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**Vocabulary Size and Kanji Knowledge of Japanese as a Second  
Language:  
Effects of the First Language and Learning Period**

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In this study, the Kanji Conversion Test (KCT) was developed and implemented together with the Vocabulary Size Test for Reading Japanese (VSTRJ-50K) (Tajima et al., 2015; Sato et al., 2017) to measure the estimated Japanese vocabulary size and kanji knowledge of university students who are native speakers of Japanese (hereafter referred to as Japanese L1 students) as well as those who learn Japanese as a second language (JSL) (hereafter referred to as Japanese L2 students). A comparison was made between the results of the two groups, and the effect of the first language was then examined. The purpose was to answer the following research questions: 1) Is there a difference between the vocabulary size of Japanese L1 students and Japanese L2 students? 2) Is there a difference between the kanji knowledge of Japanese L1 students and Japanese L2 students? 3) For Japanese L2 students, is there a relation between the time required to learn vocabulary/kanji and the students' level/first language? 4) What is the correlation between vocabulary size and kanji knowledge? 5) Does the first language and the word origin (Japanese/Chinese/Western origin) influence vocabulary size and kanji knowledge?

The first test used in this study, the VSTRJ-50K is a 40-minute multiple-choice test in which items are sampled from the most frequent 50,000 words in the Vocabulary Database for Reading Japanese (Matsushita, 2011). The test taker chooses the correct definition of a word in context from multiple choices of definitions. The second test, the KCT, which was developed for this study, is a 20-minute multiple-choice in which the items are sampled from the most frequent 2,000 kanji in the Character Database of Modern Japanese (Matsushita, 2014). The test taker is presented with a word in context and is required to choose the correct kanji from multiple choices of kanji.

The participants of this study were 971 students (971 VSTRJ-50K examinees and 446 KCT examinees) enrolled in universities and Japanese language learning institutions in Japan as well as abroad. All KCT examinees took the VSTRJ-50K. When comparing Japanese L1 and Japanese L2 students, the analysis was limited to university students in Japan.

Below are the results of the analysis accompanied with a brief discussion:

1) There was a significant difference in the estimated vocabulary size between Japanese L1 and Japanese L2 students at three universities in Japan revealed by applying the Mann-Whitney *U* test. Results show that Japanese L1 students averaged over 40,000 words which confirms results of previous research by Ogiwara (2016) and Sato et al. (2017).

2) With regards to the effect of the first language of the Japanese L2 students, there was a significant difference between Chinese L1 students and non-kanji background students using the Mann-Whitney *U* test, with Chinese L1 students' estimated vocabulary size averaging over 30,000 words, while non-kanji background students averaged less than 20,000 words. The above results echo insights by many Japanese language teachers and indicate a need for further deliberation on whether Japanese L2 students are getting enough learning support after enrolling at their respective universities.

3) Similar results were obtained for kanji knowledge, showing a significant difference between all the three groups of Japanese L1 students, Chinese L1 students and non-kanji background Japanese L2 students.

4) The correlation coefficient of the VSTRJ-50K and the KCT was  $r=.82$  ( $n=446$ ,  $p<.01$ ), and Spearman's rank correlation was also high at  $\rho=.84$  ( $n=446$ ,  $p<.01$ ), indicating a strong correlation between vocabulary size and kanji knowledge. It can be hypothesized that recalling the shape of the kanji requires remembering the meaning as well, implying that these two skills that were tested in this study are strongly connected, and may in fact be overlapping.

5) The average study time per word and kanji was long for beginner Japanese learners, then it became shorter for intermediate Japanese learners. It then became longer again as learners reached an advanced level of Japanese language knowledge. It can be hypothesized that as learners gain a better understanding of the foundational units of Japanese words and kanji, they are able to study more efficiently, but as they reach more advanced levels, every new word or kanji they encounter is of extremely low frequency, which in turn causes the study time to be prolonged once again because of the low chances of encountering or using these words/kanji. Also, the results showed that a Japanese language learner needs more than 2,000 hours of study time to reach the same level of kanji knowledge or KCT score of a Japanese L1 student.

6) In order to examine the influence of L1 on Japanese L2 students, a Rasch analysis was conducted on both tests. Although the correlation between the two tests was high, the results showed that 95 of the 125 items had a misfit with an Outfit *t* (ZSTD) absolute value of more than 2, indicating low unidimensionality for the VSTRJ-50K. Due to this result, a differential item functioning analysis (DIF) was performed for each L1 group. As a result, the goodness of fit to the model increased within each group, and there were many words with different difficulty levels depending on L1. In particular, the differences depending on word origin (Japanese/Chinese/Western origin) were remarkable. Japanese L2 students of Chinese background had a much easier time understanding Chinese-origin words, while non-kanji background students had an easier time understanding Western-origin words. In addition, Korean L1 students had an easier time understanding Western-origin words than Chinese-origin words. These results differ from Japanese L1 students, which may possibly indicate a gap between what "easy Japanese" means for Japanese L1 and L2 students.

Based on these results, it was estimated that Japanese L2 students in Japan differ from Japanese

L1 students in vocabulary and kanji knowledge by at least several hundred hours of study. This suggests that continuous support for Japanese language learners is necessary even after students enter university. In addition, the influence of L1 on vocabulary and kanji knowledge is strong, suggesting the need for curriculum development that comprehensively takes into consideration L1/L2 vocabulary and kanji knowledge.

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