How Do Japanese EFL Learners Comprehend Derivatives?: A Qualitative Analysis from the Perspective of Vocabulary Expansion

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Abstract
Using morphological knowledge is considered effective for vocabulary expansion of EFL learners. According to Nagy and Anderson (1984), an optimum use of the knowledge of suffixed derivatives leads to a twofold increase in vocabulary size. A previous study (Sakata, 2006) showed that low-intermediate Japanese EFL learners can comprehend about 80% of derivatives with base word knowledge. To corroborate this study, this present paper employed an interview procedure to confirm whether Japanese EFL learners have the ability to use morphological information to comprehend derivatives. The results showed that subjects used morphological information with most of the derivatives (81.2%) when the base words were known. For the purpose of vocabulary expansion, the results showed that unfamiliar derivatives could be comprehended at the rate of 52.8%, indicating that employing morphological information could lead to a 1.5-fold increase in learners' vocabulary size.

Key Words
Receptive vocabulary expansion, Derivational knowledge

Introduction
Vocabulary acquisition is hugely demanding for EFL learners. Native speakers are said to have at least a 20,000 word-family receptive vocabulary (Nation, 2001, p. 9). Even though EFL learners don’t need to have such a huge vocabulary size as low frequency words seldom occur, it is said that they should have at least 3,000 word families (Laufer, 1992).

One way to master these word families is using the derivational relationships between English words. For example, the derivative *happiness* is derived from the base word *happy*. It can be considered that already knowing the meaning of the base word *happy* might facilitate the acquisition of the meaning of the derivative *happiness* since the two forms are similar and learners can easily extract the base form *happy* from the form of *happiness*. Learners can use this kind of relationship to expand their vocabulary size.

The knowledge to use this relationship belongs to morphological knowledge. Tyler and Nagy (1989) showed that native speakers of English experience a developmental sequence of morphological knowledge from Phase 1 (relational knowledge, RK) through Phase 2 (syntactic knowledge, SK) to Phase 3 (distributional knowledge, DK). Speakers having RK can extract the base form of a certain derivative when facing derivatives. For example,
when they see *happiness* for the first time, they can figure out the meaning by extracting the base form *happy* in the form of the derivative. This phase doesn’t require explicit knowledge of suffixes (e.g., *-ness*). Suffixes usually provide the syntactic functions of derivatives and those functions don’t always have to be known when reading or listening is taking place since that information is already provided by the contexts surrounding the derivatives.

SK refers to the knowledge related to the understanding of the syntactic information contained in certain suffixes. In the example of *happiness*, SK refers to the knowledge of the function of the suffix *-ness*, which changes words into nouns. This knowledge enables speakers to infer the part of speech of unfamiliar words and facilitates the comprehension of the whole word. Finally, with DK, speakers become aware of which part of speech a certain suffix attaches to. For example, this knowledge allows them to know that the suffix *-ness* only attaches to adjectives, not to nouns or verbs. Tyler and Nagy (1989) showed that the acquisition order of native speakers was RK → SK → DK.

Of the three kinds of knowledge referred to above, RK is considered important for receptive skills (e.g., listening and reading) development since learners don’t have to know the functions of suffixes explicitly. Adequate RK is considered to enable them to successfully infer the meaning of derivatives with base word knowledge.

How much morphological knowledge do Japanese EFL learners have? With respect to their SK, Schmitt and Meara (1997) investigated suffix knowledge of Japanese high school and university EFL students, by asking the subjects which suffixes were possible for each of 20 verbs (receptive suffix knowledge), and by asking them to provide suitable suffixes to the verbs (productive suffix knowledge). They found that those learners had quite insufficient suffix knowledge. The rates of the correct answers were 42/47% for productive knowledge and 62/66% for receptive knowledge. They also found that the productive suffix knowledge correlated significantly with vocabulary size at 0.27/0.35 and the receptive suffix knowledge correlated with it at 0.37/0.41. From these results, they concluded that those learners’ suffix knowledge was poor.

Mochizuki and Aizawa (2000) asked high school and university students into which parts of speech certain suffixes change words. The tested suffixes were “in Levels 3-6 of Bauer and Nation’s (1993) Affix Levels and those used in more than two words in the “Vocabulary Lists” (Nation, 1996)” (Mochizuki and Aizawa, 2000, p. 295). The rate of correct answers was 67%. The correlation coefficient of suffix knowledge with vocabulary size was little higher in this study (0.54).

The above studies show that Japanese EFL learners have insufficient suffix knowledge. However, suffix knowledge may not always be needed to comprehend derivatives with base word knowledge. Sakata (2006) showed that even if attached suffixes were not known, low-intermediate level Japanese EFL learners in a university could comprehend more than 80% of derivatives when they have their base word knowledge. Suffixes contain

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1 This research was longitudinal (a one-year study) and the numbers before / represent the percentage score at T1 (at the beginning of the study) and the numbers after / represent the percentage score at T2 (at the end of the study).
syntactic information showing which parts of speech certain words belong to, but this information is not always necessary since contexts surrounding derivatives provide such information. When reading is taking place, learners may analyze the syntactic structures of sentences to comprehend the meanings of derivatives. Therefore, how much they can comprehend derivatives with base word knowledge (RK) needs to be studied separately from how much they know affixes.

Sakata (2006) also showed that when low-intermediate Japanese EFL learners had base word knowledge, they could comprehend $60 - 90\%$ of their derivatives. It shows that they might have RK even if they have relatively insufficient SK. However, this past study investigated the knowledge of base words and derivatives separately, so it is possible that they might comprehend these words separately rather than utilizing the relationships between them. Therefore, it must be determined whether they really use morphological information to comprehend derivatives before concluding that those learners have sufficient RK.

This present study will employ interviews to explore whether low-intermediate Japanese EFL learners can use morphological information to comprehend suffixed derivatives; in other words, whether they have adequate RK. It will also be investigated whether they can comprehend derivatives with base word knowledge at recall level. The past study used multiple-choice tests to investigate the knowledge of base words and derivatives. Therefore, it can be said that the previous study explored shallower knowledge. Laufer, Elder, Hill and Congdon (2004) indicated that receptive vocabulary knowledge has two phases, receptive recall and receptive recognition. The difference in the two types of knowledge is as follows. When someone has receptive recall knowledge, he/she can access the meaning of a certain word without referring to any hints (choices). On the other hand, when someone only has receptive recognition knowledge, he/she has to be given choices to access to the meaning of a certain word. Therefore, the former knowledge is more advanced than the latter knowledge. The result of Laufer et al. also suggested that the subjects could answer larger proportions of questions in the receptive recognition test than in the receptive recall test.

Sakata (2006) tested the receptive recognition knowledge of base words and derivatives in the terms of Laufer et al. However, it wasn’t explored whether this accounts for receptive recall knowledge, too. To conclude if base word knowledge really facilitates the comprehension of derivatives, we also have to explore the knowledge at this other level. This will allow us to draw a complete picture regarding the relationships between base words and derivatives. Therefore, this study will also explore how low-intermediate level Japanese EFL learners can comprehend derivatives with base word knowledge at recall level through interviews.

How effective is the use of RK for vocabulary expansion? Nagy and Anderson (1984, p. 313) said that $12.8\%$, or about one eighth, of the words in the American Heritage corpus (Carroll, Davies and Richman, 1971) are derivatives and that there are 45,453 base words in school English textbooks for L1 students from 3rd to 9th grade. According to their calculation, with the knowledge of 45,453 base words, 40,033 suffixed derivatives are
comprehensible since the relationships to the base words are transparent. Therefore, fully utilizing the relationships between base words and suffixed derivatives is considered to lead to an approximately twofold increase in receptive vocabulary size. Can Japanese EFL learners do the same to expand their vocabulary size?

To explore their ability to expand vocabulary size using morphological relationships, this present study will also investigate whether the subjects can comprehend unfamiliar derivatives when they have base word knowledge. If they can successfully infer the meaning of unfamiliar derivatives, it can be said that they have the ability to expand their vocabulary size. Whether this is true will be investigated.

Summarizing the above contents, we will investigate the following three questions by conducting interviews:

1. Do low-intermediate Japanese EFL learners use morphological information when comprehending derivatives?
2. Does their recall level base word knowledge facilitate their recall level derivative comprehension?
3. Can they successfully infer the meaning of unfamiliar derivatives with base word knowledge to expand their vocabulary size?

The 8 subjects of the study are divided into four pairs, and the qualitative difference in terms of the comprehension of derivatives is also investigated.

Method

Subjects

Eight participants were selected based on the results of Sakata (2006) and separated into four pairs in terms of their vocabulary size and derivative comprehension rate (RK ratio) in the previous study.

<table>
<thead>
<tr>
<th>Table 1: Four subject pairs</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>N</td>
</tr>
<tr>
<td>Vocabulary size</td>
</tr>
<tr>
<td>Derivative comprehension rate (RK ratio)</td>
</tr>
</tbody>
</table>

They were selected so as to investigate whether their vocabulary size and their RK ratios in Sakata (2006) would affect the results of this present study. Therefore, there were large differences in terms of vocabulary size and RK ratios between the four pairs. The details will be followed in Table 1.

To investigate how well subjects could comprehend derivatives when they had base word knowledge, this rate was calculated by dividing the number of correctly answered derivatives by the number of whole derivatives of which base words had been answered correctly. For example, if the base words *elect* and *admire* were answered correctly but *introduce* was not answered correctly, and also if the derivatives *electorate* and *introduction* were answered correctly but admiration was not answered correctly, then the ratio would be $1/2 = 0.5$ (The item *introduction* was not incorporated in the calculation since a base word, *introduce*, had not been answered correctly). This ratio was calculated on an individual basis.
Materials

Twenty words were selected from the words of 2,000 word family level appearing in Schmitt's VLT test Version 1 (Schmitt, 2000), which are high frequency words. The meanings of these words (at recall and recognition level) were tested as base word knowledge. High frequency words were selected to raise the possibility of correct answering, as we cannot explore the relationship between base words and derivatives if subjects (especially low vocabulary holders) don't know the base word meaning.

Derivatives of the base words were selected from Nation's word family list. On the list, each word family is headed by its base form. For example, acceptability, acceptable, acceptance, accepted, accepting and accepts are grouped together, headed by accept. One word family member was selected for each base word. The selection was randomly conducted. No adjustments with respect to selecting derivatives considering the level of the subjects were conducted so that their ability to apply the base word knowledge to comprehend derivatives could be explored. That is, easy base words were selected to ensure as much as possible that the subjects would know them. However, we have to explore their ability to apply their knowledge of base words to any derivative. Therefore, no level adjustment was conducted to choose the derivatives.

Selected base words and derivatives are as presented in the next table.

<table>
<thead>
<tr>
<th>Table 2: Tested base words and derivatives</th>
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</thead>
<tbody>
<tr>
<td>Base words</td>
</tr>
<tr>
<td>victory</td>
</tr>
<tr>
<td>secret</td>
</tr>
<tr>
<td>trick</td>
</tr>
<tr>
<td>shadow</td>
</tr>
<tr>
<td>wealth</td>
</tr>
<tr>
<td>climb</td>
</tr>
<tr>
<td>examine</td>
</tr>
<tr>
<td>bake</td>
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<tr>
<td>connect</td>
</tr>
<tr>
<td>limit</td>
</tr>
</tbody>
</table>

(The above words are put in the order of the base word test.)

When RK is measured, contexts seem to play a big role as mentioned above. Therefore, we will have to explore the situation in which contexts are provided, too. For this purpose, contexts4 were created with the following two criteria. First, as low vocabulary holders participated in this experiment, contexts should be adjusted to those learners to prevent non-experimental variables (such as misreading the context) from affecting the results. Contextual sentences were made using words within the 2000 word-family level (quoted from the Nation's word family list). However, even with this high

4 Contexts were also made for base words to investigate the knowledge level of base words.
frequency vocabulary, subjects might not be able to comprehend the context because of their insufficient knowledge of base words. In that case, Japanese definitions for the unknown words were provided by the interviewer.

Second, contexts were carefully made to avoid providing subjects with semantic hints to comprehend derivatives since contexts providing this kind of hint prevent the grasp of the true ability of subjects to comprehend the meaning of derivatives. They were made to facilitate only the syntactic comprehension of derivatives.

The procedure described below includes multiple-choice tests. Therefore, we had to make alternative answers for each base word and derivative. The choices were given to the subjects with contexts, and much care was taken to prevent subjects from answering with test-taking techniques. If there is only one alternative fitting the blank of a provided sentence, they will choose that answer. Therefore, only semantically suitable alternatives to the contexts were made.

There was another point to consider when making the alternatives. To explore whether subjects can comprehend derivatives with syntactic correctness, each cluster of 6 alternatives consisted of 3 pairs of semantically similar but syntactically different choices, each pair representing a different concept.

An example of one cluster is as follows.

**Table 3: An example cluster for the base word test**

<table>
<thead>
<tr>
<th>The choices for trick</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. tejina (trick)</td>
</tr>
<tr>
<td>2. kijutsushi (trickster)</td>
</tr>
<tr>
<td>3. gaiken (appearance)</td>
</tr>
<tr>
<td>4. gaienkentekina (surface)</td>
</tr>
<tr>
<td>5. shuushuhin (collection)</td>
</tr>
<tr>
<td>6. shuushusuru (collect)</td>
</tr>
</tbody>
</table>

(The context for trick was: His trick is wonderful.)

**Procedure**

First, base word knowledge was tested\(^1\). The answer sheet with the base word test was distributed to each subject and participants were asked to provide Japanese definitions to each base word as well as they could. After their completion of the test items, the provided answers to the base word knowledge test were checked by the interviewer. If the correctness of the answer was not clear, an electronic dictionary was used to investigate whether those answers were acceptable. If the answers passed these criteria, then the knowledge level for such words was assigned as receptive recall. The answers were scored on two points: semantic correctness and syntactic correctness. If subjects provided unacceptable answers, the investigation continued to the next phase.

In the second phase, they were provided with contexts. As described above, these sentences had minimum semantic clues and were made to facilitate syntactic comprehension. If subjects could provide correct (semantically and syntactically) definitions with this contextual help, the knowledge level for that word was assigned as receptive recall with contexts and the investigation for that word ended. If they couldn’t

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\(^1\) A suffix knowledge test was also conducted but will not be mentioned in this study.
provide acceptable answers, the investigation continued to the next phase.

In the final phase, they were provided with 6 alternatives (Japanese definitions). If they could successfully choose the right (semantically and syntactically correct) definition from alternatives, the knowledge level for that word was assigned as receptive recognition and the investigation for that word ended.

Summarizing the procedure, it can be said that the procedure continued until they could provide or choose the semantically and syntactically correct answer or their knowledge was determined to be none. The purpose of this procedure was to confirm the knowledge level (receptive recall or receptive recognition) for each base word.

The above contents showed the procedure for base words. After a two-week interval, the subjects were interviewed to determine their ability to apply their base word knowledge to comprehend derivatives. At this time, the knowledge level for each derivative was assigned as for base words, except that the meaning was asked verbally at the beginning of the interview. Besides this difference, their method of comprehending derivatives was also investigated to determine whether they used morphological information. For example, when being faced with a derivative, preference, whether they use the similarity between the forms of the base word prefer and the derivative preference to comprehend the derivative was checked. The contents of the interviews will be discussed in the results section.

Results
Quantitative analysis

To investigate whether subjects could comprehend derivatives at recall level when they had base word knowledge at recall level, quantitative analysis was conducted. Here, an RK ratio was calculated with respect to derivatives (e.g., preference) whose base word (e.g., prefer) had been answered correctly.

The RK ratio results showed that if they had base word knowledge at recall level, they could comprehend derivatives (at least with contextual help<sup>6</sup>) at recall level at 78.0%. This figure is similar to that obtained in Sakata (2006). This suggests that even if the stricter criterion of recall level is adopted, subjects show a similar tendency in terms of derivative comprehension.

The difference in derivative comprehension among the subjects of different vocabulary size was maintained in this study, too. In Sakata (2006), the more vocabulary the subjects had, the better they could comprehend derivatives. Of the four pairs participating in this study, two pairs consisted of 4 students whose vocabulary size was more than 3,000 word families. The other two pairs consisted of 4 students whose vocabulary size was less than 2,000 word families. The results of the quantitative analysis of the interviews showed that low vocabulary holders (less than 2,000 word families) could comprehend 69.2% of derivatives when they have base word knowledge. High vocabulary holders (more than

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<sup>6</sup> Why data with contextual help for derivative comprehension was used is that in real communicative situations, there are always contexts so learners can use this information. The presence of contextual help is thought to help us explore the real picture of derivative comprehension.
3,000 word families), on the other hand, could comprehend 82.9% of derivatives with base word knowledge. Of course, there were individual differences between the subjects, but the fact the overall tendency was maintained suggests that as for the recognition level knowledge, a higher vocabulary facilitates derivative comprehension at recall level.

Table 4: Derivative comprehension rates (RK ratio) at recall level of each subject

<table>
<thead>
<tr>
<th>Vocabulary size</th>
<th>More than 3,000</th>
<th>Less than 2,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK ratio in Sakata (2006)</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Name of the pair</td>
<td>Pair 1</td>
<td>Pair 2</td>
</tr>
<tr>
<td>Mean for pairs of the same vocabulary size (%)</td>
<td>82.9</td>
<td>69.2</td>
</tr>
<tr>
<td>RK ratio (%)</td>
<td>94.1</td>
<td>89.5</td>
</tr>
<tr>
<td></td>
<td>78.9</td>
<td>66.7</td>
</tr>
</tbody>
</table>

There were differences in terms of derivative comprehension rate (RK ratio) for the four different pairs in Sakata (2006). Results in this present study showed that these differences were not maintained. The RK ratios of the Pair 1 subjects (high derivative comprehension rate, high vocabulary in the previous study) were 94.1% and 78.9% respectively. The rates of Pair 2 subjects (low derivative comprehension rate, high vocabulary) were 89.5% and 66.7%. The rates of Pair 3 subjects (high derivative comprehension rate, low vocabulary) were 88.9% and 71.4%. The rates of Pair 4 (low derivative comprehension rate, low vocabulary) were 75.0% and 37.5%. These results suggest that if the test items are different, learners may show a different derivative comprehension rate (RK ratio).

Summarizing the quantitative analysis, subjects showed the same tendency at the stricter level (recall level) as at the recognition level. That is, if they have base word knowledge at the recall level, they can comprehend derivatives at the rate of about 70 ~ 80%. It was also found that the more vocabulary they have, the more derivatives they can comprehend. This confirms the result of the previous study.

Qualitative analysis 1: Relational Knowledge with Derivatives (both Familiar and Unfamiliar Derivatives)

The second main point of this chapter is to investigate whether subjects use morphological information when comprehending derivatives. When the author interviewed subjects, he checked whether they comprehended derivatives as a whole (e.g., happiness) or separated them into parts (happy + -ness). After the completion of the interviews, the author transcribed the contents of the interviews and checked the comprehension method (as a whole or separated) again to confirm the initial results. Some answers were ambiguous in terms of the comprehension method. These answers were

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Footnote: This subject was extremely low in RK ratio. However, this study could not find any reason for this poor performance.
carefully checked against the contents of the interviews.

Overall, there is a tendency for subjects to comprehend derivatives using morphological knowledge (relational knowledge, RK). The contents of some example interviews are as follows.

**baker**
Q: What is the meaning of this word?
A: I think this means a person who bakes.
Q: Why do you think so?
A: *Bake* is a verb meaning cook and *-er* means a person.

**recognition**
Q: What is the meaning of recognition?
A: *Ninshiki* (recognition)?
Q: When figuring out the meaning, did you separate the word or comprehend it as a whole?
A: I separated it. *Recognize* means to understand or something and part of this is *-tion*, then I thought this is a noun.

**climber**
Q: What is the meaning of climber?
A: *Tozansha* (climber).
Q: Did you separate the word or comprehend it as a whole?
A: *Climb* means *noboru* (in Japanese) and *-er* attaches. Therefore, I thought it is a noun.
Q: When *-er* attaches, what kind of noun does a word turn into?
A: A person.
Q: Could you separate the word?
A: Between b and e.

Calculating the rate of using morphological information, 81.2% of the derivatives which had been successfully comprehended at recall level at least with contextual help and base word knowledge, were understood through the use of morphological information. The rate of this use is a little higher with high vocabulary holders. Three thousand word family holders used morphological information at the rate of 82.8%. Subjects having a vocabulary of less than 2,000 word families use it at the rate of 77.8%. The difference is slight. Therefore, it can be said that whatever their vocabulary size is, they tend to use morphological information.

The interviews didn’t show any qualitative difference in comprehending derivatives between these pairs either. It can be concluded from these results that they use morphological information with 70~80% of the derivatives. Thus, it can be said that these low-intermediate level Japanese EFL learners have relational knowledge which they use
to comprehend derivatives through knowledge of other morphologically-related words.

**Qualitative analysis 2: Relational Knowledge with Unfamiliar Derivatives**

Some of the derivatives were unfamiliar to the subjects. For the purpose of vocabulary expansion, learners have to be able to comprehend unfamiliar derivatives to a certain extent. Whether they can do this will be discussed now. To investigate this ability of the subjects, they were asked to indicate whether each derivative was familiar or unfamiliar on answer sheets. Some ambiguous answers in terms of the familiarity of derivatives were checked against the interviews. Eventually, it was found that derivatives whose base words were correctly answered at recall level were unfamiliar to the subjects in a total of 36 cases. How well they could comprehend these derivatives was then investigated.

The result was that the subjects could comprehend unfamiliar derivatives at recall level at the rate of 52.8%. Even if the derivatives were unfamiliar to them, they could figure out the meaning of more than half of them when they had base word knowledge. There was almost no difference between different vocabulary size pairs (High vocabulary holders → 52.9%, low vocabulary holders → 52.6%) and no difference in this ability was apparent between the subjects whose RK ratio was better and worse in Sakata (2006).

How were these unfamiliar derivatives comprehended? Surprisingly, these successfully comprehended derivatives were all inferred through the use of morphological information. This strategy use is apparent from the interviews as follows:

- **trickster**
  Q: What is the meaning of this word?
  A: I have not seen this word.
  Q: With this context, can you figure out the meaning?
  A: He is a trickster (the provided context).
  Q: What is the meaning of *trickster*?
  A: I know the meaning of *trick*, but I don’t know -ster.
  Q: Can’t you guess the meaning of the whole word?
  A: *Sagi, sagi, ..., sagishi* (trickster, a correct answer)?
  Q: Did you figure out the meaning by extending the meaning of *trick*?
  A: Yes.
  Q: In this case, did you separate the word?
  A: Yes.
  Q: Where did you separate?
  A: Between *trick* and -ster.
  Q: So, you saw this word for the first time?
  A: Yes.

- **limitation**
  Q: What is the meaning of *limitation*?
  A: *Seigen* (Limitation).
Q: Did you separate the word?
A: Yes.
Q: Where did you separate it?
A: After limit. I don’t know the meaning of -ation. However, I can associate limit with time-limit. Then, I felt that’s where it should be separated.
Q: Did you see this word for the first time?
A: Yes.

shadowy
Q: What is the meaning of shadowy?
A: Kagenoaru (shadowy).
Q: How did you find the meaning?
A: Shadow is attached to -y.
Q: Where did you separate the word?
A: Here (between w and y).
Q: Did you know the word shadowy?
A: No, I didn’t.

The above contents showed that they use morphological information to infer the meaning of unfamiliar derivatives. Now, individual differences will be focused on. The RK ratio was different for different subjects. The scores for each subject were as follows:

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>Vocabulary Size</th>
<th>DC rate in Chapter 2</th>
<th>Success rate for inferring unfamiliar derivatives (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>More than 3,000</td>
<td>High</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>33.3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Low</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>Less than 2,000</td>
<td>High</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Low</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

As can be seen, there are huge differences in terms of the subjects’ ability to comprehend unfamiliar derivatives. Of course, the numbers of both the unfamiliar derivatives and the subjects themselves were small, so these differences are not generalizable. However, it should be kept in mind that there are differences between learners in terms of the ability to infer the meanings of unfamiliar derivatives.

**Discussion**

First, the results indicated that with base word knowledge, the subjects could
comprehend derivatives at the rate of about 80% at recall level. This supports the results (Sakata, 2006) that base word knowledge leads to about 80% understanding of derivatives. Even if the stricter criterion (recall level) was adopted, they still showed 80% understanding of derivatives. This suggests that in real communicative situations, they might not have much difficulty in understanding derivatives if they have base word knowledge. Of course, in authentic conversations, we have to deal with other factors such as speed and anxiety. However, in light of the learners' knowledge, it can be said they have sufficient relational knowledge (RK) to understand the meaning of derivatives.

Second, it was found that they use morphological information with more than 80% of the tested derivatives. This also supports the conclusion that they have relational knowledge (RK). They can use morphological information in figuring out the meaning of morphologically related words. All of these results suggest that they have adequate relational knowledge to comprehend suffixed derivatives.

Third, the difference between the high vocabulary holders and low vocabulary holders was maintained. The more vocabulary they have, the easier they understand the meaning of derivatives. On the other hand, the rate of use of morphological information of the two vocabulary groups (more than 3,000 word-family group and less than 2,000 word-family group) was similar. These two facts suggest that the way to comprehend morphologically complex words doesn’t change with vocabulary growth. However, the increase of vocabulary items facilitates comprehending derivatives.

This result might be related to network building in the learners’ lexicon. Qian and Schedl (2004) showed that the more vocabulary learners have, the denser the lexical network will be. In the results of this present study, the 3,000 word-family holder’ lexical network might be denser than that of less than 2,000 word-family holders. The denser the lexical network is, the easier we can associate words with other words. It can be considered that in the lexical network of 3,000 word-family holders, one word has more connections with other members of its word family than in the lexical network of less than 2,000 word-family holders.
Figure 1: Comparison of network structure of low vocabulary holders and high vocabulary holders

In the above figure, we can see that a word family contains more words in the high vocabulary holders’ lexicon than in the low vocabulary holders’ lexicon. This difference in terms of network building of word families might affect the difference of the rate of derivative comprehension.

Fourth, the inter-pair difference in terms of derivative comprehension rate (RK ratio) in the previous research was not maintained in this study. The subjects who had scored high in the derivative comprehension test in Sakata (2006) didn’t necessarily have a high score in this study. This suggests that the ability to comprehend derivatives is not a single component. It might be different for each word family. Therefore, the whole ability of derivative comprehension might be a conglomerate consisting of each word family’s components. Testing relational knowledge might have to contain more items to grasp the whole picture.

Of course, we need to be cautious in interpreting this result, as the number of interview subjects was small. If more subjects had participated, their scores might have been more consistent. Additionally, as RK concerns the ability of inference, there is also a possibility that their RK is unstable so each test reveals different states of RK knowledge.

Fifth, it was found that the subjects could comprehend unfamiliar derivatives using morphological information at the rate of above 50%. This suggests that when the unfamiliar items are morphologically related to words already known to learners, they can comprehend half of them. It is difficult to interpret this rate (i.e., Is it large or small?). However, it can be said that they have ability to comprehend some unfamiliar derivatives when they have base word knowledge. This might bear some pedagogical implications. In class, teachers might not have to teach every word’s meaning. If morphologically-related
words have been introduced earlier, the meaning doesn’t always have to be taught. If we adopt Nagy and Anderson’s (1984) calculation, Japanese EFL learners have relational knowledge to expand their vocabulary size up to 1.5 times by the use of relational knowledge to suffixed derivatives.

**Conclusion and Suggestions for future research**

This study found the following five points.

1. Even if the stricter criterion of recall was adopted, the participants showed the comprehension of derivatives at 78.0% when they had base word knowledge.
2. Subjects used morphological information at 81.2% when comprehending derivatives, supporting the conclusion that they have adequate relational knowledge.
3. Subjects who had larger vocabulary showed better comprehension of derivatives.
4. Derivative comprehension rates (RK ratio) differed when using different test-items.
5. Slightly more than half of the unfamiliar derivatives could be comprehended with morphological information.

Although previous studies showed that Japanese EFL learners are poor in terms of their suffix knowledge (SK), this present study corroborated the results of Sakata (2006) which showed that they have relational knowledge (RK) to some extent which is adequate to expand their vocabulary size. However, this study has several problems to be resolved. First, the numbers of items and subjects were small, as this was a qualitative analysis. In the future, we will have to try other methods to confirm the results of this study. The conclusion that low-intermediate Japanese EFL learners have ability to expand their vocabulary size by 1.5 times should also be confirmed in the future. Second, we have to deal with subjects of different abilities. Junior or senior high school students might not have adequate RK due to their insufficient exposure to English materials. On the other hand, learners at higher levels might be better at comprehending derivatives. We should investigate further to draw a whole picture of morphological knowledge of EFL learners. Finally, to make English language teaching more effective, methods for improving RK should be explored. This study confirmed that Japanese low-intermediate EFL learners have to some extent adequate RK. However, there were individual differences. To make learners able to expand their vocabulary size by morphological knowledge, we will have to find an effective way to teach it.

**References**


