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

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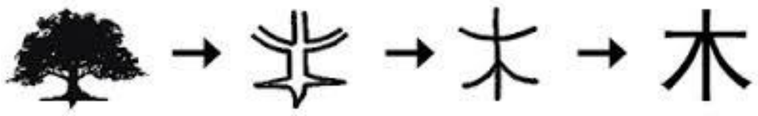
Background

What is a Logograph?

Japanese logographs (*kanji*) are simple or complex pictographic and ideographic representations of their referents



Unlike alphabetic systems, each kanji encodes both phonological and semantic information, and has multiple pronunciations ("readings")

Kun reading: Native Japanese reading, e.g. 木 (ki)

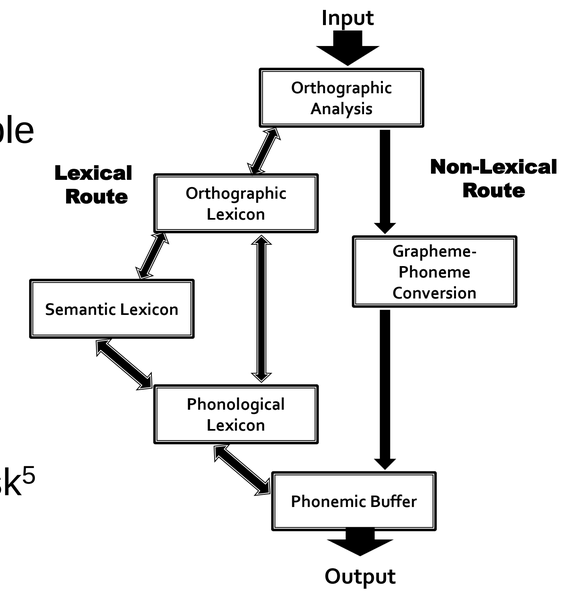
On reading: Sound reading derived from Chinese, e.g. 木材 (mokuzai)

➢Given that each kanji has multiple readings and encodes both phonological and semantic information, what is the nature of lexical access during the visual recognition of kanji logographs?

Processing Kanji Logographs

Different processing pathways possible
- Dual-Route Cascaded model[1,2]

Mixed experimental evidence
- Parallel access[3]
- Phonological access first[4]
- Semantic access first
  - Currently, most supported view
    - Priming in a lexical decision task[5]
    - Brain activation during fMRI[6]



However, many studies use compound kanji, where the reading of the kanji is constrained by context

➢What happens when there are no constraints?

Research Questions

1. What is the order of lexical access during the reading of kanji?
2. Can previous results with compound kanji be replicated using single kanji stimuli?

Method

Participants

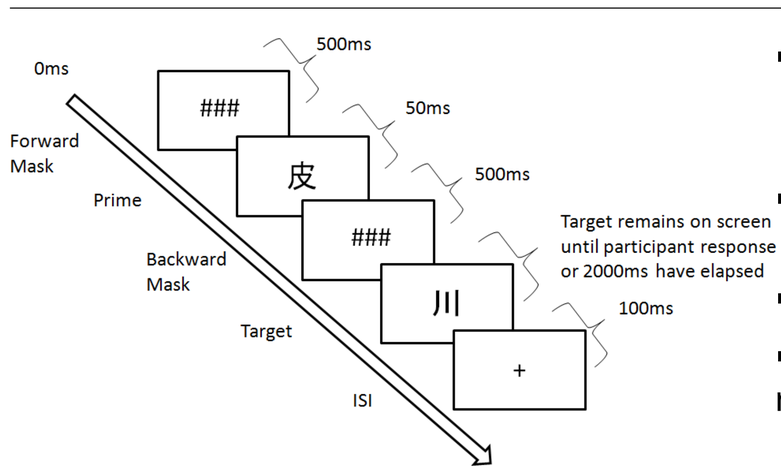
Native speakers of Japanese (n= 35)
- Young adults (ages 18-26) enrolled in or completed university
- Proficient readers (Kanken 2 or higher)
- Tested in Kobe, Japan

Masked Priming Lexical Decision Task

Design adapted from previous study using compound kanji[5]

High-frequency (JLPT N3 or lower) single kanji primes and targets

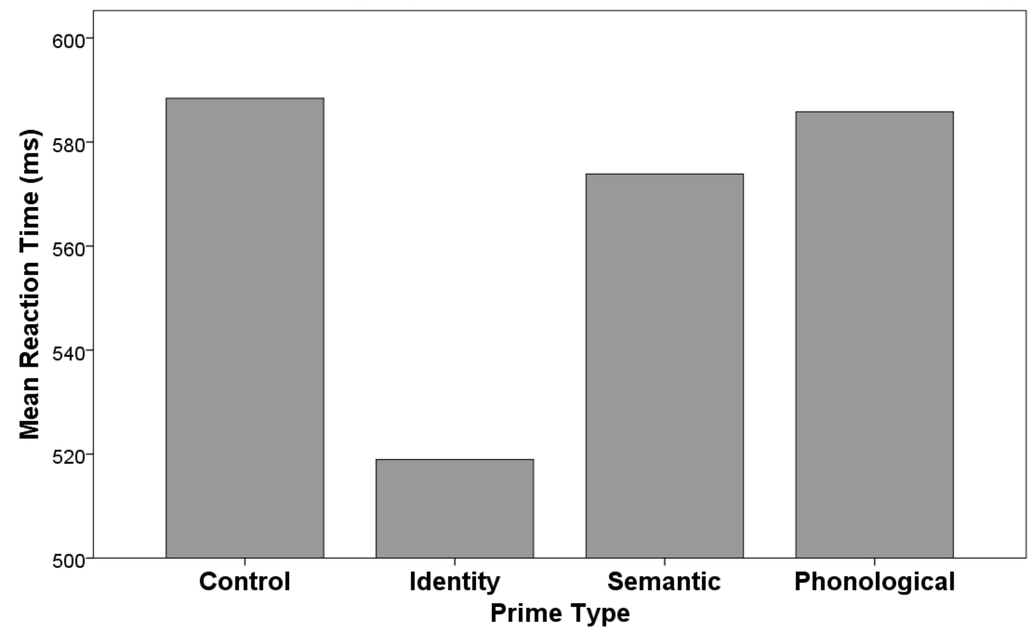
Target	Phonological Prime	Semantic Prime	Identity Prime	Control Prime
川	皮	水	川	車
kawa	*kawa*	*mizu*	*kawa*	*kuruma*
river	skin	water	river	car



- 64 items
  - 32 targets
  - 32 distractors
- 6 items per condition
  - Latin squares design
- Manual response
- Reaction times recorded and analysed

Results and Discussion

Mean Reaction Time (RT) as a Function of Different Prime Types



- Significant **Identity** priming (M=69.5ms, SD=49.4ms; *p*<.001)
- Trend toward **Semantic** priming (M=14.6ms, SD=45.7,ms; *p*=.068)
- No significant **Phonological** priming (M=2.6ms, SD=67.8ms; *p*=.821)

Significant Identity priming
- Participants are processing visually-presented kanji stimuli

Trend toward Semantic priming
- Semantic lexicon must be accessed to resolve reading

No significant Phonological priming
- Both *kun* and *on* readings are activated for single kanji
  - Possible frequency confounds

In line with previous studies[5], this suggests that the semantic lexicon may be accessed before the phonological lexicon
- Resolution of multiple readings may require semantic mediation

Conclusions and Future Directions

What is the order of lexical access during the reading of single kanji?

➢**Current results are inconclusive, but compatible with previous studies**

Use of single kanji may have created confounds
- Future studies with single kanji must control both for kanji frequency and for *kun* and *on* reading frequency

Insufficient number of stimuli
- Pilot study designed for L2 Japanese learners, therefore limited to high-frequency kanji

References 1. Colheart, M., Rastle, K., Perry, C., Langdon, R., & Ziegler, J.C. (2001). DRC: A dual route cascading model of visual word recognition and reading aloud. *Psychological Review, 108,* 204-256. 2. Sambai, A., Coltheart, M., & Uno, A. (2012). *A non-lexical reading processing occurs serially for the Kanji writing system?* Poster presented at the 9th Annual Meeting of the Society for the Scientific Study of Reading (SSSR), Montreal, Canada. 3. Morita, A., & Matsuda, F. (2000). Phonological and semantic activation in reading two-kanji compound words. *Applied Psycholinguistics, 21,* 487-503. 4. Verdonschot, R.G., La Heij, W., & Schiller, N.O. (2010). Semantic context effects when naming Japanese kanji, but not Chinese hanzi. *Cognition, 115,* 512-518. 5. 5. Chen, H-C., Yamauchi, T., Tamaoka, K., & Vaid, J. Homophonic and semantic priming of Japanese kanji words: a time course study. *Psychonomic Bulletin & Review, 14*(1), 64-69. 6. Wu, C.Y., Koh, J.Y.S., Ho, M.H.R., Miyakoshi, M., Nakai, T., & Chen, S.H.A. (2014). Age-related differences in effective connectivity of brain regions involved in Japanese kanji processing with homophone judgement task. *Brain & Language, 135,* 32-41.

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