J31 A Comparison of Gaze Behavior in Sequential Versus Simultaneous Presentation of Signatures in a Handwriting Comparison Task

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Learning Overview: After attending this presentation, attendees will understand some of the principles of cognitive psychology and the use of eye-tracking technology to study attention and feature-matching processes as they relate to the presentation of writing information in forensic document examination.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating different methods of unmasking information contained in writing samples on the visual behavior and decision accuracy in a signature comparison task.

A substantial body of research addresses the cognitive mechanisms involved in attention and visual search. Relational models of visual search demonstrate that visual attention can be guided by attending to specific feature values, such as color, size, or intensity, by inhibiting attention to irrelevant features, or by directing attention to how stimuli differ. Many current theories of attention propose that attention is based on "the interplay of a bottom-up, saliency-based attentional system and a top-down, feature-specific selection mechanism."[1] According to Becker, another type of information that guides attention is relational information about the target, or information about how the irrelevant information of a non-target differs from the features of the target.[1] Relational models place the target in relation to its context, offering more specific (e.g., directional) information about differences.[1] This relational aspect of attention may also be influenced by the presentation formats of signature specimens.

Research on eyewitness testimony and studies on the use of sequential vs. simultaneous lineups in criminal investigations provide a conceptual framework for studying the effects of method of presentation on the deployment of attentional resources and the examination and weighting of signature specimens. Although simultaneous lineups are the most common procedure used in the United States, researchers argue that simultaneous lineups, which are relational in nature, result in biased judgments.[2] Witnesses are required to use "relative judgments" by comparing lineup members to each other, rather than relying on their memory for such comparisons. This method is problematic because if the true perpetrator is not in the lineup, then the witness will often implicate the lineup member who most closely resembles the perpetrator, resulting in a false identification.[3] Much of the laboratory research in this area indicates that sequential lineup procedures are less likely to be biased than are simultaneous lineups.

Subsequent field research using the double-blind sequential method of lineup presentation indicates that, in practice, the simultaneous procedure may produce fewer false identifications than the sequential procedure. The sequential lineup forces witnesses to resort to "absolute judgment" in which they can compare each photograph in the lineup only to their memories of the offender, but field studies of this phenomenon have demonstrated either equivocal or contrary results to lab studies.[4]

Kassin et al. stated, "Examiners should work 'linear' rather than 'circular,' thus initially examining the evidence from the crime scene and documenting their findings before making comparisons against a target. This will eliminate the potential influence of the target on how information is processed and the weight assigned to it."[5]

The use of sequential rather than simultaneous presentation of signatures during a handwriting identification task has been discussed in the Forensic Document Examiner (FDE) community in Australia, but this procedure has not been empirically tested. This presentation reports the results of an empirical experiment investigating the differences in examination processes and the accuracy of signature comparison decisions when signatures are presented simultaneously or sequentially during a signature comparison task.

Sixteen signatures were presented during an experimental eye-tracking procedure (NIJ Award # 2015-DN-BX-K069). Signature comparisons were counterbalanced so that all 16 signature comparisons were viewed either simultaneously or sequentially. Participant gaze behavior was recorded using a Tobii X2-60 eye-tracking system. Results will be discussed in the context of current discussions about sequential unmasking of forensic evidence features.

Reference(s):

1. Becker, S.I. (2010). The Role of Target-Distractor Relationships in Guiding Attention and the Eyes in Visual Search. *Journal of Experimental Psychology*: General, 139(2), 247-265. http://dx.doi.org/10.1037/a0018808.
2. Wells, G.L., and Olson, E. (2003). Eyewitness Testimony. *Annual Review of Psychology*, 54, 277-295.
3. Wells, G.L., and Seelau, E. (1995). Eyewitness Identification: Psychological Research and Legal Policy on Lineups. *Psychology, Public Policy and Law*, 1, 765-791.
4. Mecklenburg, S.H. (2006a, March). *Report to the Legislature of the State of Illinois: The Illinois Pilot Program on Sequential Double-Blind Identification Procedures*. Illinois State Police, Springfield IL.
5. Kassin, S.M., Dror, I.E., and Kukucka, J. (2013). The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions. *Journal of Applied Research in Memory and Cognition*, 2, 42-52.

Decision Accuracy, Presentation Context, Presentation Order