

Word and Symbol Search by Some Japanese Learners of English : L1 and L2 Reading Ability

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1. Introduction

The purpose of this study is to explore the source of reading ability in a foreign language (English). The interest in this study lies in whether the first language reading ability and / or general cognitive ability such as graphic symbol memory contribute(s) to the second language reading ability.

The author's previous study (Yanase, 1988) found that verbal efficiency (the number of correct responses performed within a limited time) revealed differences between good and poor readers, while accuracy (the number of correct response irrespective of time limitation) did not (cf. Perfetti, 1985). Good readers performed better in three reading tasks ranging from word recognition to discourse creation. No interaction was found between reading ability and the three tasks, indicating that good readers were consistently better than poor readers in the performance. It was suggested that the source of reading ability lies in at a more fundamental level than that of word recognition. What, then, could be the source of difference in reading ability in a foreign language ?

Many studies are done on the source of reading ability in a first language. Vellutino and Scanlon (1987) made a comprehensive review of the issue and supported the view that reading ability is not related with visual perception, visual memory, association learning, serial memory and rule learning. Thus they suggested that reading ability is *linguistic* ability, as opposed to general cognitive ability cited above.

Concerning the relationship between first and second language (reading) ability, some studies claim that the first language (reading) ability is related to the second language ability. Cummins (1979), for instance, proposed the concept of cognitive / academic language proficiency (CALP) and claimed that CALP underlies language proficiency in both first and second languages. Similarly, Alderson (1984) put the issue as "Reading in a foreign language : a reading problem or a language problem ?" and asserted that it is both a language (specific) problem and a (general) reading problem, although he was rather inclined to regard reading as a language problem as far as beginners are concerned.

However, many of the researches on this issue are not empirical. Besides, some of the researches are not as specific as empirical researches should be. For example several studies reviewed by Takanashi and Takahashi (1987) merely measured correlations of foreign language reading ability with various factors, without making the reading ability clear. The present study, on the other hand, attempts to clarify empirically the source(s) of reading ability in the second language by defining the first and the second language reading ability and the ability of visual memory.

The present study employed word recognition tasks as a representative index of reading ability. Many studies share this view of reading ability (Perfetti & Hogaboam, 1975; Juel, 1983; Perfetti, 1985; Stanovich et al., 1986). For example, Perfetti (1985), who is an advocate of verbal efficiency theory, claims that the efficient execution of the subcomponent skills of reading determines the success of reading comprehension. Otherwise, he asserts, enough attention is not available for (attention-consuming) comprehension to take place. In fact the author's previous study found that there was a significant correlation between word recognition and reading ability ($r = .34, p < .01$).

Yet other researchers cast doubts about equating word recognition ability with reading ability. Oakhill and Garnham (1988: 4) claim that such a theory is based on two false assumptions: (1) apart from a large number of vocabulary items, the only thing that beginning readers lack compared with skilled readers is the ability to identify written words; (2) understanding written language is much the same as understanding spoken language.

However, the above criticism cannot undermine the empirical evidence that word recognition ability is a good *index* of reading ability. It is a truism that reading is more than word recognition. We should not dismiss the findings of empirical reseraches that reading ability is represented by word recognition ability.

2. Method

Subjects were 74 female junior college students. They have been learning English for 8 years on average. Their major was English literature. The examiner¹ of the experimental tasks reported that they were well motivated toward the tasks.

The point of interest in the search tasks was the number of correct responses performed in a limited time (90 seconds). There were three tasks. The first task was an English word search. Subjects were given a category name such as a "musical instrument" in Japanese and were requested to circle words that fall into the category and to cross out the others. One category name and five search words were given per line. 200 words that were selected from textbooks for junior high students (*New Horizon English Course*) and considered to be quite familiar to the subjects. Highly frequent words were preferred because it must be certain that the subjects knew the words in the task well; otherwise the subjects would be unable to recognize words in the first place, thus making the word recognition task irrelevant. Given this limitation, the author used the same 200 words in Form B (to be explained later) as well as in Form A.

The second task was a Japanese search. The task was identical with the previous one except that all words were Japanese and that no identical words were used in Form B. 400 words that were used were randomly selected from a Japanese dictionary. In order to make it consistent that the two tasks require speech recoding, *Katakana* words were preferred to *Kanji* words (reading *Kanji* might not involve speech recoding). These two tasks were linguistic in that they require speech recoding and meaning retrieval².

The third task was a symbol search. 19 capital letters were selected from Greek and Russian letters. 5 letters were randomly selected to compose a nonword (a string of 5 letters). The subjects were required to find identical string with the far left one among 5 strings and

circle it / them and cross out others. Since these letters were unfamiliar to the subjects, the subjects neither recoded speech nor encoded meaning. Thus this task was considered to be nonlinguistic and regarded as a task to measure visual memory.

In each line in the three tasks, the number of target words (words that fall into the category or strings that are identical with the far left one) was from 0 to 2, making the tasks not monotonous. This was to discourage the subjects from finding one correct item and crossing out all the others without really recognizing them.

Each task consisted of 40 lines, which had one target item and 5 search items. The tasks were written on a word processor and photocopied on B4-size paper. The time limitation was 90 seconds for one task and the use of an eraser was prohibited in order not to waste time. Examples and exercises were given before the tasks. In order to check reliability, Form A and Form B were used for each task and all the subjects did both of them. Since all items were arranged randomly, Form A and Form B in each task were considered to have the same quality (A computer program was used to produce randomized numbers). The order of presentation was 1) Japanese word search 2) English word search 3) symbol search and the order was repeated for Form A and Form B. Intermission was put between Form A set and Form B.

3. Results

Basic statistics are given in Table 1. Since 3 subjects failed to cross out, their data were deleted. More items were processed in Form B than in Form A due to the practice effect. A point of interest is that the number of response of Japanese word search was almost the same as that of English word search.

Table 1 Basic Statistics

Task	N	Mean	SD
Eng. A.	71	99.9(100.8)	17.7(17.5)
Eng. B.	71	119.2(120.5)	20.5(20.5)
Jpn. A.	71	99.1(100.4)	17.5(17.3)
Jpn. B.	71	122.9(123.5)	18.4(18.3)
Sym. A.	71	71.9(72.6)	15.0(15.2)
Sym. B.	71	82.2(83.6)	13.0(13.9)

Note. The number in parentheses indicate correct responses

Even with the practice effect, it seems extraordinary that the ratio of the number in Form A to that in Form B by the same subject are less than 1 / 1.5 (and obviously more than 1.5 / 1). These data should be interpreted as results of some bias. The subjects who showed such a ratio might have made an unintentional mistake such as failing to turn over a page quickly, or might have been too nervous or discouraged in either form. In order to obtain more sound estimate, 4 data whose ratios were beyond the above level were excluded from the following analyses. Consequently, the number of subjects whose data were used below was 67.

Reliability coefficients (correlations between Form A and Form B) were .81 (English), .72 (Japanese) and .70 (Symbol); the data were considered to be sufficiently reliable. Since variances of Form A and Form B were not the same, scores in both forms were standardized respectively. The sum of a standardized Form A score and a standardized Form B score was used for the following analyses.

The relatively high reliability for English was probably caused by the task materials. Since the subjects had to be familiar with words in the word recognition task, 200 words were used twice in Form A and Form B of the English word search, while in the other tasks no identical words / strings were used twice. If the same words / strings had been used in the Japanese word search and symbol search, a reliability might have been as high as that of English word search.

The first analysis is a correlational analysis. Correlation coefficients were as follows : English and Japanese $r = .85$; English and Symbol $r = .47$; Japanese and Symbol $r = .45$. The correlations were all significant ($p < .01$). The correlation between English and Japanese (.85) were significantly higher than the second highest correlation between English and Symbol (.47) ($t(64) = 5.52, p < .001$), hence significantly higher than the correlation between Japanese and Symbol, too. Since the three tasks were significantly correlated with each other, it was decided to obtain partial correlations, which removes the factor of the third task. The partial correlation between English and Japanese with the Symbol factor removed was .82 ($p < .01$). The correlation between English and Symbol with Japanese factor partialled out was .19 (n.s.). The correlation between Japanese and Symbol with English factor partialled out was equally .19 (n.s.).

Since English word search ability is acquired last, a multi-regressional analysis was done with its dependent variable English and with its independent variables Japanese and Symbol. The result was represented as :

$$\text{Eng} = 3.48 + .82 \times \text{Jpn} + .11 \times \text{Sym}, (R^2 = .73)$$

This equation indicated that 73% of English word recognition ability was to be explained by Japanese word recognition ability plus Symbol search ability (visual memory) and that contribution of visual memory was relatively little.

In order to examine whether good English reader (those who were good at word recognition) were constantly better than poor English reader in Japanese word recognition and symbol search, a 2 factor (English reading ability \times Tasks) analysis of variance was conducted with repeated measures on English reading ability. Good readers were defined as those whose z scores were more than 60 ($n=11$) and poor readers were defined as those whose z scores were less than 40 ($n=11$). The effect of the interaction was significant ($F(2, 40) = 13.40, p < .01$) (See Figure 1). The effect of English reading ability was significant ($F(1, 20) = 153.72, p < .01$). The effect of tasks was nonsignificant $F(2, 40) = .33$ due to the standardization of the scores.

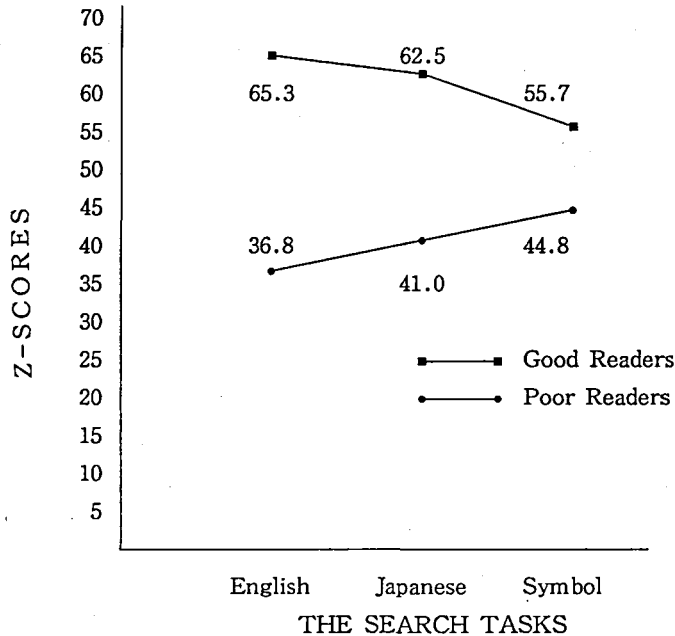


Figure 1 The result of ANOVA

4. Discussion

It is of interest that the subjects processed as many English words as Japanese words in the two search tasks. It does not follow, however, that the subjects were bilingual in the strict sense of the word.

First of all, the English words and the Japanese words were different in terms of frequency. The Japanese words were randomly selected from a dictionary and were not always frequent words. On the other hand, the English words were taken from a word list of a series of textbooks for junior high school students. They were quite frequent and all words belong to 2000 Defining Vocabulary of the Longman Dictionary of Contemporary English. The English words were of stationery (notebook, pen, pencil ····), of musical instruments (piano, guitar, violin···), of relatives (aunt, father, husband ····), of animal (cat, dog, lion ···), of vehicles (car, ship, train ····), of season (spring, summer, fall, winter), of sport (tennis, baseball, basketball ···), of food (bread, egg, orange), of the body (face, leg, nose ···), of numbers (eight, five, hundred····) and others (pronouns, etc.) Thus it is not surprising that many English words were processed quite efficiently.

Secondly, the order of the tasks might have contributed favorably to the English word search. The Japanese word search was done first in each form. Since the current word search tasks were speed tasks, the practice effect fosters the second task considerably. Ideally, the order of the tasks should have been randomized. If Japanese and English words had been of the same frequency and the order of presentation had been randomized and still as many English words were processed as Japanese words were processed, the result would have indicated that it is possible to have the same reading ability of the second language as that of the first language in about 8 years. But as it is, the current result does not suggest so.

However it should be noted that this study suggests that the second language learning is a matter of degree, not of quality. It is the case, as the subjects in the study showed, that language learners gradually acquire second language proficiency, ultimately close enough to their first language proficiency. It might well be that we can acquire it in a shorter time than we may have expected, at least as far as word recognition is concerned. At any rate, language learners should not be discouraged by the dichotomous idea of a native / foreign distinction and think that acquisition of a "foreign" language is practically impossible. It is simply a *second* language to learn (The author is now intentionally violating the conventional distinction of EFL and ESL).

The correlation coefficient between English and Japanese (.85 or .82 when partialled out) is striking. It supports the view that the second language proficiency shares much with the first language proficiency. If this is the case it follows that there is no such thing as *foreign* language aptitude. There is only general *language* aptitude. It would be encouraging for those who are not good at a foreign language reading despite their good first language proficiency. They should not worry that they have no talent for foreign language reading.

However, one might argue that this correlation coefficient in the current study is surprisingly high. One might claim that we should take the language material in the current study into consideration more carefully. Many *Katakana* words are loan words from English. In fact, about 170 out of 200 words in the current study were from English. Thus one might argue that the language material does not well represent Japanese and / or English and that we should expect a lower correlation; it might be the case that the English words and the Japanese words belong to the same lexicon³.

But this never cast serious doubt on the interpretation of the current study. First of all, it is not true that the *Katakana* words do not well represent Japanese. They are Japanese. Besides, there is no evidence that processing of *Katakana* words *after they are recoded into speech* is different from processing of other Japanese words. It is possible that speech recoding of *Kanji* and that of *Katakana* might be different, but certainly, the processing of them afterward is not different once they are recoded. Therefore it is incorrect that the *Katakana* words do not well represent Japanese. It is wrong to undermine the finding of the study on account of the above criticism.

Secondly, it is untrue that the English words used in the experiment do not well represent English. They are frequent English words. Their letters and orthography are totally different from those of Japanese. Concerning pronunciation, it is truer to say that their pronunciations are more or less different from the English counterparts than to say they are similar.

No matter what doubt may be cast, the argument stands that orthography, which is specific to a language, is of minor importance for intermediate learners such as the subjects in the present study. Reading in a second language is more a reading problem than a language problem (cf. Alderson).

The common reading proficiency seems to be rather linguistic than nonlinguistic. First, the partial correlation between English and Japanese was not so low as other partial correlations. It was still .82 and it indicates that visual memory (symbol search) does not contribute much to the common language proficiency. Secondly, although apparent

correlations between English / Japanese and Symbol were moderate (.47 and .45 respectively), the partial correlations were low and nonsignificant (.19 for both). What made the correlations between English / Japanese and Symbol moderate was the linguistic factor, not the (nonlinguistic) cognitive factor such as visual memory.

Thirdly, the equation of the multi-regressional analysis indicated that 73% of English word search was to be explained by Japanese word search and symbol search combined and that most contribution was from Japanese word search (the coefficient was .82 for Japanese word search and .11 for symbol search).

Lastly the significant effect of the interaction of the ANOVA indicated that differences in ability diminished as a task became more basic (English to Japanese to Symbol). For all these reasons, it should be concluded that nonlinguistic cognitive ability is not an important factor of the common language reading proficiency.

It does not follow, however, that there is a causal relation between the first language ability and the second language ability. In addition to a causal relation, Ehri (1979) points out four possibilities between two factors that are correlated with each other : prerequisites; facilitators ; consequences ; and incidentally correlated relations.

The first possibility, prerequisites, suggests that the first language ability must be acquired before the second language ability. Apart from the obvious contention that this is the case because English is learned as a second language, this assertion is of interest because it is in line with the theory of phonological awareness. The ability to discriminate sounds may indeed be the basis of language learning (cf. Stanovich, 1986 ; Bradley and Bryant, 1983).

The second possibility, facilitators, suggests the first language ability, if not essential, facilitates the second language ability. This might well be the case considering adults' successful learning of a second language (apart from pronunciation), as opposed to children's learning. It may well be the case that the increase of the first language ability helps learning of the second language because they are both information processing activities.

The third possibility, consequences, is a reverse causal relation, according to Ehri. The success of the first language learning is the consequence of the success of the second language learning. Despite the apparent incredibility, this assertion should not be dismissed altogether. West's anecdotal study in India (cited by Takanashi and Takahashi, 1987) reported that training of English (as a second language) enhanced the ability of the mother tongue. Yet, a precise empirical reserach is necessary to assert this possibility.

The last possibility, incidentally correlated relation, states that a seeming link between the two factors may be established because each is related to some other factor. However, the present study clarified that general cognitive factor, the only other generally recognized factor, is an unlikely candidate as the factor behind the correlation.

In summary, there is high correlation between the first language word recognition ability and the second language word recognition ability. Since word recognition ability is critical in reading, the finding is considered to indicate that reading ability is common in a first language and a second language after a learner has mastered the orthography of the target language. It may well be the case that second language proficiency is a function of first

language proficiency (cf Cummins, 1979) .

However, it should be again reminded that this study is concerned with only word recognition for a limited lexicon. Reading in a second language is obviously much more than word recognition. Comprehension follows word recognition. A lot of vocabulary must be acquired. Syntax is different in the first and the second language. So is the discourse structure. Further empirical research should be done to examine these issues.

It is not that, however, that we had a complete understanding of word recognition. We should assess the contribution of the knowledge of the alphabet, of orthography and speech recoding ability. Are knowledge of the alphabet, orthography, grapheme-phoneme correspondence distinctive? Sophisticated research is necessary to clarify what factors constitute word recognition.

We should also examine the issue of transfer developmentally. It is of interest how the degree of transfer will change as a learner becomes more proficient. Since the writing system of Japanese is totally different from that of English, it is of particular interest how a beginner will overcome this obstacle and learn to decode English. These are remaining questions.

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Notes

1. I would like to appreciate Ms. Naoko Motooka at Matsuyama Shinonome Women's Junior College for her kind cooperation.
2. One might argue that speech recoding is not necessarily involved in a word search task. But a recent research finds that speech is *automatically* activated in reading (Perfetti, 1987).
3. I'd like to appreciate Mr. Tomoyuki Yokoyama at Hyogo College of Education for his comment on this point.