Aginsky, Valery

Black Toner Comparison using Solubility Tests: A Case Report

Abstract: This paper describes an actual case examination in which optical methods, solubility tests, and thin-layer chromatography (TLC) were used to determine whether two questioned documents, printed/copied on an office machine(s) using black toner, were produced on or around their purported dates (several years apart), or whether the documents were produced contemporaneously (in close proximity in time, i.e. not several years apart, as dated). In this civil case, based on the results of the optical and TLC examinations of the toner on both questioned documents, the Defendant’s expert found and testified that black toner in these documents had a connection and were consistent with each other, and this finding was used as a chemical basis for the expert’s opinion that the two documents were most probably produced contemporaneously, not several years apart, as dated. This author, retained as a rebuttal expert, repeated the above examinations conducted by the Defendant’s expert, and determined that the only chemical connection and consistency between the two toners was that they contained a common pigment, carbon black. While optical and TLC examinations could not distinguish between the black toners on the two documents (these results were in agreement with the finding of the Defendant’s expert), the solubility tests (chemical extraction of toner samples in chloroform to prepare extracts to be applied on TLC plate for chromatographic analysis) showed that the two toners had significantly different extractability in chloroform; evidence that the toners were of differing chemical composition.

Two common parameters of solubility (extractability) of a solid substance in a solvent are the speed at which the solid dissolves (rate of dissolution/extraction) and the completeness of the dissolution (extent of dissolution/extraction). In this case, the difference in the solubility of the two toners in chloroform was clearly evident and very significant (as in, for example, the drastic difference between the solubility of instant coffee and ground coffee in hot water): one toner was extracted in chloroform almost instantly (within seconds) and completely, while the other toner dissolved only partially (not completely) and the process of dissolution (formation of a suspension of carbon black in chloroform) was slow. Thus, in this comparative examination of two documents produced by electrophotography using black toners, the solubility tests proved to be more discriminating (provided more discriminating power) than the optical and TLC methods.

Bio: VaLery Aginsky is a forensic chemist working in the field of forensic document examination for 36 years. He received his Ph.D. in Analytical Chemistry in 1980 from the Military Academy of Chemical Defense in Moscow, Russia. His training was with the Forensic Science Center of the Ministry of the Interior of Russia. He is currently employed with Aginsky Forensic Document Dating Laboratory located in East Lansing, Michigan.

Dr. Aginsky is the author of more than 25 peer-reviewed articles on ink analysis and document dating, including chapters in several books and encyclopedias.
Aginsky, Valery

Thin-Layer Chromatography of Inks: Efficiency of Separation of Ink Components

Abstract: There are numerous publications relating to the use of thin-layer chromatography (TLC) in the analysis of inks on documents. This paper compares the efficiencies of TLC separation of ink components when using several developing solvents (solvent systems) commonly used for ink analysis in the forensic laboratory. The parameters chosen for this evaluation are the shape of and distance between chromatographic zones of components of Methyl Violet, a dye mixture often used in the manufacture of black, violet and blue ballpoint, fountain pen, and stamp pad inks. (This mixture typically consists of the dye Crystal Violet and its two or three homologues, which are triphenylmethane dyes of a similar chemical structure, and hence similar physical and chemical properties, whose chemical structures differ only by one methylene [CH2] group). The results obtained show that at least three solvent systems, one of which (ethyl acetate - isopropanol – water - acetic acid = 30:15:10:1) was developed and reported by this author in the 1980s, provide significantly improved TLC separation efficiency compared with the Solvent System recommended in the current SWGDOC Standard for Test Methods for Forensic Writing Ink Comparison.

Bio: VaLery Aginsky is a forensic chemist working in the field of forensic document examination for 36 years. He received his Ph.D. in Analytical Chemistry in 1980 from the Military Academy of Chemical Defense in Moscow, Russia. His training was with the Forensic Science Center of the Ministry of the Interior of Russia. He is currently employed with Aginsky Forensic Document Dating Laboratory located in East Lansing, Michigan.

Dr. Aginsky is the author of more than 25 peer-reviewed articles on ink analysis and document dating, including chapters in several books and encyclopedias.
Baird, Courtney King, Diane K. Tolliver

History + Knowledge = Strength

Abstract: The ASQDE Resource Center is a component within the ASQDE organization whose mission is "to foster education, sponsor scientific research, establish standards, exchange experiences, and promote instruction in the field of questioned document examination, and to promote justice in matters that involve questions about documents." The Resource Center relocated to Indianapolis, IN June 27, 2018, from Memphis, TN. Over 200 boxes of books, articles, case files, research files, memorabilia, equipment and more were brought by rental truck by Jason Lee Miller (then ASQDE president). There were also business files from the organization, newsletters, annual general meeting programs and photographs. Among these resources were the hard copy files of the contents of QDAD (the Questioned Document Article Database).

A digital inventory of many of these resources was provided by past Resource Center curator Grant Sperry with assistance from Dan Purdy, both ASQDE past presidents.

This presentation is an overview of the Resource Center and the completed tasks over the past year including the process of preparing space to accommodate this bountiful array of materials. Creation of a complete inventory, establishment of a catalog system for locating materials, designing policies for the acceptance of new materials, the loaning of resource center assets, accessioning and de-accessioning materials, and the preservation and conservation of these precious materials was needed. Many of these materials show signs of deterioration and breakage. The need to institutionalize (to incorporate into a structured and often formalized system) the Resource Center is critical to the preservation and usefulness of its contents to ASQDE members.

Bio: Courtney King Baird is the Forensic Document Unit Supervisor at the Indiana State Police Laboratory in Indianapolis, IN. She earned her Bachelors of Science in Chemistry Education from Purdue University, West Lafayette, IN and her Master of Forensic Science from the University of New Haven, West Haven, CT. Ms. Baird is a member of the American Society of Questioned Document Examiners and the Midwestern Association of Forensic Scientists.
Caligiuri, Michael, Danica Ommen, Cami Fuglsby, Christopher Saunders, Linton Mohammed, Jonathan Morris, Carolyne Bird

The Kinematic Modeling of FDE Writership Opinion

Abstract: As with other forensic disciplines, document and handwriting examinations rely on feature-comparison methods that attempt to determine whether an evidentiary sample is or is not associated with a potential source sample (e.g., from a suspect), based on the presence of similar patterns, impressions, or other features in the sample and the source. When experts follow accepted best practices, they compare specific features between questioned and known samples to reach a likelihood or probability opinion about writership. While such comparative methods are largely subjective and depend on training and experience, research supporting the validity of this approach against objective quantitative standards is lacking. The aim of the present study was to test whether expert opinion of writership can be explained with a high degree of accuracy using a quantitative measure of feature similarity derived from kinematic principles of handwriting motor control. A finding that FDE writership opinions vary systematically with these kinematic feature scores would strengthen the foundational validity of the FDE decision-making process.

Kinematic similarity scores for temporal and spatial-geometric features of handwriting movements were calculated from 40 pairs of handwriting dynamically recorded from 35 writers. Half of the pairs comprised print material with the other half written in cursive. Pairs consisted of either within- or between-writer samples. Four unidimensional kinematic similarity scores were calculated from each pair (temporal features for up and down stroke and spatial features for up and down strokes). Multiple regression models were used to test the significance of kinematic similarity scores for different feature sets (e.g. temporal, spatial) in explaining FDE support for the proposition that the samples were from the same writer (prosecution hypothesis) and for the proposition that the samples were from different writers (defense hypothesis).

Preliminary results revealed that the spatial-geometric features derived from analysis of handwriting strokes were significantly associated with accurate scores by FDEs for both the prosecution and defense hypotheses. The strength of these associations varied with writing style and whether the sample pairs were actually from the same or different writers. The results of this study provide empirical evidence to support the validity of expert opinions for admissibility in courts of law under Daubert.

Acknowledgment: Research supported by National Institute of Justice grant # 2017-DN-BX-0148

Bio: Dr. Caligiuri attended the University of Wisconsin, Madison where he received a Ph.D. in the neurosciences with an emphasis in human motor control and movement disorders. He served as member and on the editorial board of NIST's Work Group on Human Factors in Handwriting Examination. His research over the past 10 years has focused on handwriting kinematics to enhance our understanding of cognitive, neuromotor, and behavioral sources of variability in handwriting and the FDE decision-making processes.
Choi, Jinwoo, Mijung Choi

Between the Orient and the Occident: Differences in the Application of Handwriting Analysis Concept and Terminology

Abstract: Strength of pen movement is an important identifying element of individual handwriting in Sino sphere handwriting analysis, including Korea and Japan. It is used as an important indicator of interdependence elements and forgery of handwriting, establishing the location and direction of characters composition and stroke. However, the judgment of "strength of pen movement" is limited to the vague expression "GOOD" or "BAD," which is due to the unique Asian thinking that takes into account the context of intuitive thinking looking at objects in the connectivity of the whole. This is a concept that contradicts the scientific methodology of individual observation and analytical thinking by regularity. The reason why it is important to understand the fundamental differences between the orient and the occident is because of the understanding of the inherent characteristics of Sino sphere characters and the expansion of the application of the court. Currently, the location of handwriting examinations in Korean courts is recognized in a non-scientific area. In other words, the characteristics of handwriting analysis are mentioned only from a vague expression of macro perspective, and the basis of examination depends solely on the subjective experience of the handwriting examiners. So Korea court system, including judges who have adopted rules of evidence, are constantly demanding scientific methods of inspection, but have failed to meet this part.

In our previous study, we identified the square frame structure of Sino sphere characters and inherent differences by the method of vertical writing. Based on these inherent differences, we could identify the differences in perception by dividing them into the orient (: macro perception) and the occident (: micro perception). And in terms of its relevance to the application of the terms of handwriting analysis, we identified the limitations and extent of the multiple interpretations of the overall context structure of the Oriental perspective. In addition, we were able to identify the scope of categorization and segmentation perceptions focused on the handwriting evidence of occidental perspectives.

Bio:
Crawford, Amy, Drs. Nicholas Berry, Alicia Carriquiry, and Danica Ommen

Statistical Analysis of Handwritten Glyphs for Writer Identification

Abstract: In this talk we provide a method for performing automated writer recognition in a closed set of writers. We begin by extracting data from scanned handwritten documents using an automated, open source process. Through this process writing is cleaned, skeletonized, and parsed, resulting in a collection of handwriting components that often correspond to letters. We call these components *glyphs*, and treat them as small graphical structures with vertices and edges. We demonstrate how writers can be suitably characterized by the rate at which they emit glyphs to certain classes in their writing. We present a dynamic method for creating glyph classes through clustering using a custom distance metric. We will also discuss a deterministic way to create glyph classes, and results from the two methods are compared. A variety of measurements are recorded about each of the glyphs, then the measurements and class memberships serve as data for a statistical hierarchical model. Samples from 27 writers in the Computer Vision Lab database are used in a full scale writer identification. We create a model for the 27 writers and hold one document out for each writer to be used as a questioned document. We evaluate the probability of writership under each of the known writers for each of the questioned documents.

Bio: Amy is currently working towards a PhD in Statistics at Iowa State University. She earned her Bachelor of Science degree in Mathematics and Statistics from North Dakota State University, and her Master of Science degree in Statistics from Iowa State University. She researches with the Center for Statistics and Applications in Forensic evidence with a focus on statistical evaluations of handwritten documents.
Drexler, Steven

A Case of Temporary Insanity

Abstract: This poster presentation will discuss a handwriting case from early 1859 Washington D.C. The case involves an anonymous letter received by U.S. Representative Daniel Sickles warning Rep. Sickles of his wife's adulterous activity with the District Attorney, Philip Barton Key. Sickles stalks Key, assassinates Key, pleads temporary insanity and is found not guilty. However, to this date, the author of the anonymous letter remains unknown. Collectively, working with historian and author Chris DeRose, possible authors were identified. Using images of authentic archived historical documents as handwriting standards of these suspected authors, an attempt is made to identify the anonymous author.

Bio: Steven G. Drexler is a 1980 Graduate of the University of Central Florida achieving a B.S Forensic Science. He has worked in the field of Forensic Science as both a Trace Evidence Examiner (1980-1996) and a Forensic Document Examiner (1998 - Present). He completed his training with the Alabama Department of Forensic Sciences under the direction of Dr. Richard Roper in 1998. Now in private practice, he is a member of the ASQDE, the Questioned Document Section of the AAFS, SAFDE, and is certified by the ABFDE.
Durina, Marie

Fraudulent Receipts Printed with Ink Jet Technology using K-Fortification

Abstract: This poster summarizes a case example involving a series of thefts of over $500,000 in retail merchandise by an organized crime syndicate using fraudulent receipts, from the well-known retail chain store: Marshall’s. The Questioned receipts submitted were generated on genuine thermal roll paper bearing the Marshall’s store logo, but were printed using color ink-jet printing with “K-fortification,” a technology available only in Hewlett-Packard ink jet printers. These were compared to genuine store receipts created with a thermal printing process. Characteristics of “K-fortification” are visually demonstrated in this poster, as are characteristics of thermal printing. Challenges encountered during testimony at the trial, and the outcome, are also discussed.

Bio: Marie Durina has been a Forensic Document Examiner with Riley Welch LaPorte and Associates Forensic Laboratories since 2016 and currently lives in North Carolina. She retired in 2015 as Senior Forensic Document examiner with the San Diego Sheriff’s Department Regional Crime Laboratory, where she was trained in 2003 by Dr. Linton Mohammed, and where she was principal trainer for FDEs Brenda Lanners and Gina Hunter. She has a Bachelor’s Degree in Business Administration from Baruch College, CUNY, and a Graduate Certificate of Academic Studies in Forensic Document Examination from Oklahoma State University. Marie is a member of ASQDE, SAFDE, AAFS QD Section, OSAC, the ASB Consensus Body, and is certified by the ABFDE.

Cognitive Human Factors and Feature Salience in Forensic Handwriting Examination: Results from a Qualitative Interview

Abstract: For many studies, quantitative data is necessary for statistically evaluating differences between individuals or groups, such as significantly different levels of performance on a task. However, quantitative data can sometimes lack the depth and insight that can only be collected in a qualitative manner, such as information collected during open-ended interviews. Here we present some of the findings from our international study of cognitive human factors in forensic document examination (NIJ Award No. 2015-90606-KY-DN).

This poster reports results from a content analysis of open-ended qualitative data collected as a follow-up to the eye-tracking portion of the same study. Questioned Document Examiners provided detailed feedback regarding collected eye-tracking data. This feedback included explanations for gaze location and duration, reasons for evaluating certain portions of questioned or known signatures, and insight as to which elements or factors of either a questioned or known signature played an important role in the examiner’s determination of whether the questioned signature was genuine or simulated.

The content analysis specifically assessed Questioned Document Examiners’ open-ended interviews about twelve signatures that were previously presented in the eye-tracking portion of the study. Examiners were asked to provide as much or as little detail as was necessary to explain what went into their decision making process. The content analysis of these interviews aimed to answer one primary research question—what specific features and elements do examiners rely on to make their determinations regarding whether a signature is genuine or simulated? As secondary research questions, this analysis also assessed the importance of certain features in examiners’ determinations and whether trends emerged related to elements of specific signatures or overall assessments.

This analysis adds further information and depth to the results of the quantitative data collected, analyzed, and presented at this conference.

Bio: Charles P. Edwards, M.A. is a doctoral student in the Interdisciplinary Social Psychology Ph.D. Program at the University of Nevada, Reno. He received his M.A. in psychology from Boston University. His research interests are in psychology and law; specifically, judge stress and jury decision-making.
Eisenhart, Linda, Dr. Brian Eckenrode, Mr. Austin Hicklin

Forensic Handwriting Examiner Decision Analysis Black Box Study: Physical Subtest

Abstract: Purpose: The FBI Laboratory, with Ideal Innovations and Noblis, is conducting a black box study evaluating the accuracy and reproducibility of forensic document examiners’ decisions regarding handwriting comparisons. The study will also assess what impact, if any, such factors as experience and training have on examiner decisions. Subtest Study Participation: We want the people who take the physical test to also take the digital test and strongly encourage them to have started the digital test prior to the meeting, but if not we will allow people to register at the time.

Overall Study Participation: Participation in the study is open to examiners who have performed handwriting evidence comparisons in operational casework within the last two years. Non-U.S. examiners are welcome to participate if they use the SWGDOC Standard Terminology in Expressing Conclusions of Forensic Document Examiners (9-point scale) or a similar conclusion scale of at least 5 levels. Participation in the study will be anonymous.

Event Description: During this part of the program, attendees who have already registered for the overall study will be asked to do a subtest of handwriting examinations with original, physical samples. Each participant would have a list of 10 specific comparisons to complete. To make efficient use of time with these comparisons, the participants will have access to digital images of the comparisons before and after the physical subtest, so that they can make preliminary conclusions at their leisure. A limited number of stereo microscopes will be available on site and participants are encouraged to bring their own loupes. An online scheduler will be setup in advance so that participants can reserve slots - we will take drop-ins as space allows, and otherwise schedule a time slot.
Goff, Mark

Digital Capture and Comparison of Indented Writing Developed with an Electronic Detection Device (EDD)

Abstract: This presentation will demonstrate an alternate method for the capture and comparison of Electronic Detection Device (EDD) results. Since the inception of EDD processing, the developed image of indented writing has been captured through note taking or the physical encapsulation of the toner developed image. While the physical encapsulation of the developed image, commonly called a ‘lift’ preserves the information and provides a semi-transparent medium for comparison, it has some limitations. These limitations can include; the cost in purchasing fixing film; the slight distortion added to the developed image from placement of the fixing film and viewing through the adhesive layer; the labor involved in trimming, labeling and scanning the developed lifts; the storage considerations of the lifts as laboratory created evidence; and the slight image degradation over time from the aging of the lift.

This research project started with an attempt to find alternate methods to capture the results of EDD processing. The first step in the research was to consult the relevant standards and accreditation requirements and verify that physical encapsulation was not required. Different options of image capture were explored including Charged Coupled Device (CCD) and Contact Image Sensor (CIS) scanners, and digital photography. The three different methods each have various strengths and were found to provide acceptable results, however digital photography was deemed the optimal method of capture due to the ease of use and speed of capture.

With the lack of a physical lift to compare to a potential source writing, a new method of comparison was needed. In this search, other types of cases were explored, where overlays are used including traced signatures, trash mark comparisons and obliterated writing decipherment, and footwear comparisons. The search revealed the use of digital overlay comparisons has been used in many areas of forensic examination, so a method was developed for use in the comparison of developed writing impressions with potential source writing.

This presentation will expand on the journey; from creating physical lifts of indented writing developed with EDD, through imaging and comparison, and will conclude with a demonstration of how to conduct a digital comparison of writing impressions developed with EDD in Adobe Photoshop. The method demonstrated is applicable to Adobe Photoshop CS3 through the current version CC19.

Bio: D/Lt. Mark Goff is a Forensic Document Examiner with the Michigan State Police. He earned a Bachelor of Arts in Criminal Justice from Western Michigan University, and completed his laboratory's 3 year training program in 2012. Mark is a provisional member of ASQDE, a member of the Questioned Document Section of the AAFS, a member of MAFS, a consensus body member of the ASB, a member of the OSAC Questioned Document Subcommittee, and is certified by the ABFDE.
**Hammond, Derek, Dr. Mara Merlino, Jan Kelly, Linda Jones, Brent Ostrum, Jonathan Morris**

**ST2AR "Redux"**

**Abstract:** An update will be provided on the reboot of Skill-Task Training, Assessment & Research, Inc. (ST2AR) and the introduction of ST2AR's Executive Committee members.

**Bio:** Derek Hammond is a Forensic Document Examiner with the United States Army Criminal Investigation Laboratory and a co-founder of the nonprofit organization Skill-Task Training, Assessment & Research Inc. (aka "ST2AR"). Derek is a member of the ASQDE, AAFS, SAFDE, OSAC, and has been certified by the ABFDE since 2000.

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**Hensell, Tryst**

**The Bureau of Engraving and Printing's Mutilated Currency Division: How to Recover the $2,000,000 You Buried in Your Garage**

**Abstract:** The Bureau of Engraving and Printing's Mutilated Currency Division (MCD) provides a unique free public service. This MCD is responsible for examining currency which has been damaged to the extent that its value is questionable, determining its value, and subsequently reimbursing the holder. The most common causes of mutilation include fire, water, chemicals, and explosives; animal, insect, or rodent damage; and petrification or deterioration by burying.

This presentation will provide interesting details about the Bureau of Engraving and Printing's Mutilated Currency Division as well as highlight some of their casework with damaged document. A Q&A session with the MCD's Program Manager will be included.

**Bio:** Tryst (Ty) Hensell has been the Program Manager of the Bureau of Engraving and Printing's Mutilated Currency Division for the last 5 years. He previously worked for The Washington Post for 30 years where he became the Superintendent of Materials Handling. He has also served the U.S. Government as the Passport Manager of the Government Publishing Office (3 years) and as the Chief of the BEP Office of Security Printing (3 years).
Jones, Linda, Dr. Kaye Ballantyne

Transitioning to Evaluative Reporting: Lessons being Learnt by the Australian and New Zealand Document Examination Community

Abstract: Traditionally, the forensic document examination community subscribed to the identification paradigm - that a questioned writing could be identified to a single writer, to the exclusion of all other possible writers. However, this view has been changing, with increasing recognition that conclusive opinions are inappropriate under the logical reporting frameworks, and represent an evaluation of the probability of the proposition, rather than the probability of the evidence given the propositions. The publication of the revised Modular Forensic Handwriting Method1 has prompted the Australian and New Zealand Document Examination Specialist Advisory Group (DocSAG) to conduct workshops on evaluative reporting, and explore the issues surrounding transitioning away from the traditional approach.

An education session was initially provided for DocSAG members surrounding probability theory, proposition construction and estimating of the probability of evidence given varying propositions, cognitive factors and training associated with the logical framework. A second workshop addressed issues specific to handwriting and signature examination, including the use of default propositions, the weighting of specific characteristics and features relative to propositions, the documentation of the analysis and comparison process, and variation between examiners and laboratories in the comparison and reporting of the weight of evidence. A third workshop addressed practical issues regarding implementation and training, and was used to conduct practical exercises and blind trials to aid with calibration of the expert opinions within and between laboratories.

Throughout the education and transition process, the DocSAG have gained considerable insights into the complexity of transitioning a community to the new paradigm, given the number of laboratories, the diversity of examination approaches and variance in levels of pre-existing knowledge of the logical framework. The lessons learnt throughout this process may prove informative for other disciplines and communities also wishing to transition to the evaluative reporting framework.


Bio: Linda Jones is the Unit Leader of Document Examination at the Victoria Police Forensic Services Department in Australia and has worked as a Forensic Document Examiner since 1995. Linda is the current Chair of the Australia and New Zealand Document Specialist Advisory Group (DocSAG), Vice President of the in Australasian Society of Forensic Document Examiners Inc. (ASFDE), a member of the Australian and New Zealand Forensic Science Society (ANZFSS) and of the Australian Academy of Forensic Science (AAFS).
Kaur, Amanpreet, Prof. (Dr.) R.K. Garg

To Study the Effect of Primary Learnt Handwriting Language on Secondary Learnt Language

Abstract: Our mother tongue has great impact on the language that we learn later in our life. In the similar way, the language that one use primarily for writing purpose affect the secondary language. Handwriting examination in these types of cases is foremost because these features may lead to the nationality and locality of the writer of handwriting in question and may help the document examiner to compare the handwriting samples irrespective of the script. The given study is basically focused on the similarities found in the class as well as individual characteristics of the Mother tongue and secondary learnt language. 100 individuals were selected for the study and 8 handwriting samples for both languages that are Punjabi (Mother tongue of Punjab region) and English were collected with the consent of the subjects. Results obtained were statistically analyzed and revealed that earlier learned language effect secondary language significantly. In 68% of the cases, there is a similarity between the individual and class characteristics of the two languages.

Bio: Amanpreet Kaur completed her masters in Forensic Science Punjabi University, Patiala, Punjab, India. Currently, she is pursuing PhD in Forensic science with specialization in the field of handwriting examination from Punjabi University, Patiala, Punjab, India. She also worked as lecturer at Kurukshetra University, Haryana, India for 2 years. She had 2 publications in reputed journals and presented 4 papers at international and national conferences.
Kelly, Mary

Effective Communication: The Evolution of Standard Terminology

Abstract: Once an examination or analysis is completed, the Document Examiner is left to convey the results in the most concise and clear manner possible. The language used and the conclusions stated should be easy to understand, yet precise in nature. In the end, a clear statement of the conclusion, based upon the weight of the evidence, is essential. In the early years of the profession, many different versions of conclusions were used by various examiners. They ranged from such terminology as “the writing is consistent with” to “the writing cannot be associated with” to numerous other variations thereof. Often times the language used was confusing and ambiguous.

In an effort to establish some uniformity in expressing conclusions, a committee of the Questioned Document Section of the American Academy of Forensic Sciences (AAFS) was formed. The resulting recommended guidelines were presented in 1990 at the AAFS meeting in a paper entitled “The Standardization of Handwriting Opinion Terminology,” written by Thomas McAlexander, Jan Beck and Ronald Dick.

The guidelines set out a nine-point scale for reporting conclusions, ranging from identification to elimination, including six qualified opinions of varying degrees. The nine point scale was meant to encompass the entire “gray scale” of degrees of confidence. The guidelines included probability statements which were meant to reflect a confidence scale not statistical measurements. These guidelines were widely accepted within the profession.

Through the years however, discussions have continued as to whether a seven- or five-point scale might be preferable to the nine point scale. In addition, recent years have brought discussions of adopting a Bayesian statistical approach to reporting conclusions. In the end, the most important criteria remains, that such reporting be concise and accurate in its statement of the conclusion. A review of the various means of expressing conclusions will be examined.

Bio: Mary Kelly is a Forensic Document Examiner in Private Practice in Cleveland, Ohio. She received her training in document examination from Dr. Phil Bouffard and worked for the Cleveland Police Forensic Laboratory and the Lake County Forensic Laboratory for a total of 28 years before entering private practice. She is a member of the ASQDE and AAFS and is certified by ABFDE.
Kingsbury, Stephanie

Case Studies of Handwritten Indented Impressions

Abstract: One of the cornerstones of forensic document examination is handwriting analysis. Forensic document examiners analyze handwriting on documents for many different features, such as spacing, pen pressure, speed, slant, character formation, and line quality. These handwritten attributes are then compared to a known subject’s handwriting to pinpoint similarities and dissimilarities to make an ultimate determination of authorship.

Similarly, indented impression analysis has long been a staple in forensic document examination. Indented impressions frequently provide details about a case that may have otherwise gone unnoticed.

In this presentation, I extend the traditional comparative approach of handwriting examination to the examination of handwriting in indented impressions. I examine four specific cases in which unsourced handwritten indented impressions were evaluated to develop investigative details about the possible suspects. In each case, the indented impression handwriting analysis played a crucial role in the resolution of the investigations.

Bio: Stephanie Kingsbury is a Forensic Document Examiner with the US Postal Inspection Service's National Forensic Laboratory. She earned a bachelor's degree in Chemistry and Criminal Justice from Carthage College, and a Master's of Forensic Science degree from George Washington University. Stephanie completed a 2.5 year training program at the Homeland Security Investigations Forensic Laboratory. Stephanie is a member of ASQDE and the Questioned Document Section of AAFS.
Lewis, Jane

Reasons for Qualified Opinions in Forensic Document Examination

Abstract: Reasons for Qualified Opinions in Forensic Document Examination
Jane A. Lewis, MFS

This study was motivated by recent questions from attorneys asking why less than conclusive opinions were necessary in reports. When submitters deliver questioned handwriting evidence for analysis they expect that the resulting opinion will be an identification or an elimination. The use of electronically saved documents at low resolution and the tendency of individuals and businesses to scan and destroy original documents imposes limitations on the examinations of forensic document examiners. This study was conducted to determine the main reasons for questioned handwriting cases resulting in qualified opinions. Scales of opinions are typically used by forensic document examiners to convey the level of confidence that the evidence in the case will support. The goal of each examination is to determine the origin or authenticity of the questioned material. Limitations of the evidence will lead to a less than definite conclusion expressed as a qualified opinion. Appreciation for the reasons behind qualified opinions will help spur attorneys and investigators to search for the best quality case evidence. Original questioned and known documents will provide the most detailed information to allow document examiners to properly do their work.

Case files from 2015-2017 and the first half of 2018 were reviewed in order to determine the reasons for qualified opinions in each case. Ten specific reasons for qualified opinions were discovered from studying 49 cases. Evaluation of each case and the reasons for the qualified opinions generated were tallied. The three main reasons for qualified opinions in the case files were: the lack of contemporaneous known writing, the lack of known writing comparable to the questioned writing and the submission of poor clarity copies. The submission of poor clarity copies was the most common reason for a qualified opinion in a questioned handwriting case. A substantial number of cases displayed two reasons for reaching a qualified opinion.

The study sought to specify the precise reasons that forensic document examiners rendered qualified opinions in questioned handwriting cases. The study pointed to three significant reasons and seven other important reasons for the findings. The study suggests that informing submitters of the specific reasons for qualified opinions in questioned handwriting cases will lead investigators and attorneys to strive for the best evidence submissions in each case which will include original questioned and known documents or good quality first generation copies

Bio: Jane Lewis has a private practice in the land of beer and bratwurst, Milwaukee, Wisconsin. She completed a Master of Forensic Sciences degree from the George Washington University. Jane retired from the Wisconsin State Crime Laboratory in 2011 and also worked in the Questioned Document Sections of the US Secret Service and FBI Laboratories. Jane is the author of Forensic Document Examination Fundamentals and Current Trends, and is a member of the ASQDE.
Luber, Jeffrey, Kirsten Breen, Rachel Valero, Ashley Tam

What the Font is That!

Abstract: This poster presentation will demonstrate some common methods of reducing the amount of toner used in a printed text.

Inkjet and toner printing methods can be costly - to both the environment and economically. To resolve this problem, methods have been developed to limit the amount of toner or inkjet that is used during the printing process. This is done in multiple ways including distributing less toner or ink to each character, adding voids (holes) with the absence of toner to each character, and even creating new fonts that are designed specifically to use less toner. These reduced toner and inkjet fonts are termed ecomode, ecofriendly or economode. One may confuse a font produced with reduced toner or ink as a possible defective or very unique style of font. The poster presentation will give the analyst familiarity with novel font appearances for reduced toner printed documents.

Bio: Jeffrey Luber is a Diplomate of the American Board of Forensic Document Examiners. He received his ABFDE Certification in 1987. Mr. Luber has a Masters of Forensic Science degree from the George Washington University. Jeff received his training from Stephen McKasson from 1980 through 1983 at the Illinois State Police, Crime Laboratory located in Joliet, Illinois. Jeff worked at the Chicago area lab until early 1984. Jeff loved the Illinois system, but missed the East Coast and surf fishing on the beach, and in March of 1984 Jeff started at the Suffolk County Crime Laboratory located in Hauppauge (Long Island), New York. Jeff is also a member of, the ABFDE, the AAFS and a member and Past President of the Northeastern Association of Forensic Scientists.
Manzolillo, Patricia

Where Have All the Cases Gone? Or, How Has the Work Changed?

Abstract: US Postal Inspection Service Forensic Laboratories have employed questioned document examiners since 1940 and is one of the longest operating federal document laboratories providing services in the United States. While there have been many changes to laboratory locations and number of examiners; a significant decrease in the number of requests submitted to the USPIS Forensic Laboratory Services Questioned Document Section has been observed over the past ten years. A deeper dive is required to determine how the work has specifically changed. This paper will conduct an analysis of the questioned document requests and submissions to USPIS Forensic Laboratory Services 2009 - 2018. The analysis will examine the changes and trends over ten years in the following areas: volume of requests, type of requests, type of investigations supported, types of examinations completed, complexity of exams, size of submissions and court testimonies. At times management has employed various strategies to increase awareness of services and number of requests. The effectiveness of these strategies will be discussed. Several “routine” cases from the early 1940’s will also be reviewed and it is expected this contrast will serve to highlight how forensic document examination has evolved in one of the longest continuously operating federal forensic document laboratories in the US.

Bio: Patricia A, Manzolillo is the Laboratory Director for the US Postal Inspection Service Forensic Laboratory Services in Dulles VA. She earned a MS in Forensic Science from University of Alabama at Birmingham in 1996 and has been a Forensic Document Examiner with USPIS since 1996. Patricia is a member of ASQDE, AAFS, ASTM and is certified by the ABFDE.
Merlino, Mara, Derek Hammond, Chandler Al Namer, Taleb Al Namer, Veronica Dahir, Charlie Edwards, Guillermo Villalobos

Feature Salience and Call Accuracy in Simultaneous and Sequential Writing Comparison Tasks

Abstract: A substantial body of research addresses the cognitive mechanisms involved in attention and visual search. Relational models of visual search demonstrate that visual attention can be guided by attending to specific feature values such as color, size, or intensity, by inhibiting attention to irrelevant features, or by directing attention to how stimuli differ. Many current theories of attention propose that attention is based on “the interplay of a bottom-up, saliency-based attentional system and a top-down, feature specific selection mechanism” (p.248). According to Becker, another kind of information which guides attention is relational information about the target, or information about how the irrelevant information of a non-target differs from the features of the target. Relational models place the target in relation to its context, offering more specific (e.g., directional) information about differences. This relational aspect of attention may also be influenced by the presentation formats of signature specimens.

The use of sequential rather than simultaneous presentation of signatures during a handwriting identification task has been discussed in the FDE community in Australia, but this procedure has not been empirically tested. This presentation reports the results of an empirical experiment investigating the differences in examination processes and the accuracy of signature comparison decisions when signatures are presented simultaneously or sequentially during a signature comparison task.

Sixteen signatures were presented during an experimental eye tracking procedure (NIJ Award # 2015-DN-BX-K069). Signature comparisons were counterbalanced so that all 16 signature comparisons were viewed either simultaneously or sequentially. Participant gaze behavior was recorded using a Tobii X2-60 eye tracking system. Results will be discussed in the context of current discussions about sequential unmasking of forensic evidence features.

Bio: Dr. Mara Merlino earned her doctoral and master’s degrees from the Interdisciplinary Ph.D. Program in Social Psychology and the University of Nevada, Reno. She is currently Professor of Psychology and Sociology and Coordinator of the MA Program in Interdisciplinary Behavioral Science at Kentucky State University. Dr. Merlino currently serves on the NIST Organization of Scientific Area Committees (OSAC), and was also an invited member of NIST’s Expert Working Group on Cognitive Human Factors in Handwriting Examination, an international and interdisciplinary group of approximately 20 document examiners, statisticians, researchers, attorneys, and human factors experts, tasked with reporting the state of research, education, training, management practices, and other areas, and providing recommendations for future research, training and education practices, and other issues to strengthen the field.
Training in Forensic Document Examination: Current Thoughts and Future Directions

Abstract: The NIST Organization of Scientific Area Committees (OSAC) has been engaged in efforts to improve the reliability and validity of the methods, procedures, and conclusions in all areas of forensic practice. OSAC discussions have included topics such as the cross-disciplinary standardization of reporting language, creation of clear, concise, and empirical standards for demonstrating expertise in the field, and meaningful, recognized certification or licensure. Among these discussions is the specification of programs of study that will qualify trainees to gain employment as experts in the field. Conversations in the area of forensic document examination have included debates about the merits of modular training compared to a 24-month program of study; identifying a single recognized certifying organization; requiring certification for trainers/mentors; requiring private laboratories to adhere to the standards set for government labs; and standardization of document examiner education and training.

This presentation will discuss the results of a recent survey of the education and training background of professional document examiners (NIJ Award # 2015-DN-BX-K069). The current movement toward an educational model of training standards and practices will be discussed. Further discussion will center around the ongoing discussion in the field about creating standardized training programs that incorporate the identification of relevant knowledge, skills, and abilities; creating measurable and objective course goals; specifying learning objectives that incorporate introductory, intermediate, and mastery level goals; creating valid and reliable measures of learning; and creating objective and measurable benchmarks for determining training effectiveness. This discussion will include information about identifying constructs to be measured, how to measure the reliability and validity of assessment techniques, and constructing standardized tests and measures.

Bio: Dr. Mara Merlino earned her doctoral and master’s degrees from the Interdisciplinary Ph.D. Program in Social Psychology and the University of Nevada, Reno. She is currently Professor of Psychology and Sociology and Coordinator of the MA Program in Interdisciplinary Behavioral Science at Kentucky State University. Dr. Merlino currently serves on the NIST Organization of Scientific Area Committees (OSAC), and was also an invited member of NIST’s Expert Working Group on Cognitive Human Factors in Handwriting Examination, an international and interdisciplinary group of approximately 20 document examiners, statisticians, researchers, attorneys, and human factors experts, tasked with reporting the state of research, education, training, management practices, and other areas, and providing recommendations for future research, training and education practices, and other issues to strengthen the field.
Merlino, Mara, Derek Hammond, Veronica Dahir, Taleb Al Namer, Chandler Al Namer, Charlie Edwards, Mauricio Alvarez, Guillermo Villalobos, La'Quida Smith

Cognitive Human Factors and Forensic Document Examiner Methods and Procedures: Examination Context, Sufficiency of Writing Samples, and Opinions Strength Results

Abstract: Cognitive ergonomics is a subfield of human factors in which cognitive processes such as memory, perception, reasoning, decision making, skilled performance, and human reliability are examined in the context of work and operational settings. The goal of cognitive ergonomics is to improve task performance by the systematic study of the interaction between human cognitive functioning and the systems or environments in which tasks are performed. Forensic science is produced and consumed in the context of various systems developed by human actors. Here we present some of the findings from our international study of cognitive human factors in forensic document examination (NIJ Award No. 2015-90606-KY-DN).

This paper reports results from eye-tracking experiments investigating the relationship between position of the questioned and known writings and the visual inspection of available writing features, examiners’ use of the nine-position “authorship” scale; and examiner call accuracy given varying numbers of writings and writing complexity (NIJ Award No. 2015-90606-KY-DN). The three experiments in this research investigated the following questions:
- What is the relationship between the context established by presentation order of questioned and known writing and the examination process?
- How do examiners apply the currently-used bipolar continuum of certainty (Elimination through Identification with a center position of Inconclusive) when expressing their opinions about the authorship of questioned writings?
- How much writing constitutes “sufficient” information upon which to base an opinion?

This study extended our previous research (NIJ Award No. 2010-DN-BX-K271) exploring the reliability, measurement validity, and accuracy of established FDE procedures.

Bio: Dr. Mara Merlino earned her doctoral and master’s degrees from the Interdisciplinary Ph.D. Program in Social Psychology and the University of Nevada, Reno. She is currently Professor of Psychology and Sociology and Coordinator of the MA Program in Interdisciplinary Behavioral Science at Kentucky State University. Dr. Merlino currently serves on the NIST Organization of Scientific Area Committees (OSAC), and was also an invited member of NIST’s Expert Working Group on Cognitive Human Factors in Handwriting Examination, an international and interdisciplinary group of approximately 20 document examiners, statisticians, researchers, attorneys, and human factors experts, tasked with reporting the state of research, education, training, management practices, and other areas, and providing recommendations for future research, training and education practices, and other issues to strengthen the field.
Merlino, Mara, Derek Hammond, Taleb Al Namer, Guillermo Villalobos, Charlie Edwards

**Writing Speed and Fluidity, Writing Complexity, and Call Accuracy in Signature Comparisons**

**Abstract:** The extensive scrutiny of the methods and findings of numerous areas of expert testimony has prompted acrimonious debate among academicians, forensic practitioners, and legal professionals concerning what has been referred to by the Forensic Science Committee of the National Academy of Sciences (“Committee”) as “faulty forensic science analyses.” While acknowledging the importance and utility of the forensic disciplines, the Committee also addressed the perceived flaws in such evidence. For example, advances in technology in various forensic disciplines, especially in the field of DNA testing, show that erroneous or misleading forensic evidence has contributed to the wrongful conviction of innocent individuals. The Committee called for improvements in forensic science practices, arguing that increased and demonstrated reliability and validity in forensics will help law enforcement investigations by improving the reliability of identifications, and homeland security efforts will also improve as improvements are made in the methods and procedures of the forensic disciplines. Among the writing characteristics identified by professional document examiners as indicators of genuine writing are the speed and fluidity of the questioned writing when compared to the known writings of an individual. This poster reports empirical information about the accuracy of results of forensic document examiner comparisons of genuine-to-genuine and genuine-to-simulated signatures when considering the handwriting dynamic information obtained from digitizing tablets using Movalyzer® software. Results comparing high-complexity and low-complexity signature samples will also be reported.

**Bio:** Dr. Mara Merlino earned her doctoral and master’s degrees from the Interdisciplinary Ph.D. Program in Social Psychology and the University of Nevada, Reno. She is currently Professor of Psychology and Sociology and Coordinator of the MA Program in Interdisciplinary Behavioral Science at Kentucky State University. Dr. Merlino currently serves on the NIST Organization of Scientific Area Committees (OSAC), and was also an invited member of NIST’s Expert Working Group on Cognitive Human Factors in Handwriting Examination, an international and interdisciplinary group of approximately 20 document examiners, statisticians, researchers, attorneys, and human factors experts, tasked with reporting the state of research, education, training, management practices, and other areas, and providing recommendations for future research, training and education practices, and other issues to strengthen the field.
Mitchell, Linda

An Efficient Way for Case Management

Abstract: Besides case progress and notes, FDE’s in private practice must have the means to keep track of time and services, conflict checks and billing. This presentation will review the Bill4Time online accounting software.

Bill4Time software has an application that was designed for attorneys but can easily be adapted for the FDE private practice.

After several years of trying to manage case files and billing using spreadsheets, Quickbooks and other accounting applications, I discovered this software and began using it about one year ago. I have found that it fulfills everything I need to keep my records organized and up-to-date. I can also use the mobile app to keep track of time entries without having to re-enter them from my desk or risk the chance of forgetting to post my time.

This presentation will introduce the software, briefly outline its capabilities and walk through the management of a typical case file.

(I have no affiliation with Bill4Time and have not been paid to present this information.)

Bio: Linda Mitchell is a Forensic Document Examiner in private practice in San Diego County, California. She earned her Bachelor of Science Degree in Criminal Justice Administration from the University of Phoenix and completed her 30-month training program in 2011. Linda is a member of ASQDE, AAFS, SWAFDE and is certified by the ABFDE and currently serves on its board of directors as Testing Chair.
Mohammed, Linton, Diane N. Do

An Evaluation of the Efficacy of an Electrostatic Detection Device as a Screening Tool for Latent Prints

Abstract: Documents submitted for forensic examination are often processed in the first instance by the Questioned Documents Section. Processing the documents with an Electrostatic Detection Device (EDD) for indented impressions of handwriting is often one of the first examinations conducted. Latent prints are routinely developed with the EDD processing which takes about ten minutes per document. The purpose of this study was to determine if an EDD can be used as a screening tool by Latent Print Examiners. Prints were placed on three different types of paper - 20lb copy paper, 20lb 25% cotton, 32lb 100% cotton. These documents were processed with an EDD and the developed prints were evaluated by a Certified Latent Print Examiner. The documents were then processed with ninhydrin. A comparison of the ninhydrin-developed impressions with the EDD-developed impressions was conducted. An evaluation of the possible use of an EDD as a screening tool for Latent Print Examiners will be presented.

Bio: Dr. Linton Mohammed has been in the field of Forensic Document Examination for more than 30 years. He has testified as an expert witness more than 150 times in the US, England, and the Caribbean. He is the co-author of “The Neuroscience of Handwriting: Applications for Forensic Document Examination,” and the author of “Forensic Examination of Signatures” coming out in June 2019. He has published several papers in peer-reviewed journals and has conducted workshops on Document Examination in several countries.

Dr. Mohammed is certified by the American Board of Forensic Document Examiners, Inc and holds a Diploma in Document Examination from the Chartered Society of Forensic Sciences.

He is a member & Past-President of ASQDE.
Mohammed, Linton, Peter V. Tytell

WORKSHOP: Non-destructive examination of ink

Abstract: It is a common task for FDEs to compare ink entries to determine whether or not the ink or the entries is differentiable. Before subjecting a document to the [hopefully minimally] destructive sampling of the ink chemist, FDEs will often conduct non-destructive optical examinations of the ink(s). Today these examinations typically involve high tech “plug and play” commercial packages involving specialized light sources and cameras with specific sets of filters for each that can provide a wonderful variety of optical techniques with just the push of a button by an entry level technician. However, there are other techniques involving much simpler materials combined with knowledge, training, and experience that can provide an FDE with meaningful results in ink differentiation examinations. In a world where smart phone apps perform the most basic functions, hands-on techniques utilizing dichroic filters, LAB-color analysis of scanned images, and color deconvolution software are too often overlooked. This workshop will present information on the basic theories of light, color, and human color perception as they apply to the work of the FDE. Attendees will become familiar with various non-destructive methods of ink comparison and participate in a practical application examining actual ink samples.

Bio: Dr. Linton Mohammed has been in the field of Forensic Document Examination for more than 30 years. He has testified as an expert witness more than 150 times in the US, England, and the Caribbean. He is the co-author of “The Neuroscience of Handwriting: Applications for Forensic Document Examination,” and the author of “Forensic Examination of Signatures” coming out in June 2019. He has published several papers in peer-reviewed journals and has conducted workshops on Document Examination in several countries.

Dr. Mohammed is certified by the American Board of Forensic Document Examiners, Inc and holds a Diploma in Document Examination from the Chartered Society of Forensic Sciences.

Dr. Mohammed is in private practice in Burlingame, CA (San Francisco Bay Area).
Mokrzycki, Gregg, Peter Belcastro Jr.

WORKSHOP: Writing On Unusual Surfaces

**Abstract:** This half day workshop will focus on the fundamental concepts of writing on unusual surfaces such as walls, mirrors, wood, wax, fabric, and other textured surfaces. This fundamental workshop was developed for document examiner trainees, recently certified document examiners, and those examiners with limited experience with handwriting on these types of unusual surfaces. Instruction and discussion will cover the collection of known samples in such scenarios, limitations associated with these types of writings, collection and preservation of the evidence, and issues concerning photography of the questioned writing. In addition, attendees will be given several practical problems and asked to conduct examinations and provide results.

**Bio:** Gregg Mokrzycki is a Forensic Document Examiner with the Federal Bureau of Investigation Laboratory. He earned a Bachelor of Arts Degree in International Relations from Johns Hopkins University and a Master of Forensic Sciences Degree from The George Washington University. Gregg is a member of the Midwestern Association of Forensic Scientists (MAFS) and a distinguished member of the Mid-Atlantic Association of Forensic Scientists (MAAFS) and served as president of the organization from 2009-2010.
Moore, Clarra, Dr. Patrick Buzzini

Analysis of Colored Felt-Tipped Blending Marker Ink Using Gray Value Measurements of Visual Spectral Data

Abstract: Felt-tipped markers are highly valued in the artist industry, namely due to their blending capabilities. These markers can be used to create simple calligraphy or intrinsically detailed pieces of art. Despite the popularity of these pens in artistic circles, they are rarely studied in a forensic setting. The goal of this project is to provide questioned document examiners with a potential methodology to objectively analyze the optical characteristics of felt-tipped ink samples using gray value measurements.

Forty-two Copic® Sketch markers were obtained for this project. Single ink strokes were created on regular plain white office paper. A blended ink sample was also created using ten Copic® Sketch marker. The Video Spectral Comparator (VSC) was initially used to record images of the collected ink samples using various illumination conditions, particularly infrared reflectance and infrared luminescence. Gray level values were then measured using ImageJ software. The proposed VSC protocol identified the joint use of ten different illumination types and filters to maximize differentiations. The proposed protocol allowed differentiating all the forty-two ink samples. The proposed VSC protocol, as well as gray value measurement analysis, was also applied to a sample colored using different blends on regular paper and artistic paper. This sample proved useful to appreciate the characteristics of these markers and their interaction with different types of papers. The method of using the VSC 6000 combined with the measurement of gray values offers an objective component during comparative examinations and proved very helpful when comparing a large number of samples like in this study where a visual assessment would result very time consuming.

Although the current results show high potential in distinguishing between single ink stroke samples from colored felt-tipped blending markers, this study was limited to a collection of different colors from a single brand. Further research is ongoing to include representative brands available in the current market and more importantly to include larger sample sets for intra-color comparisons.

Bio: Clarra Moore is a third-year PhD student from the Department of Forensic Science at Sam Houston State University. They received a Bachelor of Science Degree in Forensic Chemistry, as well as Minors in Biology and Criminal Justice, at Sam Houston State University in 2013. Clarra is a student affiliate of the Questioned Document Section of AAFS.
Murray, Erica

Rocketbook: Write, Scan, Erase

Abstract: Rocketbook is a reusable smart notebook with pages which can be wiped clean after the notes are scanned, categorized, and saved into a cloud service. It does not work like a dry erase board; the pages look and feel like normal paper, and when paired with a Pilot FriXion gel pen, the ink firmly bonds to the pages until it is erased with a wet cloth. Its benefits for the everyday consumer are many - it is eco-friendly, reduces clutter, keeps you organized, and you get the digital benefits of storing your notes and using Optical Character Recognition (OCR) to search through your handwritten notes at the stroke of a key - but what challenges does it present to a document examiner? A closer look from a forensic perspective was taken at the Rocketbook regarding the type of “paper” and whether erased writing or indented writing could be revealed. With one to two layers of writing, oblique lighting prevailed over fluorescent lighting in visualizing the erased writing, and electrostatic detection of the indented writing was more effective than oblique lighting. With more than two layers of writing, it became increasingly difficult to be able to uncover any legible information due to the reusability of the notebook. Rocketbook is a one-of-a-kind notebook, therefore it is important to increase awareness of it in the event that it is encountered in casework.

Bio: Erica Murray is training to become a Forensic Document Examiner with the FBI Laboratory. She earned a Bachelor of Arts in Criminal Justice from Penn State University, and a Master of Science in Crime Scene Investigation from the George Washington University. She is currently in her first year of her laboratory's training program.
Nobles, Karen

A Study of The Average Amount of Variation in Synchronous Signature Samples

Abstract: The identification of handwriting is based on three main principles: no two writers write exactly alike; a writer cannot write exactly the same way twice; and every writer has some natural variation in repeated specimens of their handwriting. While common sense tells us the principle which states a writer cannot write exactly the same way twice is true, just as a baseball player cannot hit the same home run time after time, there is a noticeable lack of research and quantitative data to support this principle. There is an apparent dearth of studies which quantify the lack of congruity between naturally written synchronous signatures. Research in this area would provide support when concluding signatures are not genuine because they can be precisely overlaid. This study was designed to measure the amount of variation in the signatures of 100 different writers. The samples used were normal-course-of-business signatures obtained from Florida public records. Three signatures of each writer that were purportedly written at one sitting, were measured for 5 prechosen characteristics and the intra-writer variation between those signatures will be statistically analyzed. This research is currently in progress and results will be provided as they are obtained, analyzed and verified.

Bio: Karen Nobles is currently in private practice with Forensic Document Services in Pensacola, FL. This follows her retirement in 2014 from the Florida Department of Law Enforcement’s Crime Laboratory system. Karen recently (assuming I will graduate in May!) earned a Master of Science Degree in Forensic Science and Questioned Documents from Oklahoma State University. Karen completed her initial training in 1986 and is a member of the ASQDE, the Questioned Document Section of the AAFS, SAFDE, ASTM, SWGDOC, and the Forensic Document Examination Subcommittee in OSAC.
Olson, Larry

A Machine-Made Indentation Mystery

Abstract: Machine-made indentations are often created on a document when it passes through a printer, photocopier, scanner, or fax machine. This presentation is intended to: 1) make examiners aware of possibility of finding these indentations on questioned documents, and 2) warn them not to jump to conclusions about how they were produced.

Casework at the IRS Lab often involves examining large numbers of tax documents collected in the investigation of schemes to collect fraudulent refunds. All manner of exams are used to attempt to source the documents, including examinations of:

- fingerprints
- paper (type, size, fluorescence)
- the type of form used (whether printed by a software package or downloaded from Internet)
- writing ink
- handwriting (signatures and handwritten entries), and
- indentations (handwritten and/or machine-made).

In a recent case, several different patterns of machine indentations were developed among the documents.

Some documents had indentations that were apparently produced when processed by the IRS. Several other documents had indentations that could not be sourced. These fell into three groups, based on the patterns present.

One set of the indentations could be traced to a source, but HOW they were produced defied explanation. The author will provide details of the case, and explain what caused the indentations.

Bio: Larry Olson is a Forensic Document Examiner completing 34 years with the IRS National Forensic Lab. After completing a Master's degree in Forensic Science through George Washington University in 1983, he began his training briefly at the Immigration and Naturalization Forensic Document Lab before moving to Chicago in 1985. Larry is a member of ASDQE, the Questioned Document Section of the AAFS, SWAFDE, a past-President of MAFS, and is certified by the ABFDE.
Ostrum, Brent

Proposal for a FHE process map (Based on the Logical Approach and Propositionally-driven)

Abstract: Any process map serves as a step-by-step guide to the proper procedure(s) and method(s) that must be followed to achieve some specified purpose or goal. In forensic document examination work, the goal is usually some assessment of potential authorship or source. Recently there has been a fundamental shift in how evaluations are performed with the focus being on an evaluation driven by alternative, competing propositions.

Over the years, various process maps have been developed to guide evaluations however none of these conform very well to the logical approach. The process map presented here addresses those shortcomings, specifically for forensic handwriting examination. It is based on principles that conform to the logical approach to evidence evaluation; specifically,
1) All interpretation occurs in a framework of circumstances,
2) Interpretation is meaningful when two or more competing propositions are addressed, and
3) The examiner evaluates the probability of the evidence/findings given the propositions, and not the probability of the propositions.

The proposed map also incorporates steps aimed at enhanced quality assurance, including context management, bias minimization, and peer review. The outlined procedures may be adapted for use in any size of laboratory but would require significant resources in some applications.

Bio: Brent Ostrum is a Senior Forensic Document Examiner with the Canada Border Services Agency (CBSA) in Ottawa, Ontario, Canada. His career spans thirty plus years starting with the RCMP before moving to CBSA. Mr. Ostrum is the sitting chairman of the Canadian Society of Forensic Science QD Section and has been certified by the ABFDE.

Mr. Ostrum is working practitioner and sitting chairman of Document Section of the Canadian Society of Forensic Science. He serves on the Executive Council for ST2AR, the NIST-OSAC QD subcommittee, and the Expert WG on Human Factors in Handwriting Examination. He completed the UNIL course “Statistics and Evaluation of Forensic Evidence”, and presented several lectures and workshops on the Logical Approach to Evidence Evaluation for FDE purposes.
A Strategic-Pragmatic approach to Forensic Document Examination

Abstract: The scepticism regarding the forensic relevance of handwriting examination is not new. It is found in various critical reviews, e.g. NAS report, to strengthen forensic science. We agree that improvements had to be made and were made for the benefit of forensic document examination in general and handwriting examination in particular. The question is if the meanwhile added values are sufficiently pragmatic and strategically focused to be fit for purpose. Can we explain in a few sentences of what has been the progress to improve: enhanced awareness versus new research? Could it be, that some new elements have been added, however without being sufficiently pragmatic and straightforward in terms of strategy? Ask the right question to get the right answer - ask about quality.

Basic quality requirements include:
- have defined examination strategies;
- go for accepted standards and best practices when claiming state-of-the art examination;
- use validated procedures, methods and techniques;
- be in ligne with international guidance for evaluative reporting;
- refer to peer reviewed research & development results.

Since the quality is the sum of all of these factors, it is evident that for the broad discipline of forensic document examination we need to split-up, depending on measurements and testing (e.g. ink analysis) versus judgements and opinions (e.g. handwriting examination). Forensic document examination does cover a broad spectrum of methods and techniques, from chemistry to pattern analysis and cognitive processes. As long as forensic document examination is considered to be an open patchwork of a variety of forensic activities, methods and techniques, it is difficult to focus on a pragmatic and strategic approach for strengthening this forensic sector. Some international forensic working groups have published best practice manuals to give guidance on what the quality requirements are all about. This is a right step in a right direction. However, as long it is just a “guidance” and not a “standard”, this impact factor is limited. Meaning that we need to go one step further and define standards for the most relevant sub-disciplines of modern forensic document examination.

Bio: Peter Pfefferli is a consultant and forensic document examiner in private practice. He has been a corresponding member since 1987. As former director of the Forensic Science Institute in Zurich-Switzerland, Peter has been a founding member and now honorary member of the European Network of Forensic Science Institutes (ENFSI). He retired from Police in 2017. Now in private practice he is an international quality assurance expert for forensic document/handwriting examination. Since 2018 Peter has the status of ASQDE Life Corresponding Membership.
Polston, Carrie, Patrick Buzzini, James Curran

The discrimination of inkjet printer inks Using Micro Raman Spectroscopy Part II: Comparing Visual Inspection and Different Variants of Linear Discriminant Analysis Methods

Abstract: When investigating counterfeited currency, various information is gathered from seized specimens to develop investigative leads about printer source candidates. Micro Raman spectroscopy is proposed as a rapid, non-destructive screening tool to identify unknown inkjet printers used to produce counterfeited banknotes. Inkjet printers generate microscopic dots that can be analyzed individually using a microscope coupled to the Raman spectrometer. In the present phase of this project, 231 Raman spectra were collected from the three cyan, magenta and yellow dot components of 11 inkjet printer ink samples using a near-infrared (NIR) laser wavelength at 785nm. Spectra were first compared visually and groupings were formed for each individual color and for the three colors considered jointly. Though visual inspection provided useful investigative information, visual inspections of spectra are highly time consuming and labor intensive, requiring a knowledgeable analyst to transform and interpret each spectra individually before performing comparative analyses. This makes visual inspection impractical and tedious for the intended investigative purpose and therefore a sensible statistical classifier is sought. Three variants of linear discriminant analysis (LDA) were applied: 1) Principal component analysis (PCA) followed by LDA, 2) Partial least square discriminant analysis (PLSDA) and 3) “Sparse” LDA. Although spectral comparisons by means of visual inspections are still superior to differentiate Raman spectra on the basis of minor peaks, “Sparse” LDA provided the highest classification potential (i.e., highest accuracy).

In case this info is needed:
This project is supported by Award No. 2016-DN-BX-0164 awarded by the National Institute of Justice, Office of Justice Programs, US Department of Justice

Bio: Carrie Polston completed her bachelor’s degree in biology at Truman State University. She completed an internship with the University de Lausanne in Switzerland in 2016, where she gained exposure to Questioned Documents casework scenarios and began research on related topics. She is currently a fifth-year PhD candidate in the Department of Forensic Science at Sam Houston State University, with research focusing on magnetic flux measurements of toner-printed documents.
Assessing the Impacts of Induction Spatial Effects on Magnetic Flux Measurements of Toners

**Abstract:** This work expands on previous research into magnetic properties of toner. Specifically, this research investigates the effects of the external biasing unit on the repeatability of magnetic flux measurements. The hypotheses advanced were that 1) the sample does not reach saturation magnetization for all particles if the sample distribution is abnormally shaped and the surface area of the toner exposed to the induction current is less than $\frac{1}{4}$ of the total sample surface area, and 2) hysteresis effects can enhance or suppress the native magnetic flux of the sample depending on the sensor orientation relative to the native flux field of the sample. Both phenomena could lead to aberrant measurement values which are not representative of the true value for the sample and can increase the apparent sample inhomogeneity and measurement uncertainty if not controlled.

Measurements were conducted on 5 samples collected from different printing devices. The samples contained controlled grids of square, rectangular, and elongated rectangular blocks that had the same area as well as line grids of differing densities. Thirty measurements were conducted on each sample, on each grid type, with the sensor oriented so the rectangles or lines were parallel to the induction current. The measurements were repeated in planes of rotation 90, 180, and 270 degrees counter to this original position. The values obtained for each sample in the different planes of rotation for the square grid were compared with ANOVA and t-testing to evaluate the presence and impact of hysteresis effects. The values obtained for each sample in the different planes of rotation for the rectangular grids were compared to those obtained for the square grids using ANOVA and t-testing to determine the impact of the induction current orientation effects.

It was found that both hysteresis and induction current orientation effects had a significant effect on the results obtained when comparing the measurements taken from one sensor orientation to those taken from another orientation (p value <.01). However, the magnitude of the hysteresis effects was smaller (<20% enhancement or suppression) than the magnitude of the induction orientation effects (up to 90% suppression). The hysteresis effects were also found to be reciprocal, with enhancement values mirrored by equal and opposite suppression values in another plane of orientation. This indicates that the hysteresis effects can be controlled via sampling methodology. New quantitative methods are needed to anticipate and correct for orientation-induced variation in the measured magnetic flux. The implications of the hysteresis effects will be presented with contextual information about applications to QD casework samples, and a control methodology will be outlined.

**Bio:** Carrie Polston completed her bachelor’s degree in biology at Truman State University. She completed an internship with the University de Lausanne in Switzerland in 2016, where she gained exposure to Questioned Documents casework scenarios and began research on related topics. She is currently a fourth-year PhD candidate in the Department of Forensic Science at Sam Houston State University, with her research focusing on magnetic flux measurements of toner-printed documents.
Ross, Jim

**Automated Authentication of Driver's Licenses: Challenges and Solutions**

**Abstract:** Automated document authentication has been touted as a solution to increase the efficiency of document inspection, standardize the examination process, and reduce human error. Automated readers capture full color images using several light sources and perform multiple security checks against a reference database to ensure the driver's license is valid. The readers are widely deployed as an integral part of identity solutions for department of motor vehicles, for document inspection by financial institutions, and as a primary tool for Transportation Security Administration prescreening of passengers. This presentation will explore the automated checks being performed by such readers and highlight the strengths and weaknesses. A case study involving hundreds of counterfeit U.S. driver’s licenses will be examined and the lessons learned will be discussed.

**Bio:** Jim Ross is the Questioned Documents Unit Chief at the Homeland Security Investigations Forensic Laboratory. He has testified as an expert witness in the field of forensic document examination on numerous occasions and has given many presentations and training seminars on the techniques utilized to detect counterfeit and altered identification documents. Jim earned a graduate degree in Forensic Science from The George Washington University and a Bachelor of Science degree in Criminal Justice from York College of Pennsylvania. He is a diplomate of The American Board of Forensic Document Examiners and a member of the American Society of Questioned Document Examiners and the American Academy of Forensic Sciences Questioned Documents Section.
ASQDE 2019 – PROGRAM ABSTRACTS

Tanaka, Tobin, Peter Tytell and Tobin Tanaka (Colloquium); Courtney Baird, Kristen Welch and Tobin Tanaka (Breakout Session)

ASQDE Trainee Colloquium and Breakout Session

Abstract: This year there will be two special events for trainees.

On Saturday 3 August an afternoon colloquium will have topics of interest for those new to the profession: (i) typography, (ii) note taking, (iii) training bibliography and anything else that may be pertinent.

The Trainee Breakout Session will be held in the afternoon of Monday, August 5 during the time of the ASQDE Business Meeting as done in past years. It will offer an opportunity to conduct a practical case examination, record notes of findings, write a report and participate in a discussion of the case. Trainees and document examiners who have no more than two years experience post-training are encouraged to participate in this session. The practical problem will be provided approximately four to six weeks in advance of the session to permit time for completion beforehand.

The environment for the Colloquium and Breakout Session is meant to foster discussion, open learning opportunities, and encourage collaboration now and into the future.

Bio: Tobin Tanaka is a forensic document examiner with the Canada Border Services Agency. He is a member of the American Society of Questioned Document Examiners, the Australasian Society of Forensic Document Examiners, Inc, the Questioned Document section of the American Academy of Forensic Sciences (AAFS), the Chartered Society of Forensic Sciences and the Canadian Society of Forensic Science. He is certified by the American Board of Forensic Document Examiners.
ASQDE 2019 – PROGRAM ABSTRACTS

Vastrick, Thomas, Ellen Schuetzner, Kelsey Osborn

Measuring the Frequency of Occurrence if Handwritten Numerals - An Extended Database

Abstract: In 2018 the authors published the second report in a series establishing frequency of occurrence proportions for handwritten numerals. While all numerals were included in the database, it was desired that the database should constantly expand for both number of writers and features measured.

This study adds 17 new numerals to the general handwriting database. This presentation will highlight the measured proportions. In addition the authors will present three aids for examiners to use in their examinations. One is the data in spreadsheet form from which the examiner can make any case specific modifications or applications. Second, an easy to read table of frequency of occurrence proportions along the feature descriptions and images of each feature is provided. Finally a table quantifying the level of independence or interdependence of nearly 30 pairs of numeral features will be demonstrated.

The attendees will gain an appreciation of the ongoing study and learn ways in which they can apply this study to their daily work and in defense of our statistical foundation of heterogeneity when challenges to such in court.

Bio: Thomas Vastrick is a forensic document examiner in private practice with 42 years of experience. He earned a Bachelor of Science degree in Forensic Science with a minor in chemistry from California State University at Sacramento and completed his in resident training in forensic document examination with the US Postal Inspection Service in Washington DC. Tom is a Diplomate of ABFDE, sits on the Board of Directors with AAFS and is Secretary of ASQDE.
Ware, Charlotte

Single Signatures: Writer Associations in Early America

Abstract: As an amateur genealogist as well as a FDE, I am often asked to perform writer associations based only on signatures to determine if the signer of several documents was, in fact, the same writer. Such documents were typically authored in the late 17 or 1800s. Important yet different factors need to be taken into consideration when performing this type of examination when opposed to the factors considered in the examination of modern day signatures. This poster presentation’s purpose is to provoke discussion on the practice of writer associations involving early American documents. Some of the factors to be taken into account during examination include the occupation and education of the writer, the geographic location in which the writer lived, and the social status of the writer’s family. The literacy rate and specific time period are also deciding variables. All of these factors are important in determining how frequently the author wrote. Is it possible that the signatures being examined could be the only signatures they had ever written? Or was it commonplace for them to write their signature and other documents as well? How is this accounted for in the reasoning and conclusion process that a FDE undergoes during an examination? Examples will be presented on the poster, as well as theories meant to foster discussion on the subject.

Bio: Charlotte Ware is a Laboratory Unit Manager, with the US Postal Inspection Service Forensic Laboratory Services. She also works as a FDE for Forensic Document Examination Services. She has a MSFS and is certified by the ABFDE.
A Methodology Utilizing Type Font in the Determination of the Age of a Document

Abstract: The advancements and evolution of technology have a cause and effect on the examination of documents. The process of determining when a document was created remains of great importance. Regarding the age of a document, there are many factors to be considered in this multi-faceted examination that can accurately and scientifically determine when a document was composed. The determination of an age of a document can be supported by that of indentation analysis, offsetting and transfer as well as the age of materials. Many materials that have been researched and studied include paper, writing inks, typewriting, photocopiers and printers, facsimile machines, printed matter, and handwriting and signatures. Given the advancements in technology, this paper will provide research in the area of printed matter, specifically that of type font. This paper will discuss and propose a methodology to be used in conducting an examination of type font from a digital platform and how its value contributes in the determination of the age of a document.

Bio: Kristen Welch is a forensic document examiner with the Homeland Security Investigations Forensic Laboratory and has over ten years of experience in the field of forensic science. She is active in national and international professional development activities, and regularly attends professional meetings and workshops. She is a member of the American Society of Questioned Document Examiners and the Midwestern Association of Forensic Scientists. She is certified by the American Board of Forensic Document Examiners.
Winchester, Janis

The Shroud of Turin as a Document and the VP-8 Image Analyzer

Abstract: The purpose of this research is to describe the Shroud of Turin, and list the studies that show the letters and letter combinations observed using photography and magnification capabilities. The Shroud of Turin presents an unusual and unique linen cloth surface that has been the subject of a wealth of scientific investigations. When a 2D photograph of the Shroud of Turin is viewed using the VP-8 Image Analyzer and an oscilloscope, the resulting portrait image has the appearance of 3D. Thus, the invisible is shown as visible using this technology.

The linen burial cloth attributed to the historical Jesus of Nazareth is kept in Turin Italy in an environmentally controlled container. A photograph of the image shows a portrait of a man bearing marks as described in the literature as the passion and crucifixion of Jesus of Nazareth. The VP-8 Image Analyzer is an analogue instrument invented in the late 1960's for various applications such as topographic views, radiology, and other inquiries where greyscale may be plotted as height, length, and width of an object, the X, Y, and Z axis.

The results of this research include information on the potential translation of words appearing on a photograph of the Shroud of Turin as described by Shroud Researchers, analysis of the Shroud of Turin using the VP-8 Image Analyzer by the author, and suggestions for future tests of the Shroud of Turin.

Bio: Janis Winchester is retired from the Florida Department of Law Enforcement after 38 years in various sections, including the Crime Laboratory, Inspections, and Training. Janis is a Life Member of the ASQDE and serves on the ASQDE Journal Editorial Board. She is also a Life Member of IAI and is a Retired Fellow of the American Academy of Forensic Sciences.
Aloyoni, Mohammed

Why Facial Comparison is Part of QD

Abstract: Twenty years ago, I was assigned to supervise the facial comparison section which wasn’t under any department of the crime lab, so I ended up going on training with the four examiners who worked in the section. The training was in Germany under the expert Mr. Kurt Kedman who used to be a trainer for FBI agents. We also went to the UK to be trained by Dr. Ray Evans of University of Manchester. With this training I worked on cases of facial comparison that were mainly two-dimensional photos on documents such as passports or national ID and birth certificate files. However most of these documents had been tampered with therefore needing someone with questioned document expertise. Throughout this paper I will lay out the main aspects of the science of facial comparison and how it became part of the QD Department of the crime lab of Saudi Arabia.

Bio: Mohammed Aloyoni is a senior Forensic Document Examiner and head of the QD department at central lab of Saudi Arabia. He earned a Bachelor of Science Degree in Chemistry from Augsburg college in MN, Mohammed is a correspondent member of the ASQDE since 2002, and just went into retirement after being promoted as a General.

Orta, Raymond

Forgery Methods In The Venezuelan Notary And Public Registry System

Abstract: As forensic documents examiners in practice since 1995, we have detected different methods of forging public documents in Venezuela to break the law. Deceiving through documents is not limited to private documents; the spectrum of cases includes notarized documents, corporations, vehicles, and real estate records.

This compilation summarizes the most common methods to forge notarized and public documents, including the creation of false certified copies, alteration of public documents controls by addition, and document substitutions on the notary books. We have found forged signatures of signatories, witnesses, public officers and false official rubber stamps.

Methods and Materials
Literature and Internet searches.
Orta Poleo Document Lab digital library searches.

Bio: Raymond J. Orta MartÃnez is a Forensic Document Examiner from Venezuela. He is correspondent Member of the American Society of Questioned Document Examiners since 2004. Member of the Registry of Judicial Experts, Supreme Tribunal of Justice of Venezuela. Attorney at Law, Specialist in Procedural Law in the Central University of Venezuela.