



D23 Objective Determination of Eyewitness Identification Accuracy Employing Ocular Measures

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After attending this presentation, attendees will understand the potential application of a novel methodology to objectively determine the accuracy of eyewitness identification using cognitive and physiological measures that do not solely rely on traditional verbal decision making processes.

This presentation will impact the forensic science community by providing an additional tool that can be combined with current techniques used in eyewitness identification to add an objective measure to perpetrator recognition and supplement current computer-based lineup approaches.

Mistaken identifications are a leading factor in wrongful convictions in the United States and have contributed to over 75% of wrongful convictions overturned by post-conviction DNA evidence. In addition, witness subjective confidence is a poor indicator of memory accuracy.

Compilation of mug shots by federal and local law enforcement has provided a corpus of data that can be drawn upon to construct lineups. Recent efforts have focused on developing computer systems that facilitate administration of eyewitness identification tasks. These systems have been shown to be effective in both laboratory situations (MacLin, Zimmerman, and Malpass, 2005) as well as with local law enforcement (MacLin and Phelin, 2007).

Such advances in the ability to create computer-based lineups have been complemented by advances in non-contact, easy to use eye tracking technology. Current systems can be incorporated straightforwardly into video monitors and permit simultaneous collection of gaze, pupil diameter, and blink rate data unobtrusively while individuals view presentations of text and images.

Previous work has shown that individuals examine images of previously seen faces differently from novel faces, exhibiting fewer eye fixations, less overall viewing, and less statistical constraint in their viewing patterns (Althoff and Cohen, 1999). Further studies have shown that other ocular parameters, including changes in pupil diameter and blink rate, also reliably differentiate between novel and familiar faces (Marchak, et al., 2007; 2010). The goal of this effort was to determine if these measures could be used to objectively measure the performance of an eyewitness determining the presence of a perpetrator in a lineup.

Participants watched a video that involved a secretary entering an office, putting down a purse, and leaving the room to get coffee. A perpetrator passed by the open door, rifled through the purse and took objects, fleeing when the secretary returned. At the end of the video, the participants engaged in a word search distracter task for five minutes to prevent rehearsal and then completed a questionnaire describing the suspect and the crime. Lastly, half of the participants viewed a simultaneous lineup and half a sequential lineup of six faces while eye movements, pupil diameter, blink rate, electrodermal activity, and judgment confidence ratings were measured. In addition, for each lineup type, half did not contain the perpetrator.

The findings showed that eye movement measures can differentiate between the perpetrator and foils, in particular the first return fixation to a previously viewed region, the greatest fixation duration, the proportion of fixations, and the proportion of gaze time. Further, differences in maximum pupil diameter between the perpetrator and foils were also highly diagnostic. Blink rate data were mixed and a less reliable predictor. Of special note, these ocular measures were indicative of the perpetrator even in some instances when the participant made an incorrect response and selected a foil as the perpetrator.

A detailed overview of the paradigm and an analysis of the contribution of the multiple ocular measures will be presented, as well as the differences in effectiveness of the approach when applied to simultaneous and sequential lineups. The implication of the findings and recommendations for field application and evaluation will be discussed, along with plans for future research.

Eyewitness Identification, Memory, Methodology