

The Document Examiner's Role in Deciphering Handwriting of a Severely Impaired Writer

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Introduction

Sometimes in our professional capacity we are presented with a case that, on first inspection, does not immediately appear to fall within the scope of our expertise. This paper describes one such example.

We were asked to analyse an illegible handwritten university exam (Figure 1) written by a post-graduate student with dysgraphia. Faculty members could not read this version of the exam; consequently they requested that the exam be typed for grading. The professor questioned the integrity of the transcript as the student had opportunity to further research and modify her answers while preparing the typed version. Our task was to determine if the written text was accurately represented in the transcript.

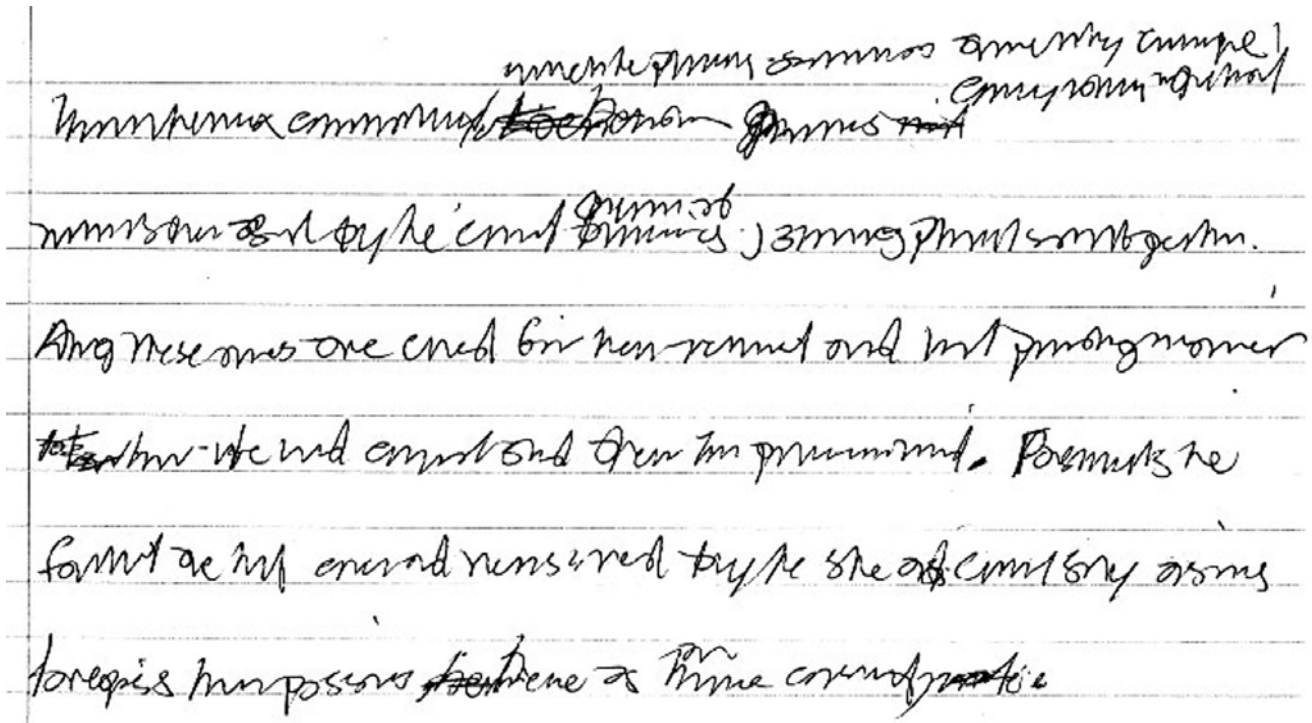


Figure 1. An example of the distortion seen in the handwriting of a university student with dysgraphia.

Dysgraphia is defined as an impairment of the ability to write generally caused by a brain dysfunction or diseaseⁱ. It manifests itself as a difficulty in automatically remembering and mastering the sequence of muscle motor movements needed in writing letters or numbers. The handwriting is distorted or incorrect – letterforms are inappropriately sized and spaced, as well as being poorly organized on the line and on the page. In addition, words are misspelled or used improperly, despite thorough instruction. This disorder is a processing problem that causes writing fatigue and interferes with the communication of ideas in writing. It is out of harmony with the writer's intelligence and, while it may be associated with other learning disabilities, it is not usually indicative of social or other academic problems^{ii iii}.

To facilitate this analysis we were provided with a previous exam and a transcript that had been prepared by staff immediately following the sitting. In this instance the student dictated the text to the typist – we are told with great difficulty, as she could not always read her own writing.

Procedure

From the outset it was apparent that to succeed at the task the writing parameters for each word had to be established, given that most of the script appeared illegible upon cursory inspection. A preliminary intercomparison was made amongst repeated words within selected pages of both the known and questioned exams using Write-On©.

Write-On© is a handwriting comparison software program which provides an efficient method to assess natural variation by allowing the user to search for all instances of a given letter or word within a document. A typewritten transcript must be linked to scanned copies of the handwritten pages. Searches can then be conducted for specific letter strings and the results illustrated in an occurrence chart.

The preliminary analysis proved to be very revealing. Many examples were found in which apparently illegible scrawls were repeatedly used to represent the same word(s) within the text, providing the first indications that the handwriting was more than just random movements. Some words had been written using numerous, but consistent, variations in the forms (Figure 2). Furthermore, it was often possible to recognize root words buried within a complex string of letterforms despite the extremely high degree of distortion (Figure 3).



Figure 2. Examples of words written using numerous variations. In these examples, the words range from clear and legible, to forms that are illegible and no longer contain movements representative of each character within the word.

This portion of the analysis also exposed some stumbling blocks, including:

- very long words represented by extremely abbreviated handwriting, making recognition difficult (Figure 4)

- many words executed in a run-on fashion, with no pen lifts to help distinguish one word from the next (Figure 5)
- handwriting so distorted it could not be deciphered (Figure 6).



Figure 3. Despite the extreme distortion, it was often possible to find the forms used to represent simple words buried within more complex strings.

The next phase in the analysis involved comparison and association of the questioned handwriting with the transcription. Due to the volume of material it was agreed that a representative sampling of twelve pages would be tested and the results accepted as indicative of the transcript's accuracy.

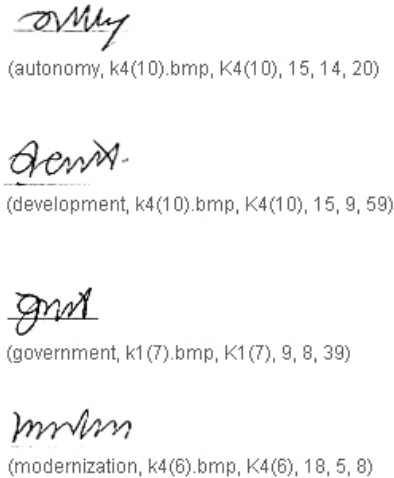


Figure 4. Examples of long words represented by extremely abbreviated forms.

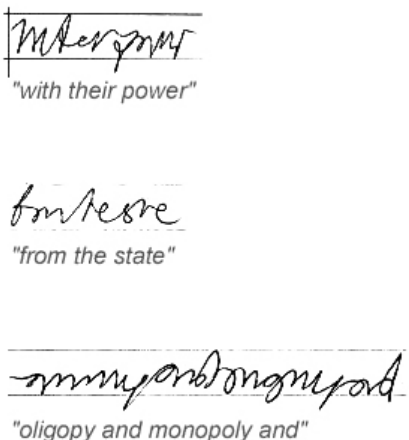


Figure 5. Examples of writing executed in a run-on fashion with no pen lifts to help distinguish one word from the next.

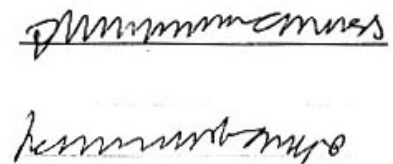


Figure 6. Examples of handwriting so distorted that decipherment was not possible.

Words that could not be matched with certainty during the course of associating the handwriting with the transcript using Write-On© were tagged for further study. Three recurring difficulties were encountered: possible idiosyncratic variations of words; illegibility; and mismatches in content between the transcript and the handwriting (Figure 7 & 8). Once the association with the transcript was complete, the list of tagged words was scrutinized in greater detail using a team approach. Each entry was evaluated by three analysts and efforts were made to resolve the content. When internal consistency was an issue, a search using Write-On© was performed so that each instance of the word could be examined in detail (Figure 9).

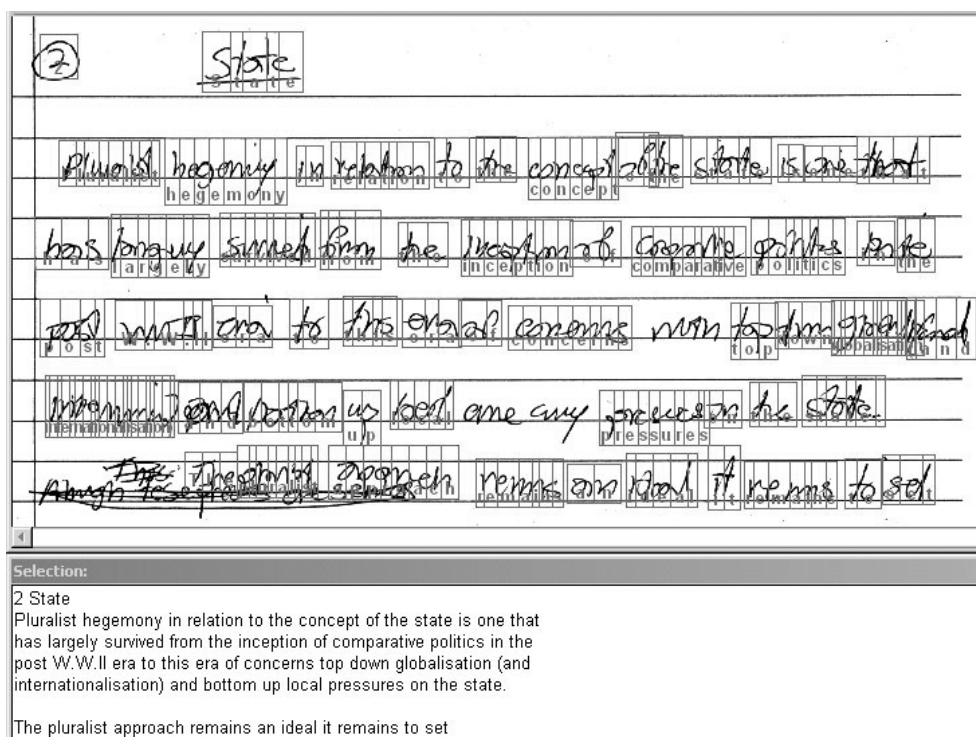


Figure 7. A screen capture from Write-On© showing some associated handwriting and the corresponding typed transcript. In this example almost all of the handwriting could be associated.

Observations

Although it was not possible to decipher each and every word found in the questioned exam, the majority of text could be accounted for. Some discrepancies were noted between the transcription and the handwritten text on the pages studied. The differences were of two types. Firstly, there were occasions where there are more handwritten words in a sentence than have been typed. In a limited number of instances, an entire sentence may be absent from the transcript. Secondly, there are areas in the transcript where more words appear in a sentence than could be found in the handwritten text.

It should be noted that similar inaccuracies were also found within the specimen exam. They may reflect problems in deciphering the handwritten text, or typist errors.

There are no examples of multiple sentences or paragraphs appended to the end of an answer, as might be expected if one were adding information.

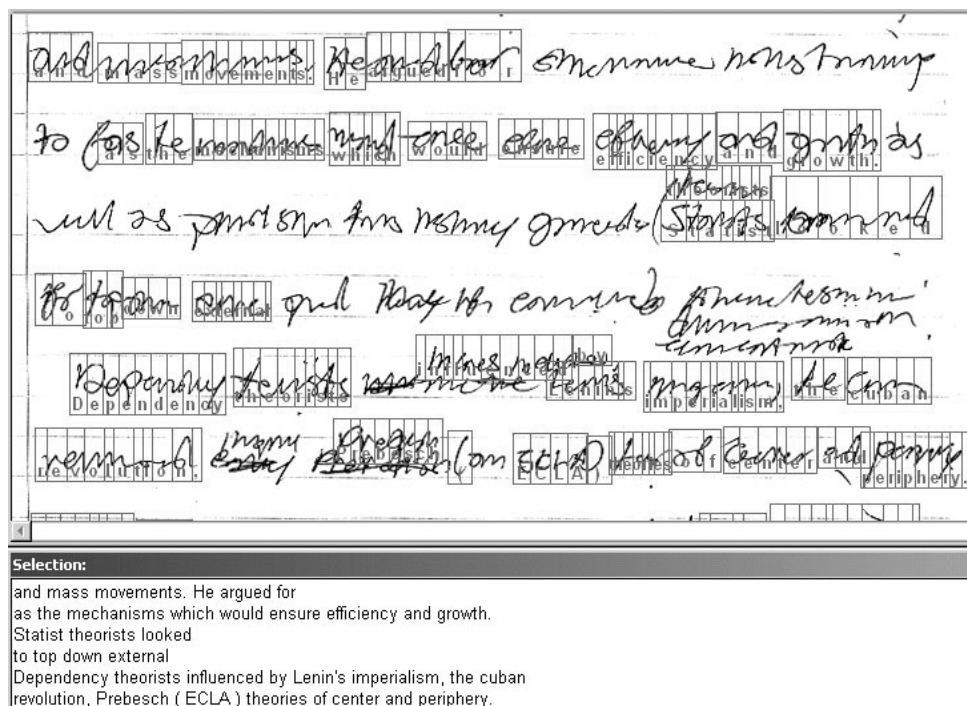


Figure 8. A screen capture from Write-On© showing some associated handwriting and the corresponding typed transcript. Note that in this example, unlike that seen in Figure 7, many more sections of the handwriting could not be associated.

Conclusion

No evidence was found amongst the pages examined to indicate that the answers as seen in the transcript were not representative of the handwritten version. Obviously this conclusion could stand only for those pages examined and we could not comment on the veracity of those pages not scrutinized.

It warrants mentioning that without the aid of the specimen examination it would have been much more difficult, perhaps not even possible, to learn the student's handwriting. Certainly there would have been far more unrecognized words and word combinations, particularly if they occurred infrequently.

The approach taken in this case has many similarities with a standard handwriting comparison. However, the objective was to decipher not to authenticate. As with any handwriting comparison, assessment of the natural variation, in this instance from one repeated word to the next, was critical to interpreting content. This methodology could also be applied in other files where illegibility is an obstacle. Three such examples include interpreting a doctor's progress notes, resolving the content of a holographic will and deciphering the interview notes of a journalist.

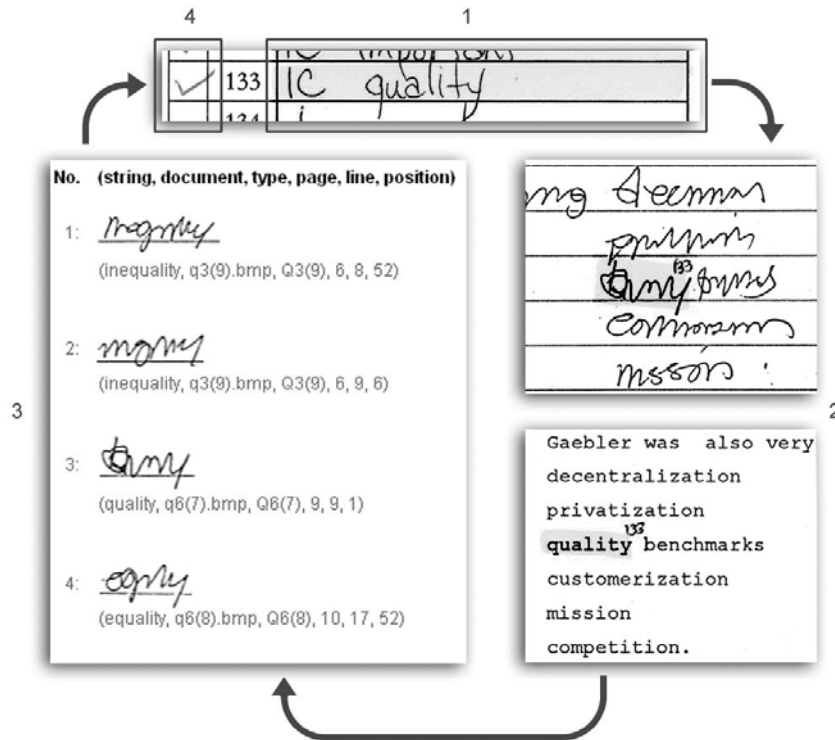


Figure 9. Each item tagged (1) was noted on both the handwriting and the transcript (2). Those words tagged for internal consistency review were then compared with other examples of the same word (3) and a pass or fail notation was made (4) based on whether or not the handwriting structures were repeated in other examples. As seen in this example, matches were often found buried within complex words containing the root word.

ⁱ Canadian Dictionary of the English Language, ITP Nelson, Scarborough 1997

ⁱⁱ National Centre for Learning Disabilities (information on web site at www.ld.org/info/indepth/dysgraphia.cfg)

ⁱⁱⁱ The International Dyslexia Association (information on web site at www.dyslexia-ca.org)