J10   An Analysis of Forensic Document Examiner (FDE) Aptitude in Determining and Comparing Velocity Rates of Handwritten Strokes

Michael Caligiuri, PhD, University of California, Dept of Psychiatry, 9500 Gilman Drive (0603), San Diego, CA 92093; Linton Mohammed, PhD*, Forensic Science Consultants, Inc, 433 Airport Boulevard, Ste 406, Burlingame, CA 94010-2014; and Carl R. McClary, BA*, 2600 Century Parkway, Ste 410, Atlanta, GA 30345

After attending this presentation, attendees will better understand the aptitude of FDEs in comparing and determining the velocity of handwritten strokes. This presentation will provide training information for journeyman and trainee FDEs.

This presentation will impact the forensic science community by providing empirical data on the aptitude of FDEs in discriminating velocity of handwritten pair samples. This discrimination is one part of the examination process and can be vital when determining genuineness in handwriting and signatures. The results will provide insights into the ability of FDEs in this area of examination, and the study will be an impetus for future research.

Proper evaluation of the speed of a written stroke is an important parameter for FDEs in determining whether or not signatures or handwriting are genuine. FDEs make this evaluation based on line gradation, variations in pen pressure, and initial and terminal strokes. FDEs have been shown to make reliable evaluations of line speed from early generational photocopied samples and from online samples. This study was conducted by extracting 60 original handwritten letters ("l") from a large database of 16-bit digitized samples and presenting them to 50 forensic document examiners in the form of sample pairs. Each pair included samples of the letter "l" selected to range in known stroke velocity from 10mm/s to 150mm/s. The average velocity of a handwritten stroke is 100mm/s. Pairwise comparisons of letters executed at various speeds were then presented to the FDEs who were asked to provide an opinion as to which of the two samples of the pair was faster. The opinions were a forced call and no inconclusive opinions were allowed. FDE judgments were evaluated to determine the reliability of the FDEs in the task of comparing line velocity using blinded repeat pairs.

The FDEs evaluated the line velocity using online samples. Once these examiner classifications were performed and results received, they were evaluated against the known velocity differences between the sample pairs. That point along the continuum of velocity difference scores where 95% or more of the FDEs accurately selected the faster sample served to operationalize the Just Noticeable Difference (JND). Further analyses were performed to examine effects of years of experience on the magnitude of the JND.

This study processed FDE judgments for accuracy and their ability to identify the JND in perceived stroke velocity based on ground truth of known velocities. This study has implications for validating claims by FDEs about reliably estimating handwriting speed. Identifying the perceptual JND for stroke velocity is relevant to questions of whether experienced FDEs can distinguish important features in handwriting that fall within or outside the writer's natural variation.

This study provides information on the ability of FDEs to determine the velocity of handwritten strokes and their ability to differentiate strokes based on velocity ratings from digitized samples. It should also provide training samples for FDE journeyman examiners and trainees and an impetus for other studies to expand on this one.

Forensic Document Examination, Velocity, Kinematics