The Effect of Learning Method on Efficiency of Lexical Memory Retrieval

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Abstract

The present study examines the value and the application of a new vocabulary learning method devised to promote the efficiency of lexical memory retrieval. It is the method of presenting a word in chunks with its L1(Japanese) translation. The experiment was conducted to discover the difference between the conventional method (paired-association) and the new method. The subjects, 52 university students, were engaged in matching tasks on a computer assisted program developed by the author, and during the tasks they were supposed to use inference to discover correct answers. After learning sections they were given four tests, two of which were conducted on the same day while the other two were conducted seven weeks later to examine short-term effects and long-term effects. The result was that the new method or the chunk presentation method, in spite of the lower achievement rate in the first two tests, proved more effective in the test given seven weeks later. This result reveals that the chunk presentation method can be an alternative to conventional methods for intermediate English learners who are required to memorize some thousands of words in a limited period. The effect of structural difference in chunks on memory retrieval efficiency is also examined.

1. Introduction

Lexical acquisition is an essential part of foreign language learning. L2 learners are expected to acquire a large number of lexical items in a limited period. However, "unfortunately, traditionally, vocabulary has received less attention in second language pedagogy" (Folse, 2004), and even now in language classrooms very little attention is paid to lexical learning. The present study aims to examine the effects of learning methods on lexical acquisition and to propose an alternative method of lexical learning applicable to L2 class which enables learners to acquire a large number of lexical items with high efficiency.
2. Background

What are the factors that promote lexical acquisition? Native speakers of English are said to have acquired approximately 20,000 lexical items by the time they become university students (Nation 1990), and the acquisition of such a large number of lexical items results mostly from incidental learning through inference in the process of communication activities (Schmitt, 2000). The efficiency of incidental learning is theoretically supported by the depth of processing hypothesis (Craik, F., & Tulving, E., 1975) because the lack of lexical knowledge can be compensated by inference which is a kind of deep metal process. However, in the L2 learning situation, where limited time is available, it is almost impossible to acquire more than several thousand lexical items in a few years by incidental learning through inference alone. The key word method is one of the solutions to this problem. It is an intentional learning method which uses a mnemonic method of associating L1 sound with L2 meaning in learners’ mental lexicons (Hulstijn, 1997). Its long-term retention effect is caused by deeper processes involved in the task of association.

As for the process of lexical acquisition, Nation (2001) argues that the acquisition of L2 lexical items starts in general as an input of unanalyzed wholes, or chunks. It is only later that their place within word building system and lexical fields are analyzed (Myles, Hooper, & Mitchell 1998). Lewis (2002), paying attention to this nature of chunks, proposes the lexical approach. Ellis (1997) argues that language rules and lexical information are automatically acquired by the repetition of chunking process in our memory.

The effects of L1 on lexical learning are also examined in a number of studies (Hulstijn 1992, Prince 1995). Lewis (2002) argues that L1 is important in acquiring L2 in that it inevitably relates L2 lexical items and expressions to L1 language items.

Considering these research results and arguments, the factors which promote the efficiency of lexical acquisition can be stated as follows;

a. Deep mental processing such as inference
b. Presentation of L1 translations
c. Use of chunks

The present study tries to examine the effect of a learning method satisfying these three factors and to verify its efficiency of lexical memory retrieval.

3. Method

An experiment was conducted using a new method of lexical learning tasks. They are the tasks that involve combining presented chunks with the L1 translation of target words in chunks. In this method, learners have to infer the meaning of a target word in a chunk by the hint of the meanings of other lexical items. The nature of this method is that it involves the factors promoting
lexical acquisition mentioned above. The author prepared a computer program for using this method as web-based lexical matching tasks functioning on computers so that learners could carry out trials and errors repeatedly to finally discover the correct answers as their own pace without being tired (Appendix 1).

The experiment used 20 verbs and 20 nouns selected from JACET 8000 word list (2004) (Appendix 2). They were all selected from Level 8 (the highest level) because university freshmen, the subjects of the experiment, were not expected to have knowledge of these words. The words were divided into two groups and presented in two different ways – word presentation with its L1 translations (WP, hereafter) and chunk presentation with L1 translations of target words (CP, hereafter) (Appendix 3). As in Appendix 1, the translations were presented as alternatives to be chosen as answers to question items which were words or chunks, and only for WP method, correct answers, or the meaning of the words, were given prior to learning. For CP method no clues to the answers were given so that learners would have to use inference. As mentioned above, these two types of task were presented on computer displays and while learning the subjects were required to engage in matching tasks by dragging and dropping.

The same word list was used to make the achievement tests. The test comprised 30 test items of which the half were nouns and the other half were verbs. Of each of these 15 test items, 5 were words equivalent to those presented in the learning sections as words (W→W), 5 were the words which were the target words presented in the learning sections as chunks (W→C), and 5 were the exact chunks presented as chunks (C→C). For all these three different types of question items, L1 alternatives which were the same as those used in the learning sections were presented. In other words, one column of a mixture of words and chunks was on the left and another column of L1 translations was on the right as alternatives (Appendix 4). Using these three types of question items, 4 tests were prepared for the experiment. Tests 1, 2, and 3 were the same except for the order of presentation of the question items. Test 4 was different from the other tests in that C→C question items were new and had not been included in the material used in the learning sections.

The subjects were 51 university students with pre-intermediate level English proficiency. The experiment was carried out in a computer lab, and the subjects were engaged in the lexical learning tasks presented on computer displays. There were two learning sections. In Section 1 half of the subjects learned in WP mode and the other half learned in CP mode, and in Section 2 these two groups learned in the alternative modes. The contents of the tasks for each group were exactly the same.

After the two learning sections, Tests 1 to 4 were given to the subjects. Tests 1 and 2 were carried out a short time after completing the learning sections - immediately after the learning sections (Test 1) and 25 minutes after (Test 2). These two tests were for measuring the short-term effects of learning method. Tests 3 and 4 were carried out 7 weeks after the learning sections were completed to measure the long-term effects of the learning methods. In addition, a survey was conducted to discover which strategy the subjects used in learning sections and the tests, inference
of the meaning of target words by context, main focus on target words, or main focus on chunks as unanalyzed wholes. Focus on chunks as unanalyzed wholes meant the strategy of combining the meaning of the chunks directly with the L1 translations.

These are the procedures of the experiment:
1. Learning section 1 (10 minutes)
2. Learning section 2 (10 minutes)
3. Test 1 (10 minutes, immediately after Learning Section 2)
4. Listening Test for interference (25 minutes)
   To prevent additional efforts to strengthen the vocabulary memory on the part of the subjects, a listening test was conducted.
5. Test 2 (10 minutes, immediately after the listening test)
6. Test 3 & Test 4 (10 minutes, 7 weeks later)
7. The survey

4. Results

For the collection of data the number of correct answers in each question item was summed up and its average score was calculated for each of the presentation modes (Table 1). Two of the 51 subjects were excluded from the data because it was confirmed that they had already known some of the words used in the learning sections. In Test 1, conducted immediately after the learning sections, the items with the highest percentage was those of W→W mode, the second highest was C→C mode, and the lowest was C→W mode. An analysis of variance showed that there was significant difference among the three modes of question items (F=35.0, p<.01). In Test 2, conducted 25 minutes after the learning sections, the same tendency was found in regard to the average percentage of the three modes, but a significant difference was detected only between C→W mode and the other two modes. The difference between W→W mode and C→C mode was not significant. In Test 3, conducted 7 weeks after the learning sections, the items with the highest achievement rate were those of C→C mode, and significant difference was detected between C→C mode and the other two modes. In Test 4, whose C→C items were not in the learning section lists, no significant difference was detected among the three modes. As shown in Figure 1,

<table>
<thead>
<tr>
<th>Item Mode</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>W→W</td>
<td>74.1</td>
<td>71.6</td>
<td>25.1</td>
<td>26.9</td>
</tr>
<tr>
<td>C→W</td>
<td>33.1</td>
<td>31.0</td>
<td>18.3</td>
<td>26.3</td>
</tr>
<tr>
<td>C→C</td>
<td>59.4</td>
<td>62.0</td>
<td>39.4</td>
<td>26.0</td>
</tr>
</tbody>
</table>

W mode and the other two modes. The difference between W→W mode and C→C mode was not significant. In Test 3, conducted 7 weeks after the learning sections, the items with the highest achievement rate were those of C→C mode, and significant difference was detected between C→C mode and the other two modes. In Test 4, whose C→C items were not in the learning section lists, no significant difference was detected among the three modes. As shown in Figure 1,
C→C mode had the lowest rate of decline.

![Graph showing the percentage of correct answers](image)

Figure 1  The percentage of correct answers (%)

Next, to investigate the difference in achievement rate between the types of target words, in other words, between nouns and verbs, the percentage of correct answers for each type was calculated. The result is shown in Table 2 and Figure 2. In C→C and C→W modes, the

<table>
<thead>
<tr>
<th></th>
<th>Test1</th>
<th>Test2</th>
<th>Test3</th>
<th>Test4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Noun</td>
<td>Verb</td>
<td>difference</td>
<td>Noun</td>
</tr>
<tr>
<td>W→W</td>
<td>37.3</td>
<td>36.7</td>
<td>0.6</td>
<td>35.3</td>
</tr>
<tr>
<td>C→W</td>
<td>22.4</td>
<td>10.6</td>
<td>11.8 **</td>
<td>20.8</td>
</tr>
<tr>
<td>C→C</td>
<td>34.9</td>
<td>24.5</td>
<td>10.4</td>
<td>36.9</td>
</tr>
</tbody>
</table>

Table 2  Difference of achievement rate according to lexical type in each presentation mode

![Bar chart showing difference of achievement rate](image)

Figure 2  Difference of achievement rate according to lexical type in each presentation mode
achievement rate was generally higher when the target words were nouns than when they were verbs, and especially the achievement rate of nouns in C→W mode were significantly higher than that of verbs in Test 1, Test 2 and Test 4 (F=15.6, p<.01; F=11.4, p<.01; F=8.5, p<.05, respectively) On the other hand, in W→W mode, there was almost no difference in achievement rate except Test 4.

As shown in Figure 3, the results of the survey revealed that the strategy used more often by the subjects in learning sections was inference of the meanings of target words by context (57.5%). The rest of the subjects focused mainly on target words (42.5%). In other words, they paid attention to target words rather than chunks, but all these subjects except one answered that they partly used the context. In the tests, however, the number of subjects who focused on target words fell to 22.5% and the rest of the subjects used strategies of inference by context or focus on chunks as unanalyzed wholes. This indicates that most learners tried to use inference to discover the meanings of target words in the learning sections, and when they are required to retrieve the memory stored during learning, most of them (about 80%) tried to use inference or the memory of chunks themselves.

The result of Test 1 reveals that WP method is more efficient in retaining the memory of lexical meaning than CP method in a short span. This is in agreement with the notion that larger objects take more time to be stored in our memory. Along with this result, the less efficient lexical retrieval in C→W mode items than C→C mode items allows us to assume that chunks were retained in the metal lexicon as unanalyzed wholes, not as sums of analyzed lexical items. This finding agrees with the result of the survey.

On the other hand, the results of Test 2 and 3 reveals that CP method is more efficient in retaining the memory of lexical meaning in a long span. Considering the fact that the period of learning by WP and CP methods was the same (20 minutes), the efficiency of CP method can be
said to be very high. The validity of this analysis is confirmed by the fact that in Test 4, whose C→C items were new to the subjects, no significant difference was detected among the three modes, which proves that there is no factor in C→C mode that would promote the process of memorization.

As for the efficiency of lexical retention between nouns and verbs, except for the data in Test 4 which is inexplicable, it can be stated that in C→W mode the retention rate of verbs is generally very low. Along with this result, the results of the survey give us a speculation. When the subjects learned the lexical meaning by CP method, it is probable that networks of the words composing chunks were gradually built up in their mental lexicons. In the tests, by seeing a part of a chunk, subjects activated their established networks and retrieve the meaning of the target word. Verbs are more functional in its nature than nouns and they need to be given more information by other lexical items included in chunks in order to fulfill their functions. This means that verbs need more time to build mental networks with other lexical items. 20 minutes for learning was probably not enough to establish fixed lexical networks, and this made lexical meaning retrieval more difficult. This could be indicated by the result showing that the retrieval rates of verbs by C→C mode tests are generally lower than those of nouns. However, it must be noted that this data was not statistically significant.

6. Conclusion

This study was conducted to determine if differences in learning methods have any effect on the efficiency of lexical memory retrieval. For this purpose two methods of learning, chunk presentation method and word presentation method, were compared. The result showed that in the case of chunk presentation method the effect of learning continued longer. This method was more efficient in terms of the lexical meaning retrieval after an extended period of time (7 weeks). As for the effect of lexical types on the efficiency of lexical meaning retrieval, the memory of verb chunks was more difficult to retain than that of noun chunks.

A pedagogical implication of these findings is that intermediate learners will benefit from the chunk presentation method of lexical learning. They have already acquired the knowledge of basic words, so that they are prepared to infer newly encountered words presented as a form of chunk. It is reported that L2 learners are generally learning words through the paired-association method (Kawamura 2004). However, they often complain that the words they learn by this method are very easily forgotten. There is a possibility that the chunk presentation method will be one of the solutions to this problem.

Some limitations to this study may be that the depth of the lexical knowledge acquired through this method is not examined. The role of L1(Japanese) and the effect of using computer assisted programs should also be measured. Further studies will be needed to examine these questions.
References


Appendix 1

単語学習

Try to learn the meanings of the words by heart.
単語の意味を覚えてください。

siblings 兄弟

guise 外観

resurrection 復活

elector 選挙人

rector 校長

condemnation 非難

beech ぶなの木

crypt 地下室

subsistence 生存

lineage 家柄

単語学習テストA-Test

Match the items on the right with the items related in meaning on the left.
左の単語の意味を右から選びなさい。（左クリックしそのままドラッグし指を離しドロップ）

Sibling 兄弟

guise 外観

resurrection 復活

elector 選挙人

rector 校長

condemnation 非難

beech ぶなの木

crypt 地下室

subsistence 生存

lineage 家柄

Sorry! Try again. Incorrect matches have been removed.
Your score is 50%.

単語学習テスト1

Match the items on the right with the items related in meaning on the left.
左の表現の中に含まれるいずれかの単語の意味を右から選びなさい。（左クリックしそのままドラッグし指を離しドロップ）

a car freak 動物

economic upheaval 態

on a window ledge 小石

plenty of pebbles 小石

police suppression 霊

rosy-cheeked lass 変動

street congestion 混雑

the last homage お別れ

water trough おけ

women's emancipation 解放

Sorry! Try again. Incorrect matches have been removed.
Your score is 60%.

NII-Electronic Library Service
Appendix 2

Nouns
freak upheaval ledge pebble suppression lass congestion homage
through emancipation sibling guise resurrection elector rector
condemnation beech crypt subsistence lineage

Verbs
banish contaminate convene intimdate lust mar shear sprawl stoop
subside bum hunch crate clump pant dangle emulate contrive snort
muster

Appendix 3

<table>
<thead>
<tr>
<th>English</th>
<th>Japanese</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>a car freak</td>
<td>マニア</td>
<td>sibling</td>
</tr>
<tr>
<td>economic upheaval</td>
<td>変動</td>
<td>guise</td>
</tr>
<tr>
<td>on a window ledge</td>
<td>棚</td>
<td>resurrection</td>
</tr>
<tr>
<td>plenty of pebbles</td>
<td>小石</td>
<td>elector</td>
</tr>
<tr>
<td>police suppression</td>
<td>弾圧</td>
<td>rector</td>
</tr>
<tr>
<td>rosy-checked lass</td>
<td>娘</td>
<td>condemnation</td>
</tr>
<tr>
<td>street congestion</td>
<td>混雑</td>
<td>beech</td>
</tr>
<tr>
<td>homage to my friend</td>
<td>敬意</td>
<td>crypt</td>
</tr>
<tr>
<td>water trough</td>
<td>おけ</td>
<td>subsistence</td>
</tr>
<tr>
<td>women’s emancipation</td>
<td>解放</td>
<td>lineage</td>
</tr>
</tbody>
</table>

Appendix 4

Vocabulary Test

1 upheaval 1 おけ 16 banish all errors 1 すぼめる
2 subsistence 2 解放 17 emulate 2 去り込む
3 suppression 3 小石 18 lust for power 3 掛なう
4 sibling 4 告別 19 convene 4 払いのける
5 plenty of pebbles 5 混雑 20 muster 5 欲する
6 street congestion 6 棚 21 subside 6 汚染する
7 freak 7 弾圧 22 shear 7 落ち入る
8 the last homage 8 変動 23 mar the beauty 8 養す
9 lineage 9 マニア 24 intimidate 9 切り落とす
10 ledge 10 娘 25 sprawl on a sofa 10 召集する
11 women’s emancipation 11 家柄 26 hunch 11 鼻を鳴らす
12 lass 12 外観 27 dangle 12 ぶら下げる
13 rector 13 兄弟 28 stoop his shoulder 13 奪い起こす
14 guise 14 校長 29 contaminate 14 曲げる
15 water trough 15 生存 30 snort 15 見習う

120