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Documentation of Forensic Handwriting Comparison and Identification Method: A Modular Approach

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Overview of document

This document provides a summary of a practical method that can be used to compare handwriting (whether text based or signatures) in the forensic environment. It is intended to serve as a guide for those individuals entering the profession or for those interested in investigating general aspects of the practice of forensic handwriting examination. The method proposed does not cover in detail all aspects of the examination of handwriting. It does however form the backbone of forensic handwriting method in the government environment in Australia and New Zealand as represented by the Special Advisory Group (Documents / Criminalistics).

It must be stressed from the outset that handwriting is examined using human perceptual and cognitive processes that are extremely difficult to accurately and validly describe in written form. What is presented here is the agreed general approach that government practitioners use in the majority of the comparisons that they carry out. The method is presented in the form of a flow diagram which structures the comparison and provides the reader with a guide to the significant landmark stages commonly worked through in practical handwriting examinations. Where decisions are made within the course of the flow diagram a series of modules have been written which provide additional information regarding how the issues associated with a particular decision stages are tackled. Each module is, as far as is practical, independent of other modules in the method. This has been done to facilitate changes in the process over time that may result from theoretical, practical or technological advances in the field.

Introduction to method

Forensic Document Examiners (FDEs) are specialists that are called upon to provide their expert opinions regarding a wide range of issues associated with questioned documents. One of the most commonly sought after examinations is the comparison of handwriting (which can either be text based or in the form of signatures). FDEs express opinions regarding the authorship or writings and also the process of production (for example whether a signature is the product of a copying process). FDEs draw their skill and expertise from a wide variety of sources. These include training programs within laboratories or specialist society meetings, the scientific literature relating to the discipline and a number of dedicated textbooks (see for example Osborn, 1929; Harrison, 1958; Conway, 1959; Hilton, 1982; Ellen, 1989; Huber & Headrick, 1999, and the journals cited in the reference section of this

document). In addition, most FDEs subscribe to independent testing programs which provide them with feedback regarding the probative value of the skills that they utilize in day to day casework. When reading the method it should be remembered that this document is brief and sits at the front of a significant quantity of detailed specialist information, research and FDE experience. This document remains dynamic with regular amendments based on both feedback from those choosing to subscribe to it and changes to the paradigm arising from scientific research. The document is not intended to be used in isolation however does provide a framework and summary of the authors perceptions of the most recent relevant philosophies within the field.

Handwriting is a complex learnt motor behavior that is carried out, at least to some extent, by most members of the population. Individuals are generally taught a copy-book system of writing (one which through formal education is considered to be the model for the handwriting that they are to produce.). There are many copy-book systems taught throughout the world. Huber and Headrick (1999) list 76 different systems in North America alone. What makes skilled handwriting a useful form of evidence in the forensic environment is that it is found to be a relatively stable behavior within the writer but it does vary quite markedly between writers, even when people are taught exactly the same copy-book system. Srihari and his colleagues (2002) using computer algorithms were able to validate handwriting individuality in a sample population of 1500 individuals with a 96% confidence. Using additional features these authors suggested that this conclusion could be reached with a near 100% confidence. A qualitative approach was used by Huber (2000) on nearly 1000 samples of writing. This author found that for all bar two of the samples the balance of the samples could be discriminated.

As with most forms of forensic identification evidence it is this ‘inter-individual’ variation that provides us with a useful tool to determine whether there is a nexus between a particular writing act and a person (or another writing act). Handwriting as a learnt behavior is however subject to a number of variables that can make the examination process quite complex. Examples of these variables are the intra-writer variation (the variation in the handwriting within an individual which is observable as slightly different handwriting each time a sample is produced) and the reality that people can change their handwriting purposefully (disguise) or copy the handwriting of others (simulation). This document summarizes the interaction between these methodological elements.

There are a large number of variables that can impact on an individual's ability to produce handwriting in a consistent fashion in relation to the model that they were taught. These include the complexity of the original copy-book system the writers propensity to consciously modify the characters or connections away from the copy-book system (see Simner (1998) for an interesting study on copy-book divergence), subconscious modifications to the movements (which may occur in order for them to increase the efficiency of their movements), the writers motor skill level and capacity, and the bio mechanical/postural restrictions associated with any given writing event. Complicating the system is that individuals can purposefully change their motor output, and therefore the handwriting that they produce, and can therefore attempt to disguise their own handwriting characteristics or imitate (simulate) the images produced by others to some extent.

In the very simplest of forms the process of handwriting comparison and identification can be described as follows. Examiners are provided with a handwriting sample (whether text based or signatures) whose author is considered unknown or disputed. This sample is termed 'questioned'. The questioned writing is compared to another sample of writing (a ‘comparison sample’). This comparison sample could be writing submitted as having been written by a particular person (a ‘specimen’ or ‘exemplar’) or it could be another sample of questioned handwriting (termed a ‘common authorship’ examination). Specimen writings are the most frequently encountered form of comparison sample. These may be either 'requested', where the content of the handwriting is dictated to the individual, or 'collected' where the investigator, or client, locates samples of an individuals day to day writing. The comparison sample is examined and pictorial and structural features that the examiner believes characterize handwriting are assessed. These features are compared to the features associated with the questioned sample. If it is found that the questioned features are similar to the specimen features then propositions are advanced which could account for the similarities. Should the examiner be of the opinion that there is evidence to support the proposition that the similarities result from both the questioned and specimen images having been produced by the one writer then the handwriting is said, with some level of confidence, to be 'identified'. Alternatively if the features are found to be dissimilar to the questioned images, explanations are proposed that could account for the dissimilarities, and in some instances the examiner will be of the opinion that there is evidence to support the proposition that the handwriting was not written by the specimen writer.

It must be remembered when assessing method that handwriting is a behavioral artefact. As a behavior, handwriting evidence is subject to a number of potentially limiting factors which include:

- No amount of handwriting will fully characterize the extent of the variation in the behavior or describe exactly the characteristics of the system which controls its generation.
- It is still not possible to determine objectively the relative frequency of any particular handwriting feature in the population
- The fluency of the movement can change over the course of different writing events
- The features of writing may change naturally over time.

Added to these considerations is the reality that the instrument performing the examination and comparison of handwriting in the forensic environment remains the FDEs brain. The technique is therefore based on human perception and cognition and is subject to normal human variation with respect to these processes. Handwriting examination therefore should be referred to as 'opinion identification evidence' whereby expert opinion refers to the examiners belief in the extent to which the evidence supports that the writer of the comparison sample did or did not write the questioned writing.

Handwriting examination involves more than solely the 'identification' or ‘exclusion’ of writers as having written a particular sample of questioned writing. The discipline also deals with the elucidation of handwriting processes. Handwriting processes are behaviors that can be inferred from information within the images. Examples of processes investigated may be disguise, simulation behavior (whether performed unassisted or as a tracing), and machine-generated handwriting. These issues are also addressed within this document.

What is not addressed in this method is the extraction of writer demographic features such as age and gender. Although there has been some controlled research conducted into the determination of these characteristics (see for example Haines et al, 2002 and Bandi & Srihari, 2005) the results either do not support that the techniques employed are sufficiently reliable or the techniques themselves can not be applied to casework samples due to the limitations associated with the format of commonly encountered writing samples.

Validation of method

Given that the forensic examination of handwriting is based on a cognitive and perceptual process, the validation of the strategies used to examine and compare handwriting is centered on validation and blind testing of FDEs. This is achieved through quality assurance systems and independently conducted trials. This will ensure that, although the written method is difficult to directly validate, the expertise and skill drawn upon to examine and compare handwriting can be directly investigated and appropriately characterized. This is further explored in the annexure.