Review

The use of handwriting examinations beyond the traditional court purpose

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ABSTRACT

Traditionally, forensic science has predominantly focused its resources and objectives on addressing court related questions. However, this view restricts the contribution of forensic science to one function and results in lost opportunities as investigative and intelligence roles are often overlooked.

A change of perspective and expansion of the contributions of forensic science is required to take advantage of the benefits of abductive and inductive thought processes throughout the investigative and intelligence functions. One forensic discipline that has the potential to broaden its traditional focus is handwriting examination. Typically used in investigations that are focused on both criminal and civil cases, the examination procedure and outcome are time consuming and subjective, requiring a detailed study of the features of the handwriting in question. Traditionally, the major handwriting features exploited are characteristics that are often considered individual (or at least highly polymorphic) and habitual. However, handwriting can be considered as an information vector in an intelligence framework. One such example is the recognition of key elements related to the author's native language. This paper discusses the traditional method generally used around the world and proposes a theoretical approach to expand the application of handwriting examination towards gaining additional information for intelligence purposes. This concept will be designed and tested in a future research project.

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1. Introduction

A document may be broadly defined as any material displaying marks, symbols or signs that communicate a message to another. The majority of documents consist of information written on paper by mechanical or electronic means, for example a typewriter or printer, or by hand using a writing instrument, like a pen or pencil [1]. However,

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many other objects and instruments can be employed to convey messages (e.g. rocks, leaves, graffiti on walls or lipstick on mirrors) or brandings (e.g. drug packaging, stamped or printed information on counterfeited objects) [2]. The examination of documents is a discipline that stemmed from the courts' and investigations' need for assistance in understanding evidence relating to the origin and history of questioned documents [1,3]. The purpose of the analysis is to answer questions related to, but not limited to, the authorship, authenticity and/or source of the document. Questioned documents are those suspected of being false or with a disputed or unknown origin. Depending on the questions being asked, the examiner seeks not only to identify the author of the handwritten and/or printed matter, but additionally, analyse inks, papers and other elements of a document, as well as recognise additions or substitutions, restore erased writings and detect indentations [1].

A significant share of investigative questions relating to document examinations involves handwriting examinations. The purpose of this analysis is to identify the author of the handwriting on a questioned document, detect forged signatures and determine whether a common author produced a series of documents [4]. Handwriting is a complex perceptual-motor task, requiring the conscious and repetitive formation of letters and words in order to practice and reinforce the skill [1,3]. Once this ability is developed, the writer redirects most of their conscious thought to the subject matter rather than the writing process. This skilled motor process results in the introduction and repetition of a writer's own personal habits to the handwriting trace [5]. These writing characteristics were traditionally divided into two types; class characteristics and individual characteristics. The former can be defined as traits common to a group of writers that may be influenced by the writing system learnt and geography, while the latter represents the unique elements that discriminate writers [1,3]. A person's writing style stems from the adaptation of the prescribed writing system studied and it has been theorised that an understanding of the class characteristics induced by the teaching methods and systems taught, may be able to indicate the nationality and academic background of the writer [1]. However, due to the relatively recent shift towards electronic communication, paralleled with the lack of concern placed on penmanship, class characteristics have become less distinct and identifiable in present day handwriting [3]. Therefore, for the purpose of handwriting examinations, a person's writing is comprised of a combination of individual characteristics. These characteristics are influenced by individual preferences, natural skill level and the amount of practice an individual undertakes to build and maintain the trace [1]. This results in differing combinations of handwriting characteristics amongst writers, which is referred to as the principle of individuality and has led to the assumption that no two people write exactly the same and no one person writes the same word identically twice. Generally, these two fundamental ideals of handwriting are acknowledged when providing expert opinion with respect to the source of a piece of writing [1,5].

The efficiency of forensic science as a whole has recently been called into question [6–8]. Generally, forensic case data from many disciplines of forensic science falls prey to poor integration into the investigation and intelligence processes [9]. This is largely due to the existing paradigm of forensic science focusing on court processes, which has been categorised as slow, susceptible to subjective opinions and inconsistent in terms of the interpretation of case data [8,10]. The role of forensic science should thus be expanded and rather than using forensic case data solely to assist in prosecution, it can be analysed systematically to obtain knowledge about criminal activity and disrupt and prevent crime [11]. This approach is referred to as forensic intelligence [12], and is the "accurate, timely and useful product of logically processed forensic case data for investigation and/or intelligence purposes," as defined by Ribaux et al. [9]. This new paradigm aims to move away from the current case-by-case, reactive law enforcement response, towards proactive intelligence-led policing [13,14]. The transversal, adaptable nature of the forensic intelligence approach across different forensic science sub-disciplines is evidenced by its application in the area of document

examination and illicit drug profiling [13,15]. This involved the categorisation of false identity documents, such as identity cards, passports and stolen blank documents [14,16–18]. Visual features, such as UV features, watermarks and the machine-readable zone, were extracted and used to establish a document profile. A comparison procedure was then developed and implemented to identify links and trends between cases. At this stage, we ought to ask the question: could this approach also be expanded to handwriting analysis? If this is possible, a redirection and extension of the contributions and goals of traditional handwriting examinations towards the provision of intelligence could also be possible.

Applying the forensic intelligence approach to handwriting examinations stems from an operational need. It is believed that handwriting can provide another layer of information about the object from which it originates. For instance, a security problem that this could help address is the "low volume-high frequency importation" of illicit drugs using the international mail system [19]. In Australia, the Australian Federal Police (AFP) is responsible for upholding the Commonwealth law and contributing to protecting Australians both domestic and overseas from criminal threats [20]. In 2012, it launched its National Forensic Rapid Laboratory (Rapid Lab). The Rapid Lab "allows different forensic disciplines to work on a seized item at the same time," allowing for a quick turnaround time when analysing parcel post seizures [19]. The packages are triaged and examined to obtain useful information, including fingermarks, handwriting, chemical profile of the drug/s and potential place of origin. This information is then stored and compared with other seizures allowing the detection of potential links and trends between cases, uncovering the extent and volume of organised crime [19]. With respect to handwriting, analysts may have the potential to not only link cases that appear to have been written by the same person, but also infer their native language, which may be useful as this intelligence product can be fed back to the originating country's authorities. In conjunction with other traces, such as the physical characteristics of the parcel's packaging or the chemical profile of the illicit substance within, it has the potential to provide important intelligence information. This may further differentiate a series of crimes or associate series of crimes, which were previously believed to be unrelated.

As a way to progress the debate, this paper provides an overview of the traditional methods for handwriting examination, discussing the current limitations of this court-oriented discipline. A theoretical expansion for handwriting analysis is then proposed, which aims to present the advantages of expanding this practice's objectives towards intelligence-led policing. This approach will be practically tested and presented using data in future research.

2. Traditional role of handwriting examination

The process of handwriting examination is concerned with identifying the author of a questioned document where the court systems are the primary stakeholders of the opinion/s produced [4]. The identification of the source of an unknown (questioned) handwriting involves the comparison of its elements with the features of known material (referred to as specimen) obtained from suspect writers [2]. In Australia and New Zealand, the generalised procedure used to examine handwriting is maintained and updated by an editorial group overseen by the Australian and New Zealand Documents Specialist Advisory Group. It is based on an initial publication by Found et al. [21] the 'Documentation of Forensic Handwriting Method: A Modular Approach', and is generally accepted by practitioners in policing and government laboratories as the procedure for examinations undertaken in casework. Internationally, a number of procedures have been published as standards and used within specific regional areas or jurisdictions. These include publications by the European Network of Forensic Science Institutes (ENFSI), the 'Best Practice Manual for the Examination of Handwriting' [22], and the standard previously published by the American Society for Testing Materials (ASTM), the 'Standard Guideline for Examination of