E69 Ocular Measures in the Detection of Deception

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Learning Overview: After attending this presentation, attendees will understand the principals behind the use of eye movement tracking, pupil diameter changes, blinks, and other oculometric parameters as measures of deception.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing information about alternative physiological measures that can be used in place of, or in conjunction with, traditional polygraph measures, along with data on their effectiveness. Current state-of-the-art commercial systems that employ these methods will be reviewed.

Law enforcement, military, and governmental agencies need robust credibility assessment and deception detection tools to keep up with an increasingly large number of investigative cases. Humans historically have shown poor performance when performing this task without aid. Polygraphy has been the predominant method of credibility assessment since it was first used by law enforcement in the 1920s. While this methodology can claim a high degree of accuracy when properly administered and used to investigate specific instances of events, it has proven to be less than optimal in several situations, leading to the investigation of alternative techniques and technologies. The National Research Council of the National Academies of Sciences has noted: *The limitations of the polygraph, especially for security screening, justify efforts to look more broadly for effective tools for deterring and detecting security violations.*[1]

Polygraphy hypothesizes that individuals in deceptive situations experience an emotional response that causes arousal of the Autonomic Nervous System (ANS). Increase in arousal is detected through measurement of changes in physiological functions in respiration, blood pressure, and skin conductance. Change in the responses of cognitive and perceptual processes can be measured and employed in a similar manner. Changes in eye movement patterns can serve as an indirect measure of memory and effectively indicate concealed knowledge. Like polygraph measures, pupil diameter is affected by arousal in the ANS but also by cognitive workload through the Central Nervous System (CNS). This provides the potential to combine CNS and ANS measures to investigate prior knowledge and deception detection. Similarly, research has shown that blink parameters are diagnostic in determination of deception, with the differences accounted for by both theories of cognitive load as well as arousal-based theories.

Ocular measures of veracity have applicability across a variety of domains. Determination of concealed knowledge and credibility assessment are obvious applications for use in law enforcement and suspect questioning. Source verification is another application well suited to this technique as it permits a quick screening of an individual to determine if other credibility assessment methods should also be employed. The various protocols can be applied in other areas including customs, border crossing, and questioning of enemy combatants.

As this technology moves from research to commercial products, this report will provide a background to both better understand the potential of such applications as well as determine their effectiveness for specific situations. After presenting information on the principles and practicalities of collecting ocular measures, an overview of currently available commercial systems will be provided. Attendees will leave with a better understanding of the benefits and limitations of this approach and how it compares with current deception detection methodologies.

Reference(s):
[1]. NRC. *The Polygraph and Lie detection.* Committee to Review the Scientific Evidence on the Polygraph. 2003.

Deception Detection, Polygraph, Ocular Measures