Effects of L1 on L2 Lexical Inferencing

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[ABSTRACT] This study examined how L1 influenced L2 inferencing when reading. Japanese university students inferred the meanings of new words from written text in L1 and L2 and reported on the knowledge sources (KSs) used to determine them. The findings indicate that the students' L2 inferencing was far less successful than their L1 inferencing. However, similar patterns in KS use were identified, which can be viewed as the influence of L1 on L2 inferencing. Specifically, the students used such KSs as word morphology and sentence meaning frequently and such KSs as discourse meaning and world knowledge relatively infrequently in both L1 and L2 inferencing. However, the rate of inferential success associated with the use of each KS was higher in L1 than in L2, especially that associated with the use of word morphology. The results of correlational analyses confirm relationships between L2 proficiency, inferential success, and initial retention of word meanings. L2 proficiency in vocabulary and reading appears to be related to rates of inferring as well as rates of word retention. More importantly, inferential success appears to be related to word retention, which indicates that when inferencing is successful, it can be an effective word learning strategy.

(Key Words) second language learning, vocabulary acquisition, L1 transfer, lexical inferencing, Japanese learners of English

Introduction

L1 learners appear to acquire much of their vocabulary, beyond the first few thousand words used in common conversation, when they attempt to infer word meaning from written context. Researchers generally agree this is also the case with L2 learners, although their views as to the degree differ. Inferring word meaning from context is a complex process influenced by many factors, including text, word, and learner. For example, recent research shows that a learner's L1 influences the procedures and outcomes of L2 lexical inferencing (Wesche & Paribakht, 2010). This study investigates how L1 influences L2 lexical inferencing when Japanese university students infer word meaning from an English text.
Literature Review

Lexical Inferencing Process and Its Outcomes

Lexical inferencing is a process that “involves making informed guesses as to the meaning of a word in the light of all available linguistic cues in combination with the learner’s general knowledge of the world, her awareness of the co-text and her relevant linguistic knowledge” (Haastrup, 1991, p.13). If learners infer word meaning successfully, it can help immediate comprehension in reading, and under favorable conditions, it can result in the retention of word form as well as semantic and other lexical information.

Research has identified factors that play an important role in determining learners’ inferential behavior and success: they include text (difficulty, genre); word (part of speech, frequency); learner (L2 proficiency, learning experience, L1, familiarity with the text topic); and task (summary task, question task). Depending on the conditions, a wide variability has been found in the rate of inferential success, such as 56.8% (Huckin & Bloch, 1993), 52% (Fraser, 1999), 45% (Kobayashi, 2011), 33% (Parry, 1993), 28% (Frantzen, 2003), and 25.6% (Nassaji, 2003).

Research has demonstrated that L2 readers draw on various linguistic and nonlinguistic knowledge sources (KSs) and strategies to infer word meaning (Chern, 1993; Fraser, 1999; Haynes, 1993; Nassaji, 2003; Nassaji, 2004; Paribakht, 2005; Paribakht & Wesche, 1999; Wesche & Paribakht, 2010). Haynes (1993) found that ESL readers achieved a high rate of success when cues were available in the immediate sentence context. Although the students frequently used word-level graphemic cues, word-form identification was not always easy for them. Insufficient context, global cues, or a student’s lack of vocabulary knowledge caused difficulties. Similarly, Chern (1993) found that Chinese ESL students were able to use graphemic, morphemic, phonetic, contextual cues, as well as background knowledge. Sentence-bound and word-based local cues were often used by both high- and low-proficiency students. The use of global cues correlated highly with the students’ proficiency levels.

Recently, researchers have become increasingly interested in the KS use in target languages other than English. For example, Mori (2002) focused on English-speaking students learning Japanese. The students inferred the meanings of kanji compounds under three conditions (words in isolation, context cues only, and both). Although the effects of the two sources appeared nearly half the students did not combine them, relying on either kanji or contextual cues.

Of the factors that influence lexical inferencing, learners’ L2 general proficiency and vocabulary knowledge appear to make a major contribution to their inferential success and behavior. Nassaji (2004) found that the mean rate of success for the lexically skilled (LS) group was significantly higher than for the lexically less skilled (LLS) group. The LS students made more frequent and effective use of evaluative and context-based strategies, whereas the LLS students used word-based strategies more frequently. Likewise, Kobayashi (2011) found that students with high lexical proficiency inferred
word meaning more frequently as well as more effectively than those with low lexical proficiency. The high-proficiency students made more frequent use of sentence-level sources, whereas the low-proficiency students used word-level sources more often.

These studies indicate that L2 learners are able to guess word meaning from both context-based and word-based cues. They made more frequent use of word-based and sentence-bound local cues than global cues that require the integration of information in longer sections of text. The use of context-based cues, especially global ones, is more frequent among high-proficiency students.

**Vocabulary Development Through Reading**

A wide variability has also been found in the rate of word retention through lexical inferencing when reading, such as 6% and 8% (Pitts, White, & Krashen, 1989), 7% (Hulstijn, 1992), 19% and 38% (Haynes & Baker, 1993). With few exceptions, however, L2 students learn a relatively small number of words from context.

For example, Wesche and Paribakht (2010) found learners with higher L2 lexical proficiency were more successful in inferring word meanings and retained more words. However, for both groups, gains in word-form familiarity were the most likely outcome. After the inferencing task, both groups reported word-form familiarity for approximately 75% of the target words, although their meanings remained unknown. Regardless of lexical proficiency, few word meanings were retained (10.2% for Persian speakers and 16.4% for French).

**Cross-Linguistic Issues in Lexical Inferencing**

L1 transfer effects on L2 performance have been found in all linguistic aspects including pragmatics and rhetoric, syntax, the lexicon, morphology, phonology, phonetics and orthography (Wesche & Paribakht, 2010). Furthermore, transfer may also affect L2 processing skills, and its effects may be more long-lasting than linguistic features (Koda, 2004). Accordingly, L1 may play an important role in L2 lexical inferencing. Only recently have researchers begun to systematically examine L1 influences on L2 lexical inferencing.

One study (Haastrup, 2008) compared L1 and L2 lexical inferencing by the same learners, investigating whether there was a difference in the quality of lexical inferencing between L1 and L2. The participants, in grades 7, 10, and 13, performed parallel tasks in two languages (Danish for L1 inferencing and English for L2 inferencing). For all three hallmarks of the quality of lexical inferencing (advanced processing, adaptability, and success), the participants' results in L1 were clearly superior to those in L2. Lack of L2 lexical knowledge appeared the main reason for this. However, the same developmental patterns were shown in both languages; the quality of lexical inferencing in both languages rose along with their educational level.

Wesche and Paribakht (2010) examined the influences of L1 on L2 lexical inferencing from written texts. The analysis included comparison of L1 lexical inferencing by
speakers of three languages (English, Persian and French) and L2 lexical inferencing by the latter two groups. The Persian and French speakers were far less successful at inferring appropriate meanings for L2 target words than for L1 ones (22% versus 83% and 51.6% versus 74.3% success rates, respectively).

Every group primarily depended on cues that were meaning oriented (i.e., sentence meaning, discourse meaning, world knowledge). Moreover, they tended to use local cues, found in the word itself or within the immediate sentence context (word or sentence cues). Sentence meaning was by far the most frequently used KS subtype by all groups, although the relative importance of other KSs varied by group.

The French and Persian speakers used sentence meaning cues even more in L2 than in L1, and more than the English L1 group. The L2 readers relied heavily on sentence meaning and sentence grammar and used such strategies as world knowledge less frequently. In Persian L2 inferencing, the L1 influence was seen in the shared L1-L2 prominence of discourse meaning. In French L2 lexical inferencing, the L1 influence was shown by the frequent use of diverse word cues (i.e., word morphology, word form, and word association).

Although both groups were far less successful in inferencing in L2 than in L1, the differences between L1 and L2 success were particularly large for the Persian group. Moreover, the French group retained more words. This appeared to be related to the relative typological distance of the two languages from English.

These studies show that learners’ L1 influences the procedures and outcomes of their L2 inferencing. However, to my knowledge, there is no research that investigates the effects of L1 on L2 lexical inferencing by Japanese learners of English. Therefore, this study examined those effects when Japanese university students read an English text. Specific research questions were as follows:

1. How successful are Japanese learners of English in determining word meaning in L1 and L2?
2. What KSs do they use to infer word meaning in L1 and L2?
3. What proportion of words do they retain in L2?
4. What is the relationship between vocabulary knowledge, inferential success, and word retention?

Method

Participants

The participants were 44 Japanese students majoring in English at a university in western Japan. The group was comprised of 18 freshmen, 5 sophomores, and 21 juniors, 26 male and 18 female. Their mean score on the Test of English for International Communication (TOEIC) was 442.67 (SD = 108.01), and their mean score on the Reading Section of TOEIC was 190.67 (SD = 63.30). Their mean score on the Vocabulary Levels Test (Schmitt, Schmitt, & Clapham, 2001) was 59.85 out of 150 (SD = 27.04). Of the 44 students, 22 agreed to participate in the second phase of the study. On average, their
level of proficiency was slightly higher than the original pool.\(^{(2)}\)

**Instruments**

*Vocabulary Levels Test.* A longer version of the Vocabulary Levels Test (Schmitt, Schmitt, & Clapham, 2001) was used to measure the participants’ receptive knowledge of vocabulary. It contains words from five frequency levels: 2000, 3000, 5000, 10,000, and academic. Each level includes 10 sections, each of which has six words and three definitions. The test taker is required to match the words with their definitions. There are 150 items in total, 30 in each level.

*English reading text.* A text used in Wesche and Paribakht’s (2010) study was chosen (Appendix A). It is factual and deals with a topic of general interest (i.e. the ice age). It contains 290 words and has a readability of 8.8, as measured by the Flesch-Kincaid index. Twelve words were selected as targets.\(^{(3)}\) They were highlighted in boldface in the text. Prior to the selection, five students with levels of English proficiency similar to the participants in the main study were asked to circle all the unknown words in the text. The target words were selected from those that were unfamiliar to all of the five students. The researcher provided glosses for other words that were problematic. According to Nation (1990; 2001), readers should know at least 95% of the words in the text in order to infer word meaning from context. Therefore, the researcher attempted to create a text that all participants would fully comprehend.

*Japanese reading text.* A chapter of an introductory linguistics textbook was used. It discusses the relationship between language and cognition in a plain manner. Its length is approximately 9500 letters. To ensure that some words were unknown to the L1 readers, a relatively long text was chosen.

*Vocabulary posttests.* In order to assess different degrees of word retention, two types of vocabulary posttests were administered. The first was a production test that required supplying word meaning by writing an L1 translation or definition (definition-supply test). The second was a recognition test that required matching the 12 target words with their Japanese translations, choosing from 18 alternatives (matching test).

**Procedures**

A week before the research session, the participants took the Vocabulary Levels Test. The research session consisted of two phases. In the first phase, they first completed an L2 reading task, in which they were asked to skim the text quickly and then try to infer the meanings of target words. Next, they were instructed to write down the determined meanings and how they were determined. Then, the definition-supply and matching vocabulary posttests were administered, in that order. On the completion of the first session, those who agreed participated in the second phase. In the second phase, the participants were asked to complete an L1 reading task similar to the L2 one. In the L1 task, they were asked to skim the text while underlining unknown words, and then try to infer their meanings. Next, they were asked to write them down with the KSSs used to
determine them. The entire research session took 1.5–2.5 hours, with the first phase lasting 1–1.5 hours and the second phase 0.5–1.

**Analyses**

The researcher and a second coder examined the participants’ responses to the L1 and L2 inferencing tasks in order to identify the KSs used to deal with each unknown word. A taxonomy was developed by modifying the one used in earlier research (Paribakht, 2005; Wesche & Paribakht, 2010) (see Appendix B) to reflect the data of the present study. The KSs used by the participants were classified according to the taxonomy. Intercoder reliability was 98% for both L1 and L2. The taxonomy consists of two main categories, linguistic and nonlinguistic. Linguistic sources include those based on L2 as well as L1. L2-based sources are further divided into word-level sources, sentence-level sources, and discourse-level sources. Each of the main linguistic categories includes three or four subcategories. Nonlinguistic sources include the learner’s world knowledge and previous experience.

The researcher and the second rater evaluated the participants’ success in L1 and L2 inferencing using a three-point scale (successful, partially successful, unsuccessful) adapted from the one used in Fraser (1999). A successful response was defined as a case where the determined meaning was appropriate for the text context with little or no distortion, a partially successful response as one where the determined meaning worked generally for the context despite some distortion or loss of text representation, and an unsuccessful response as one where no or an inappropriate meaning was determined. The interrater reliability was 97% for L1 and 96% for L2.

The researcher and the second rater scored the definition-supply vocabulary posttest using the same three-point scale mentioned above. The interrater reliability was 99%. The matching test was scored as either correct or incorrect.

Since the participants’ responses showed that from the onset some of them had knowledge of some of the target words in the L2 task, these words were removed from the data. Accordingly, the numbers of the target items differed, depending on the participant. Therefore, successful inferencing as well as vocabulary posttest scores were converted to percentages, by dividing them by the total numbers of unknown words.

For the above analyses, when any disagreement occurred, the researcher and the second coder or rater resolved it through discussion to achieve 100% agreement. The obtained numbers of KS use, rates of inferential success and the vocabulary test scores were analyzed using descriptive statistics such as means, standard deviations, ranges, and percentages. In addition, Pearson correlations were calculated to determine the relationship between the students’ vocabulary knowledge, inferential success, and word retention.
Results

Inferential Success

In the L2 task, 44 participants responded to 12 target words, a total of 528 responses. Removing the 35 words that the students had already known reduced it to 493.

Table 1 presents the participants’ rates of success in L2 inferencing. On average, they determined the meanings correctly for 26% of the words, partially correctly for 23%, and unsuccessfully for 38%. They failed to come up with any meanings for 12%.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
<td>44</td>
<td>0.26</td>
<td>0.21</td>
<td>0.88</td>
<td>125</td>
</tr>
<tr>
<td>Partially</td>
<td>44</td>
<td>0.23</td>
<td>0.12</td>
<td>0.42</td>
<td>116</td>
</tr>
<tr>
<td>Unsuccessful</td>
<td>44</td>
<td>0.38</td>
<td>0.23</td>
<td>0.83</td>
<td>190</td>
</tr>
<tr>
<td>Failure</td>
<td>44</td>
<td>0.12</td>
<td>0.17</td>
<td>0.67</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>493</td>
</tr>
</tbody>
</table>

In the L1 task, the 22 students indentified a total of 311 words to be unknown, with an average of 14. The number of unknown words ranged from 5 to 31, indicating a wide variability of L1 vocabulary knowledge.

Table 2 shows the participants’ success in L1 inferencing. On average, they determined the meanings correctly for 65% of the words, partially correctly for 18%, and unsuccessfully for 15%. They failed to determine any meanings for 2%. The results show that the participants were far more successful at inferring word meaning in L1 than in L2.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
<td>22</td>
<td>0.65</td>
<td>0.13</td>
<td>0.55</td>
<td>196</td>
</tr>
<tr>
<td>Partially</td>
<td>22</td>
<td>0.18</td>
<td>0.09</td>
<td>0.33</td>
<td>59</td>
</tr>
<tr>
<td>Unsuccessful</td>
<td>22</td>
<td>0.15</td>
<td>0.11</td>
<td>0.45</td>
<td>50</td>
</tr>
<tr>
<td>Failure</td>
<td>22</td>
<td>0.02</td>
<td>0.04</td>
<td>0.14</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>311</td>
</tr>
</tbody>
</table>

Knowledge Sources and Success

In the L2 task, the 44 participants used 564 KSs in total to infer the meanings of 431 words. Out of these 564, 173 cases (31%) were successful, 153 (27%) were partially successful, and 238 (42%) were unsuccessful. Out of the 422 words for which KSs used were identified, a single KS was used for 303 words (72%), and multiple KSs were used for 119 (28%).

Appendix C presents the frequency distribution of KS use in L2, along with the rate of
inferential success associated with each KS. The students used *sentence meaning* most frequently (42%) and *word morphology* second most frequently (18%). These two accounted for 60% of their KS use. The use of *sentence meaning* was associated with higher rates of success (65% including partial success), whereas the use of *word morphology* resulted in high rates of failure (64%). KSs used with relative frequency were *discourse meaning* (9%), *world knowledge* (8%), *word association* (7%), and *sentence grammar* (7%). The use of *discourse meaning*, *world knowledge*, and *word association* largely resulted in success (67%, 89%, and 78%, respectively). The use of these three KSs was also associated with high rates of full success (49%, 53%, and 46%, respectively). In contrast, the use of *sentence grammar* often led to failure (54%)

In the L1 task, the 22 participants used 362 KSs in total to infer the meanings of 305 words. Of these 362, 234 cases (65%) were successful, 73 (20%) were partially successful, and 55 (15%) were unsuccessful. Out of the 305 words inferred, a single KS was used for 250 words (82%), whereas multiple KSs were used for 55 (18%).

Appendix D demonstrates the frequency distribution of KS use in L1 as well as the rate of inferential success associated with each KS. The students used *word morphology* most frequently (50%) and *sentence meaning* second most frequently (35%). These two comprised most of their KS use (85%). Their use resulted in high rates of success (87% and 80%). They used *word association* relatively frequently (6%), and this KS was also associated with high rates of success (95%). Other KSs were used infrequently, accounting for less than 5% of the total.

The comparison of L1 and L2 inferential KS use indicates that the students used similar sets of KSs in L1 and L2 inferencing, although the rate of inferential success associated with the use of each KS was higher in L1 than in L2.

**L2 Word Retention**

Table 3 presents the students’ mean rates of word retention, as indicated by their scores on the two types of vocabulary posttests. On average, they recalled word meaning for 17% of the target words on the definition-supply test. The rate of retention became 33% when partial success was considered. They recalled word meanings for 49% of the target words on the matching test. The results suggest that they learned a considerable proportion of the target words.

<table>
<thead>
<tr>
<th></th>
<th>Definition-Supply</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Successful</td>
<td>34</td>
<td>0.17</td>
</tr>
<tr>
<td>Partially</td>
<td>34</td>
<td>0.16</td>
</tr>
</tbody>
</table>

**Vocabulary, Inferential Success and Word Retention**

Table 4 demonstrates the correlation between vocabulary knowledge, assessed by the
Vocabulary Levels Test, and inferential success, as well as the correlation between vocabulary knowledge and word retention. It also shows the correlation between reading ability, assessed by the Reading Section of the TOEIC, and inferential success, as well as the correlation between reading ability and word retention.

There was a significant positive correlation between vocabulary knowledge and the rates of inferring \((r = .38, p < .05)\) and between vocabulary knowledge and word retention indicated by matching test scores \((r = .36, p < .05)\). Furthermore, a stronger correlation was found between reading ability and the rates of inferring \((r = .48, p < .01)\). A strong correlation was also found between reading ability and word retention, as indicated by scores on the definition-supply and matching tests \((r = .40, p < .05; r = .55, p < .01, \text{ respectively})\). However, no significant correlation was found between any other variables. The results indicate that students with high proficiency in vocabulary and reading did not infer word meaning more successfully than those with low proficiency, although they inferred the meanings of more words and retained more words.

The correlation between inferential success and word retention shows significant relationships between two variables (see Appendix E). The rates of successful inferring as well as those of successful/partially successful inferring were strongly correlated with scores on the definition-supply test \((r = .91, p < .01; r = .68, p < .01; r = .76, p < .01; r = .73, p < .01, \text{ respectively})\) and the matching test \((r = .54, p < .01; r = .56, p < .01, \text{ respectively})\). These positive correlations indicate that inferential success resulted in the retention of words.

**Discussion**

**Inferential Success**

The Japanese students inferred word meaning far more successfully in L1 than in L2. They were 2.5 times more successful at identifying exact meaning (65% vs. 26%) and 1.7 times more successful at identifying exact/approximate meaning (83% vs. 49%). Moreover, compared with English speakers’ L1 inferencing in a previous study, in which a success rate of 89% was found (Wesco & Paribakht, 2010), the Japanese students’ L2 inferencing was less successful. Previous studies (Kobayashi, 2011; Nassaji, 2004) have indicated that learners’ general proficiency and vocabulary knowledge are strongly related to their inferential success. Therefore, it is likely that these pre-intermediate L2 learners were less successful at lexical inferencing.

The students’ L2 inferencing was either comparable or less successful than the L2
inferencing of those in previous studies (Huckin & Block, 1993; Nassaji, 2003; Parry, 1993; Wesche & Paribakht, 2010). For example, Wesche and Paribakht (2010) found that French L2 readers successfully inferred meanings for 31% of the words and Persian L2 readers for 11%. The Japanese students’ superior performance to the Persian students may be related to the research design of this study; the students read a short text with the provision of glosses. These conditions could account for their greater success. In contrast, the Japanese students’ inferior performance to French students, despite the favorable conditions, can be attributed to the typological distances from English of the two languages. L2 inferencing may be facilitated by positive transfer for French learners whose L1 is closely related to English (Wesche & Paribakht, 2010), an advantage that is not available to Japanese learners.

**Knowledge Sources and Success**

The comparison of L1 and L2 inferential KS use indicates that the students used similar sets of KSs in L1 and L2 inferencing, although in different proportions. *Sentence meaning* and *word morphology* were the primary KSs used in both L1 and L2 inferencing. In the L2 task, *sentence meaning* was used most frequently (42%), followed by *word morphology* (18%). In the L1 task, *word morphology* was used most frequently (50%), and *sentence meaning* second most frequently (35%). The use of *word morphology* was particularly frequent in L1 inferencing. This seems to be related to the structures of Japanese words. In Japanese, most new words are compounds consisting of *kanji* characters, each of which has a specific meaning. Accordingly, the meanings of unknown words can be inferred by referring to the meanings of the component characters. Therefore, *word morphology* can be a useful KS to infer word meaning in Japanese.

The Japanese students also made more frequent use of *word morphology* in L2 inferencing than the native speakers in Wesche and Paribakht’s study (2010) who used this KS only 6% of the time. Given the finding that *word morphology* was also used frequently in L1 inferencing, the Japanese students’ dependence on this KS in L2 inferencing can be considered the transfer of L1 processing skills.

KSs used with relative frequency in L2 inferencing were *discourse meaning* (9%), *world knowledge* (8%), *word association* (7%), and *sentence grammar* (7%). Similarly, *word association* was a relatively frequent method of L1 inferencing (6%). *World knowledge* and *discourse meaning* were also used in L1 inferencing, although with low frequency. The similarities in patterns of KS use in L1 and L2 can be considered the influence of L1. *Sentence grammar* was not used in L1 inferencing. The use of this KS in L2 inferencing can be attributed to the grammar-focused English instruction the Japanese students had received. Likewise, the French and Persian L2 readers in Wesche and Paribakht’s study (2010) who had received such instruction used this KS frequently.

The students used *world knowledge* and *discourse meaning* less frequently in L2 inferencing than the native English speakers in Wesche and Paribakht’s study (2010). Since these KSs were also used less frequently in L1 inferencing, it can be considered L1
influence. Alternatively, this can be explained by the students' low proficiency in L2. Previous studies (Chern, 1993; Haynes, 1993) indicated that L2 readers made more frequent use of local cues than global cues that required the integration throughout the text. The French and Persian L2 readers in Wesche and Paribakht’s study (2010) also used world knowledge less frequently than the native English speakers, and the French learners used discourse meaning less frequently.

Comparison of the Japanese students’ L2 KS use with the native English speakers’ L1 KS use in Wesche and Paribakht’s study (2010) indicates text language (English) effects on their L2 inferencing. Their reduced use of word morphology and increased use of discourse meaning and world knowledge in L2 in relation to L1, which are more typical of English L1 patterns, could mean that they had integrated some of the KS use patterns of English L1 readers.

The students’ inferential success in the use of each KS was smaller in L2 than in L1. In particular, word morphology and sentence grammar were associated with high rates of failure (64%, 54%, respectively) in the L2 task. The lesser success associated with word morphology seems to be a serious problem because the students made frequent use of it. Their responses indicate this was related to the lack of morphological knowledge. In contrast, the lesser success associated with sentence grammar appeared to suggest the unhelpfulness of grammatical information alone for inferring word meaning. World knowledge, discourse grammar, and word association were associated with high degrees of success, although their use was rather limited.

The students used multiple KSs more frequently to infer the meaning of a word in L2 than in L1. Multiple KSs were used for 28% of the words in L2, whereas they were used for 18% in L1. The students’ use of multiple KSs in L2 was far less frequent than that of the native English speakers in Wesche and Paribakht’s study (2010), who used them 64% of the time. However, their increased use of multiple KSs in L2 relative to L1 can be viewed as an adaptation toward English L1 norms.

**L2 Word Retention**

The students retained a considerable proportion of the target words immediately after the inferencing task. They retained word meaning successfully for 17% of the target words, and partially successfully for another 16% on the definition-supply test. They retained 49% of the target words on the matching test. These retention rates are as high as or higher than those found in other similar studies, such as 6% and 8% (Pitts, White, & Krashen, 1989), 7% (Hulstijn, 1992), 10% and 16% (Wesche & Paribakht, 2010), and 19% and 38% (Haynes & Baker, 1993). The high retention rates found in this study could relate to several factors. First, the students were prompted to infer the meanings of all target words. This might have forced them to attend to words that they normally wouldn’t have. Secondly, they were instructed to write down the inferred meanings together with the KSs used, which might have made them recall their thought processes. This elaborative processing might have enhanced their retention.
The third factor is text length. The students retained more words than those in Wesche and Paribakht’s (2010) study, who were also instructed to infer all the target words while thinking aloud. The Persian students retained 10%, whereas the French students retained 16%. Despite the typological proximity of French to English, the French students’ retention rate was similar to that obtained in this study. The high retention rates achieved in this study might be the result of a shorter text with fewer target words, which allowed the students to focus more closely on each target word.

### Vocabulary, Inferential Success and Word Retention

Analysis of the correlations between L2 proficiency, inferential success, and word retention indicates that students with high proficiency in vocabulary and reading did not infer word meaning more successfully than those with low proficiency, although they inferred the meanings of more words and retained more words.\(^9\)

The parity in the two groups’ inferential success might be due to the use of a short text with glosses. This condition might have greatly benefited the students with lower lexical proficiency by enabling them to understand surrounding words and text fully, which yielded results comparable to those of students with higher lexical proficiency.\(^10\)

Although the students with higher proficiency were not superior in inferential success, they had higher rates of inferring as well as higher rates of word retention. This may indicate that their laborious attempts to infer word meaning led to retention of the words, even though their initial efforts failed. Interestingly, their scores on the matching test were higher than their rates of inferential success. This may show that they were able to refine their initially wrong guesses with the aid of the definitions given on the matching test.

The rates of inferring and word retention were not only correlated with vocabulary knowledge but also reading proficiency. This might show that inferring word meaning from context requires more than knowledge of receptive vocabulary, as measured by the Vocabulary Levels Test. As Nassaji (2004) found that depth of vocabulary is a strong predictor of success in lexical inferencing, knowledge of syntactic and semantic associations of a word with other words is important in inferring word meaning from context.

These positive correlations between inferential success and word retention indicate that inferential success did result in the retention of words. In fact, the comparison of their guesses and answers on the definition test shows that the students recalled the inferred meanings on the test most of the time (71%). This indicates that when successfully inferred, new word meanings can be at least temporarily retained and serve as a basis for further learning.

### Conclusion

The findings of this study provide insights into L1 influences on L2 lexical inferencing and vocabulary learning by drawing on data from the Japanese learners’ inferencing in
L1 and L2. The students' L2 inferencing was less successful than their L1 inferencing. Limited success in L2 inferencing may be related to low L2 proficiency and typological distance of L1 and L2.

L1 appears to influence the kinds of KSs used to infer word meaning in L2. Similar patterns of KS use were found in L1 and L2 inferencing. To increase L2 inferential success, the students may need to use similar KSs as native speakers, a change which appears to have already begun. Specifically, they may need to use discourse meaning and world knowledge more frequently and word morphology less frequently. They also need to increase their use of multiple KSs to infer the meaning of a word. Furthermore, they need to improve their knowledge of word morphology, because the use of this KS was associated with high rates of failure.

The results confirm relationships between L2 proficiency, inferential success, and initial retention of word meanings. L2 proficiency in vocabulary and reading appears to be related to rates of inferring as well as rates of word retention. More importantly, inferential success appears to be related to word retention, indicating that when inferencing is successful, it can be an effective word learning strategy.

There were several limitations to the present study. First, the sample size was small. In particular, only 22 students performed the L1 inferencing task. A larger-scale study should be conducted to verify the results. Second, only quantitative analyses of data were performed in this study. Although they are valuable to our general understanding of L1 and L2 lexical inferencing, they do not provide deep insights into processes and outcomes. Future research should include qualitative analyses to enhance our understanding in those areas. Thirdly, this study only examined the initial retention of word meanings through the immediate posttests. As initial learning may not necessarily lead to long-term retention, future research could include the administration of delayed posttests. Fourthly, a short text was used for the L2 inferencing task to avoid a prolonged research session. However, a longer one could be helpful in discerning the process of inferencing that would occur in less intensive conditions.

References


Haastrup, K. (2008). Lexical inferencing procedures in two languages. In D. Albrechtsen,


Appendix A. Reading Text: Ice Age

If you could visit the North America of ten thousand years ago, you probably would not recognize it at all. No cities or freeways graced the landscape. The millions of people who now inhabit the continent were absent. In fact, the landscape would probably have appeared rather bleak. Portions of what is now called the United States and much of what is now called Canada were covered by glaciers. To say that the ice mass was very big would be a dramatic understatement. It would be more precise to describe it as overwhelmingly vast, covering hundreds of thousands of square kilometers. The climate across North America was considerably colder than it is now. Influenced by the cold ice to the north, rain, sleet, and snow poured down continually. As the ice advanced southward, trees disappeared and wide valleys were carved from the plains. There was life on the continent, however. In the shadow of the great mass of ice, larger animals stalked smaller ones for food, and hardy grasses struggled to survive. Despite the harsh environment, a balance was reached. Eventually, the ice slowly retreated over many thousands of years, leaving behind a devastated landscape. However, it also left behind all the elements necessary for new life. The melting ice released sediment which formed a thick layer of fertile soil. Trees grew again as the cold gradually released its grip on the land. Eventually people settled where once there had only been ice, and North America began to take the shape that we now know. When we consider these ancient events chronologically, we are reminded that the surroundings that are so familiar to us, and indeed, the history of nations, mean little when considered in the perspective of geological time.

Appendix B. Taxonomy of Knowledge Sources Used in Lexical Inferencing

L2-Based Sources

- Word Knowledge
  - Word Association: Association of the target word with another familiar word or a network of words.
  - Word Collocation: Knowledge of words that frequently occur with the target words.
  - Word Morphology: Morphological analysis of the target word based on knowledge of grammatical inflections, stems and affixes.
  - Word Form: Knowledge of formal (orthographic or phonetic) similarity between
the target word and another word; that is, mistaking the target word for another word resembling it.

- **Sentence Knowledge**
  - Sentence Meaning: The meaning of part or all of the sentence containing the target word.
  - Sentence Grammar: Knowledge of the syntactic properties of the target word, its speech part and word order constraints.
  - Punctuation: Knowledge of rules of punctuation and their significance.

- **Discourse Knowledge**
  - Discourse Meaning: The perceived general meaning of the text and sentences surrounding the target word (i.e., beyond the immediate sentence that contains the target word).
  - Formal Schemata: Knowledge of the macro structure of the text, text types and discourse patterns and organization.

**L1-Based Sources**
- L1 Loan Word: Knowledge of formal (orthographic or phonetic) similarity between the target word or a part of it and an L1 loan word.

**Non-Linguistic Sources**
- World Knowledge: Knowledge of the topic of the text and other related background knowledge.
- Previous Experience: Knowledge based on previous encounters with the word.

### Appendix C. Frequency of Knowledge Sources and Inferential Success in L2

<table>
<thead>
<tr>
<th>KS</th>
<th>N</th>
<th>%</th>
<th>Success</th>
<th>Partial Success</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Association</td>
<td>37</td>
<td>7</td>
<td>17 (46%)</td>
<td>12 (32%)</td>
<td>8 (22%)</td>
</tr>
<tr>
<td>Word Collocation</td>
<td>13</td>
<td>2</td>
<td>3 (23%)</td>
<td>1 (8%)</td>
<td>9 (69%)</td>
</tr>
<tr>
<td>Word Morphology</td>
<td>104</td>
<td>18</td>
<td>23 (22%)</td>
<td>15 (14%)</td>
<td>66 (64%)</td>
</tr>
<tr>
<td>Word Form</td>
<td>16</td>
<td>3</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td>Sentence Meaning</td>
<td>240</td>
<td>42</td>
<td>66 (28%)</td>
<td>90 (37%)</td>
<td>84 (35%)</td>
</tr>
<tr>
<td>Sentence Grammar</td>
<td>39</td>
<td>7</td>
<td>10 (26%)</td>
<td>8 (20%)</td>
<td>21 (54%)</td>
</tr>
<tr>
<td>Punctuation</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (100%)</td>
</tr>
<tr>
<td>Discourse Meaning</td>
<td>49</td>
<td>9</td>
<td>24 (49%)</td>
<td>9 (18%)</td>
<td>16 (33%)</td>
</tr>
<tr>
<td>Formal Schemata</td>
<td>1</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>L1 Loan Word</td>
<td>6</td>
<td>1</td>
<td>5 (83%)</td>
<td>1 (17%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>World Knowledge</td>
<td>45</td>
<td>8</td>
<td>24 (53%)</td>
<td>16 (36%)</td>
<td>5 (11%)</td>
</tr>
<tr>
<td>Previous Experience</td>
<td>5</td>
<td>1</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>5 (100%)</td>
</tr>
<tr>
<td>Uncertain</td>
<td>9</td>
<td>2</td>
<td>1 (11%)</td>
<td>1 (11%)</td>
<td>7 (78%)</td>
</tr>
<tr>
<td>Total</td>
<td>564</td>
<td>100</td>
<td>173 (31%)</td>
<td>153 (27%)</td>
<td>238 (42%)</td>
</tr>
</tbody>
</table>
The participants in the second phase were 8 freshmen, 5 sophomores, and 9 juniors, including 14 male and 8 female students. Their mean score on the TOEIC was 473.42 (SD = 113.37), and their mean score on the Reading Section of TOEIC was 208.68 (SD = 66.52). Their mean score on the Vocabulary Levels Test was 76.73 (SD = 28.28).

The target words were grace, bleak, glacier, understatement, sleet, stalk, hardy, retreat, devastated, sediment, chronologically, and perspective.

The interrater reliability of 99% was obtained because the vocabulary posttest was scored after the students’ responses to the inferencing task were rated, and their responses to both tasks were usually the same as discussed later.

Prior to carrying out these correlations, assumptions such as normal distribution and linear relationship were carefully checked.

Since L1 data consists of only 22 students, a direct comparison of L1 and L2 data may not be fair. However, it turned out that the 22 students showed similar behavior as the original pool in L2 inferencing. On average, the students determined the meanings correctly for 23% of the words and partially correctly for 24%.

### Appendix D. Frequency of Knowledge Sources and Inferential Success in L1

<table>
<thead>
<tr>
<th>KS</th>
<th>N</th>
<th>%</th>
<th>Success</th>
<th>Partial Success</th>
<th>Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Association</td>
<td>21</td>
<td>6</td>
<td>8 (38%)</td>
<td>12 (57%)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Word Collocation</td>
<td>11</td>
<td>3</td>
<td>10 (91%)</td>
<td>0 (0%)</td>
<td>1 (9%)</td>
</tr>
<tr>
<td>Word Morphology</td>
<td>180</td>
<td>50</td>
<td>130 (72%)</td>
<td>26 (15%)</td>
<td>24 (13%)</td>
</tr>
<tr>
<td>Word Form</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Sentence Meaning</td>
<td>125</td>
<td>35</td>
<td>70 (56%)</td>
<td>30 (24%)</td>
<td>25 (20%)</td>
</tr>
<tr>
<td>Sentence Grammar</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Punctuation</td>
<td>2</td>
<td>0</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Discourse Meaning</td>
<td>11</td>
<td>3</td>
<td>6 (55%)</td>
<td>3 (27%)</td>
<td>2 (18%)</td>
</tr>
<tr>
<td>Formal Schemata</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>L1 Loan Word</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>World Knowledge</td>
<td>7</td>
<td>2</td>
<td>7 (100%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Previous Experience</td>
<td>5</td>
<td>1</td>
<td>2 (40%)</td>
<td>1 (20%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Uncertain</td>
<td>0</td>
<td>0</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>100</td>
<td>234 (65%)</td>
<td>73 (20%)</td>
<td>55 (15%)</td>
</tr>
</tbody>
</table>

### Appendix E. Correlation Between Inferential Success and Word Retention

<table>
<thead>
<tr>
<th></th>
<th>Supply S</th>
<th>Supply SP</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infer S</td>
<td>.91**</td>
<td>.68**</td>
<td>.54**</td>
</tr>
<tr>
<td>Infer SP</td>
<td>.76**</td>
<td>.73**</td>
<td>.56**</td>
</tr>
</tbody>
</table>

Note. **p < .01. S = successful; SP = successful + partially successful.
This analysis is based on the data from 34 students because vocabulary test scores were not available for 10 students. This is either because they did not take the tests or their answers were incomplete.

If the researcher had used a longer text with no provision of glosses, the comparisons of the results of the present study with those of Wesche and Paribakht's (2010) study would have been fairer. However, given that the students in this study were used to reading short texts intensively, it seemed that making them read a longer text and infer the meanings of the target words within an hour or so would be too daunting a task. Therefore, the researcher decided to use a short text. As mentioned in the Method section, the glosses were provided to ensure that the students knew more than 95% of words, which is a necessary condition for inferring the meanings of unknown words. In short, the researcher wanted to make the task as appropriate as possible for the students' level, although it complicated the interpretation of the results.

The students with high proficiency and those with low proficiency did not differ in the patterns of KS use, either. The only difference was in the use of discourse meaning. The students with high lexical proficiency used this KS more frequently, as indicated by a significant positive correlation between the use of this KS and vocabulary knowledge ($r = .37, p < .05$).

Another possible reason for the parity of the two groups is that because the researcher decided to exclude the results of students who knew many of the target words, their levels of proficiency did not differ greatly.