Differentiating Genuine and Forged Signatures Using Handwriting Biometrics

Heidi H. Harralson, MA, CDE, D-BFDE, Tucson, AZ
Hans-Leo Teulings, Ph.D., Neuroscript, LLC, Phoenix, AZ

Analyzing the biometric data acquired from experimental samples of genuine and forged signatures, we will show how to analyze the data and render conclusions from captured electronic signatures. Software applications such as MovAlyzeR will analyze the data as well as biometric data from another commercially-available e-signature software system. Methodology and limitations for FDEs in analyzing biometric e-signature data will be discussed.

(Note: Pre-symposium workshop on using the MovAlyzeR software in forensic examinations – see elsewhere.)

Handwriting: Defining its principles, natural and fundamental laws

Henriette Fournier, Forensic Document Examiner
Montreal, Quebec

Neurologists are providing insight into the basic principles, fundamental and natural laws that govern the expression of writing. French authors S. Pellat (1927) and Alain Buquet (1997-1998) have defined these principles in their books. This presentation will discuss these works which can assist the forensic document examiner in gaining a better understanding of the various influences involved in writing. Understanding these principles puts the assessment of handwriting on a more scientific level. Writing specimens and case studies will be used for demonstration.

It’s a Strange New World in Digital Documents

Charla Janney, Forensic Document Examiner, President
Charla Janney & Assoc., Lakewood, CO.

More and more people and businesses are using “digital” and/or “electronic” signatures for legally binding documents. This program will explain the differences between the two types of signatures and will also explain how these signatures are made. A brief overview of the emerging laws that are being developed regarding these types of digital documents will be discussed. This raises the question of how much “traditional” document examination work can be performed when these types of documents are called into question? What can the forensic document examiner handle in such cases and what may require consulting a forensic computer specialist? These issues will also be discussed.

Point of Sale Signatures and their Forensic Examination

Emily J. Will, BS, MA, D-BFDE, Forensic Document Examiner, Raleigh, NC

Digital signatures are becoming more common and entering the case work of forensic document examiners. This raises the question of how forensic examination of these signatures may differ from the long common forensic examination of traditional ink signatures. Can these digital signatures be examined in the traditional way? What additional information is needed? What conclusions can be reached? This presentation will discuss the kind of problems such examinations pose and the types of questions the FDE should be asking the submitter of the evidence. These and other relevant issues will be discussed using a court case involving point of sale signatures.

Calibration of Scanners and Cameras

Richard T. McEvoy, Jr. Forensic Imaging, Inc., Victor, NY

The recent uproar over “scientific methodology” in all things done in forensic work can be a major concern for those doing document examination. Or, does it really have to be? By having a standard way of doing things and an established method of calibrating the tools that can be calibrated, one can apply a “scientific method” to the task of imaging for document examination. By doing these calibrations, when other examiners might not, one can expect that one would appear both more scientific and more professional, when in (or out) of court. This program, then, will explore some easy ways of achieving these calibrations. Handouts will be given.

Pattern Recognition Research

Claire LaVelle, MS Computer Science, NPS, Monterey, CA
MA Interdisciplinary Computer Science, Mills, Oakland, CA

Forensic handwriting examination has been the focus of research in pattern recognition for a while. This presentation will explore:

• A historical review of the Pattern Recognition field and its interest in forensic handwriting examination, motivations of the researchers, the techniques used and how those techniques have evolved;
• Ways in which the field of Pattern Recognition is trying to automate handwriting analysis; and
• Discussion of the innovations in Pattern Recognition, what they mean for today’s forensic handwriting examiner, and those entering the profession in the future.
Kinematic Variability In Signature Formation in Dementia

Michael P. Caligiuri, Ph.D., UCSD, La Jolla, CA (presenter)
David P. Salmon, Ph.D., UCSD, La Jolla, CA
Douglas R. Galasko, M.D., UCSD, La Jolla, CA

Fifty years ago, Hilton (1962; 1969) described a subset of troubling signatures that examiners of questioned documents often encounter. These signatures are those produced during serious illness. Evaluating troubling signatures becomes more of a challenge when the illness occurs late in life, when handwriting changes from natural causes related to aging are already underway.

Recognizing that variation exists in nearly every identifiable element of a signature, Hilton stressed the importance of obtaining multiple samples to appreciate the variability and more importantly to identify a pattern of change falling outside this range of normal variability during periods of illness. While modern studies of handwriting kinematics in dementia reveal greater stroke-to-stroke variability and decreased smoothness relative to healthy writers, these findings are of limited utility to the forensic community as they were based on standard writing samples, not signatures.

The goals of this study were to examine the variability in pen movement kinematics during signature writing across samples in dementia and to identify potential writer-specific variables associated with increased variability. In this study, 13 well-characterized patients diagnosed with probable Alzheimer’s disease (AD) and 15 age comparable healthy individuals were asked to write their signatures at least five times using a non-inking pen on a Wacom digitizing tablet.

Digitized signatures were recorded, stored and analyzed using MovAlyzeR software. Kinematic parameters included stroke duration, absolute vertical stroke amplitude, average absolute stroke velocity, average normalized jerk, number of acceleration peaks/stroke, pen pressure, loop surface, and stroke slant. Estimates of variability were derived from the standard deviations and coefficients of variability. Results indicated that AD patients produced signatures with significantly greater trial-to-trial variability than healthy writers. Specifically, significant differences were found for stroke duration, vertical stroke size, normalized jerk, and stroke slant. No differences were observed for stroke velocity, loop surface, or pen pressure. AD patients with signs of Parkinsonism exhibited greater variability in smoothness than non-Parkinsonian subjects. Associations between age, gender, or dementia severity and kinematic variability were not significant. The results of this study have direct implications on FDE casework involving signatures from writers with dementia. The present results indicate that contemporary signatures written by individuals with moderate dementia are likely characterized by wide range of variability in static features such as stroke amplitude, smoothness and form (stroke slant). It is incumbent upon FDEs to take such variability into account when examining questioned signatures.

Forensic Analysis of Painted Signatures on Artwork

Heidi H. Harralson, MA, CDE, D-BFDE, Spectrum Forensics International, Tucson, AZ (presenter)
Martin W. B. Jarvis, Ph.D., Charles Darwin University, Darwin, Northern Territory, Australia.
Larry S. Miller, Ph.D., D-BFDE, East Tennessee State University, Johnson City, TN

Forensic handwriting examination of signatures on artwork can be problematic as “painting” a signature has more similarities to drawing than writing naturally. The purpose of this study was to examine the differences that occur between signatures signed with a conventional inking pen on paper to signatures signed with a paint brush on canvas. Twelve artist subjects produced both inking and painted signatures. Handwriting features were compared for the two types of signatures including length, height, breaks, and fluency. Not only were there differences in the signature fluency, connectivity, and size, but sometimes artists produced widely different graphic signatures on artwork in comparison to their legal signatures. This study helps forensic analysts and art authenticators to more clearly understand the process and limitations of analyzing painted art signatures.

Authentication of autographs and historical documents

John Gorajczyk, D-BFDE, Forensic Document Examiner Phoenix, AZ

Cases involving autographs and historical documents are not common cases for document examiners unless one specializes in this area. This presentation will center on the best practice for locating appropriate exemplars and working with such documents to demonstrate authenticity.

The Effects of Motivational and Cognitive Bias in Forensic Science

Michael Wakshull, MS, Forensic Document Examiner Temecula, CA

Cognitive and motivational bias can influence the decisions made by forensic examiners, juries and judges. Cognitive biases can affect the perceived credibility of the examiner’s report, court testimony or ability as an expert witness. The 2009 NAS report described cognitive biases as, “common features of decision making, and they cannot be willed away.” A model of motivational bias and cognitive bias is presented. Methods of overcoming bias and perception of bias are offered. This presentation explores methods that can be implemented to recognize these biases. Once the biases are known, people can take steps to mitigate the influences of the biases. Methods that can be used to mitigate the effects of these biases on decisions are presented.

The potential for bias in forensic science, referenced by the Criminal Justice and Forensic Science Reform Act of 2011 sponsored by Senator Patrick Leahy, and the Forensic Science and Standards Act of 2012 sponsored by Senator Jay Rockefeller, are discussed.
State of the Art: Paper and Ink Analysis Update 2012

Michael Weldon, BA, D-BFDE, Forensic Document Examiner, (presenter)
Guido F. Verbeck, Ph.D. Associate Professor of Chemistry
Ubisha Joshi, Intern, University of North Texas Forensic Program

Paper humidity techniques first initiated by Walter Rantenen (Integrated Paper Services - a testing lab for paper forensics) and Mike Weldon were extensively followed up with research at the University of North Texas Forensic Program. Research has yielded some valuable data and fresh knowledge in the areas of paper and ink chemistry. Additionally, new methods are being developed for a forensic science technique and instrumentation for the trace and ultra-trace analysis of inks, dyes, paints, and transferred chemistries on documents. This method focuses on direct sampling and microphase extraction of chemical residues to isolate and analyze key components. The analysis of trace and ultra-trace residue within documents can provide evidence of other chemicals present that would normally be unseen or too difficult to detect with other instrumental methods or techniques. This pioneering research has demonstrated promising results, employing virtually non-destructive methods for the extraction of trace ink samples on vintage documents from the 1830’s. Even though the average FDE will not have the instrumentation necessary to conduct such procedures, it is essential to learn of their value and application for referral, when case circumstances may benefit from such analysis.

Essentials of Computer Forensics

Karl Epps, EnCE, Epps Forensic Consulting PLLC, Scottsdale, AZ

With well over 90% of the world’s information today being created and stored electronically and more than half of which will never be printed, it is important to understand the basics of computer forensics. This fast paced presentation will focus on how forensic computer examiners properly seize and preserve evidence and some examples of what information can be attained from that evidence.

Requested Writings as Exemplars from an Admitted Forger – A Workshop, Part 2

Robin Williams, MFS, MS, D-BFDE, Forensic Document Examiner Green Bay, WI

What procedure would you employ if an admitted forger stated under oath that they signed another person’s signature on documents, but could not remember if they signed the documents in question? The Forensic Document Examiner had to prove or disprove whether the admitted forger signed it. This case study will address the potential problems faced by a document examiner when only working with “Formal Request Signatures” related to the signature examination, as well as the application and reliability of “Formal Request Signatures” versus “Contemporaneous Course of Business Signatures”.

This presentation is a continuation of the case presented at the 2011 AFDE Symposium.

Essential Tremor: The effects on activities of daily living; Pre and Post Deep Brain Stimulation

Arshia Sadreddin, MD, Director Huntington’s Clinic, Barrow Neurological Institute, Phoenix, AZ

Deep brain stimulation has provided therapeutic benefits for disorders that include tremor. An implant in the patient causes a change in brain activity, thus allowing activities such as handwriting to improve. After gaining an understanding of Essential Tremor and implanting of the "brain pacemaker", writing from individuals obtained when the implant is activated and deactivated will be presented for discussion.

Handwriting Image Analysis

Hans-Leo Teulings, Ph.D., Neuroscript, LLC, Tempe, AZ
Heidi H. Harralson, MA, CDE, D-BFDE, Forensic Document Examiner, Tucson, AZ

Five technologies to process handwriting images could become available for forensic document examination in the near future. One technology separates known texts into letters and quantifies features per letter or per word. This technology has been applied to evaluate handwriting performance by children in primary schools in The Netherlands. A second technology can be used to enhance handwriting images into 3-dimensional images. A third technology is to translate a static image into a movement. A forth technology is to automatically segment handwriting into lines and to automatically characterize each line by several features. This technology has been used to identify early signs of Parkinson’s disease. A fifth technology can be used to automatically match individual handwriting styles. We hope to learn which technology(s) will help forensic document examiners.

Marketing Principles that Matter

Lisa Boramaster Fontes, Advertising Sales Manager, State Bar of Arizona, Phoenix, AZ

This session will cover key principles of marketing and advertising that will drive better results from your marketing investment and activities. The presenter will share the most effective approach to your marketing and advertising strategy, from the perspective of a career spanning 29 years in advertising, media, and business-to-business marketing as an advertising director and publisher of Business Journals in five cities across the U.S.

The program will include a question-and-answer period to facilitate a robust discussion about todays media, marketing and advertising environment, and what you should be doing now to market your services. Topics will include:

- The One Mistake You Don't Want to Make in Your Marketing
- Marketing Principles to Help You Make Money as an Expert
- Advertising Principles that will help you get results
- How to Connect with Attorneys through State Bars
**Difference or Variation: Just how much does it take to be sure?**

**R. B. (Dick) Lewis**, Forensic Document Examiner, Littleton, CO

This case study would test or perhaps shake the confidence of many examiners. It involves the question of how much variation an individual can display in his or her writing before the variation is considered a difference. In extreme variation cases, the question is whether an identification can be made and at what level of confidence. How many writing samples or normal course of business exemplars are needed to be sure one has enough?

These are questions we all ask ourselves each time we are examining writing. The case that will be presented is a prime example of why we should always ask ourselves whether we really have enough comparison specimens. Our responsibility as an expert requires caution when rendering opinions with limited exemplars, especially in the case of extreme variation.

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**On a Slippery Slope**

**Steven A. Slyter**, D-BFDE, Forensic Document Examiner Louisville, Kentucky

Accumulating opinions as to the value of pattern recognition evidence now puts the future of subjective opinion expertise on a slippery slope. Who are the serious critics? What are the merits of their criticism? How do we respond?

This presentation will explore the types of cases, which call for the Forensic Document Examiner to be restrained, and resolutely objective about the boundaries imposed on a case by the evidence made available for the examination.

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**Changing Technology: the fax machine and eFax**

**Emily J. Will**, MS, D-BFDE, Forensic Document Examiner Raleigh, NC

Technology is always moving forward, so it is time for an update on the quality and capabilities of fax machines and a look at eFaxing. How have fax machines changed? Has the quality of faxed documents improved significantly? What options are available on newer fax machines? Instead of owning a fax machine or using the fax portion of an All-In-One machine, some people opt for the e-Fax process. How does eFaxing work and is the quality much different from the standard faxing process? These are some of the questions that will be addressed in this presentation.

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**Ethical Considerations when Conducting Research on Identifiable Signatures**

**Michael P. Caligiuri**, Ph.D., UCSD, La Jolla, CA

This presentation will discuss the ethics and federal regulations governing human subjects research and how these impact the conduct of research involving collection, storage, and sharing of identifiable handwritten signatures. The presentation will focus on enrollment of vulnerable individuals, elements of informed consent, and managing risk of loss of confidentiality.

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**Tips & Information**

In this session participants share information on a variety of subjects for the benefit of their colleagues. These are 10 minute sessions.

**Multiple Personality Disorder**

**Bonnie Schwid**, D-BFDE, Forensic Document Examiner, Milwaukee, WI

The handwriting of two of the personalities captured on a tablet.

**Credit Cards**

**Charla Janney**, Forensic Document Examiner, Lakewood, CO

**Case Specific Exemplars** (and)

**Dementia and Natural Variation in Handwriting**

**Vickie L. Willard**, D-BFDE, Forensic Document Examiner, Cleveland, OH

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**PRE-SYMPOSIUM WORKSHOP**

**Full Day Hands-on**

**MovAlyzeR Software in Forensic Document Examination**

**Presented by:**

**Hans-Leo Teulings**, Ph.D. NeuroScript

**Heidi H. Harralson**, MA, D-BFDE

Participants will receive a full featured MovAlyzeR trial version software to install on their computer for a hands on experience. Bring your laptop or tablet PC. The workshop will include protocols to record handwriting movement, designing and conducting experiments with MovAlyzeR software, understanding digital signatures recorded on POS signature pads, and relationships between movement recording and scanned imaging. Mock cases will be presented for better understanding the applications to case work.

**Registration:**

- Non-MovAlyzeR owners $150
- MovAlyzeR owners Free

Individuals purchasing MovAlyzeR software before the workshop or immediately after the workshop will receive a refund of the workshop registration fee.

(Class limited to 25 - Register Now)
Embassy Suites Hotel
4415 E. Paradise Valley
Phoenix, AZ
(602) 765-5800
1-800-EMBASSY

Reservations:
Single or Double: $99.00 + tax
Add $10 each for third or fourth person in room

EXTRAS: Hot full breakfast buffet included
Social hour with free drinks and hors d’oeuvres after the meeting

NOTE: This is the same hotel the AFDE symposium was held at in 2010. Those attending spoke highly of the breakfast and social hour or two after the meeting.

AFDE reservation rate will only be guaranteed until September 17, 2012. After this date the block of rooms will be released and reservations will be on a space available basis only.

AFDE rates are highly discounted. Book your room early.

Transportation from airport to hotel:
Super Shuttle: $20 per person - go to the Shuttle Station.
Desert Coach: $40 per car, up to 4 people 602-286-6161
ET Limo: $42 / 2 people, reservations ahead: 602-439-7414
Taxi: about $45

AFDE rates apply 3 days before and after the symposium, so plan to attend the pre-symposium workshop on the MovAlyzer and stay a few extra days to enjoy the sites in and around Phoenix.

Sedona is a pleasant 2 hours drive north where you can experience a Pink Jeep Tour http://pinkjeep.com.

Drive a few hours south to the Tucson area and visit old Spanish Missions http://www.sanxaviermission.org; http://en.wikipedia.org/wiki/Spanish_missions_in_the_Sonoran_Desert.

While in the area, visit Tombstone – the gunfight at the OK Coral and the legendary Wyatt Earp territory.

Driving north you can visit the South Rim of the Grand Canyon. Spend the night at a hotel overlooking the canyon (need early reservations). Arizona is a fabulous place to visit.

Symposium Registration Fees
AFDE Member $400.00
Non-Members $435.00
FDE Trainees/students $200.00

For Additional Information Contact:
Lynne Variano: 310-714-9449 alvassoc@gmail.com

Registrations received by Sept. 10th will be included in a drawing for $100 refund on registration fee.

SYMPOSIUM AGENDA

Thurs. Oct. 18 1:00 PM AFDE Board Meeting
Thurs: Oct. 18 6:00 PM Symposium Registration
6:30 PM Symposium - Presenters
Fri: Oct. 19 8:30 AM Symposium - Presenters
5:00 PM Symposium end of day
7:00 PM AFDE Business Meeting
Sat: Oct 20 8:30 AM Symposium - Workshop
5:00 PM Symposium end of day
Sun: Oct 21 8:30 AM Symposium - Presenters
5:00 PM Closing

Hospitality Suite open evenings. Times will be posted.