OSAC Research Needs Assessment Form

Title of research need: Bloodstain Pattern Classification

Keywords: Pattern analysis, bloodstain pattern analysis, classification, blood

Submitting subcommittee(s): Bloodstain Pattern Analysis **Date Approved:** 1/5/17

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

Background information:

1. Description of research need:

SEE ALSO ATTACHED ADDENDUM for additional details.
A problem in bloodstain pattern classification is that different bloodstain pattern analysts may give different classifications for the same pattern. Thus, more research is needed in order to minimize subjectivity in pattern classification. Currently, classification of a pattern results in the naming of a pattern using mechanism-based terminology. The mechanism by which a pattern was made, however, is part of the reconstruction process of a BPA scene. Thus, new research is needed in order to avoid mechanism-based terminology and to base the classification upon objective, physical characteristics.

2. Key bibliographic references relating to this research need:

- Arthur RM et al. A novel, element-based approach for the objective classification of bloodstain patterns. For Sci Int 2015;**257:**220
- Saviano J. Articulating a concise scientific methodology for bloodstain pattern analysis J Forensic Id 2005;**55:**461
- Gardner R. Defining a methodology for bloodstain pattern analysis. J Forensic Id 2006;**56:**549

3a. In what ways would the research results improve current laboratory capabilities?

This research will result in a unified framework for the classification of bloodstain patterns, based on physical characteristics of bloodstains. This unified framework will lead to a more objective and consistent method amongst bloodstain pattern analysts. It will decrease the error rate and increase the reliability of the method.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

This research will provide the field of bloodstain pattern analysts with a theoretical foundation for the classification of bloodstain patterns necessary for later studies in the accuracy and reliability of analysts. This research will lead to a better understanding of the decision-making process. It will provide guidance for the BPA subcommittee to revise current methods and to better reflect the current scientific state. A list of quantifiable, measurable and objective physical characteristics resulting from this research will help the subcommittee to describe the human pattern recognition process that has not been elucidated so far.

3c. In what ways would the research results improve services to the criminal justice system?

An objective method for pattern classification will lead to more reproducible and reliable outcomes amongst different bloodstain pattern analysts. This will result in a more justifiable framework leading to a cutting edge improvement to the criminal justice system.

4. 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.

Subcommittee Approval date:

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes ◯ No ◯

2. Does the SAC agree with the status assessment? Yes ◯ No ◯

If no, what is the status assessment of the SAC:

Approval date: 1/5/17

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)

ADDENDUM

Research questions regarding bloodstain pattern classification

OSAC Bloodstain Pattern Analysis Subcommittee
November 17, 2016

Introduction

This document serves as an addendum to the OSAC Research Needs Assessment Form entitled "*Bloodstain Pattern Classification*" approved by the Bloodstain Pattern Analysis Subcommittee on November 17, 2016. The BPA Subcommittee is of the opinion this addendum provides additional details not captured in said form.

What is the problem?

1) Different people (of similar competence/experience) may give different classifications for the same pattern.
   Evidence: CTS proficiency tests/casework testimony

2) The inter and intra pattern variability is high: two impact patterns may exhibit as much variation as an impact pattern compared to an expiration pattern
   Evidence: BPA course exercises/personal experimentation/casework examples

3) The descriptions of patterns are sometimes/often a description of the mechanism. The thought process during pattern classification is not well worked out: before classifying a pattern, objective, measurable characteristics should direct the analyst into the correct classification.
   Evidence: SWGSTAIN terminology list/BPA language used in terminology

Why do we care about these problems?

Accurate conclusions regarding mechanisms are vital to a fair outcome in court.

What are the research questions?

1) How do BPA analysts currently classify patterns?

2) Find the characteristics of individual patterns that are relevant to pattern classification.

3) How much variation is there in classification among different BPA analysts?

4) What terms do we need to describe a bloodstained area in an objective and unambiguous way? (Find data descriptors that describe relevant bloodstain characteristics in a physical measurable way)

5) Find a universal way to articulate pattern classification in order to come to the same outcome for all trained analysts.