Visual Recognition of Two-character Kanji Compounds under Masked Phonological Priming

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(Abstract)　The aims of this study are to investigate whether phonology is evoked in visual recognition of two-character kanji compounds in Japanese, and, if any phonology is observed, to investigate the time course of the phonological processes. Two-character compounds were used as visually presented primes and targets in a lexical decision task.

Key words: phonological recoding, prime durations, lexicality, prime-target combination patterns

Two important independent variables are homophony between primes and targets and prime durations (3 durations). Also, four other independent variables were used: lexicality of targets, the number of phonological units (moras) of both primes and targets (3 or 4), lexicality of first characters of compounds in primes and targets, and combination patterns of primes and targets (6 patterns). Reaction times and error rates were measured in a computer experiment.

Following previous research (Ozaki 2000) on words in sentences indicating homophone facilitation effects, phonological recoding in isolated kanji compounds is the focus of the present study. Results of 6 experiments out of the total 21, each of which tested 15 subjects, are reported in the presentation. Two-character kanji words and nonwords were used as stimuli. The real words were all abstract nouns and high-frequency compounds (120-10,000 in Amano & Kondo eds. 2000). Nonwords were made by wrongly combining high-frequency characters (5,000-1,000,000 in Amano & Kondo eds. 2000). Visual similarity was entirely eliminated between homophones and pseudohomophones. Prime durations were 35ms, 70ms, and 500ms. The prime-target combination patterns were 1) nonword + real word (homophonic), 2) nonword + real word, 3) real word + nonword (homophonic), 4) real word + nonword 5) real word
+ real word (homophonic), 6) real word + real word. Subjects are all female and

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students of Tsuda College with approximate age range of 18-23. Results of 3 experiments out of 21 have been obtained at this stage.

The following three points are noted with reaction time. No differences were sobserved with respect to errors with very few mistakes. Firstly with prime durations, The 35ms prime duration yielded 54ms longer reaction time than 500ms ($p=0.0750$ at the significance level of 0.5%). There were no significant differences between 35ms and 70ms or between 70ms and 500ms. It seems that the recognition of compounds was completed in 500ms, yielding no priming effect, and that the recognition was mostly completed in 70ms. As to the weak priming effect of the 35ms duration, it may be due to the lexicality of a prime, while it is difficult to draw a definite conclusion concerning causes at this stage. It may not be due to prime-target homophony, considering the fact that strongest homophonic effect was observed with 70ms, though not reaching the significant level. That is, phonology may not be activated at as early a phase as the first 35ms of word recognition.

While it was only a trend at this stage, the following result was obtained with the interaction between prime durations and prime-target combination patterns. The patterns of prime-target homophony yielded different reaction times among the three prime durations, respectively: reaction times were longer in the order of 35ms, 70ms, and 500ms. On the other hand, non-homophonic prime-target combination patterns showed similar reaction times with 500ms and 70ms and longer reaction time with 35ms. The rersult from the homophonic patterns implies that phonology was evoked after 70ms when the recognition of a prime was achieved (post-lexical phonology), which interfered with the recognition of a target. The result from the non-homophonic patterns implies that other possible causes than phonology, for example, prime lexicality, interfered with the recognition of a target after 35ms prime presentation, yielding longer reaction time for a target.

Secondly, real words showed 45ms shorter mean reaction time than nonwords did ($p=0.0629$ at the significance level of 0.5%). It is in accordance with results of other researchers experimenting on English.

Thirdly, a difference between prime-target combination patterns which reached the significance level was that between the pattern, ‘real-word prime + nonword target (homophonic) and the pattern, ‘real-word prime + real-word target (non-homophonic)’. The former yielded 78ms longer reaction time than the latter ($p=0.0241$ at the significance level of 0.5%). It may me that the former was interfered with by two factors, lexicality difference and homophony, while the latter was facilitated by the identical lexicality.