【実証的研究論文】

Acquisition of Polysemous Words Through Incidental Vocabulary Learning: The Role of Semantic Overlap

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Abstract

Usually, words have more than one meaning, causing difficulty in acquiring all meanings of ambiguous words. Polysemous words, however, have semantically related or overlapping senses (hereafter, semantic overlap), which may help to infer and retain an appropriate meaning of these words. This study examines the effects of semantic overlap on inferring and retaining subordinate meanings of polysemous words for Japanese learners of English as a foreign language (EFL). A total of 49 Japanese undergraduates attempted to infer and learn the subordinate meanings of 18 target words (nine high and nine low-overlap words) in the lexical inference and recall tasks. The results showed that the degree of semantic overlap affects the inference and retention of subordinate meanings of polysemous words.

Key Words: Incidental Vocabulary Learning, Polysemous Word, Semantic Overlap

1. Introduction

Most words are ambiguous by nature because words usually have more than one meaning. This lexical ambiguity is linguistically subdivided into two main categories: homonymy and polysemy (e.g., Jackendoff, 2002). Homonymous words, which share the same orthographic and phonological form, are semantically unrelated to each other and arise from different concepts (e.g., bank as the land alongside or sloping down to a river or a lake and a bank as a financial establishment). That is, homonymy are an unpredictable coincidence of two different words having the same name. Polysemy, on the other hand, has multiple semantically related or overlapping senses and a polysemous word has one concept (i.e., core meaning) with various related senses. Thus, lamb, for example, has multiple related meanings that come from the same concept (a lamb as the animal and a lamb as the flesh of a lamb as food).

Nation (2001) suggests that it is very hard for L2 learners to acquire all the meanings of ambiguous words intentionally because most words have more than one meaning. Furthermore, to learn vocabulary incidentally through reading, L2 learners need to succeed in inferring an appropriate meaning of a word from the context. To succeed in identifying the appropriate meaning in this manner, finding useful cues from the word and surrounding text and previous knowledge play key roles in generating an informed guess (Wesche & Paribakht, 2009).
addition, successful identification of a previously unknown meaning of a word may lead to the retention of new knowledge about that word (Bolger, Balass, Landen, & Perfetti, 2008; Frishkoff, Perfetti, & Collins-Thompson, 2011). In the process of guessing, readers increase their mental effort on the word-form, making association between the context and their knowledge. Because of this mental effort, inferring leads to better retention of vocabulary than learning words in isolation (Mondria & Wit-de Boer, 1991; Wesche & Paribakht, 2009).

However, since polysemous words have semantically related or overlapping senses, knowledge of one meaning of a polysemous word may help to infer and retain its other appropriate meanings. To choose the appropriate meaning of a polysemous word in a particular context, two factors play key roles in lexical ambiguity resolution: meaning dominance and context (Simpson, 1981). Dominant meanings are understood more readily than are subordinate meanings in a wide range of tasks. Moreover, dominance effects can be modulated by contextual constraint. In this article, the term “dominant meaning” is consistently used to refer to meaning that is most frequently used by learners.

Some studies have examined L1 readers’ contextual interpretation of ambiguous words (Durkin & Manning, 1989; Klein & Murphy, 2001; Klepousniotou, Titone, & Romero, 2008). According to Klepousniotou et al., highly overlapping meanings are interpreted appropriately in any context (e.g., cooperating, neutral, or conflicting context) while words with moderately or low overlapping meanings fail to be interpreted in a conflicting context. Concerning L2 learners, on the other hand, only few studies have examined the interpretation of polysemous words (Kang, 1993; Verspoor & Lowie, 2003). Kang (1993) showed that even advanced L2 learners have difficulty in interpreting polysemous words. Verspoor and Lowie (2003) examined how presenting the dominant or subordinate meanings affected the interpretation of polysemous words. The results showed that presenting the dominant meanings leads to better guessing and long-term retention of the subordinate meanings of polysemous words than when the dominant meanings are not provided.

Comparing the studies of L1 readers and L2 learners, however, some factors have not been considered. Klepousniotou et al. (2008) did not examine the retention of the subordinate meanings of polysemous words. Furthermore, Verspoor and Lowie (2003) did not consider the effects of semantic overlap. Therefore, it is necessary to examine the effects of semantic overlap in the inference and retention of the polysemous words’ meaning. However, in this study, the polysemous words for which the participants know the dominant but not the subordinate meanings will be used. Because L2 learners learn word’s meaning both intentionally and incidentally, they need to encounter the word in various contexts. However, when they encounter words in various contexts, they may face difficulty in comprehending the meaning and need to infer the appropriate meaning by using the known information of the words (i.e., the dominant meanings).

As reviewed in the previous sections, polysemous words embedded in various contexts are
comprehended differently at the point of semantic overlap in L1 studies. However, the roles of semantic overlap in L2 learners are still unclear, particularly, when they infer the subordinate meaning of polysemous words while knowing their dominant meanings. In addition, it is still unclear whether L2 readers can retain the subordinate meanings inferred in the lexical inference task. An examination of the effects of semantic overlap on inference and retention of subordinate meanings may enable L2 learners to learn polysemous words efficiently in incidental vocabulary learning. Hence, the present study aims to investigate the following research questions (RQs):

RQ1: Does the degree of semantic overlap affect the inference of the subordinate meanings of polysemous words?

RQ2: Does the degree of semantic overlap affect the retention of the inferred subordinate meanings?

2. Method

2.1 Participants

Forty-nine Japanese undergraduate students participated in this study with their university year level ranging from the first to the fourth. Their majors were humanities, social and international studies, human sciences, life and environmental sciences, science and engineering, informatics, medical sciences, health and physical education, and art and design: thus the study was not biased toward a particular academic field. All participants had received formal English language education for six or more years. However, four students’ data were excluded because they could not accomplish all the tasks. Finally, 45 students’ data were used in this study.

2.2 Materials

To select target words and contexts used for this experiment, two pilot studies were conducted.

2.2.1 Pilot Study 1

A total of 70 polysemous words used in Klepousniotou et al. (2008) were selected as pre-target words. Three Japanese undergraduates and 10 graduates majoring in English education were explicitly asked to rate the degree of semantic overlap between the two definitions about the dominant and subordinate meanings of the pre-target words using a 5-point Likert scale with 1 indicating the weakest and 5 indicating the strongest degree of semantic overlap. The participants were also required to choose which meaning of the two meanings of each target word was more frequently used.

From the results of the ratings of the semantic overlap, a total of 70 target words were subdivided into two groups of 35 items each on the basis of a median split (high overlap: $M =$
4.31, 95% CI [4.21, 4.40], low overlap: $M = 3.08$, 95% CI [2.89, 3.27]). The two types of words significantly differed in their semantic overlap, t(68) = 11.81, $p < .001$, $d = 2.82$. Then, 10 target words were picked up from each group.

A total of 20 target words were selected by three criteria: (a) the easier words were at levels 1-3 according to JACET 8000, specifically for Japanese EFL learners (JACET Basic Word Revision Committee, 2003); (b) the frequency of word meanings in L2 ratings did not reverse in L1 ratings, which was already judged in Klepousniotou et al. (2008); and (c) the participants were likely to know the dominant but not the subordinate meanings. These 20 target words were composed of 10 polysemous words with high overlap and 10 with low overlap (high overlap: act, block, blood, body, business, course, ground, medicine, position, and title; low overlap: board, cause, column, company, function, intelligence, and issue).

2.2.2 Pilot Study 2

Three Japanese undergraduates and 15 graduates majoring in English education participated in this study. A total of 20 target words were chosen from the results of Pilot Study 1. A cloze task was used to examine several measures related to the cloze probability for the target word meaning. In this task, 51 low constraint sentences were constructed. The definition of the low constraint was designed to be semantically uninformative, providing no meaningful context (Griffin & Bock, 1998). Thus, the researcher picked up two or three contexts of each target word with reference to some dictionaries. The target word in each sentence was replaced by a blank space (e.g., Be careful not to leave any ____. This context provides no clues to the meaning of the target word tracks). To avoid the discussion among the participants, the cloze task was performed individually. The task was conducted on paper, and the participants were asked to write as many appropriate words as they could think of (i.e., cloze response) in Japanese or English.

The results showed that some target words had two weakly constraining contexts (title, business, issue, and company). Three criteria were posed in order to select one of the two or three contexts: (a) the context involving easier to understand words for Japanese EFL learners on the basis of JACET 8000, (b) the easier context with regards to grammar, and (c) special expressions such as proverbs (in this task, the context A man is known by the company he keeps). Inappropriate contexts were not used in experimental studies.

Moreover, the definition of the low constraint was designed to be semantically uninformative, providing no meaningful context; therefore, weakly constraining sentences were defined as those with no more than 40% success rate for the most common completion based on Griffin and Bock (1998). The most weakly constraining contexts of each target word were put in the order of the lowest of success rate, and the success rate of less than 40% was selected. Finally, nine words from each group of the target words were chosen for experimental studies (see Appendix).
2.2.3 Materials for This Experiment

On the basis of the results of Pilot Study 1, 18 polysemous words were selected as target words. The participants were shown the target words in two conditions: (a) target words only and (b) sentences including one of the target words each. On the basis of the results of Pilot Study 2, the weakly constraining sentences were defined as sentences to focus only the effects of semantic overlap in a lexical inference task of the experiment.

2.3 Procedure

a. Preliminary Task: To ensure that the participants knew the dominant but not the subordinate meanings of the target words, a preliminary task was conducted before the main task. In this task, only the target words were presented in a worksheet and the participants were asked to write as many of the words’ meanings in Japanese as they knew.

b. Lexical Inference Task: After the preliminary task, a lexical inference task was conducted. In this task, the participants were provided with worksheets containing 18 sentences; that involved one target polysemous word each used in its subordinate meaning (e.g., Our New Year issue will include all your favorite musicians). The participants were asked to translate the English sentences into Japanese and write the meanings of the target words (issue in this example).

c. Interference Task: The purpose of the interference task was to keep the time interval between the lexical inference and immediate recall tasks. In this task, participants were asked to read a text that was unrelated to the target polysemous words or sentences.

d. Immediate Recall Task: After the interference task, an immediate recall task was conducted. The participants were given the target words similar to those they had received in the preliminary task. They were required to write as many of the words’ meanings in Japanese as they knew. This task expected them to write the meaning inferred in the lexical inference task.

e. Delayed Recall Task: A week after the immediate recall task, a delayed recall task was conducted. In this task, the participants were asked to write as many of the words’ meanings as they could. The participants were again expected to write the meaning inferred in the lexical inference task.

2.4 Scoring

One target word, position (high overlap), was removed because the sentence “He returned to the original position” had a defect. This sentence was unsuitable for the lexical inference task because both the dominant (a place where someone or something is located or has been put) and subordinate meanings (the way in which someone is sitting or standing) were applicable here.

In the preliminary task, the responses were examined to determine whether the participants
(a) knew the dominant but not the subordinate meaning of each target word and (b) already knew the subordinate meaning of each target word. This resulted in the loss of less than 15.2% of all the data. To calculate the correct rating for each participant, words for which the participant did not know the dominant meaning or already knew the subordinate meaning were removed one by one.

In the lexical inference task, the two raters checked whether the participants could infer the subordinate meanings of the target words. The removed words in the preliminary task were omitted in the analysis.

In the immediate and delayed recall tasks, the raters checked whether the participants could retain and write the subordinate meaning that they had inferred in the lexical inference task. If they could do so, they were given 1 score. The removed words in the preliminary task were omitted in the analysis.

2.5 Data Analysis

To make the proportions more suitable for statistical analysis, arcsine transformation was conducted on the score of the lexical inference, immediate recall, and delayed recall tasks. Then, the transformed scores were analyzed with a two-tailed t test and a two-way analysis of various (ANOVA). To address RQ1, a two-tailed t test was performed to compare the success rate of targets between high and low-overlap words in the lexical inference task. For RQ2, a two-way ANOVA was conducted on the transformed scores of the immediate and delayed recall tasks with semantic overlap (High vs. Low) and test (Immediate recall vs. Delayed recall) as within-participant variables.

3. Results and Discussion

3.1 The Role of Semantic Overlap in Inferencing Subordinate Meanings

The lexical inference task examined whether the degree of semantic overlap affects the inference of subordinate meanings of polysemous word. The results are presented in Table 1.

<table>
<thead>
<tr>
<th>Semantic overlap</th>
<th>M (%)</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>High overlap</td>
<td>35.99</td>
<td>11.32</td>
<td>54.74</td>
<td>0.00</td>
<td>[32.59, 39.39]</td>
</tr>
<tr>
<td>Low overlap</td>
<td>16.12</td>
<td>15.61</td>
<td>45.00</td>
<td>0.00</td>
<td>[11.46, 20.81]</td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval.*

Results of the two-tailed t test showed a significant difference between high and low-overlap success scores, *t*(44) = 8.08, *p* < .001, *d* = 1.45. Results of the lexical inference task showed that the participants could succeed in lexically inferring of the high-overlap target words
(M = 35.99%) rather than the low-overlap target words (M = 16.12%), even though the contextual constraint was weak in this experiment. Readers, in general, fail to infer unknown meanings in weakly constraining contexts (Bolger et al., 2008; Borovsky, Kutas, & Elman, 2010; Frishkoff et al., 2011; Webb, 2008). However, the participants in this experiment succeeded in inferring subordinate meanings in such contexts. It is, therefore, argued that the degree of semantic overlap affects the inference of the subordinate meanings of polysemous words. In the participants’ success in inferring the subordinate meanings of high-overlap target words, a core meaning plays a key role, activating the concept of the dominant meaning. Figure 1 shows the image of the degree of semantic overlap and core meaning of a word.

As shown in Figure 1, for example, the high-overlap polysemous word blood has two strongly related meanings (“the red liquid that circulates through the body” and “family background; descent or lineage”). When trying to infer the subordinate meanings of polysemous words, readers can interpret the subordinate meaning of the high-overlap polysemous words by activating the dominant meaning (Klepousniotou et al., 2008). Because the meanings of high-overlap polysemous words are highly related to each other, readers can activate and interpret the appropriate meanings easily. Thus, the results of the lexical inference task revealed that the L2 learners can activate the dominant meanings of the high-overlap polysemous words strongly related to subordinate meanings, leading to successful inference of the subordinate meaning. On the other hand, low-overlap polysemous words such as panel have two meanings that are weakly related (“a flat board” and “a small group of people”). When trying to infer the subordinate meanings of such words, readers fail (Klepousniotou et al., 2008). Because the meanings of a low-overlap polysemous word are not so much related to each other, readers could not activate or interpret the appropriate meanings easily. Thus, the results of the lexical inference task reveal that the L2 learners could not activate the dominant meanings of low-overlap
polysemous words, and consequently, they failed to infer the subordinate meaning.

From these observations, in response to RQ1, it would be safe to state that the degree of semantic overlap affects the inference of the subordinate meaning, and this effect depends on the degree of relating core meaning (i.e., the degree of semantic overlap).

3.2 The Role of Semantic Overlap in Retaining Subordinate Meanings

The immediate and delayed recall tasks examined the effects of the degree of semantic overlap on the retention of the subordinate meanings inferred in the lexical inference task. The results are presented in Table 2.

Table 2

<table>
<thead>
<tr>
<th>SO</th>
<th>Immediate recall</th>
<th></th>
<th>Delayed recall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>95%CI</td>
</tr>
<tr>
<td>high overlap</td>
<td>75.56</td>
<td>24.25</td>
<td>[68.27, 82.85]</td>
</tr>
</tbody>
</table>

*Note. SO = Semantic overlap; CI = confidence interval.*

Results of the two-way ANOVA revealed a significant main effect of semantic overlap, $F(1, 44) = 81.03, p < .001, \eta^2 = .533$, and test, $F(1, 44) = 17.90, p < .001, \eta^2 = .003$. However, no interaction was found between these two factors, and qualitative analyses were conducted to examine this specifically. Figure 2 shows variations of the means of retention scores for high and low overlap in the immediate and delayed recall tasks.

*Figure 2. Retention score of recall tasks.*
To answer RQ2, (a) retention score and (b) effects of the contextual constraint are discussed. First, regarding the retention score, the results of the immediate and delayed recall tasks showed that the participants could successfully retain the subordinate meanings of high-overlap rather than the low-overlap target words. A closer analysis of the retention scores of the two recall tasks revealed that the participants retained 61% of the subordinate meanings of the high-overlap target words even at the lowest average. In previous research, participants could not retain that many meanings inferred from the context (Frishkoff et al., 2011; Wesche & Paribakht, 2009). However, the participants successfully retained the subordinate meanings of high-overlap polysemous words because of the effects of the semantic overlap. To discuss more details, the next factor needs to be considered.

Second, regarding the contextual constraint, Frishkoff et al. (2011) suggested that a strongly constraining context produces greater retention of lexical knowledge than does a weakly constraining context. However, the recall tasks’ results in this study showed that the participants succeeded in retaining the subordinate meanings even though the contexts were weakly constraining sentences. These outcomes were led by the effects of the semantic overlap. The mechanism of retaining the subordinate meanings of polysemous words is presented in Figure 3.

**Figure 3.** Mechanism of retaining subordinate meanings of polysemous words. “Strongly related and tend to succeed” means that readers tend to succeed in inferring and retaining subordinate meanings because of the strong relatedness. “Weakly related and tend to fail” means that readers tend to fail to infer and retaining subordinate meanings because of the weak relatedness.
As shown in Figure 3, in this experiment, high-overlap polysemous word, for example *blood*, have two strongly related meanings, and the participants already knew the dominant meaning. Since the dominant meaning was already stored in their mental lexicon, they could easily recall it. Therefore, in the lexical inference task, they could retain the subordinate meaning by using a cue from the known dominant meaning and not from contextual information. On the other hand, low-overlap polysemous words, such as *panel*, have two weakly related meanings. The results of the recall tasks suggest that the participants tend to fail to retain subordinate meanings, because neither the known dominant meaning nor the contextual information provided them with a cue. Thus, it would be safe to say that the degree of semantic overlap affects the retention of the subordinate meaning that is inferred in the lexical inference task (RQ2).

4. Conclusion

4.1 Summary of the Present Study

Overall, the results revealed the role of the semantic overlap in the inference and retention of the subordinate meanings of polysemous words despite the occurrence in weakly constraining sentences. According to previous studies, readers activate the dominant meanings and infer the appropriate meaning of each context (Klein & Murphy, 2001; Klepousniotou et al., 2008). Therefore, it is obvious that regardless of the context, when the degree of semantic overlap is higher, readers more easily infer the subordinate meanings of polysemous words.

Verspoor and Lowie (2003) indicated that providing a dominant meaning resulted in better guessing and long-term retention of subordinate meanings of polysemous words. In addition, some previous studies suggested that a strongly constraining context produces greater retention of lexical knowledge than does a weakly constraining context (Frishkoff et al., 2011, Webb, 2008). In the present study, the EFL learners succeeded in retaining the subordinate meanings of high-overlap rather than low-overlap polysemous words even though the contexts were weakly constraining sentences. The EFL learners knew the dominant meaning and therefore could easily recall it because it had been already stored in their mental lexicon. From this, they could retain the subordinate meanings of the high-overlap polysemous words inferred in the lexical inference task by using a cue from the known dominant meanings and not from the contextual information.

Overall, the present study revealed that the degree of semantic overlap affects the inference and retention of the subordinate meanings of polysemous words.

4.2 Pedagogical Implications

The present study’s findings have practical as well as theoretical implications. Notably, inferring the meanings of polysemous words is useful for vocabulary learning if the learners know their dominant meanings. Previous studies on incidental vocabulary acquisition show that encountering words repeatedly in various contexts leads learners to acquire vocabulary
knowledge (Bolger et al., 2008; Chen & Truscott, 2010; Webb, 2008). The results of this study revealed that the dominant meaning of a polysemous word provides a clue to infer the subordinate meanings, especially when the two meanings are highly overlapping. Using the clue from the dominant meaning, readers remember the subordinate meaning because the two meanings are strongly related. These indications suggest that L2 learners may acquire such subordinate meanings in a relatively small amount of learning time.

To applying this suggestion to the classroom, providing high-overlap polysemous words in context will be effective for teaching polysemous words because students can infer appropriate meanings of such words without using a dictionary. This can be done by activating the concept of its dominant meaning and then deriving the appropriate meaning from the dominant meaning. When they finish inferring the appropriate meaning, discussing the meaning with one another can also be effective. Considering the appropriate meaning leads to a deep understanding of the text.

Regarding the low-overlap polysemous words, the EFL learners were asked to infer the subordinate meaning in a weakly constraining context leading to failure in inferring the subordinate meanings. However, learners in the educational contexts are not always asked to infer subordinate meanings in weakly constrained contexts. When they are provided low-overlap polysemous words in strongly constrained context, they can infer the subordinate meanings by using cues from both the dominant meanings and contextual information. For example, students may interpret appropriate meanings of the word issue in the sentence “The next issue will be published on May 28.” Using cues from the dominant meanings and contextual information leads to better inference and retaining of the subordinate meanings. Moreover, successful inference of the meanings of polysemous words encourages students to try to infer other unknown words or meanings in contexts.

References


Appendix

Appendix: Target Words and Contexts

<table>
<thead>
<tr>
<th>Target word</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>act</td>
<td>He believes her act of being interested in him.</td>
</tr>
<tr>
<td>block</td>
<td>I get a block about spelling when I have to write on the blackboard.</td>
</tr>
<tr>
<td>blood</td>
<td>He is a citizen of France but British by blood.</td>
</tr>
<tr>
<td>body</td>
<td>He thought about the body of the difficult problem.</td>
</tr>
<tr>
<td>business</td>
<td>He does business in his wife's name.</td>
</tr>
<tr>
<td>ground</td>
<td>The school grounds are closed during vacations.</td>
</tr>
<tr>
<td>medicine</td>
<td>He teaches medicine to the people in the village.</td>
</tr>
<tr>
<td>position</td>
<td>He returned to the original position.</td>
</tr>
<tr>
<td>title</td>
<td>The boss of the company gave the office worker a new title.</td>
</tr>
</tbody>
</table>

Note. The target words are underlined.

Acknowledgment

This article is a part of my BA thesis at University of Tsukuba. I would like to express my gratitude to Professor Yuji Ushiro and his colleagues for their valuable comments and suggestions. I also wish to thank two anonymous reviewers for their useful comments to improve this paper.