

## Effects of handwriting and keyboarding on the processing of morphographic characters

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Once Japanese students enter university, the computer keyboard becomes a frequently used mode of writing. However, it is not clear whether the choice between handwriting and keyboarding has cognitive consequences (but see Mueller & Oppenheimer, 2014, for a handwriting advantage in learning). In this study, we investigated how readers' handwriting/keyboarding habits and 20-minute writing activity affect lexical processes during visual word recognition.

It is widely believed that morphographic characters are decomposed into sub-character constituents. For example, Miwa et al. (2014) reported that when Japanese two-character words are read, the lexical properties of the whole word, the constituent characters, and the sub-character constituents all co-determine response times and eye fixation durations. However, it is not clear whether such lexical processes are modulated by individual differences.

We predicted that Japanese readers' experience in handwriting and keyboarding affects how they read morphographic characters. To handwrite morphographic characters, writers have to start with sub-character constituents, writing one stroke at a time. In contrast, to properly type morphographic characters, writers must actively pay attention to phonological information. Therefore, we predicted that handwriting motivates the activation of sub-character constituents and that keyboarding motivates phonological processes.

A pretest-posttest design was used. We asked native speakers of Japanese to read 250 left-right kanji characters and 250 non-characters in a lexical decision task. We then asked half of the participants to handwrite kanji words for approximately 20 minutes and the other half to type the same kanji words using a keyboard. We then asked all the participants to complete the lexical decision task again. Participants' handwriting/keyboarding experience data were collected through a questionnaire. Using generalized linear mixed-effects modeling, we will assess the effects of writing activity and writing habit on lexical processes, considering potential nonlinearity (Miwa & Baayen, 2021).

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