J15 Analysis of Eye Movements While Observing Handwriting

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After attending this presentation, attendees will understand: (1) the strategies that a forensic document examiner takes to extract characteristics from handwriting by visual inspection; and, (2) the importance of the observation from various perspectives in handwriting examination.

This presentation will impact the forensic science community by demonstrating the relationship between the examiner's eye movements and the correctness of the identification results.

Eight forensic document examiners participated in the experiment. They were instructed to watch the monitor displaying two handwriting samples, one of which was the questioned handwriting and the other was the known handwriting, and decide whether two samples were written by the same person or not. Sixteen writers participated in the preparation of handwriting samples. They were asked to write the same person's name in square style. One out of sixteen writers was asked to prepare five samples, two of which were used for the known handwriting and other three were used for the questioned handwriting. Another fifteen writers were asked to prepare one sample, which were used for the questioned handwriting. The handwriting pair, used as a stimulus, consisted of a known handwriting and a questioned handwriting. So, there were eighteen handwriting pairs used as stimuli. Three out of eighteen pairs were the same writer's pair and the other fifteen were different writers' pair. Procedure of the experiment was as follows: known handwriting pair was firstly presented to the subject for extracting characteristics of the known handwriting; then 18 stimuli were presented to the subject respectively in random order; subjects were instructed to click the mouse to display a stimulus, observe it as long as necessary to identify the writer, and click the mouse to express their opinion as to the identity of the writer; and, eye movements of the subjects during the observation and the time necessary to their decision making were measured. An eye-tracking system was used for the measurement.

Answers obtained from the subjects were either correctly identified or inconclusive. Average ratio of inconclusive was higher in the case of the different writer than the same writer. Average time necessary to the decision making was significantly longer in the case of inconclusive than conclusive. Observing manner was roughly common to the subjects, that is, subjects observed some point of the first character of the known handwriting and then observed the corresponding point of the questioned handwriting. Then, observation point moved to the next point of the known handwriting and then the corresponding point of the questioned handwriting. The same procedure was taken throughout the entire observation. All the subjects observed almost the same points in the case where the stimulus was undertaken; short response time and unanimous answer. All the subjects observed characteristics on shape such as terminating manner of a stroke, curvature, and relation between two strokes. One subject observed the space between characters along with the shape and all his answers were correct.

The fact that longer time was necessary to the decision making in inconclusive cases suggests that the distinct difference or similarity between the two handwritings makes the decision making easier. This also suggests that there is a possibility of the commonality of the document examiner's knowledge on the typical or large intra-individual difference. Higher inconclusive ratio in different writers than the same writer was, however, different from the expectation because the number of the same writer samples was smaller than that of the different writer samples. This may suggest that the examiner unconsciously avoids type 1 error. The fact that the observation on the spacing had an influence on getting the correct answer suggests the necessity of various viewpoints in the identification task for reaching the correct opinion. These results show the importance of the inspection from various perspectives, the choice, and the processing of the adequate information in the handwriting examination.

Handwriting, Eye Movements, Eye-Tracking System

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