Exploration of Two Aspects of Vocabulary Knowledge:
Paradigmatic and Collocational

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Abstract

In spite of increasing vocabulary studies, a process of vocabulary acquisition remains unclear. This may be ascribed to lack of vocabulary acquisition models and longitudinal studies that address how components of vocabulary knowledge develop. This study aims to shed light on how two aspects of EFL learners' vocabulary knowledge, paradigmatic and collocational aspects, develop over one academic year. The results show first-year university students did not increase their vocabulary size, paradigmatic and collocational knowledge despite about 75-hour instruction. This may be accounted for by the students' lack of motivation of learning English. Furthermore, vocabulary aspects showed different changing patterns. Collocational knowledge seemed to change more easily than vocabulary size and paradigmatic knowledge. This may lend support to Schmitt's (1998a) argument that knowledge of meaning sense is rather stable. The results suggest some implications on teaching vocabulary, especially on a collocational aspect of vocabulary knowledge.

1. Introduction

In spite of increasing vocabulary studies, a process of vocabulary acquisition remains unclear. This may be due to two factors: lack of models that explain a process of vocabulary acquisition and lack of longitudinal studies that explore how different aspects of vocabulary knowledge function in acquisition and are interrelated to one another.

Meara (1997) argues for the need to build a model that could explain a process of vocabulary acquisition and loss. He deplores the current trend of vocabulary research that has neglected findings in other disciplines, especially psycholinguistics, that address vocabulary acquisition by means of models. Most applied linguistics research has only described learners' vocabulary size or aspects of vocabulary knowledge and very few studies have attempted to explain the process of how vocabulary is learned. He
regards this lack of models as a major reason why applied linguistics has not made a significant progress in revealing a process of vocabulary acquisition.

The other factor, lack of longitudinal studies, is pointed out by Schmitt (1998a) and Henriksen (1999). Schmitt (1998a) maintains that the majority of vocabulary studies address vocabulary size and few attempt to shed light on a process of vocabulary acquisition by focusing on individual learners’ growth in various aspects of vocabulary knowledge and their interrelationships. He points out four features that vocabulary acquisition research should incorporate: 1) description of individual learners’ vocabulary development; 2) a longitudinal study; 3) measurement of incremental development of vocabulary; 4) treatment of various aspects of vocabulary knowledge. He advocates a dimension approach for investigating the incremental nature of vocabulary acquisition that describes vocabulary knowledge by use of a framework. He argues that research based on such frameworks can be used for those for explanatory research and lead to revealing an overall vocabulary acquisition process. The same argument can be found in Henriksen (1999) that most studies have addressed the initial stage of vocabulary acquisition – that is, mapping meaning onto form – and neglected a later stage of network building. She emphasizes on the use of a combination of test formats that tap different aspects of knowledge in order to describe a learner’s lexical competence. She suggests that researchers should explore how L2 learners construct and reorganize their L2 semantic network to reveal a vocabulary acquisition process.

There are some studies that address different aspects of vocabulary knowledge in a dimension framework. Schmitt and Meara (1997) investigated how L2 learners of English developed their vocabulary size and two aspects of vocabulary knowledge (affix and association) over a year. They found that the learners’ vocabulary significantly expanded from 3,900 word families at the beginning of a school year to 4,230 at the end. They found that their learners significantly increased most of the suffixes studied over the period of research. They also found that the vocabulary size correlated with affix and association knowledge and that there was an interrelationship between the two aspects of word knowledge. Mochizuki and Aizawa (2000) made a cross-sectional study of EFL learners’ vocabulary size and affix knowledge and found that their vocabulary sizes and prefix and suffix knowledge were highly correlated. Schmitt (1998a) conducted a longitudinal study on vocabulary development of advanced L2 learners. He investigated how three learners of English developed the spelling, meaning, grammar and association of eleven polysemous words over a period of one and a half year. He found the following four points: 1) The three learners had mastered an English sound-spelling relation and had no problem about spelling a word even without knowing its meaning; 2) The three learners mostly retained their understanding of the meanings of the target words (72%). As for the rest of the words, they developed their understanding of the meanings 2.5 times more than they forgot the meanings; 3) One of the learners showed a steady progress in grammar, which could be attributed to an explicit study of the words with a dictionary, while the other two made no clear progress in grammar; 4) The three learners tended to develop their association knowledge of the target words. This study provides
evidence to the assumption that vocabulary acquisition is a gradual and incremental process with each component of word knowledge respectively fluctuating. Shimamoto (2000) addressed four aspects of receptive vocabulary knowledge in a cross-sectional study: spoken form, written form, paradigmatic and syntagmatic knowledge. She found that the four aspects of vocabulary knowledge were interrelated with each other and they were also correlated with the learners’ vocabulary size. One of the intriguing findings in Shimamoto (2000) is that moderate correlations (.32 - .68) were found between the vocabulary size and the four types of vocabulary knowledge among learners with an average vocabulary size of 3,700 word families and those with an average vocabulary of 2,600 words, while no significant correlations (.14 - .29) were found among learners with an average vocabulary of 3,200 words. She claims that there is a vocabulary size level at which L2 learners reorganize their mental lexicon as L1 learners do and that this may account for the result.

These studies provide some evidence to interrelatedness of different aspects of L2 learners’ vocabulary knowledge. It is assumed that spoken and written form, affix, meaning, association, grammar and collocation aspects of vocabulary knowledge develop as learners expand their vocabulary size. However, except for Schmitt and Meara (1997) and Schmitt (1998a), the data were taken cross-sectionally and only at one point in time. It is not clear how the same learner develops some components of his or her vocabulary knowledge over a certain period.

Research questions

L2 learners appear to incrementally increase some aspects of word knowledge; spelling, meaning, grammar and association (Schmitt, 1998a). However, this incremental nature of vocabulary growth has not been shown in other aspects of word knowledge. This study aims to explore how Japanese learners of English develop two aspects of vocabulary knowledge, paradigmatic and collocational aspects, and their vocabulary size over one academic year (nine months).

2. Method

2.1 Subjects

The subjects were 82 Japanese first-year university students in two intact classes. They majored in German, Chinese or Japanese at university. They had taken formal English instruction for at least six years. At university they took two 90-minute English classes a week; one for reading by a Japanese instructor and the other for conversation by a native speaker of English. The subjects took the two classes about 25 weeks in one academic year and so the total instruction they took amounted to around 75 hours during this study period.
2.2 Materials

A vocabulary size test (Mochizuki, 1998) was used to measure the subjects’ vocabulary size. The test is similar to the Vocabulary Levels Test (Nation, 1990) except for the following three points: 1) it uses Japanese translation instead of English definition; 2) it has seven levels (1000 to 7000 word levels) each of which samples target words from a 1000-word vocabulary list based on frequency count (Sonoda, 1996); 3) it estimates a vocabulary size in terms of word items rather than word families. Mochizuki (1998) argues that the test is better suited to measure the vocabulary size of lower intermediate Japanese learners of English than the Vocabulary Levels Test.

The researcher devised a paradigmatic knowledge test that tests 72 words in a four-choice format. Target words were selected in order that they would represent a variety of words in word class and frequency of use. The target words consisted of four groups of 18 words taken from different word lists based on frequency count (Sonoda, 1996). Each group was made up of six nouns, verbs, and adjectives taken from one of the four vocabulary lists. These target words were randomly chosen from the lists. For each target word a synonym was selected from dictionaries and thesauri and was used as a correct answer. When a target word did not have a synonym, a superordinate, co-ordinate or subordinate was used as a correct answer (eg. season for winter). This means the target word and the correct answer belong to the same word class. Then the three other choices were selected in the following manner: 1) find the vocabulary list a correct answer belongs to; 2) from the list randomly choose three words of the same part of speech as the correct answer; 3) change a word if it is similar to the target word in meaning. It is assumed that all the four choices had the same level of difficulty for the subjects because they belong to the same frequency level. Examples are given below.

<table>
<thead>
<tr>
<th>job</th>
<th>(1) date</th>
<th>(2) sort</th>
<th>(3) star</th>
<th>(4) work</th>
</tr>
</thead>
<tbody>
<tr>
<td>claim</td>
<td>(1) affirm</td>
<td>(2) expire</td>
<td>(3) mimic</td>
<td>(4) transit</td>
</tr>
<tr>
<td>available</td>
<td>(1) accessible</td>
<td>(2) chronic</td>
<td>(3) latent</td>
<td>(4) notorious</td>
</tr>
</tbody>
</table>

The researcher also made a collocation test. It would be probably best to have learners produce collocates of a word to measure a learner’s collocational knowledge, but it has methodological problems such as establishing a norming list and deciding “how broad a span to use in collocation measurement” (Schmitt, 1998b, p.40). Thus, the present researcher decided to measure receptive collocational knowledge in a multiple-choice format.

The test used the same 72 target words as used in the paradigmatic knowledge test. However, it used a collocate of a target word as a correct answer. Collocates of target words were selected from the Collins COBUILD English Collocations on CD-ROM or the Edinburgh Associative Thesaurus; an interactive version (http://www.cis.rl.ac.uk/proj/psych/eat.html). The word class of a collocate differed depending on a target word: if a target word was a noun, a noun, verb or adjective was chosen as a
collocate, if a target word was a verb or adjective, a noun was chosen as a collocate. The other three choices were made in the same way as the paradigmatic knowledge test. Examples are given below.

<table>
<thead>
<tr>
<th>job</th>
<th>(1) answer</th>
<th>(2) find</th>
<th>(3) lay</th>
<th>(4) put</th>
</tr>
</thead>
<tbody>
<tr>
<td>claim</td>
<td>(1) contrast</td>
<td>(2) generation</td>
<td>(3) responsibility</td>
<td>(4) sorrow</td>
</tr>
<tr>
<td>available</td>
<td>(1) debt</td>
<td>(2) economy</td>
<td>(3) information</td>
<td>(4) surface</td>
</tr>
</tbody>
</table>

2.3 Procedure

The vocabulary size test was given to the subjects lasting 40 minutes in April 1999, when a new academic year starts in Japan. A week later the paradigmatic knowledge test and the collocation test were conducted lasting 40 minutes. All the test questions and answer sheets were collected. The subjects took the reading class and the conversation class in the following two semesters. In the reading class they read newspaper articles on politics, economics and national news. In the conversation class they talked about a variety of general topics. Both classes paid no special attention to the target words in the paradigmatic knowledge and the collocation test. That means that the target words might have been used in the newspaper articles and in the conversations, but the instructors gave no special treatment to these words. Without being given notice, the subjects took the same three tests in succession in the very last session of the academic year in January 2000.

3. Results

Although most of the 82 students took the three tests twice, some missed one in April or three in January and some were not able to finish all the questions. Those subjects who missed any test or who left the last 20 questions unanswered in any one of the tests were excluded for further analysis. This reduced the number of subjects to 54.

Tables 1 to 3 show the mean, the standard deviation, the maximum and the minimum score of the vocabulary size, the paradigmatic knowledge, and the collocation test. The reliability coefficient $\alpha$ was calculated for the paradigmatic knowledge test (0.71 in April; 0.75 in January) and for the collocation test (0.54 in April and 0.70 in January). These values show that the tests had a moderate internal reliability. The subjects had an average vocabulary size of 4,848 words in April and increased it to 4,859 words in January. On average they scored 64.68% in April and 65.33% in January in the paradigmatic knowledge test and 57.94% in April and 59.46% in January in the collocation test. An F-test was conducted on the three tests. There was no statistically significant difference between the variance of the April result and that of the January result of the vocabulary size ($F = 1.461, df = 106, ns$) and the paradigmatic knowledge test ($F = 0.021, df = 106, ns$), while a significant difference was found between the variance of the April result and that of the January result of the collocational knowledge test.
(F = 5.40, df = 106, p < 0.05). Thus, a T-test was conducted on the vocabulary size and the paradigmatic knowledge test and a non-parametric test was used for the collocational knowledge test. There was no significant difference found between the April and the January mean in any of the three tests.

Table 1. Vocabulary Size

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>4848</td>
<td>474.5</td>
<td>5805</td>
<td>3500</td>
</tr>
<tr>
<td>January</td>
<td>4859</td>
<td>513.4</td>
<td>5885</td>
<td>3962</td>
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</tbody>
</table>

Table 2. Paradigmatic Knowledge

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
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<tbody>
<tr>
<td>April</td>
<td>46.57</td>
<td>6.48</td>
<td>61</td>
<td>35</td>
</tr>
<tr>
<td>January</td>
<td>47.04</td>
<td>6.76</td>
<td>63</td>
<td>31</td>
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</table>

Table 3. Collocational Knowledge

<table>
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<th>Mean</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>41.72</td>
<td>5.4</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>January</td>
<td>42.81</td>
<td>6.43</td>
<td>56</td>
<td>32</td>
</tr>
</tbody>
</table>

4. Discussion

There are two interesting phenomena observed in the results. We will discuss each phenomenon and then implications of the results.

First, there was no significant difference between the mean of April and that of January in the vocabulary size test. This means that the subjects did not enlarge their vocabulary size in spite of approximately 75-hour instruction. The result makes a sharp contrast with Schmitt and Meara (1997), which found Japanese EFL learners increased their vocabulary size from 3,900 to 4,230 word families in the study period. The difference between the results of the two studies may be explained by assuming that the subjects of Schmitt and Meara (1997) were more motivated to learn English than those of the present study. The subjects of the present study were first-year university students that majored in German, Chinese or Japanese and so they might find English less important than their majors. On the other hand, the subjects of Schmitt and Meara (1997) were first- and second-year English-major university students and third-year high school students. Both university and high school students probably found learning English essential because it was their major for the university students and was one of the most important subjects of university entrance examinations for the high school students. Thus, it can be assumed that motivation was a major factor that caused the difference in vocabulary growth between the two studies.
Second, the vocabulary size test and the paradigmatic knowledge test had similar variances in April and January, while the collocational knowledge test had significantly different variances in April and January.

This can be seen clearly in Figures 1 to 3. Figures 1 and 2 show a moderate change of vocabulary size and paradigmatic knowledge from April to January, while Figure 3 presents a rather drastic change of collocational knowledge. The different change patterns may be explained by Schmitt’s (1998a)
argument that “knowledge of meaning sense has a certain amount of inertia and does not change easily” (p.300). Schmitt (1998a) argues that learning a number of meaning senses is difficult for L2 learners and at the same time forgetting them is also unlikely. His assertion holds true of the vocabulary size and the paradigmatic knowledge test result because both tests measure learners’ meaning aspect of word knowledge in principle. The vocabulary size test required the subjects to choose an English word corresponding to a Japanese word and the paradigmatic knowledge test called for them to choose an English word similar in meaning to a target word. Thus the subjects were able to choose a correct answer if they knew the meaning of a target word. If Schmitt’s argument is appropriate, then it will be reasonable that the changes of the subjects’ vocabulary size and paradigmatic knowledge were moderate. On the other hand, collocational knowledge seemed to behave differently. Figure 3 illustrates that more learners increased or decreased their collocational knowledge than their vocabulary size and the paradigmatic knowledge. This seems to indicate that collocational knowledge changes more easily than meaning knowledge and to lend a partial support to Trapman’s findings that a syntactic aspect of word knowledge was lost while the meaning and form were retained (cited in Weltens and Grendel, 1993).

The results of the study imply the importance of motivation and teaching other vocabulary aspects than the meaning aspect. The result that the learners did not increase their vocabulary size and the paradigmatic knowledge in spite of instruction may be accounted for by their lack of motivation. Language teachers should bear in mind that they need to motivate their learners in learning a second language in order to expand their vocabulary in breadth and depth. Another result that collocational knowledge was more likely to change easily may suggest that language teachers should encourage their learners to pay attention to other aspects of vocabulary knowledge than the meaning aspect in their study of English. It would be an idea that teachers give both consciousness-raising activities and productive activities such as composition and speech. In consciousness-raising activities, teachers can draw their students’ attention to collocation in a reading text and tell them to find particular combinations of words in the text. Productive activities might be more helpful to improve collocational knowledge because students are required to think about collocation and use of words in an attempt to express their own idea.

5. Conclusion

This study aimed to shed light on the process of L2 learners’ development of two aspects of vocabulary knowledge. The learners as a whole did not show any progress in the aspects and their vocabulary size in spite of about 75 hours of instruction in one academic year. However, the paradigmatic and collocational aspects seem to differ in their state in an L2 learner’s mind, that is, the paradigmatic aspect appears to be more stable than the collocational aspect.

The study has several limitations. First, there is a methodological issue that the study elicited L2 learners’ receptive knowledge on paradigmatic and collocational aspects in four-choice formats. The use
of multiple-choice formats has the advantage of enabling researchers to deal with a large number of words and to process data objectively and efficiently by use of an optical mark reader. However, a multiple-choice format test only measures a small portion of a learner’s knowledge and is likely to invite guessing. It is possible that a learner happens to be unfamiliar to an answer word in the paradigmatic or the collocational knowledge test while he or she has developed paradigmatic and collocational knowledge of a target word. Thus it remains unclear whether this type of test format is valid in eliciting learners’ vocabulary knowledge. Second, the subjects of this study were rather homogenous in terms of their English proficiency and educational background. They were intermediate EFL learners that had studied English at least for six years before they entered the university. Although their motivation for learning English seemed to differ considerably, they were still considered to be similar. It is not certain if they can represent a whole group of EFL learners. Surely we need a further study that investigates how a wider range of EFL learners improves their vocabulary knowledge over a certain period of time.

References

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