Handwriting correlates of the internal structure of Chinese characters

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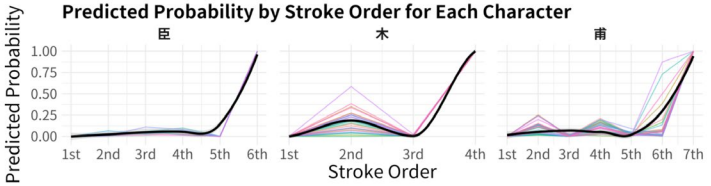
Each Chinese character generally represents one monosyllabic morpheme, but most are built out of components that often suggest the meaning or pronunciation. Chinese databases do not always agree on character composition; however, some may treat a given character as a single unit, while others decompose it into two or more components, or differ in the component boundaries. In this study we attempt to determine actual writers' structural knowledge through handwriting mechanics.

Previous handwriting studies show that the boundaries between unambiguous character components leave detectable traces in stroke speed variation (Zhang & Feng 2017), inter-stroke intervals (Lau 2020), and pen pressure (Kao et al. 1986); our study models all of these measures together for the first time.

Experiment 1 collected adult handwriting data for characters where all standard databases agree on decomposition, allowing us to build a model predicting component-final strokes from the above variables with over 77% sensitivity and specificity. In Experiment 2 we applied this model to handwritten characters of ambiguous structure, discovering three distinct categories (see figure): one-unit characters without internal structure, characters with a single consistent boundary, and characters that were parsed differently by different writers.

These findings show that handwriting reveals grapheme-internal structure that theoretical analyses missed. The roles of speed, intervals, and pressure also support proposed analogies between character structure and prosody (Myers 2019).



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