Semantic Restructuring of Vocabulary Knowledge:
Mapping an L2 Word With Different L1 Translations

Yuko HOSHINO
Tokyo Fuji University

Abstract

Words usually have multiple meanings, and some meanings are based on the same concept and others come from different concepts. This study focused on the former and investigated to what degree Japanese EFL students can understand different meanings of words (different L1 translation words). The results suggested that even when the participants understood the core meaning, most of them could not understand the non-prototypical meaning that shared the same concept with the core meaning, regardless of the participants' vocabulary sizes. This fact indicated no relationship between vocabulary breadth and knowledge about meaning other than the core meaning, and this was supported by non-significant partial correlation coefficients between the two. Therefore, knowing more than one meaning of words within the same concepts is a different aspect of vocabulary knowledge from mapping an L2 word onto only one L1 translation word.

1. Introduction

Many English words can have more than one meaning; these words can be divided into two types. One type is the homonym, which is used to refer to one word that has different, unrelated meanings; therefore, these words will have different entries in a dictionary (e.g., bow as a kind of weapon and bow as bending upper body). The second type, polysemy, refers to words with different meanings derived from the same concept; hence, they have a semantic relationship to each other and form a network as shown in Figure 1 below. There is a prototypical meaning that represents the core meaning (A), and this is linked with the extended and related meanings (B, C, and D) such as metaphors and metonymies. Moreover, each meaning has some corresponding L1 translation words (A1, A2, A3 and C1). For example, place has a prototypical meaning as “place as a space,” and there are extended meanings such as “place in a race,” “place as in where people or things take place,” and “place where people live” (Seto et al., 2007). Each meaning has one or more translation words such as “tokoro,” “chiiki,” and “chihou” for the prototypical meaning and “jun’i” for one of the extended meanings.
Therefore, one English word has different translation words even when limited to the prototypical meaning, and many more translation words exist when including the extended meaning. However, these translation words originally come from one concept, and English teachers have not paid much attention to the different translation words derived from a single concept. In the beginning step of vocabulary learning, students tend to use equivalence hypothesis (Ringbom, 1987) and match an English word and its corresponding L1 word, but they do not link the English word with several L1 translation words. However, matching only L1 and L2 words could not make students adept at using vocabulary. They have to know the difference between L1 and L2 concepts and restructure their vocabulary knowledge accordingly. Restructuring vocabulary knowledge is regarded as one of the important themes in vocabulary learning (Pavlenko, 2009), and some researchers have tried to investigate to what extent learners successfully restructure their knowledge (Jiang, 2004; Tagashira, 2007). Both Jiang and Tagashira used a sentence completion task in which the participants have to choose the L2 word appropriate to the target context from the two words having the same L1 translation words. For instance, Tagashira used emotion and feeling both of which have the same Japanese translation word “kanjo” and examined how his participants who were Japanese university students distinguished the two words. In order to complete this task successfully, it is necessary for the participants to understand the different concepts of two English words. His study sample yielded a correct response rate of 48% which was far below that of Jiang’s whose participants were Chinese native speakers. What this difference means is that Japanese university students lack sufficient vocabulary knowledge to differentiate between the concepts of these two words; therefore, they could not restructure the concept of “kanjo” into two different concepts of emotion and feeling.

However, this task would require very complicated knowledge, since distinguishing two concepts requires (a) understanding what concept each word has, and (b) understanding the difference between the concepts. In order to differentiate these two processes, this study focused on (a) and attempted to investigate the degree of L2 vocabulary knowledge restructuring, not from

Figure 1. Polysemic construction based on network model (Modified from Fukada, 2008, p. 79)
the viewpoint of distinguishing concepts of two words but from the viewpoint of examining the learner’s knowledge about an individual word. To be more specific, this study used a translation task to see whether the participants could link one English word with two different L1 translation words (one is from the prototypical meaning and the other is from the extended meaning). Mapping an L2 word onto several L1 words can be regarded as one step of restructuring vocabulary knowledge. In Sense Model by Finkbeiner, Forster, Nicol, & Nakamura (2004) in Figure 2, several senses (small black circles in the figure) belong to one word each in mental lexicon, and some of the senses are shared in two different languages. For example, both “basho” and place refer to “place as a space.” Hence, “basho” and place are often paired and memorized in the beginning stage of learning, according to equivalence hypothesis (Ringbom, 1987). However, pairing only one L1 word and one L2 word is insufficient because L1 and L2 concepts are not equal and some senses are peculiar to one language. For example, place has the concept of “place in the race,” which has a different Japanese translation, “jun’i.” Therefore, successful mapping of one L2 word onto several L1 translations can be regarded as signifying more developed knowledge than matching one L2 word and one L1 translation, because linking one English word and several L1 translations is a symptom of semantic restructuring. The past study concerning this issue is Sato (1998). She investigated whether Japanese high school students and university students could understand the various meanings of take (e.g., “nomu,” “nusumu,” and “ukeru”) in target contexts. Her results suggested that the more different the target meaning was from the prototypical meaning (“toru”), the more difficult the meaning was. However, she used only one word, take, and it is necessary to use more words in order to generalize her finding.

![Figure 2. Sense Model (Modified from Finkbeiner et al., 2004).](image)

Based on the past studies, this study examined to what degree Japanese university students successfully restructure their vocabulary knowledge. By following Sato’s (1998) materials, the focus of this study is to investigate whether the participants can produce the L1 translation word
suited to the target polysemy presented in a sentential context. This study treats the stage of linking different L1 translation words with the L2 target word, which is one step before that which Jiang (2004) and Tagashira (2007) investigated.

Research Question: To what degree is Japanese students' vocabulary knowledge restructured?

2. Method

2.1. Participants

A total of 46 Japanese university students took part in this study. There were 26 first year students, 18 second year students, and two third year students. According to the results of the vocabulary size test (Mochizuki, 1998), their vocabulary sizes ranged from 1033 to 3567 (Mean = 2645, SD = 492). From the results of the vocabulary size test, the participants were divided into 24 upper students (2770 to 3567 words) and 22 lower students (1033 to 2667 words). A t test showed there was a significant difference between the two groups, t (44) = 8.83, p = .00.

2.2. Materials

First, the target words were selected from the first 1000 words of the JACET 8000 word list (JACET, 2003), because the participants were hypothesized to know at least the prototypical meaning of these words (the minimum vocabulary size was 1033 as written above). From these words, the polysemic words were selected by referring to Seto et al.'s (2007) polysemy dictionary. That is, the words have another meaning that derives from the same concept as the prototypical meaning. Care is taken that the prototypical meaning and the non-prototypical meaning have different L1 translation words, and that the example context in Seto et al.'s (2007) is written in easy English (within the first 1000 words in JACET 8000).

After the selection, the words were presented in isolation to four university teachers in order to examine what L1 translation words came to their mind when they saw the words, and only when the prototypical meaning in dictionaries and the translation word they first produced were the same, did the words remain as the candidate target words in the main experiment. Furthermore, three university teachers and two graduate students majoring English education answered the L1 translation words when the target words were presented in the two target contexts (one represented the prototypical meaning and the other represented the non-prototypical meaning). When the participants produced a different L1 translation in response to the two types of context, the words remained among the possible target words. A pair of example contexts can be seen below. In the context of the prototypical meaning, place is used as “tokoro” or “basho” and in the context of the non-prototypical meaning, place means “jun’i” in Japanese. All the contexts are retrieved from Seto et al. (2007) with slight modification.
prototypical meaning: Scotland is a cold place.
non-prototypical meaning: Chris was the second place in the race.

Finally, as a pilot study, twelve university students whose estimated vocabulary sizes were 1633 to 3333 translated the 18 contexts (two contexts each for the nine target words). From this pilot study, the context pair for which none of the students could give the correct non-prototypical meaning and the context pair for which less than 25% of the students produced the correct prototypical meaning were removed from among the target words. Therefore, seven words (14 sentential contexts) were determined as the material for the main study. The seven target words and their L1 translation words can be seen in Table 1, and the contexts are presented in the Appendix.

Table 1
*The Prototypical Meaning and the Non-prototypical Meaning of Target Words*

<table>
<thead>
<tr>
<th>Prototypical</th>
<th>place</th>
<th>hand</th>
<th>country</th>
<th>number</th>
<th>line</th>
<th>age</th>
<th>wood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tokoro</td>
<td>te</td>
<td>kuni</td>
<td>kazu</td>
<td>sen</td>
<td>nenrei</td>
<td>ki</td>
</tr>
<tr>
<td></td>
<td>(所)</td>
<td>(手)</td>
<td>(国)</td>
<td>(数)</td>
<td>(線)</td>
<td>(年齢)</td>
<td>(木)</td>
</tr>
<tr>
<td>Non-prototypical</td>
<td>jun’i</td>
<td>tasuke</td>
<td>inaka</td>
<td>bango</td>
<td>retsu</td>
<td>jidai</td>
<td>mori</td>
</tr>
<tr>
<td></td>
<td>(順位)</td>
<td>(助け)</td>
<td>(田舎)</td>
<td>(番号)</td>
<td>(列)</td>
<td>(時代)</td>
<td>(森)</td>
</tr>
</tbody>
</table>

2.3. Procedure
The participants translated the contexts into Japanese in 20 minutes. At the same time, they wrote the translation of the context as well as the translation of the target word. This is because it might be the case that the participants did not know what to write in translating the context although they had a vague sense of the meaning of the target word. One third of both the translation of contexts and the target words were scored by two university teachers including the author, and the agreement ratio was high enough (93.75% for the contexts and 95.54% for the target words); therefore, the remaining answers were scored by the author alone.

3. Results and Discussion

The descriptive statistics can be seen in Table 2, which presents the scores and SDs of translation of the target words, the target sentence, and both. The table shows that the upper students constantly obtained higher scores than the lower students and that both groups of students had more knowledge about the prototypical meanings than the non-prototypical meanings as expected. However, contrary to the expectation that almost all of the students would have knowledge about the prototypical meaning, the lower students had only five out of seven words correct. After calculation of the proportion of correct answers for each target word, it was revealed
that the proportion of correct responses for *number* (32%) and *age* (54%) by the lower students was apparently low compared to other target words (average: 88%). The reason for the low correct rates was assumed to be the phrase “a number of,” which was included in both contexts of the prototypical meanings. Because the lower students could not understand this multiword unit, they could not understand the context fully; therefore, they could not identify the correct meaning of *number* and *age*. These words were removed from further analysis.

Table 2
*The Descriptive Statistics of Seven Target Words*

<table>
<thead>
<tr>
<th></th>
<th>Target Words</th>
<th>Target Sentences</th>
<th>Integrated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Upper Prototypical</td>
<td>6.71</td>
<td>.55</td>
<td>6.58</td>
</tr>
<tr>
<td>Other</td>
<td>4.63</td>
<td>1.31</td>
<td>4.96</td>
</tr>
<tr>
<td>Lower Prototypical</td>
<td>5.27</td>
<td>1.67</td>
<td>4.77</td>
</tr>
<tr>
<td>Other</td>
<td>3.09</td>
<td>1.48</td>
<td>3.09</td>
</tr>
</tbody>
</table>

Note. In integrated scores, the answers were regarded as correct only when both target words and target sentences were correct.

The descriptive statistics of the remaining five words can be seen in Table 3. There were ceiling effects with both levels of students in relation to the prototypical meanings, so it can be assumed that most of the participants know the core meaning of the target words. A 2 (proficiency) × 2 (meaning) ANOVA based on the results of target words showed a main effect of proficiency, $F(1, 44) = 8.57, p = .01$, and a main effect of meaning, $F(1, 44) = 180.11, p = .00$, but the significant interaction was absent, $F(1, 44) = 2.52, p = .12$, and the same results were obtained by the two-way ANOVAs based on the target sentence and the integrated scores. These results suggested that both levels of participants could not understand the non-prototypical meanings of target words even when they knew the core meanings. The rate at which the non-prototypical meaning restricted the cases when the participants knew the corresponding prototypical meaning was 52.1% for the upper students and 25.3% for the lower students.

Table 3
*The Descriptive Statistics of Five Target Words*

<table>
<thead>
<tr>
<th></th>
<th>Target Words</th>
<th>Target Sentences</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Upper Prototypical</td>
<td>4.95</td>
<td>.20</td>
<td>4.95</td>
</tr>
<tr>
<td>Other</td>
<td>3.17</td>
<td>1.13</td>
<td>3.75</td>
</tr>
<tr>
<td>Lower Prototypical</td>
<td>4.40</td>
<td>1.18</td>
<td>4.41</td>
</tr>
<tr>
<td>Other</td>
<td>2.18</td>
<td>1.05</td>
<td>2.64</td>
</tr>
</tbody>
</table>
Table 4

Results of Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Vocabulary size</th>
<th>Prototypical meaning</th>
<th>Non-prototypical meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary size</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Prototypical meaning</td>
<td>.48**</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Non-prototypical meaning</td>
<td>.31*</td>
<td>.39**</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01.

The non-significant interaction indicates that the participants were lacking knowledge about the non-prototypical meaning regardless of their vocabulary size. In order to confirm this interpretation, a correlation analysis was conducted to determine the relationship between vocabulary size, knowledge about the prototypical meaning, and knowledge about the non-prototypical meaning. The results in Table 4 showed that there were weak to moderate correlation coefficients among the three variables, so it seemed that the larger the vocabulary size of the participants, the more they knew about the non-prototypical meaning. However, there might be a linear relationship as Figure 3 indicates. That is, the students having larger vocabulary size have more knowledge about the prototypical meaning since both of them relate to vocabulary breadth, and those who know the prototypical meaning of specific words are more likely to know the non-prototypical meaning of these words. Therefore, it is possible that vocabulary size and knowledge about non-prototypical meaning are not directly related.

![Figure 3](image-url)

*Figure 3. The hypothesized relationship between vocabulary size, prototypical meaning, and non-prototypical meanings.*

In order to reinvestigate the relationship between the three, a partial correlation analysis was conducted between vocabulary size and knowledge about the non-prototypical meanings, controlled for the knowledge about prototypical meanings. The results showed that they have very weak and insignificant correlation (partial $r = .15, p = .31$). The fragile relationship between the two was also supported from the results of stepwise regression analysis that showed knowledge about prototypical meanings was the only significant predictor of vocabulary size ($R^2 = .30$). Therefore, the obtained bivariate correlation coefficients between vocabulary size and knowledge about the non-prototypical meanings was caused by the knowledge of the prototypical meanings.
in-between, and they did not have a direct relationship.

These results imply that knowing more than one meaning of a word is clearly an aspect of vocabulary knowledge that is different from vocabulary size. What is instructive is that this study used polysemous words, whose meanings were based on the same concept, and not homonyms, whose meanings derive from different concepts. Words have many senses in each of L1 and L2 concepts and some of them exist in shared concepts but some do not, as can be seen in Sense Model in Figure 2. Pairing only one L1 word and one L2 word is insufficient because L1 and L2 concepts are not exactly equal. This knowledge would reflect only the shared concepts and neglect the L2 specific concepts. The fact that only half of the upper students and one fourth of the lower students understood the non-prototypical meanings indicates there is room to improve the vocabulary curriculum so that students can restructure their L2 vocabulary knowledge more skillfully.

4. Conclusion

The aim of this study was to investigate to what degree Japanese university students’ vocabulary knowledge is restructured by using a translation task in a sentential context. The results showed that most of the participants could not answer the non-prototypical meanings of the target words; hence, their knowledge is far from restructuring even with very frequent words. Although mapping only a non-prototypical meaning onto an L2 target word, as this study investigated, is not complete restructuring, mapping an L2 word onto various translation words would be one of the steps to achieving restructured vocabulary knowledge. However, since this study used only a small number of words, it is necessary to adopt more words to clarify the development of vocabulary knowledge. Furthermore, this study could not distinguish between the students who can indicate the non-prototypical meaning when the word is presented in isolation and those who cannot. However, the goal of teaching vocabulary is not to foster the former type of students but to enable students to adjust their vocabulary knowledge to suit any contexts, whether explicitly or implicitly. Hence, mixing these two types of students would not be a major problem, at least in this study.

Also, this study revealed that the knowledge about non-prototypical meaning is an aspect of vocabulary knowledge different from vocabulary size. However, since meanings of polysemous words belong to the same concept, teachers have not paid much attention to them. They might be placing too much confidence in flexible use of receptive vocabulary once their students acquire one meaning of the target word, because teaching several meanings from identical concepts seems an unnecessary additional exercise. This study clarifies that efforts must be made to render students’ vocabulary knowledge adaptable to the target context and to applying suitable L1 translation words. Of course, however, the goal of acquiring vocabulary is not that of mapping L1–L2 words. Yet, acquiring L2 concepts and mapping them onto an L2 word will require going
through the process of mapping L2 onto several L1 words initially. In order to automatically apply students' stored vocabulary knowledge to various contexts, we need to give special attention to restructuring. However, there has been little work done on restructuring as yet, except for some studies (Akamatsu, 2009; Jiang, 2004; Tagashira, 2007) despite its importance (Pavlenko, 2009); hence, it is necessary in the future to investigate how restructuring occurs and how we can help students to restructure their knowledge.

Acknowledgment

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References


JACET (2003). JACET list of 8000 basic words [JACET 8000]. Tokyo: JACET.


**Appendix**

The context that represents the prototypical meaning is (a) and the non-prototypical meaning is (b).

**PLACE**
(a) Scotland is a cold *place*.
(b) Chris was the second *place* in the race.

**HAND**
(a) She raises her *hand* to call a taxi.
(b) He was always ready to give a *hand* at any job.

**COUNTRY**
(a) There are 56 million people in the *country*.
(b) There was a big movement of people away from the *country* to the towns.

**NUMBER**
(a) A great *number* of trees were cut.
(b) I’m sorry, I’ve got the wrong *number*.

**LINE**
(a) Draw a straight *line* in ink.
(b) We waited in long *lines* for concert tickets.

**AGE**
(a) The number of rings will tell you the *age* of the tree.
(b) All the golden *ages* are located in the past.

**WOOD**
(a) This desk is made of *wood*.
(b) Rabbits are very active in the *wood*.