



## Questioned Documents Section – 2009

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### **J5 Individuality of Handwriting: A Twins Study**

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After attending this presentation, attendees will gain an understanding of: (1) the extent of individuality of handwriting as measured by the comparison of the handwriting of a significant number of twins, and (2) performance of automated methods in handwriting verification in comparison with that of lay persons and professional examiners.

The presentation will impact the forensic science community by providing a measure of individuality of handwriting and error rates.

Since handwriting is influenced by physiology, training, and other behavioral factors, a study of the handwriting of twins can shed light on the individuality of handwriting.

A study of writer verification for twins and non-twins is presented using an automatic handwriting verification system. The system performs the task through a statistical model of similarities between a set of features extracted from each of the handwriting samples. Handwriting samples provided by 206 pairs of twins as well as by 206 pairs of non-twins were used in the study. For twins, the experiment consisted of 1,236 tests (including 824 different content and 412 same content pairs), where the task is to determine whether two half-page documents were written by the same individual. The results show that the handwriting of twins tend to be more similar than that of non-twins: the verification error rate of twins is about 13% while non-twins' error rate is around 4%. Error rates with identical twins is higher than that of fraternal twins. Error rates in all cases can be arbitrarily reduced by rejecting (not making a decision) on borderline cases. System performance is seen to lie in-between that of lay persons and professional forensic document examiners.

**Twins' Handwriting, Automated Writer Verification, Human and Machine Performance**