OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Best practices to minimize potential biases in laboratory-based practices in DNA testing and data analysis

Describe the need:

Subcategory: Training, ethics, and efficiency

The quality and veracity of scientific evidence reflects the interplay of several factors that include critical decisions made by forensic scientists at every step of the analysis and interpretation pipeline including the case assessment phase — where there may be a need to access critical task-relevant information to determine what items to test and how to test them. Inherently, this case assessment process may expose the analyst/laboratory to irrelevant information that could contribute to cognitive bias in subsequent data analyses. Although forensic scientists strive for objectivity, they are subject to the same cognitive bias with the potential to inadvertently shape analyses and judgments. People rely on heuristics (mental shortcuts) when making decisions. Although these automatic and unconscious processes are often useful, heuristics can also beget systematic errors, called *cognitive biases*, that can affect decision-making. Due to the nature of their work, forensic scientists are sometimes faced with scenarios where factors that may elicit cognitive biases can enter the casework pipeline, despite deliberate efforts to minimize such factors. Even with a growing body of work on the role of cognitive bias in forensic science, more is needed to develop and implement strategies in the laboratory to mitigate cognitive bias when forensic scientists' decisions require exposure to case facts.

Keyword(s): cognitive bias, DNA interpretation, case assessment, human factors, task-relevant information

Submitting subcommittee(s): Human Biology **Date Approved:** 05/16/2025

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)

Yes. As bias is certainly addressed in many standards, some strategies exist to combat bias but additional research is needed specifically directed to the issues of forensic DNA testing.

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)?

No

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)

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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?

No

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

Cognitive factors such as selective perception, adjustments to regular occurrences, and confirmation bias affect the interpretation of information in everyday life and in the workplace in many ways. In forensic science, the body of research addressing human factors is still limited and would benefit from targeted research on the role of cognitive bias in process design and forensic scientists' decision-making when case information is required to inform examiner process and decision making. This is especially important for evaluating complex DNA mixture data where the interpretation may be influenced by human factors. Here expert systems or probabilistic genotyping may remove some of the analyst- to-analyst variability for mixture deconvolution and comparisons, but there still will be differences on which mixtures are deemed suitable for comparison and how different analysts perceive the limitations of the software used. Cognitive biases can also affect overall testing strategies and sample selection, and reporting or court testimony.

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

Most of the current research on human factors and cognitive bias in forensic practitioners is focused on forensic pattern evidence interpretation. More research needs to be focused on bias in forensic DNA, including, but not limited to, risk analysis of biases experienced throughout the entire laboratory workflow and into new techniques to mitigate bias during laboratory testing, and data interpretation, reporting and testimony.

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

Criminal justice system stakeholders rely on forensic laboratories to provide biology/DNA results on physical evidence in an unbiased fashion with reports and testimony designed to express the significance and the limitations of the data, so that all parties clearly understand the conclusions. A systematic study and a strategy for minimizing the effects of factors like selective perception, base rate regularities and confirmation bias on forensic DNA testing, and data interpretation, reporting and testimony, will support this goal.

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

	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.