Effects of handwriting and keyboarding on the processing of morphographic characters

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Background and research questions

- When morphographic words are recognized, they are decomposed into constituent units [1,2,3,4]
- It is not clear to what extent such decomposition is affected by the characteristics of readers.
- We studied whether readers' writing habits modulate lexical effects during the recognition of Japanese *kanji* characters.
- We studied whether a one-time writing activity (handwriting vs. typing) affects the way *kanji* characters are processed.
- We also studied whether long-term writing habits (handwriting vs. typing) affect the way kanji characters are processed.
- Because different modes of writing motivate different processes:
  - Handwriting might motivate constituent-based analytical processing.

  - Typing might motivate holistic and phonological processing.

Experiment

Participants

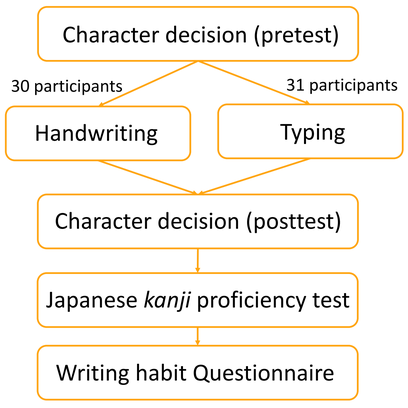
- We tested 61 native Japanese speakers (33 females, mean age = 21.4).

Materials

- 250 Japanese characters and 250 non-characters were sampled.
- Only characters with a left-right structure were used.
- Nonwords were random combinations of radicals with one stroke added/removed.

Character 鐘 Non-character 滹

Procedure



Variables considered in this study

- Trial count
- Task (levels: Handwriting, Typing)
- Handwriting (daily amount of handwriting relative to typing)
- Strokes [5]
- Constituents (levels: Complex, VeryComplex) [5]
- log left radical frequency [6]
- log right radical frequency [6]
- log character frequency [7]
- N. of homophones [5]

Results

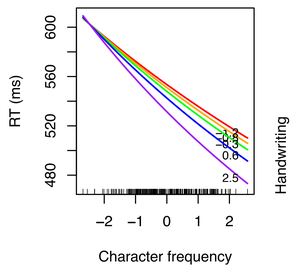
- Mixed-effects models were fitted to the -1000/RTs in the pretest and posttest separately.

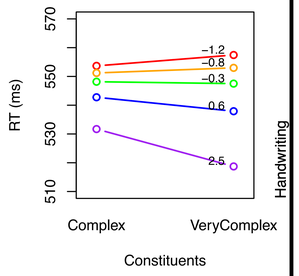
Pretest

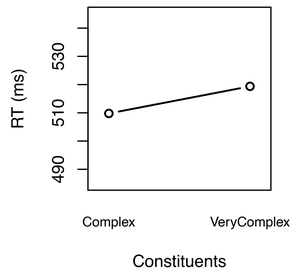
- For habitual handwriters (i.e., those who handwrite more in daily life), the whole character frequency effect was greater.
- Habitual handwriters showed a processing advantage for very complex characters.
- No significant phonological (N. of homophones) effect was observed.
- No significant radical frequency effect was observed.

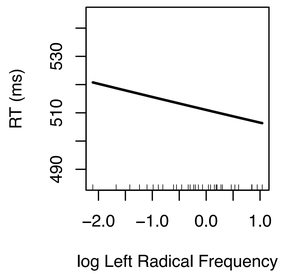
Posttest

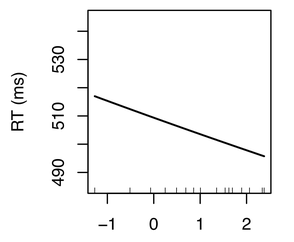
- Readers processed very complex characters more slowly than complex characters.
- RTs were shorter for characters with
  - greater character frequency
  - greater left radical frequency
  - greater right radical frequency
- Task type did not modulate any lexical effects.
- Radical effects were observed in the posttest, but not in the pretest.

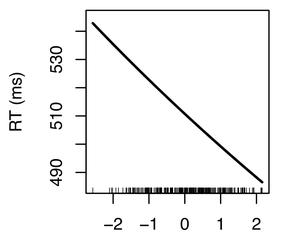












Summary

- The types of one-time writing activity do not seem to affect the recognition of morphographic words.
  - Handwriting activity does not significantly motivate constituent-based analytical processing.
  - Typing activity does not significantly motivate holistic processing nor phonological processing.
- Habitual handwriters showed an advantage in processing whole-character units and in visuo-perceptual orthographic decomposition.
- Writing activity (regardless of whether the task was handwriting or typing) might have motivated bottom-up processing involving activation of sub-character constituents.

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