Methodological Options for Enhancing Vocabulary Retention: 
In Search of an Effective Combination of Activities

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Abstract

A common strategy of foreign language vocabulary learning is to memorize a list of target words and their translations: the so-called paired association method. However, the number of studies focusing on the paired association method is very limited. This paper will present the results of a study conducted with 76 Japanese non English majors at Mie University in search of the most effective way to enhance the long-term retention of words memorized by the paired association method. In the present experiment, the paired association method was combined either with the input activity in which learners inferred the meanings of vocabulary items before memorization, or with the output activity in which learners placed vocabulary items into context after memorization. These combined activities were also compared with the paired association method itself.

1. Introduction and review of past research

Vocabulary is an essential part of language. Without sufficient vocabulary, we cannot comprehend or produce language. Therefore, learning vocabulary is the most fundamental part of foreign language (FL) or second language (L2) learning. However, it is not easy for learners to increase their vocabulary, especially in an English as a foreign language environment.

Schmitt (1997) conducted a survey with Japanese junior high school students, high school students, university students and adult learners of English on vocabulary learning strategies. The results revealed that 95% of them used a bilingual dictionary to discover the meaning of words, and 91% said new words aloud or wrote them repeatedly to consolidate their meanings. From this survey, it can be concluded that the majority of Japanese learners of English use a list of English words and their L1 translations and memorize them by saying and writing them repeatedly.
Memorization of isolated FL/L1 or L2/L1 word pairs, the so-called paired association method, is a popular method not only among Japanese learners of English but also all FL/L2 learners throughout the world. According to de Groot and Keijzer (2000), this FL learning procedure (i.e., paired association method) constitutes an important component of most FL training programs. Thinkham (1989) says rote learning (i.e., memorization of isolated word pairs) remains a common activity in L2 classrooms around the world.

There are a large number of studies comparing the keyword method with the paired association method. The keyword method is a mnemonic technique in which the keyword, an L1 word that bears a phonological and/or orthographic resemblance to the novel FL word, plays a central role. (van Hell & Mahn, 1997) Among those dealing with the long-term retention of words, many have proven the superiority of the paired association method to the keyword method. (Wang & Thomas, 1992; 1995; Wang, Thomas & Ouellette, 1992; van Hell & Mahn) Although the paired association method is a typical and effective vocabulary learning strategy for FL learners, the number of studies focusing on the paired association method is very limited.

The weakness of the paired association method is its lack of context. In the paired association method, words are isolated from context. According to Nation (2001), decontextualised learning has two criticisms. First, the lack of context makes vocabulary learning difficult, and second, such learning has little to do with language use. De Groot and Keijzer say that the paired associate FL training technique will have to be supplemented with other training techniques, such as presenting the FL words in an appropriate FL context.

In order to compensate for the weakness of the paired association method, context should be provided to learners using this method. But, when is the best timing to give context to learners? In other words, which leads to better retention of words, giving the context before memorizing words or after memorizing words? When context is given before memorization, learners have a chance to infer the meanings of target words as an input activity. On the other hand, when context is given after memorization, learners have a chance to use target words in context as an output activity. Which is more effective for better retention of word meanings, think first and then memorize or memorize first and then think?

2. Research question and hypothesis

Research question: Which method is the most effective for retention of word meanings: (1) to infer the meanings of target words and then to memorize them, (2) to memorize target words and then to place them into context, or (3) only to memorize target words?

Hypothesis: Method (1) is the most effective, and method (3) is the least effective for retention of word meanings.

According to the depth of processing hypothesis of Craik & Lockhart (1972), the chance
that some pieces of new information will be stored in long-term memory is determined by the shallowness or depth with which it is initially processed. They postulate that considering the meaning of a new lexical item requires a deep level of processing. In method (1), participants infer the meanings of the target words before they are given their meanings. On the other hand, participants in method (2) are given the meanings of the target words before they perform the contextualized activity. Therefore according to the depth of processing hypothesis, participants of method (1) will be more likely to retain the meanings of the target words because they will have considered the items to greater depths initially.

While the participants of method (1) and (2) respectively spend 20 minutes on additional contextualized activities, the participants of method (3), which is a control group, receive a reading lesson from the assigned textbook, *Language in Use* from Cambridge University Press. Since the participants of method (3) do not process the target words in context, they will be less likely to retain the meanings of the target words.

3. Methods

3.1 Participants
Three freshman classes, consisting of 73 students, of Mie University participated in the experiment. They were taking English classes as part of their course requirements. Class 1 was made up of 21 engineering majors, Class 2 of 26 engineering majors and Class 3 of 26 biology majors. It was announced that this experiment did not relate to the course requirement, and all the students agreed to participate in the experiment.

3.2 Material
20 English words were chosen as target words (See Appendix A). Words which participants were not likely to know were chosen. Ten were nouns and ten were verbs. All participants took a pretest in which they were required to write a Japanese equivalent for each target word before any treatments. Out of 20 points, the mean score was 0.19 for Class 1, 0.12 for Class 2, and 0.08 for Class 3, and there was no statistically significant difference among the three classes. From this result, it can be assumed that most participants did not know any target words.

3.3 Procedures
The results of the pretest and posttest were compared to find out the most effective method for retention of word meanings among the three classes. The procedures were as follows:

Week 1
1. All participants took a pretest.
2. Class 1 performed an input activity including all the target words. The participants were
given two or three sentences for each target word and an additional picture for ten of them (See Appendix B). They had to guess the meaning of each target word by reading the given sentences and looking at a given picture. They were given 20 minutes to perform the activity and then the answers were checked.

3. All participants were given a list consisting of the 20 target words and their Japanese equivalents (See Appendix A) and were told to memorize the Japanese equivalents by the next week.

Week 2
1. All participants took a test to make sure they had memorized all the target words. They had to write Japanese equivalents for each target word. The average score of Class 1 was 19.6 out of 20, Class 2 was 19.5, and Class 3 was 19.7. There was no statistically significant difference among the three classes, which means that all the participants memorized all the target words.

2. The participants in Class 2 performed an output activity. The participants were given incomplete sentences, and they had to complete each sentence with an appropriate target word (See Appendix C). 20 minutes was given for the output activity, and immediately thereafter they checked their answers.

Week 6 (Four weeks after the memorization test) All participants took a posttest in which they had to write a Japanese equivalent for each target word. In this test the same target words as in the pretest were presented, but in a different order. The test was given without any notice.

Table 1 is the summary of the procedures.

<table>
<thead>
<tr>
<th>Table 1. Summary of Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week 1</strong></td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Class 1</td>
</tr>
<tr>
<td>Input activity (20 minutes)</td>
</tr>
<tr>
<td>Memorization homework</td>
</tr>
<tr>
<td>Class 2</td>
</tr>
<tr>
<td>Memorization homework</td>
</tr>
<tr>
<td>Class 3</td>
</tr>
<tr>
<td>Memorization homework</td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
</tr>
</tbody>
</table>
4. Results

Table 2 shows the means and standard deviations of the pretest and posttest. Figure 1 illustrates the difference between the pretest and posttest mean scores of each class. As for the pretest and posttest, the result of an ANOVA revealed a significant difference among the three classes ($F(2, 140)=3.19, p<.05$). A further analysis of multiple comparisons by LSD revealed that the gain of Class 1 was significantly higher than that of Class 3 ($Mse=6.87, p<.05$). Although the mean score of Class 1 was better than that of Class 2, no significant difference was found statistically between them. Also, the mean score of Class 2 was better than that of Class 3, but there was no statistical difference between them. Therefore the results partly confirmed the hypothesis.

![Figure 1. Means of Pretest and Posttest](image)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>21</td>
<td>0.1904</td>
<td>0.4994</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>0.1153</td>
<td>0.4230</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>0.0769</td>
<td>0.2664</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S.V</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>43.7579</td>
<td>2</td>
<td>21.8790</td>
<td>3.19</td>
<td>*</td>
</tr>
<tr>
<td>(pretest)</td>
<td>0.1606</td>
<td>2</td>
<td>0.0803</td>
<td>0.01 ns</td>
<td></td>
</tr>
<tr>
<td>(posttest)</td>
<td>80.3801</td>
<td>2</td>
<td>40.1901</td>
<td>5.85 **</td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td>3217.9186</td>
<td>1</td>
<td>3217.9186</td>
<td>468.56 **</td>
<td></td>
</tr>
<tr>
<td>Group x Test</td>
<td>36.7829</td>
<td>2</td>
<td>18.3915</td>
<td>2.68 +</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. ANOVA for Pretest and Posttest
5. Discussion

The participants who inferred the meanings of the target words followed by memorization retained the target words better than the participants who only memorized them. Therefore, it is concluded that to infer meanings of unknown words before memorization enhances the retention of memorized words.

Although the mean score of Class 2 was better than that of Class 3 in the posttest, there was no significant difference between them. This result probably can be attributed to the difference in the nature of the posttest and the activity Class 2 participants performed: placing target words into their appropriate context is a kind of productive activity, while the posttest was to write a Japanese equivalent for each target word, which tested receptive knowledge.

Also, the mean score of Class 1 was better than that of Class 2 in the posttest, however, there was no significant difference found between them. The participants in Class 1 were given 20 minutes to infer the meanings of the target words, and they successfully inferred the meanings of 17.3 words out of 20, which was an 86.5% success rate. The participants of Class 2 were given 20 minutes to place the memorized target words into context, and they successfully placed 36.8 words out of 40 in an appropriate context, which was a 92% success rate. Inferring meanings of unknown words requires a deep processing, according to Craik and Lockhart. The result may imply that 20 minutes was not enough for the participants of Class 1 to process all the target words. If they had been given more time to process information, the result could have been better and consistent with the hypothesis.

In all classes, nouns were retained better than verbs (F(1, 140)=57.98, p<.01). This result is consistent with a previous study indicating that nouns were easier to learn than verbs (Morgan & Bonham, 1944). There was no significant difference among the three classes in the number of retained nouns (F(2, 70)=1.63, ns). From this result, it can be implied that learners can learn and retain nouns even though they are not given a context.

However, there was a difference in the number of retained verbs (F(2, 70)=2.90, p<.10). A post-hoc LSD revealed that the gain of Class 1 was significantly higher than that of Class 3 (Mse=4.58, p<.05). The gain of Class 2 was somewhere between that of Class 1 and Class 3. According to this result, when learning the meaning of verbs, learners should infer meaning in context before memorization. Considering the result that the mean score of Class 1 was better than that of Class 2, it may be implied that inferring the meaning of unknown verbs is more effective for retention than placing verbs into an appropriate context after being given their meanings.

In all classes, participants retained the words with which a picture of their referents was provided in the activities better than the words without a picture of their referents (F(1, 140)=32.15, p<.01). While there was no statistical difference found among the three classes in the retention of the target words with the help of pictures (F(2, 70)=2.09, ns), there was a
difference in the retention of the target words without the help of pictures (F(2, 70)=2.97, p<.10).
A post-hoc LSD revealed that the gain of Class 1 was significantly higher than that of Class 3
(Mse=3.75, p<.05). The gain of Class 2 was somewhere between that of Class 1 and Class 3.

In this experiment, accompanied pictures do not help word retention because the
participants in Class 3, who were not given any pictures, retained as many picture accompanied
words as the participants of Class 1 and Class 2, who were given pictures. This may be
explained by the concreteness of word meanings. According to the dual-coding theory of Paivio
(1986) and Paivio & Desrochers (1980), concrete words are stored in both a verbal system and an
image system. On the assumption that the picture accompanied words are more concrete than
the non-picture words, giving a picture for a concrete word is redundant because learners
themselves can easily visualize a referent of a concrete word without the help of a picture. It
may not even be necessary to give context for a concrete word because a concrete word itself
works on both the verbal and the image system of learners.

Contrary to the case of the picture accompanied words, the participants of Class 1 retained
the meaning of more pictureless words than those of Class 3. The result of Class 2 was
somewhere between Class 1 and 3. According to the dual-coding theory, most abstract words
are only stored in the verbal system. On the assumption that the words without pictures are more
abstract than the picture accompanied words, contexts worked on the image system, which helped
enhance the retention of word meanings. Also, the difficulty of learning abstract words may
have been supplemented by context in the case of Class 1 and 2. It can be safely said that
context helps learners retain the meanings of abstract words by working on the image system.

According to the survey conducted after the posttest, the participants of Class 3 used more
kinds of strategies than those of Class 1 and 2 when assigned to memorize target words (See Table
2). They used an average of 3.1 strategies per person compared with 1.9 for those in Class 1 and
1.7 for those in Class 2. They had to compensate for the lack of context by using more strategies
to consolidate meaning. They also spent more time (38.1 minutes on average) on memorization
than those in Class 1 (33.1 minutes) and those in Class 2 (29.8 minutes).

Although the participants of Class 2 were not given any context when they memorized the
words, they used the fewest strategies and spent the least time for memorization. More
participants in Class 2 used metacognitive strategy than the participants of other classes. It is
supposed that the metacognitive strategy the participants of Class 2 used was effective for
retention of the target words. It is also supposed that the output activity which they did after
memorization enhanced their long term retention of the words.

All the participants except one used the paired association method to memorize the target
words and their Japanese equivalents (See Table 2). The one participant with an asterisk in the
table composed sentences using target words to consolidate their meanings and tested the target
words using Japanese equivalents. The score of his posttest was one of the highest.
Table 2. Strategies used by participants to memorize target words

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing words (COG)</td>
<td>9</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Writing words (COG)</td>
<td>14</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Saying words aloud (COG)</td>
<td>4</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Testing meanings (MET)</td>
<td>10</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Punning (MEM)</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Using a bilingual dictionary (COG)</td>
<td>1</td>
<td>1*</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>1*</td>
<td>1</td>
</tr>
</tbody>
</table>

COG = cognitive strategies, MET = metacognitive strategies, MEM = memory strategies (based on Schmitt, 2000)

6. Conclusion

This study has revealed that for better retention of words’ meanings it is clearly more effective to infer unknown words’ meanings from context before memorization than to memorize in isolation, and it is also seemingly more effective than memorization followed by an output activity. Especially when learners memorize verbs and abstract words which are difficult to be visualized, inferring a word’s meaning in context is effective for enhancing the retention of a word’s meaning. A pedagogical implication will be it is beneficial for learners to infer meanings of unknown verbs and abstract words in context before memorization.

Acknowledgements

I wish to express my sincere thanks to Professor Shoroku Aoki and Professor Masanori Matsumura for their insightful comments and constructive suggestions in writing this paper.

References


Appendix

A. Target words and their Japanese equivalents

<table>
<thead>
<tr>
<th>English</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>longevity</td>
<td>名 長寿</td>
</tr>
<tr>
<td>constellation</td>
<td>名 星座</td>
</tr>
<tr>
<td>amphibian</td>
<td>名 藤生動物</td>
</tr>
<tr>
<td>diversion</td>
<td>名 気晴らし、娛樂</td>
</tr>
<tr>
<td>garnish</td>
<td>名 （料理の）つけあわせ</td>
</tr>
<tr>
<td>bestow</td>
<td>動 ～授与する</td>
</tr>
<tr>
<td>dwindle</td>
<td>動 （しだいに）少なくなる</td>
</tr>
<tr>
<td>scrimp</td>
<td>動 ～を節約する</td>
</tr>
<tr>
<td>rebuff</td>
<td>動 ～を拒絶する</td>
</tr>
<tr>
<td>obliterare</td>
<td>動 ～を消し去る</td>
</tr>
<tr>
<td>bruise</td>
<td>名 打撲傷、青あざ</td>
</tr>
<tr>
<td>beak</td>
<td>名 くちばし</td>
</tr>
<tr>
<td>leash</td>
<td>名 （犬をつなぐ）くさり</td>
</tr>
<tr>
<td>faucet</td>
<td>名 （水道の）蛇口</td>
</tr>
<tr>
<td>bib</td>
<td>名 よだれかけ</td>
</tr>
<tr>
<td>lick</td>
<td>動 ～をなめる</td>
</tr>
<tr>
<td>vomit</td>
<td>動 ～を吐く</td>
</tr>
<tr>
<td>annihilate</td>
<td>動 ～を全滅させる</td>
</tr>
<tr>
<td>chip</td>
<td>動 （陶器など）が欠ける</td>
</tr>
<tr>
<td>frown</td>
<td>動 （不機嫌、困惑などで）まゆをひそめる</td>
</tr>
</tbody>
</table>

B. Samples of the activity for Class 1

以下の下線部の単語の意味を推測し、意味を日本語で書きなさい。
1. ( )
The improved health care resulted in increased longevity of the Japanese people.
A well-balanced diet is closely related to longevity.
Grandmother, we wish you both health and longevity.

2. ( )
He got a bruise when fighting with his friend.
I bumped my leg against the chair and got a bruise.

1 1. ( )
The Nobel Prize was bestowed upon the chemist.
The gold medal was bestowed upon the winner.

1 2. ( )
The girl is licking her ice cream.
The cat licked the dish clean.

1 3. ( )
Because of the bad economy, consumer spending is dwindling.
The number of the members has dwindled from 100 to 60.
Support for the Prime Minister has dwindled away to nothing.

C. Samples of the activity for Class 2
空欄に適切な単語を上から選んで書き入れなさい。数の指定があるもの以外は、すべて二箇所に入ります。

longevity(3), bruise, constellation, beak(1), amphibian, leash, diversion, faucet,
garnish, bib, bestow, lick, dwindle, vomit, scrimp, annihilate, rebuff, chip,
obliterate, frown

1. Orion is a well-known ( ) in the winter sky.

2. He ate too much, and he ( ) everything he ate.

3. Watching a baseball game is his favorite ( ).

5. Grandmother, we wish you both health and ( ).

6. He ( ) at the noisy girls.

7. The ( ) for the main dish is a vegetable sauté.