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Are Japanese University EFL Learners Aware of the Retrieval Effect?

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日本人大学生英語学習者は取り出し効果を意識しているのか

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ABSTRACT

The finding that the act of retrieving knowledge from memory enhances long-term memory has been widely demonstrated as the *retrieval effect*. This technique is used when learners remember L2 vocabulary. However, most of the students are not aware of the retrieval effect while remembering the contents of reading passages. When learners prepare for a test, which requires them to recall what was written on the passages, they tend to spend much time rereading the passages, but not retrieving what was written. Numerous studies have showed that retrieving information results in better retention rates compared with rereading the passages. Thus, this study aims to investigate the reason why there are great differences between to-be-learned materials. We gave Japanese 110 university EFL students a questionnaire and asked them about their vocabulary learning and reading comprehension strategies. The survey found that: (a) learners are aware of the positive effect of word retrieval on learning, and (b) however, they believed that rereading is more effective in long-term retention of the reading comprehension than retrieving information from memory. The implications are that English teachers should tell their students the benefits of retrieval, and explain why retrieving information enhances their final performance.

1. INTRODUCTION

1.1 What is the Retrieval Effect?

One of the powerful tools to enhance students' long-term retention of learned information is retrieving it from memory. Retrieval practice is a process in which learners get the learned information out (Agarwal, Roediger, McDaniel, & McDermott, 2013). When the students recall given information, they remember the information in the long term. Adding a recall session after learning sessions can yield better results than the learning sessions only (Cull, 2000; Carpenter & DeLosh, 2005; Karpicke & Roediger, 2007). This is called the *retrieval effect* (Kanayama & Kasahara, 2015).

Kanayama and Kasahara (2015) examined the effects of retrieval practice on L2 vocabulary learning. The participants were asked to remember 20 English and Japanese word pairs, with the opportunities to encounter each pair three times on PowerPoint slides. The participants were divided into two groups: the retrieval group and the no retrieval group. In the first cycle, all the participants were presented with each English and Japanese word pair (deceit: 詐欺) for six seconds. In the second and third cycle, the participants in the retrieval group were presented with each English form initially (e.g., deceit: ____?) for two seconds, then its Japanese translation (e.g., deceit: 詐欺) for two seconds so that they had an opportunity to retrieve L1 translations for their L2 forms. On the other hand, those in the no retrieval group were presented with L2 forms and their L1 translation at the same time (e.g., deceit: 詐欺) for four seconds in the remaining two cycles. Thus, both groups were given the equivalent time for remembering the words. An immediate test conducted two minutes after the

study session found that the retrieval group recalled the target words better than the no retrieval group (73.7% vs. 59.7%). Moreover, the retrieval group also showed a significantly better retention rate than did the no retrieval group in a 1-week delayed test (31.2% vs. 22.1%). Kanayama and Kasahara found the positive effect of word retrieval on long-term L2 vocabulary retention.

1.2 What Makes the Retrieval Effect Better?

Why is recalling an item from memory improves students' long-term recall performance? During a retrieval session, learners are asked to recall stored information from their memory. The act of retrieving the knowledge itself enhances its long-term retention for the following two reasons.

First, producing the information from memory requires a great mental effort, and it guarantees better performance later (Kanayama & Kasahara, 2015). That is, "the deeper, more difficult, and more complex retrieval is, the more powerful that retrieval will be in facilitating successful retrievals in the future" (Storm, Bjork, & Storm, 2010, p. 244). Therefore, the mental effort contributes greatly to better long-term retention.

Second, retrieval helps learners have an effective learning plan (Kanayama & Kasahara, 2015). The students who tried retrieving learned items are able to identify which items have been remembered and which items have not (Roediger, Putnam, & Smith, 2011). Retrieval can help the learners distinguish the items they have successfully recalled and the items they have failed to recall. Based on this experience, the learners focus on the items which they have not mastered in the next learning session (Son & Kornell, 2008).

1.3 How Do Students Evaluate the Effects of Retrieval on Vocabulary Learning?

Retrieval practice is widely used as an effective vocabulary learning method (Nation, 2013). When learners are given a word list on which target L2 words and their L1 translations are written, many of them tend to cover up the word meanings with their hands or something to have the chance to retrieve the item from memory.

Our study (Kanayama & Kasahara, 2015) also observed this tendency. The participants were presented with each target word pair (e.g., deceit: 詐欺) on PowerPoint slides on a screen, using a projector and a screen. In addition, the no retrieval group was asked to put their hands on the desk during the learning session in order not to cover the target word and retrieve its meaning. Nevertheless, some participants tried using their hands; thus they had to be excluded from the data analysis. This suggests that the learners might have known the value of retrieval.

Some studies also support the implication that learners are aware of word retrieval effect. For example, Kornell and Son (2009) asked 35 college students to study English word pairs under the SS or ST mode. They were able to choose one of the two modes freely. Here, S means that each word pair is presented at the same time for 5 seconds each (e.g., whale-mammal). On the other hand, T means that the cue word was presented alone at first (e.g., whale-____), and participants were asked to type corresponding target words. The survey revealed that most of students choose the ST rather than the SS mode. Naturally, the ST condition had better score in an immediate test than the SS group.

1.4 How Do Students Evaluate the Effects of Retrieval on Reading?

These studies showed that retrieval practice is used for vocabulary learning, while other studies found that learners do not use the retrieval effect as a reading comprehension strategy. For example, Karpicke, Butler, and Roediger (2009) carried out two types of questionnaire survey to examine students' reading comprehension strategies. In the first question, 177 undergraduate students were asked to list the strategies which they used when remembering the contents of passages. The survey found that 97 out of 177 students (54.8%) thought of rereading the passages as the most useful learning strategy. However, only two out of the 177 students (1.1%) identified retrieving the information on the passages from memory as the most effective. In short, a large majority of the students preferred repeated reading to the retrieval of information while learning from reading.

In the second question, 101 participants were asked to answer the following multiple choice question. "Imagine you are reading a textbook chapter for an upcoming exam. After you have read the chapter one time, would you rather" (p. 475). There were three alternatives below.

- (a) Go back and reread the chapter.
- (b) Try to recall materials from the chapter without rereading.
- (c) Use some other study technique.

The survey found that 57% of the participants choose Option (a), and 21% of them chose Option (c). However, only 18% of the learners selected Option (b). In other words, 78% of them did not view the act of recalling information as the most effective.

Nevertheless, a large number of studies have showed that retrieving information on passages

results in better recall performance than rereading the passages (Roediger & Karpicke, 2006b; Karpicke & Blunt, 2011; Smith & Karpicke, 2014). For instance, in a study of Roediger and Karpicke (2006b, Experiment 1), they compared the effects of the SS and ST group on learning from reading passages. S means one study session and T means one test trial. In the T session, participants were asked to recall as much information from the passages as possible. The results revealed that the ST group was superior in 1-week retention to the SS group (56% vs. 42%).

Moreover, Roediger and Karpicke (2006b, Experiment 2) compared the effects of the SSSS, SSST, and STTT condition on reading comprehension of short passages. For instance, the STTT group took a study session once, following the consecutive three test sessions. After the treatment, all the participants were asked to rate how well they would recall information from the read passage a week later, using a 7-point scale (1 = not very well; 7 = very well). The survey revealed that the SSSS group expected higher scores ($M = 4.8$) than the SSST group ($M = 4.2$). The least confident group was the STTT group ($M = 4.0$). Nevertheless, the actual score in the delayed test found that the STTT group was better than the SSST and the SSSS group (61% vs. 56% vs. 40%), indicating that there was a great mismatch between the actual recall performance and the students' belief in reading-based learning. Figure 1 presents the participants' judgments of their learning. Figure 2 also shows the actual scores of each group. These two figures show the big difference between the students' predictions and the students' actual scores.

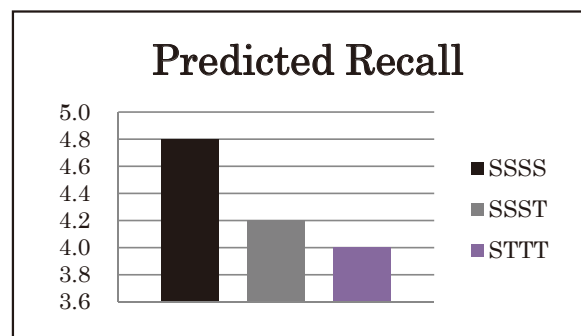


Figure 1. The predicted scores of the SSSS, SSST, and STTT group. Data are adapted from Experiment 2 of Roediger and Karpicke (2006b).

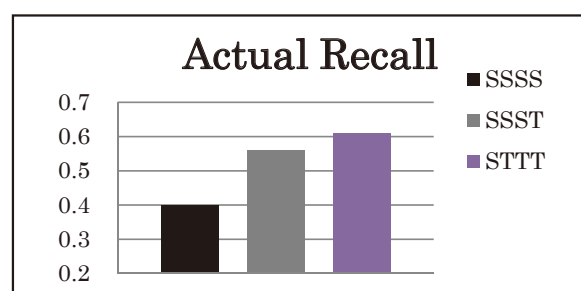


Figure 2. The actual scores of the SSSS, SSST, and STTT group. Data are adapted from Experiment 2 of Roediger and Karpicke (2006b).

In the T session, the participants were just asked to retrieve the information which they remembered, but they did not receive any corrective feedback. Therefore, they did not know if the answers which they wrote down were correct or not. Nevertheless, the STTT had the best score in the 1-week delayed test. This means that retrieving the learned information even without corrective feedback enhances students' long-term retention better than just rereading them. On the other hand, however, the SSSS group expected the highest scores. This indicates that the participants did not know the positive effect of retrieval, and seemed to think that the total time of studying would make a difference. These studies indicated that students are not familiar with a fact that retrieval practice enhances their

reading recall task.

1.5 Summary of the Previous Studies and Aim of the Present Study

To sum up, there are three main findings from the previous studies: (a) Retrieval practice is always superior to having an additional restudy session in terms of long term retention of reading materials as well as vocabulary; (b) Students are aware of the retrieval effect while remembering vocabulary; (c) They tend to think of rereading a text as more effective than retrieving the information.

However, no previous studies involved the Japanese EFL learners as participants, as far as the authors know. With relation to (b) and (c), it has remained to be seen whether the same tendency is also observed among Japanese learners of English. If so, why is there a great difference in awareness of the retrieval effect between the two to-be-learned materials? Hence, the main purpose of this study is to examine this issue. Therefore, the present study attempts to address the following three research questions.

RQ1: Are Japanese university EFL learners aware of the retrieval effect on L2 vocabulary learning?

RQ2: Are Japanese university EFL learners aware of the retrieval effect on learning from reading?

RQ3: If the answers to RQ1 and 2 different, then why is there such a difference in awareness of the retrieval effect between the two to-be-learned materials?

2. Method

2.1 Participants

We surveyed 110 undergraduate students in Japan. All the participants had studied English for at least six years. They belonged to one of three English classes, thus they took part in our survey on a different date and classroom, but we asked them to answer the same questions.

2.2 Questionnaire

Our survey includes the following four questions. Question 1 is a forced report question in which the participants were asked to choose their vocabulary learning strategy. Question 1 is as follows: “You have to remember a list of 10 English and Japanese word pairs (e.g., ligament: 靭帯). If you have five minutes to deal with the words, how do you remember them? Choose one of four alternatives as below”

- (a) Look at each word pairs at the same time.
- (b) Remember Japanese meanings while covering them.
- (c) Look at each pair at the same time initially, and then remember Japanese meanings while covering them.
- (d) Use other study technique.

Question 2 required the participants to write down the reason why they chose the option in Question 1. Question 3 asked the participants about their reading comprehension strategy. We created Question 3, modifying the format by Karpicke et al. (2009). Question 3 is as follows: “You are reading a textbook chapter in 10 minutes for a next week examination. You have read the chapter once. Now, if you have another 10 minutes to study, how do you study? Choose one of four alternatives as below”

- (a) Reread the chapter again.
- (b) Try to recall information from the chapter

(If you do so, you have no chance to re-read the chapter)

- (c) Reread the chapter initially, and then try to recall information from the chapter.
- (d) Use other study technique.

Question 4 asked the students to write the main reason why they chose the option in Question 3. The questionnaire format which we used in this study is listed on Appendix 1. Considering the results of the previous studies (Karpicke et al., 2009; Kornell & Son, 2009), we expect that most of the participants would choose option (b) or (c) rather than (a) in Question 1, and that few students would choose option (b) and (c) rather than (a) in Question 3. We examine RQ1 based on the results of Question 1. Similarly, Question 3 is based on the results of RQ2. Furthermore, in order to answer RQ3, both Question 2 and 4 should be analyzed qualitatively. We thought that some questions would not be easy for the participants to interpret. In order to avoid students' misunderstanding of the questions, the authors responded to their questions when they had problems answering each question.

2.3 Data Analysis

In order to examine Research Questions 1 and 2, chi-square tests were conducted. The number with which the participants chose each option in Question 1 and 3 was analyzed. Moreover, in order to examine Research Question 3, we qualitatively analyzed the comments which the participants wrote down in Question 2 and 4.

3. Results

Table 1 shows which option the participants chose in Questions 1 and 3, respectively. Figure 3 shows the results of Table 1 graphically.

Moreover, Table 2 presents the combinations of the options that the participants chose for Question 1 and 3. For example, there were 41 out of the 110 participants who choose both Option (a) for Question 1 and Option (c) for Question 3.

The chi-square tests revealed that there was a significant difference between the total numbers for the options which the participants chose in Question 1, $\chi^2(3) = 111.236, p < .01$, and also those in Question 3, $\chi^2(3) = 60.4, p < .01$. This means that the largest number of participants chose Option (c) as to Question 1 (about vocabulary). On the other hand, as for Question 3 (about reading), the largest number of participants chose Option (a).

Table 1
The Total Numbers for each Option the Participants Chose in Questions 1 and 3. Percents are in parentheses (N = 110)

	Option (a)	Option (b)	Option (c)	Option (d)	Total
Q.1	7 (6.4)	11 (10)	75 (68.1)	17 (15.5)	110 (100)
Q.3	59 (54)	9 (8)	32 (29)	10 (9)	110 (100)

Table 2
The Combinations of Options that Participants Chose for Question 1 and 3. (N = 110)

		Question 1			
		Option (a)	Option (b)	Option (c)	Option (d)
Question 3	Option (a)	4 (3.67)	7 (6.4)	41 (37.2)	7 (6.4)
	Option (b)	1 (0.9)	1 (0.9)	5 (4.5)	2 (1.8)
	Option (c)	2 (1.8)	2 (1.8)	24 (21.8)	4 (3.7)
	Option (d)	0 (0)	1 (0.9)	5 (4.5)	4 (3.7)

Note. The numbers in the parentheses show the percentages for each option.

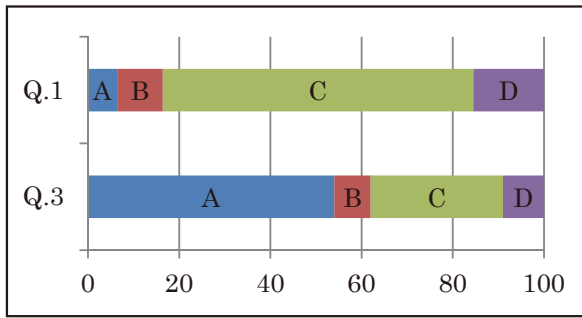


Figure 3. Graph of the results of Table 1.

4. Discussion

4.1 Evaluation of Retrieval Effect on L2 Vocabulary Learning (RQ1)

Research Question 1 of this study is to examine whether Japanese university EFL students are aware of the retrieval effect on L2 vocabulary learning. The answer was affirmative. Table 1 revealed that most of the students (78.1%) chose option (b) or (c) in Question 1. On the other hand, few students (6.4%) chose Option (a), and 15.5% of the students use other vocabulary learning strategies.

Moreover, 68.1% of the participants chose Option (c), suggesting that they like to get information into their mind at first, and then they switch a “get-in” strategy to a “get-out” strategy (retrieval). Indeed, such a learning strategy can consolidate the linking between a L2 form and its L1 translation effectively. Nation (2013) supports this idea by insisting that “simultaneous presentation of a word form and its meaning is best for the first encounter and, thereafter, delayed presentation (retrieval plus feedback) is best because there is then the possibility of effort leading to successful recall” (p. 451). It seems that learners are aware of the word retrieval effect well.

4.2 Evaluation of Retrieval Effect on Learning from Reading (RQ2)

Research Question 2 of this study is to investigate whether Japanese university EFL students are aware of the retrieval effect on learning from reading. The answer was negative. Table 1 showed that 54% of the participants chose Option (a) (rereading), but that 29 % of them chose Option (c) (rereading plus retrieval). On the other hand, only 8% of the learners selected Option (b) (retrieval). This indicates that most of the students like to reread the same material rather than to recall what was written in the passages.

The previous studies (Roediger & Karpicke, 2006b; Karpicke & Roediger, 2007; Karpicke & Blunt, 2011) have demonstrated that the use of the retrieval practice improved long-term retention of the learned information from reading. However, the participants were not aware of the retrieval effect on learning from reading. What Roediger and Karpicke (2006b) found is also case with Japanese University EFL learners.

4.3 Differences in Awareness of Positive Effect of Retrieval between Vocabulary and Reading (RQ3)

Research Question 3 concerns why there is a difference differences in awareness of the retrieval effect between the two to-be-learned materials. The survey found that the participants seem to be aware of the retrieval effect on vocabulary learning. However, when it comes to learning from English passages, they prefer rereading to retrieval.

In Question 1, 75 out of the 110 students chose Option (c). Similarly, 59 of the 110 participants chose Option (a) in Question 3. Table 3 presents the summary of the 75 students’ comment on

Question 2. Table 4 also shows the overview of the 59 students' comments on Question 4. The learners' original comments were written in Japanese, but the authors translated them into English.

Table 3

The Students' Comments Why They Chose Option (c) in Question 1 (N = 75)

Students' Comments: I chose Option C because...	Number
I have used this strategy until now./I think it's effective./ I like it.	26(34.7)
I want to get information in at first, and then get it out.	36(48)
I want to do the same thing as I will do in the test.	6(8)
Others	7(9.3)

Note. The numbers in the parentheses show the percentages for each option.

Table 4

Students' Comments Why They Chose Option (a) in Question 3 (N = 59)

Students' Comments: I chose Option A because...	Number
I want to get information in more.	14(23.7)
I want to understand the contents of the book deeply.	15(25.4)
I think that repeated reading can lead to long-term memory.	15(25.4)
I think it is impossible to remember everything once.	3(5.1)
I think that the act of recalling information is not effective.	3(5.1)
I think that repeated reading can organize my knowledge.	5(8.5)
Others	4(6.8)

Note. The numbers in the parentheses show the percentages for each option.

There are two reasons why there was a great difference in awareness of the retrieval effect between the two to-be-learned materials. First, it is a time-consuming process that retrieving

some information from a reading passage. After learners tried retrieving it from their memory, they are also required to look through the passage again for some evidence that the retrieved information really exists in the passage. This is not an easy process.

On the other hand, however, it takes much less time to retrieve the target meanings from memory. Indeed, Question 1 asked the participants to remember the 10 English forms and their Japanese translations on the word list. It allowed the participants to use their hands to retrieve Japanese meaning for its English form. By taking their hands off the list, they were able to easily find the correct answer. This is not a time-consuming process. In sum, the difference in easiness of carrying out retrievals between the two learning materials can affect their different views.

Second, retrieval practice is useful as rote learning. Rote learning is a memorization of an item by repetition or practicing (Li, 2005), and it is commonly used as an effective vocabulary learning strategy (Sinhaneti & Kyaw, 2012). When learners connect the linkage between L2 forms and their L1 meanings, this rote learning strategy is very effective in establishing this connection. Thus, L2 learners often use the retrieval practice while enhancing the linkage between L2 forms and their L1 meanings (Nation, 2013).

Actually, Table 3 revealed that 26 out of 75 participants (34.7%) thought word retrieval is effective, they have used retrieval practice until now, and they like it. Moreover, 36 of 75 students (48%) liked to check whether they mastered the target word, or not, by using their hands. These indicated that experience has told the participants that word retrieval is effective.

On the other hand, reading and understanding

a text is not a simple rote learning. Mastering a text requires not only to understand the contents of the text. Learners also have to guess what an author thinks of, to read between the lines, and how they relate acquired ideas with the knowledge they already have. It is true that retrieval practice can be useful in remembering the contents of the text, but retrieval practice cannot cover these complex aspects.

Table 4 supports this idea. It found that the participants believe that rereading a text is the best learning. 14 out of 59 participants (23.7%) like to get information in more, and 15 out of them (25.4%) like to understand the contents of the text deeply. Even other 15 participants (25.7%) believed that repeated reading can lead to long-term retention. They seemed to think that just one reading is not enough to fully understand the text. Experience has told them that rereading can cover what reading comprehension requires learners.

5. Conclusion

One of the purposes of this study was to compare the gap in awareness of the positive effect of retrieval and Japanese university students' learning strategies. This study mainly demonstrated that Japanese university EFL students exhibited little awareness of the benefits of retrieval on learning from reading passages, but were aware of the effects of retrieval on vocabulary.

How can we apply these findings into actual classroom? A pedagogical implication would be that English teachers should inform their students of the benefits of retrieval effect on reading comprehension as well as vocabulary learning, and explain why the act of retrieving itself is a powerful learning tool.

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