloodstain pattern classification: Accuracy, effect of contextual information and the role of analysts characteristics, Sci Justice, 2016; 56(2): 123-128.
- Osborne, N. K. P. and M. C. Taylor (2018). Contextual information management: An example of independent-checking in the review of laboratory-based bloodstain pattern analysis. Sci Justice 2018; 58(3): 226-231.
- Taylor, MC, Laber, TL, Kish, PE, Owens, G, and Osborne, NKP, The reliability of pattern classification in bloodstain pattern analysis, Part I: Bloodstain patterns on rigid non-absorbent surfaces, J Forensic Sci, 2016: doi:10.1111/1556-4029.13091.
- Taylor, MC, Laber, TL, Kish, PE, Owens, G, and Osborne, NKP, The reliability of pattern classification in bloodstain pattern analysis, Part II: Bloodstain patterns on Fabric Surfaces, J Forensic Sci, 2016 (6): 1461-1466.

Additional relevant research is provided in the ADDENDUM.

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. "Objective and validated methods to classify spatter patterns by the mechanism of formation"

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

The bloodstain pattern analysis community, laboratories and accrediting bodies can use this research to inform and implement improvements to the methods, standard operating procedures, training programs and other quality assurance practices.

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

A white box study will generate insight into the cognitive processes that underlie the analysis of bloodstain patterns. The white box studies will consider factors to include: contextual information, bias, the quality of the evidence; visible characteristics of the bloodstains (quality, quantity, clarity, complexity, extent of bloodstain pattern, size and distribution).

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

The research results will identify the factors that influence analysts' ability to accurately and reliably interpret bloodstain evidence. Further, the results will be valuable in promoting transparency, objectivity, and the communication between experts and laypersons, particularly within the criminal justice system. This research will provide the criminal justice system an assessment of the reliability of bloodstain pattern analysis and the weight that can be given to these findings.

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

I

	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.