

Investigating the Order of Lexical Access during Reading of Japanese Logographic Script

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Japanese logographs, called *kanji*, are ideographic representations of their referents. Unlike alphabetic systems, each kanji carries both semantic and phonological information encoded by its radical parts, and most have several pronunciations or "readings": *kun* readings are native Japanese pronunciations, typically used for single kanji (e.g., 花 "*hana*"-flower), while *on* readings are derived from Chinese and typically used in compounds (e.g., 花瓶 "*kabin*"-vase). However, both *kun* and *on* are activated during the reading of any given kanji (Morita & Matsuda, 2000). Given the complex information encoded by each kanji, the current study investigates the nature of lexical access during reading. We seek to examine 1) Whether the results of previous studies using kanji compounds can be replicated with single kanji? and 2) What is the order of access of semantic and phonological lexicons during single kanji reading?

The Dual-Route Cascaded model (DRC; Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) proposes two pathways for visually-presented words in alphabetic script: a lexical route which involves interactive access to the orthographic, semantic, and phonological lexicons, and the non-lexical route which consists of a grapheme-phoneme conversion system. The DRC may also be applicable to kanji, but given multiple possible readings, the non-lexical route may not be used. With respect to the lexical routes, it is clear that both phonological and semantic information are accessed during reading (Wydell, Patterson, & Humphreys, 1993), but what is less certain is the order of access. The results of Wydell et al. (1993) suggest parallel access, while Tamaoka (2007) found homophone effects and concluded that the orthography activates phonological representations. Chen, Yamaguchi, Tamaoka, and Vaid (2007), however, found greater semantic than phonological facilitation, suggesting semantic access first, and these results are also supported by fMRI evidence (Wu, Koh, Ho, Miyakoshi, Nakai, & Chen, 2014). These results are based on kanji compounds, where the reading is contextually restricted, but less work has been done on single kanji. Here, too, the findings are conflicting. Earlier work by Yamada (1998) suggests a semantics-first access, while Nagahara (2006) concludes that unlike phonological access, semantic access is optional.

In the current study, we use a masked-priming lexical decision task to examine the degree of identity, phonological, and semantic priming in native speakers of Japanese in Kobe, Japan ($n=43$). Participants were presented with single kanji targets, preceded by a subliminal prime that could be identical to the target, sound the same as the target, or have a meaning related to the target. Reaction time (RT) and accuracy data were collected. Participants showed high accuracy ($M=93.3\%$, $SD=6.1$), and responded significantly faster to words vs. pseudowords ($p<.001$). Significant identity priming was found ($p<.001$), but no semantic or phonological priming, and although RTs to targets with semantic primes were faster than to those with phonological primes ($M=568\text{ms}$ vs. $M=575$), these differences were not significant (all p 's=1).

While we were unable to replicate or confirm previous semantic or phonological priming results and thereby determine the order of lexical access of kanji, we discuss our results in light of activation of multiple readings. As we presented single kanji stimuli, the lack of context may have activated all possible readings, in line with Matsuda and Morita's (2000) findings. This may have resulted in feedback-feedforward interaction between the orthographic, phonological, and semantic lexicons-- a pattern of interactive activation which is possible only in the lexical route of the DRC, thus confirming this route's involvement in kanji processing. Because our task did not require overt production, no resolution of the multiple readings was necessary, and the interactive activation only caused slower processing, which may account for the lack of any semantic or phonological priming effects. Context may therefore guide lexical access strategies.

References

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