



## Questioned Documents Section – 2009

### J11 Can Dynamic Features be Used to Discriminate Between Forged and Disguised Signatures?

*Linton Mohammed, MFS\*, San Diego County Sheriff, Crime Lab, 5255 Mount Etna Road, San Diego, CA 92117; Bryan Found, PhD, La Trobe University, Bundoora Campus, Melbourne, 3086, AUSTRALIA; Michael Caligiuri, PhD, University of California, San Diego, 3350 La Jolla Village Drive, San Diego, CA 92161; and Doug Rogers, PhD, La Trobe University, Bundoora Campus, Melbourne, 3086, AUSTRALIA*

After attending this presentation, attendees will become aware of dynamic features that may help them to improve their ability to discriminate between forged and disguised signatures.

This presentation will impact the forensic science community by increasing the objectivity of handwriting examinations.

The examination and comparison of signatures is a task routinely carried out by Forensic Handwriting Examiners (FHEs). Empirical blinded studies of FHEs' skills have shown that they are proficient in discriminating between genuine and forged (simulated) signatures. In real-case scenarios; however, FHEs must also consider the possibility that the true (exemplar) writer may have produced a disguise signature in order to later claim that the signature was forged. In these cases, the disguise strategy adopted by the signer must result in a signature displaying a pictorial similarity to the writer's real signature style. This is to maximize the possibility that it would pass a cursory inspection at a transaction point by any person who might have access to a specimen signature. It is accepted that that writers' employing disguise behavior often incorporate elements or features that they can point at later as evidence of forgery (for example changes to the design of initial characters in the signature form). Some disguise behaviors can be more complex and can result in altered features that are typically associated with forgery behavior. Recently reported large scale signature validation trial results indicate that FHEs, when treated as a group, perform poorly on tasks involving the discrimination between forged and deliberately disguised signatures. It is clear that additional research effort is required to focus on the features that might best predictor whether a questioned signature is disguised or forged.

In this study, 30 writers were asked to forge the signatures of three specimen signature providers (the "model" writers). The signature style of each of the three models was different. One was a text-based signature (where all the allographs were legible). The second signature was a mixed style (where two or more, but not all of the allographs were legible) and the third was stylized (where none of the allographs were legible). The model signature writers each produced 20 signatures (ten genuine, five disguised, and five signatures disguised to look like forgeries). All signatures were written on a digitizer pad (sampling at 200Hz with 0.0005 cm resolution) which measured dynamic features such as velocity, duration, jerk, size, and pen pressure.

The forgers each provided ten genuine signatures and fifteen forgeries of each of the three model signatures. Each forger practiced three times on plain paper, before producing the forgeries on the digitizer. This resulted in a database of 1,350 forgeries. The dynamic data was analyzed statistically and the features of the genuine, disguised, and forged signatures were inter-compared. The data from the first five forgeries and the last five forgeries of each writer was statistically compared to determine if there was any learning process. A Likert survey was conducted of the forgers to determine qualitatively which of the three signature styles they found most difficult to forge. The analysis should provide empirical evidence of any predictors that might assist a FHE to improve the reliability of discriminating between disguised and forged signatures.

#### **Forensic Document Examination, Signatures, Forged, Disguised**