

# ABSTRACTS

Volume 15, Number 2

## Examination of paper and toner in page insertion/substitution cases using TLC, GC-MS and FT-IR microspectroscopy

Valery Aginsky, PhD

The comparison of paper and toner of each sheet (or certain pertinent pages) of a multi-page document produced with toner-based electrophotographic technology may help: (A) to determine if there have been page insertions or page substitutions; or (B) to test a hypothesis that multiple documents, which were supposed to come from different sources, have a common source.

This article shows that a combination of three analytical methods, thin-layer chromatography (TLC), gas chromatography-mass spectrometry (GC-MS), and reflectance Fourier transform infrared (FT-IR) microspectroscopy, provides high discriminating power with regard to both paper and toners that cannot be distinguished by non-destructive (optical) techniques. These three analytical methods may allow the examiner to achieve a high level of certainty when evaluating which of two competing hypotheses is more probable:

- (Case A) the “prosecution” hypothesis,  $H_p$ , that certain pages in the document have been substituted, or the “defense” hypothesis,  $H_d$ , that no page substitution has occurred since the initial production of the document;
- (Case B) the “prosecution” hypothesis,  $H_p$ , that multiple documents, which were supposed to come from different sources, have a common source, or the “defense” hypothesis,  $H_d$ , that all the documents came from their respective origins as indicated on the documents.

## The Use of Simple Dimensional Measurements in the Analysis of Simulated Signatures: A Preliminary Study

Rukshana Boshir, MSc and Andrew, W. G. Platt, PhD

The ability of participants to simulate the width, height, and width: height ratio of simple and complex target signatures has been explored. The natural variation of the target signatures was evaluated over 29 and 28 signatures for the simple and complex signatures respectively. A group of 20 participants were provided 12 simulations of each signature on lined and plain paper. Paired t-tests show that the complex signature was more consistently reproduced than the simple signature. Single factor Analysis of Variance (ANOVA) followed by post hoc Tukey Honestly Significant Difference (HSD) tests showed that the complex signature was more easily simulated.

## Frequency of Selected Hand Printing Characteristics Occurring within a National Population: The *New International Version Bible Across America*®

Brett M. D. Bishop

Statistical analyses of data gathered for the hand-printing characteristics of a large national population of writers has yet to be undertaken in the field of document examination. Previous, smaller studies

documented the frequency of characteristics (e.g. skill, writing systems, style, and letter formations), but have not been updated for nearly twenty years. This research project examines hand-printing characteristics, specifically letter formations, to discover data which can be analyzed to establish frequency of their occurrence.

The source for this project is the *New International Version Bible Across America*® published by Zondervan. This version contains the writing of more than 31,000 individuals representing all fifty American states and abroad. Data for this study are based on a sample set of 500 people. The characteristics studied included various formations of “a,” “n,” and “r.” This research will be compared with previous findings from other studies, the most recent of which occurred in 1992 and will include recommendations for future study regarding the distinctiveness of hand-printing characteristics.

## **Using Acceleration/Deceleration Plots in the Forensic Analysis of Electronically Captured Signatures**

**Kathleen Annunziata Nicolaidis**

A research study was conducted to determine if analysis and comparison of acceleration/deceleration plots of signature data captured by electronic signature tablets would provide meaningful evidence in an examination of electronically captured signatures. This research focused on data collected by signature tablets produced by Topaz Systems, Inc., one of the largest suppliers of digital capture devices. William Flynn, in his article “Conducting a Forensic Examination of Electronically Captured Signatures” (published in the June 2012 edition of the ASQDE Journal), noted the visual differences in the plots of genuine and simulated signatures. Further research was conducted to determine how useful plotting the acceleration/deceleration of electronic signatures would be in a forensic examination and what reliable conclusions could be made from their analysis. The study hypotheses were that acceleration plots will be consistent for one writer; that simulated, traced, and spurious signature plots will be visually different from those of genuine signatures; that there will be a noticeable difference between signature plots of different writers; and that the comparison of acceleration plots will be a useful tool for signature authentication.