



Questioned Documents Section - 2014

J12 Feature Diagnostic Value in Questioned/Known Signature Comparison Tasks

Veronica B. Dahir, PhD, University of Nevada, Reno, Center for Research Design & Analysis, 1664 N Virginia Street, Mail Stop 0088, Reno, NV 89557; Mara L. Merlino, PhD, 1066 Tamworth Lane, Frankfort, KY 40601; Tierra M. Freeman, PhD, Kentucky State University, 229 Hathaway Hall, 400 E Main Street, Frankfort, KY 40601; Victoria Springer, MA, University of Nevada, Reno, Grant Sawyer Ctr for Justice S, Mail Stop 313, Reno, NV 89557; Derek L. Hammond, BA, US Army, Criminal Investigations Lab, 4930 N 31st Street, Forest Park, GA 30297-5205; Adrian G. Dyer, PhD, RMIT University School of, Media & Communication, Bldg 5.2.36, City Campus, Melbourne, Victoria 3000, AUSTRALIA; Bryan Found, PhD, Office of the Chief Forensic Scientist, Victoria Police Forensic Services Department, 31 Forensic Drive, Macleod, Victoria 3085, AUSTRALIA; Janice R. Russell, MS, University of Nevada Reno, 1664 N Virginia Street, Mail Stop 0088, Reno, NV 89557; Lindsay M. Perez, BS, University of Nevada Reno, 1664 N Virginia Street, Mail Stop 0088, Reno, NV 89557; Jordan D. Clark, BS, University of Nevada Reno, 1664 N Virginia Street, Mail Stop 0088, Reno, NV 89557; and Valarie J. Bell, MA, University of Nevada Reno, 1664 N Virginia Street, Mail Stop 0088, Reno, NV 89557*

After attending this presentation, attendees will understand the use of eye-tracking technology to study attention- and feature-matching processes as they relate to decision-making processes in forensic document examination.

This presentation will impact the forensic science community by demonstrating the importance of engaging in theoretically-based, multidisciplinary research to an understanding of the nature of the methodology and expertise in forensic document examination.

According to Amos Tversky, most stimuli may be effectively described by the presence or absence of qualitative features. He and others argued that an object is represented by a set of features or attributes, and that judgments of similarity are achieved through a process of feature matching. Tversky's "Contrast Model" systematizes this "feature" approach, and proposes that similarity depends on the proportion of features common to the two objects as well as on their unique features. Feature matching occurs by establishing differences in quality or quantity, such as differences in color or size, or the presence or absence of the features upon which the judgment is based, usually in terms of binary variables.¹ This feature-matching process, along with the deployment of attentional resources, is a core process of forensic document examination.

Forensic Document Examiners (FDEs) are extensively trained to conduct comparisons of signatures, handwriting, and hand printing. FDEs reach their decisions by seeking those features and characteristics which may be characterized as the document's identifying attributes or characteristics. Consistent with Tversky's Contrast Model, examiners determine the presence or absence of features, whether the features are within the writer's range of variation, and then assign these features evidentiary weight. Examiners seek not only substantial similarities or differences among writing samples, but also repeated small characteristics which may be sufficient to establish clearly that writings are the work of two individuals. The number and quality of these features allow FDEs to make assertions about the authorship of the specimen and the extent of their confidence in their decisions.²

Many studies have demonstrated that FDEs are more proficient at correctly identifying or excluding signatures than are lay people.³ This suggests that compared to lay people, trained examiners should use a greater number and variety of handwriting features in reaching their conclusions about the source of questioned signatures. However, Dyer and colleagues found by using eye-tracking methodology that FDEs and lay people appeared to view signature features similarly, although the FDE opinions were more accurate than those of the lay person control group. Dyer and colleagues suggested that this finding may be due to different cognitive processes used by FDEs and lay people for evaluating questioned signatures.⁴ The findings will be discussed in the context of the examiner's extent and kind of training, education, and experience, and will be used to illustrate the ways in which cognitive psychology can contribute to an understanding of the decision-making processes of experts in the field compared to those of lay people.

This presentation describes findings from an open-ended, qualitative survey conducted as part of a national study of FDEs (supported by Award No. 2010-DN-BX-K271, National Institute of Justice, Office of Justice Programs, U.S. Department of Justice) concerning how the examiners used signature features to reach their decisions about the authenticity of signature specimens.

References:

1. Tversky, A. (1977). Features of similarity. *Psychological Review*, 84, 327-352.



Questioned Documents Section - 2014

2. Lindblom, B.S. (2006). A forensic document examiner's training. In J.S. Kelly and B.S. Lindblom (Eds.) *Scientific Examination of Questioned Documents* (2ed.). (Ch. 3, pp. 15-17).
 3. See Kam et al., 1994; Kam et al., 1997; Kam et al., 2001; Sita et al., 2002; Found & Rogers, 2005; Kam & Lin, 2003.
 4. Dyer, A.G., Found, B. & Rogers, D. (2006). Visual attention and expertise for forensic signature analysis. *Journal of Forensic Sciences*, 51, 1397-1404.
-

Feature Matching, Attention, Handwriting