

# ABSTRACTS

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## Cognitive Human Factors and Forensic Document Examiner Methods and Procedures: Writing Characteristics, Visual Context, and Handwriting Examination Decision Accuracy

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Ongoing research is needed to achieve transparency in the methods and procedures of forensic document examination, and to empirically support the creation of standardized education and training that will help forensic document examiners achieve the creation of best practices in all areas of the field. In February 2020, NIST published an extensive report prepared by the Expert Working Group for Human Factors in Handwriting Examination, titled *Forensic Handwriting Examination and Human Factors: Improving the Practice Through a Systems Approach [1]*. *The report encourages interdisciplinary research efforts that embrace multiple research methods to study neurological, physiological, cognitive, social, and environmental factors that form the context in which handwriting examination takes place. The findings reported here, which are part of a larger study, are the results of an eye-tracking experiment in which the characteristics of signatures, characteristics of the visual context, and the gaze behavior of the participants are combined to investigate how these factors relate to examiner decision accuracy.*

## A Review on Porous-Tipped Writing Instruments—Current Market Trends, Properties, and Analytical Methodologies

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Porous-tipped pens, commonly referred to as “felt-” or “fiber-tipped” pens, are a ubiquitous form of writing instruments that can have artistic, non-artistic, and even mixed applications depending both on the product’s intended use and the user’s preference. Despite a few studies that have been carried out to gather information about the physical and chemical properties of these writing instruments, porous-tipped pens and their inks constitute an under-researched area within the field of forensic document examination. The present review aims to thoroughly discuss the developments of the porous-tipped pen throughout history, the criteria that help differentiate stroke features between porous-tipped pens and other fluid pen inks, and any information gathered about their properties. A survey of the current trends of the porous-tipped pen market, the key findings from said survey, and artistic blending writing instruments are also discussed. The survey includes specifications from 141 different brands and 966 individual products from 2018 to 2019. Finally, the current state of porous-tipped pens within questioned documents is discussed. The review of existing porous-tipped pen studies and the findings of the present open-source survey allowed to highlight a number of challenges that the forensic document examiner has to face when asked to characterize and compare graphical, physical, and chemical features left by porous-tipped pens on a questioned specimen. These challenges may stem from the increased number of these writing instruments on the market, the increase of complexity of ink formulations (i.e., blending capabilities of some artistic pens), the difficulty to distinguish between artistic and non-artistic markers due to a larger availability of the former to the general public in the last years, and the diversity of porous-tipped pen tip types.

# **A Preliminary Study on Stamp Impressions with the Same Placement and Orientation on Reproduced Documents—How Easily can it be Achieved by Deliberately Stamping at the Same Relative Position and Orientation?**

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Company stamps or seals are commonly used to authenticate official documents such as quotations, sales invoices, and employment or business contracts, or to demarcate an area on a document for a signatory to sign. Although the stamp is usually machine-made, the act of manual stamping by a person introduces variation in the orientation and position of the stamp impression relative to other elements (e.g. printed text or border) on a document.

Stamp impressions are sometimes encountered in documents submitted for analysis. In a suspected case of fraud or forgery, one of the things the document examiner would determine is if the stamp impression(s) on the document is physically stamped or a reproduction of another stamp impression. The features, characteristics and placement of the stamp impression(s) would also be examined.

In cases where multiple stamp impressions on several reproduced documents appear to have the same relative positioning (placement) and orientation to the other elements (e.g. signatory line) on the document, the document examiner has to consider the possibility that these stamp impressions could either be a result of cut-and-paste manipulation (hence not a product of an inking process) or original stamped impressions that match by chance i.e. random chance matches.

Preliminary findings from our previous research showed that the probability of random matches for original stamp impressions made using a circular self-inking stamp was 0.1% when the stamp was not oriented based on any specific marking, and 4% when the stamp was oriented with the 'star' symbol located at the 6 o'clock position. The current proof of concept study further examines stamp impressions made by one of the authors deliberately aligning and orientating the stamp in a specific way on a document. Factors such as the shape of the stamp die, stamp housing, and the presence of a signatory line were also considered. The percentage of stamp impressions that had matching relative position and orientation was found to be between 0.08 and 0.69%. This exploratory study suggests that when stamp impressions encountered in more than one reproduced document have similar placement and orientation relative to other elements in the document, the examiner needs to objectively consider whether they were made by "cut-and-paste" manipulations or a chance occurrence. In view of its practical potential, more representative and comprehensive data will be collected by extending this proof of concept study to more participants and a more detailed examination of the factors involved in stamp impressions.