Discourse-Based Lexical Inferencing in EFL Reading: Focusing on Depth of Vocabulary Knowledge and Cue Availability

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Abstract

The present study examined how Japanese EFL learners infer the meaning of unknown words from discourse information, focusing on their depth of vocabulary knowledge (DVK) and availability of contextual cues for lexical inferencing. A total of 70 Japanese undergraduates performed a lexical inferencing task in a single sentence and a text (i.e., sentence-based and discourse-based inferencing tasks). In both inferencing tasks, five target words were presented to the participants with or without local cues (+Local and –Local conditions): +Local strongly constrained the inferable meanings of target words and –Local did not. The participants’ responses were scored by a 3-point scale: unsuccessful, partially successful, and successful. The scores showed that (a) EFL learners can infer the meaning of unknown words more successfully by using local and global cues than by using only local cues, and (b) EFL learners with greater DVK can make a better use of the global cues than those with smaller DVK. Furthermore, the qualitative analysis showed that (c) the learners changed non-working local cues into effective ones in discourse-based lexical inferencing by connecting local cues with available discourse information.
1. Introduction

In reading comprehension of English as a foreign language (EFL), learners often encounter unfamiliar words that make it difficult to understand the text. To achieve successful text comprehension, it is preferable that learners infer the appropriate meaning of those words from the text. However, many previous studies have demonstrated that EFL or second language (L2) learners have difficulty in lexical inferencing (e.g., de Bot, Paribakht, & Wesche, 1997; Frantzen, 2003; Haynes & Baker, 1993; Paribakht & Wesche, 1999).

In L2 lexical inferencing, learners need to effectively utilize their knowledge sources to make the best use of cues (i.e., information that semantically constrains the inferable meaning of unknown words) available in a context. In Haynes and Baker (1993), such cues are broadly classified into local and global cues. Local cues exist within the sentence in which an unknown word is embedded. According to Wesche and Paribakht's (2009) classification, local cues encompass word-level cues, which are included in an unknown word itself (e.g., morpheme and word form), and sentence-level cues, which are included in a single sentence where an unknown word appears (e.g., sentence meaning and syntax). On the other hand, global cues are regarded as discourse-level cues, which are included in a whole text beyond a single sentence (e.g., the setting of a narrative text, or the relationship between two paragraphs). These definitions of each term will clarify the further review of related literature about (a) the use of local and global cues, and (b) learners' knowledge sources involved in using cues.

In relation to the use of cues, both local and global cues can be utilized for lexical inferencing. However, most previous studies have revealed the advantages of global cues over local ones (e.g., Frantzen, 2003; Haynes & Baker, 1993; Huckin & Bloch, 1993; Nassaji, 2006; Paribakht & Wesche, 1999). For example, some researchers have reported the learners' failure in using local cues. In their experiments, the failed learners typically use local cues in word-form analogy (e.g., mistaking *squallor* for *square* in Nassaji, 2006) and misinterpretation of ambiguous contexts (e.g., in a sentence like *A butterfly's wings were buzzing*, learners were likely to misunderstand *buzzing* as "zooming," "flying," or "spinning" in Frantzen, 2003). In order to avoid these mistakes caused by local cues, many researchers have recommended using global cues because these are constructed based on the meaning of the whole text, and help learners identify the appropriate meaning corresponding to the context (Nassaji, 2006). On the other hand, some studies have also shown that the use of global cues is more difficult for learners than use of local cues, leading to poor performance in lexical inferencing (Bensoussan & Laufer, 1984; Frantzen, 2003; Haynes & Baker, 1993; Huckin & Bloch, 1993; Paribakht & Wesche, 1999); nevertheless, it is still uncertain why learners have difficulty in using global cues for lexical inferencing because there are few previous studies which have examined the effect of global cues or directly compared the effect of local and global cues on lexical inferencing success.
Next, regarding the knowledge sources in lexical inferencing, learners’ depth of vocabulary knowledge (DVK) seems involved in the use of local and global cues. Although DVK has various aspects of word knowledge, such as word form, collocations, and associations (Read, 1998), the aspects of DVK required vary, depending on whether local and global cues are used. Using local cues for inferencing involves vocabulary knowledge about the word itself (e.g., morpheme, word form) and word connection within a single sentence (e.g., syntax, sentence meaning). Meanwhile, the vocabulary knowledge needed for the use of global cues is word association which links one unknown word to other relevant words or concepts distributed in a text. Therefore, the learners’ DVK seems to promote success in both sentence-based and discourse-based lexical inferencing. However, given the advantage of global cues over local ones as stated above (e.g., Frantzen, 2003; Haynes & Baker, 1993), even learners with greater DVK fail in sentence-based inferencing. On the other hand, discourse-based lexical inferencing based on global cues is more likely to contribute toward identifying the best-fitting meaning of unknown words if the learner has an adequate amount of DVK. In fact, Nassaji (2006) supported the positive relationship between DVK and the use of global cues. According to his study, successful learners inferred appropriate word meanings from global cues by establishing semantic connections between unknown words and these cues. The essential cause of this semantic connection process was their greater DVK. Thus, we can hypothesize that the learners’ DVK plays an important role in discourse-based lexical inferencing success but is less important in the sentence-based form.

However, we point out that in order for discourse information to function effectively in providing global cues, the cue availability, which is defined as whether or not the cue strongly constrains the inferable meaning of unknown words, should be carefully taken into consideration. Let us consider what L2 learners might infer about the meaning of a pseudoword marf in the following sentences in Borovsky, Kutas, and Elman (2010, p. 289):

a. He tried to put the pieces of the broken plate back together with marf.
b. She walked across the room to Mike’s messy room to return his marf.

In sentence (a), the inferable meaning of marf is strongly constrained; namely, its meaning will converge on glue or something that is used for joining things together. Since the local cues in the sentence (a) such as put... back together provide the learners with enough information to infer the meaning of marf, the sentence (a) does not necessarily require them to use any other cues like global cues. In this study, a sentence like (a) can be characterized as “+Local” from the viewpoint of the local cue availability. In contrast, sentence (b) includes only ineffective local cues, which ambiguously implies marf as something in a room. This means that the local cue availability is low (hereafter “−Local”) so that the global cues are necessary to achieve the lexical inferencing.

In summary, although several researchers have proposed that the use of global cues based on learners’ DVK contributes to the success of discourse-based lexical inferencing, some
empirical studies have also demonstrated that L2 learners hardly ever use global cues while attempting lexical inferencing. However, it is still unclear why L2 learners often fail in discourse-based lexical inferencing, because most previous studies have not strictly manipulated the availability of cues in a text. Therefore, the current study aims to examine the effect of learners’ DVK on discourse-based lexical inferencing using global cues in relation to cue availability. A hypothesis (H) and a research question (RQ) were proposed as follows:

H: EFL learners’ DVK plays a more important role in the success of discourse-based lexical inferencing than the sentence-based form.

RQ: How does the availability of local cues affect the success of sentence-based lexical inferencing and the discourse-based form?

Because our interest was in whether and how the learners with or without deeper vocabulary knowledge infer the meaning of unknown words by using global cues, we compared the scores of sentence-based and discourse-based lexical inferencing tasks. To be more specific, the two conditions of Task (i.e., sentence-based, discourse-based) and Cue Availability (i.e., +Local, –Local) were set up in a factorial design (see Table 1):

<table>
<thead>
<tr>
<th>Task</th>
<th>Availability of local cues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence-based</td>
<td>But he always has a good repartee.</td>
</tr>
<tr>
<td>Discourse-based</td>
<td>Though, members of the audience are sometimes not so romantic. They yell rude things at him. But he always has a good repartee. When a man in fancy, colorful clothing said something to him...</td>
</tr>
<tr>
<td></td>
<td>He skipped classes often, but when his parents scolded him, his quick repartee always could cover his laziness.</td>
</tr>
<tr>
<td></td>
<td>...Tomas hated that his life was controlled by his parents. He skipped classes often, but when his parents scolded him, his quick repartee always could cover his laziness. When Tomas was 15 years old...</td>
</tr>
</tbody>
</table>

In this study, we used experimental passages in which the global cues were always available for lexical inferencing to develop the investigations of past studies. In the –Local condition, local cues were unavailable for lexical inferencing. As a result, it was difficult to infer the meaning of target words from local cues in a single sentence, and learners were required to use global cues in discourse to identify those meanings. On the other hand, +Local indicates that the inferable meaning of target words were adequately constrained by local cues within the sentence. Therefore, for the discourse-based lexical inferencing in the +Local condition, global cues were still available but were not always necessary for inferring the meaning of target words. As shown in Figure 1, these manipulations allow us to clearly investigate the impact on lexical inferencing of using global cues.
Figure 1. The contextual cues in the –Local (left) and +Local (right) conditions.

2. Method

2.1 Norming Studies

Before the main experiment, two pilot studies were conducted (a) to select texts in which the global cues were always available for discourse-based inferencing, and (b) to rate whether the possible meaning of each target word was constrained by the local cues in the selected texts.

2.1.1 Text selection

The purpose of the first norming study was to select the most appropriate texts for the present study. First, five narrative passages (hereafter Texts 1–5) were adopted from Chen and Truscott (2010). Each passage contained the same 10 low-frequency words as target words. In the pilot experiment, half of the target words were presented in a single sentence (i.e., a sentence-based task) and the others in a whole narrative (i.e., a discourse-based task). Each target word was replaced by a different pseudoword. In addition, any other low-frequency words in every passage (unless they were target words) were rephrased with the high-frequency words ranging from levels 1 to 3 in JACET 8000 (JACET, 2003) to prevent those words affecting reading comprehension.

Twenty Japanese undergraduates were instructed to infer the meanings of the target words appearing in either the sentence-based or discourse-based task, and to write them down in Japanese. The participants inferred the meanings of (a) each of five target words in the sentence-based task (five word meanings × five sentences for each word = 25 items per participant), and (b) the remaining five words in the discourse-based task (five word meanings for each passage × five passages = 25 items per participant). The allotment of the target words was counterbalanced among the participants.

With reference to Webb’s (2008) criteria, the degree of success in lexical inferencing was rated with a 3-point scale (0: unsuccessful, 1: partially successful, 2: successful). Successful meant that responses completely corresponded to the definitions. Responses that were contextually appropriate and were semantically related to original definitions were classified as partially successful. When the response did not satisfy any of the above criteria, it was considered unsuccessful even if it was contextually acceptable. After two independent raters had marked all the attempts, the inter-rater agreement was 87.26%. All disagreements were resolved through discussion to meet the 100% agreement.
The results are reported in Table 2. First, Texts 4 and 5 were excluded from the following analyses because these texts did not differ in the mean scores between the sentence-based and discourse-based tasks. For the other three texts, a Task (sentence-based, discourse-based) × Text Type (Text 1, Text 2, Text 3) analysis of variance (ANOVA) was conducted with the mean scores of the lexical inferencing task. Significant main effects were found in Task, \( F(1, 18) = 7.51, p = .013, \eta^2 = .04 \), and Text Type, \( F(2, 36) = 10.56, p < .001, \eta^2 = .12 \); however, the interaction of Task × Text Type was not found, \( F(2, 36) = 0.69, p = .917, \eta^2 < .01 \). A Bonferroni comparison showed a significantly higher mean score in Text 3 than Texts 1 and 2 (\( p = .004 \), respectively). On the other hand, Texts 1 and 2 did not differ in the mean scores (\( p = .609 \)). Thus, Texts 1 and 2 were selected for use, because their difficulty in lexical inferencing was almost the same, and more importantly, the global cues were highly available according to the main effect of Task.

Table 2

<table>
<thead>
<tr>
<th>Text</th>
<th>( N )</th>
<th>Sentence-based</th>
<th>Discourse-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text 1 (Gordon)</td>
<td>19</td>
<td>0.79</td>
<td>0.54</td>
</tr>
<tr>
<td>Text 2 (Tomas)</td>
<td>20</td>
<td>0.64</td>
<td>0.40</td>
</tr>
<tr>
<td>Text 3 (Lindsay)</td>
<td>20</td>
<td>1.05</td>
<td>0.31</td>
</tr>
<tr>
<td>Text 4 (Travis)</td>
<td>20</td>
<td>0.66</td>
<td>0.45</td>
</tr>
<tr>
<td>Text 5 (PhD)</td>
<td>19</td>
<td>0.80</td>
<td>0.41</td>
</tr>
</tbody>
</table>

*Note. Maximum possible score (MPS) = 2.00. Two non-response data were omitted.*

2.1.2 Rating of local cue availability for each target word

Although two texts were chosen as the experimental passages through the first norming study, it is necessary to take a closer look at each target word to examine the necessity of global cues to infer its meaning. Therefore, all the target words were rated in terms of whether their possible meanings were strongly constrained by local cues (i.e., cue availability; +Local and –Local). Based on Webb’s (2008, pp. 235–236) criteria (see Appendix A), two raters individually evaluated the local cue availability for each target word, resulting in an acceptable inter-rater agreement (82.86%). All disagreements were resolved through discussion.

Table 3 displays the distribution and local cue availability of the target words in the two experimental passages. As shown in Table 3, Text 1 had seven target words with highly available local cues, and three target words whose local cue availability was low. In Text 2, although the first norming study confirmed that the global cues worked effectively for lexical inferencing, two target words were judged as having insufficient local or global cues to successfully infer their meanings. Therefore, these target words were eliminated in this study. As a result, Table 3 also shows that Text 2 included six target words with highly available local cues, and two target words with low availability of local cues. This allows us to examine the difference in the learners’ discourse-based lexical inferencing success.
Table 3
Experimental Passages and Target Words Used in the Present Study

<table>
<thead>
<tr>
<th>Text 1 (Gordon): 239 words, FKGL = 7.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gordon is a singer who performs in bars and restaurants. He’s always moving around, never performing in one place for very long. That’s one reason he likes to call himself a troubadour (+Local) instead of just a musician. Also he likes images of old England, like knights and ladies sitting beside a little rivulet (+Local) watching the water flow by and listening to a musician like him. When he’s performing in the real world of cheap bars, though, members of the audience are sometimes not so romantic. They yell rude things at him. But he always has a good repartee (-Local). When a man in fancy, colorful clothing said something to him, he responded by calling the man “this bedizened (+Local) fool.”</td>
</tr>
<tr>
<td>One time he gave a free performance for an old man who was convalescing (+Local) in the hospital after he had been hurt in an automobile accident. He had suffered a head injury, which made him a little crazy. Gordon sang a song for him about freedom, but the man soon started saying strange things about the subject. “Slave owners still don’t want to manumit (+Local) their slaves. It’s because our society doesn’t accept the idea of freedom. Slavery will continue until the zeitgeist (-Local) finally changes.”</td>
</tr>
<tr>
<td>Gordon told him several times that all the slaves had been freed long ago, but the old man was obdurate (-Local). He simply would not accept the fact. So Gordon decided to jettison (+Local) that topic and try something easier. He told a picaresque (+Local) story about a teenager wandering around the country trying to discover who he really was.</td>
</tr>
</tbody>
</table>

| Text 2 (Tomas): 30 | words, FKGL = 7.2 |
|------------------|
| Tomas was born into a wealthy family, the son of a successful businessman. All his family was so bedizened (+Local) that it seemed they really liked showing off their fortune. There were always slaves around the house, serving the host or doing the housework. However, little Tomas, the only child in the family, was not happy at all. He was forced to study many subjects like history, music, drawing, and riding horses. In fact Tomas hated that his life was controlled by his parents. He skipped classes often, but when his parents scolded him, his quick repartee (+Local) always could cover his laziness. |
| When Tomas was 15 years old, the family business suddenly collapsed. His father jettisoned (+Local) his responsibilities and disappeared. The helpless mother decided to manumit (+Local) all the slaves and sell all the property. Unfortunately, she became badly sick and unable to walk for a while. Sadly, there was no one willing to give them a hand during that time. In order to make money, Tomas performed as a troubadour (+Local) wandering on the streets. He composed lyrics which were related to the zeitgeist (Excluded). Also his picaresque (Excluded) songs always moved people to tears because of his poor background, so that they gave him a few pennies more. This tiny income was just enough to keep the family alive. |
| As time went by, the mother convalesced (+Local) well from the illness. One day she said, “Tomas, my son, I hope you can be a successful business person like your father. You have to bring the fortune back to the family.” Nevertheless, Tomas didn’t follow his mother’s wishes as he used to. He was obdurate (-Local) instead. He insisted on still being a folk singer. He found himself fulfilled while singing freely, whether it was along a peaceful rivulet (-Local) or in front of a crowd. |

Note. FKGL = Flesch-Kinsaid Grade Level. +Local = both local and global cue availabilities are high; -Local = local cue availability is low but global cue availability is high; Excluded = two words were excluded from this study because neither local nor global cue availability was low.

2.2 Experimental Study
2.2.1 Participants
The participants in the experimental study were 70 Japanese undergraduates majoring in engineering, social sciences, or international studies. Four students’ data were removed from the analyses because they did not complete the given tasks. All the participants had studied English for more than six years. Their average estimated TOEFL scores were approximately 500 (ranging from 310–580) measured by the reading subsection of paper-based TOEFL practice test (Educational Testing Service, 2002), which consisted of a total of 50 items with five passages.
2.2.2 Materials

Experimental passages and target words: Two narrative passages selected through the norming studies were used (see Table 3). Target words were 10 low-frequency English words, which had been replaced with the pseudowords in the first norming study. They were not known to any participants according to their responses to a pre-reading checklist in which the participants reported whether the target words were known or unknown.

Word Association Test: To measure the participants’ DVK, the Word Association Test (WAT) version 4 developed by Read (1998) was used. The WAT measures learners’ knowledge about the semantic and collocational relationship that one word has with other words. The test was composed of 40 sets of a stimulus word and two boxes containing four words. The participants were asked to read each of the stimulus words and then circle the four words most closely related to those stimuli.

2.2.3 Procedure

Two booklets, A and B, were created for the two experimental passages. Half of the participants received Booklet A, in which they attempted the sentence-based task for Text 1 and the discourse-based task for Text 2. The others were given Booklet B, in which they performed the sentence-based task for Text 2 and the discourse-based task for Text 1.

The tasks were administered during a class period (75 minutes). In the experimental session, first, the participants performed the sentence-based task (see a sample format in Appendix B). They were given five sentences, each of which included a target word, and were asked to write down the inferred meaning in Japanese (10 minutes). At the same time, they were required to circle any words or phrases in each sentence that they used for lexical inferencing as local cues. After this task, the participants performed the discourse-based task, in which they had to read the whole passage and write down the meanings of the other five target words inferred from the overall context (15 minutes). In the same way as the sentence-based task, they were also presented with the sentences including each target word and were asked to circle any cues used for lexical inferencing. The present study manipulated the availability of local cues to investigate the effects of cue availability on the lexical inferencing success; therefore, the use of local cues but not global ones was compared between the sentence-based and discourse-based tasks. Following the discourse-based task, the participants completed a recall task in which they wrote down in Japanese what they understood and remembered from the passage (10 minutes). This task would confirm that text difficulty was well-balanced between Texts 1 and 2. Finally, the WAT was conducted to measure learners’ DVK (25 minutes).

2.2.4 Scoring and data analysis

The lexical inferencing tasks were scored in the same way as the first norming study by the 3-point scale representing unsuccessful, partially successful, and successful attempts. Two raters
individually scored 30% of the inferencing attempts, resulting in a high inter-rater agreement (85.77%). After discussion to solve disagreements, the rest of the data were scored, which indicated an agreement ratio of 94.40%. Again, all disagreements were solved through discussion.

For scoring of recall data, the two passages were parsed into a set of idea units (IUs) by two raters on the basis of Ikeno’s (1996) criteria, and the inter-rater reliability was found to be acceptable, $r = .93$ for Text 1, and $r = .87$ for Text 2. Each IU appearing in the recall protocols was scored with one point if two thirds of the information was reproduced. In scoring, 30% of the recall protocols of each passage were scored by the four pairs of raters; a process which showed a high agreement ratio of 85.66% to 93.33%. After marking the other 70% of the recall protocols, the total agreement ratio ranged from 89.88% to 92.45%. All disagreements were resolved through discussion. In the data analysis, arcsine transformation was performed on the total score because these two texts were different in the number of IUs.

Finally, the proportions of use of each local cue were calculated for individual target words by adapting arcsine transformation to compare successful and failed inferencing in different task conditions.

3. Results and Discussion

3.1 WAT Scores and Text Difficulty

Before analyzing the lexical inferencing tasks, we divided the participants into two groups according to the WAT scores. From all 160 items in the original WAT, 35 items were excluded from analysis because their point-biserial correlation coefficients were negative (Cronbach’s $a = .83$ after the removal). Based on the mean scores of WAT, 35 participants were classified as Upper ($M = 100.09$, $SD = 3.88$, $Min = 94$, $Max = 110$), while the other 31 participants were classified as Lower ($M = 85.84$, $SD = 4.42$, $Min = 78$, $Max = 93$). The mean scores between the two groups were significantly different, $t(64) = 13.95, p < .001, r = .87$.

In addition, to confirm that Texts 1 and 2 were equal in their ease of reading comprehension, we also analyzed the recall production rates (%) between Text 1 ($M = 38.09$, $SD = 10.71$, $Min = 8.77$, $Max = 56.64$) and Text 2 ($M = 39.21$, $SD = 8.72$, $Min = 19.29$, $Max = 54.00$). The result showed no significant differences between the two texts, $t(64) = 0.47, p = .643, r = .06$.

3.2 Lexical Inferencing Scores

To discuss the hypothesis and the research question, we analyzed (a) the scores on the lexical inferencing tasks, and (b) the patterns of use of local cues for lexical inferencing. This section shows the results from the former analysis, focusing on the interactions among the three factors by a three-factor mixed ANOVA for the lexical inferencing success. The design was Task (sentence-based, discourse-based) $\times$ Cue Availability (−Local, +Local) $\times$ DVK (Upper, Lower). Table 4 shows the overall results of the lexical inferencing tasks.
Table 4
Mean Scores With Standard Deviations of the Lexical Inferencing Tasks

<table>
<thead>
<tr>
<th>WAT</th>
<th>n</th>
<th>Sentence-based</th>
<th>Discourse-based</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-Local</td>
<td>+Local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>35</td>
<td>0.13 (0.39)</td>
<td>0.82 (0.55)</td>
</tr>
<tr>
<td>Lower</td>
<td>31</td>
<td>0.10 (0.27)</td>
<td>0.72 (0.53)</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>0.11 (0.34)</td>
<td>0.77 (0.54)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are in parentheses. MPS = 2.00.

The results indicated the significant main effects of Task, $F(1, 64) = 34.16, p < .001, \eta^2 = .14$, Cue Availability, $F(1, 64) = 72.97, p < .001, \eta^2 = .12$, and DVK, $F(1, 64) = 11.16, p = .001, \eta^2 = .03$. Although a three-way interaction was not significant, $F(1, 64) = 0.41, p = .526, \eta^2 < .01$, significant interactions between Task × DVK, $F(1, 64) = 5.19, p = .026, \eta^2 = .02$, and Task × Cue Availability, $F(1, 64) = 5.38, p = .024, \eta^2 = .02$ were found. Through the analysis of the two significant interactions, we will discuss the lexical inferencing success in the following two subsections, 3.2.1 and 3.2.2.

3.2.1 The role of depth of vocabulary knowledge in lexical inferencing

Figure 2 graphically displays the interaction between Task and DVK. This interaction suggested that effects of learners’ DVK were different according to the given tasks (i.e., sentence- and discourse-based tasks). A post-hoc analysis showed a significant simple main effect of Task both in Upper, $F(1, 64) = 35.12, p < .001, \eta^2 = .35$, and in Lower, $F(1, 64) = 6.00, p = .017, \eta^2 = .09$. Thus, regardless of the DVK groups, learners could make more successful lexical inferencing in the discourse-based task (0.93 points on average; see Table 4) than in the sentence-based task (0.45 on average). More importantly, although a significant simple main effect of DVK was not found in the sentence-based task, $F(1, 64) = 0.87, p = .356, \eta^2 = .01$, this simple main effect was significant in the discourse-based task, $F(1, 64) = 9.91, p = .002, \eta^2 = .13$. Combined with the significant simple main effects of Task, these results suggested that the Upper’s success rates greatly increased from the sentence-based task (0.48) to the discourse-based task (1.13) while the Lower group showed a small increase (from 0.41 to 0.70).

These results revealed a significant positive effect between DVK and the use of global cues, which fully

![Figure 2. Mean success rates of the sentence-based and discourse-based tasks by DVK.](image-url)
supported our study hypothesis. The results supported previous studies that suggested the significant role of DVK in lexical inferencing (e.g., de Bot et al., 1997; Nassaji, 2006), but further indicated that the learners' deeper vocabulary knowledge contributed to success more in discourse-based lexical inferencing than in the sentence-based form.

3.2.2 The role of the availability of local cues in lexical inferencing

To examine the effects of the cue availability on lexical inferencing success (RQ), a post hoc analysis on the interaction of Task × Cue Availability was conducted (see Figure 3). It showed the significant simple main effect of Cue Availability both in the sentence-based task, $F(1, 64) = 61.39, p < .001, \eta^2 = .49$, and in the discourse-based task, $F(1, 64) = 7.46, p = .008, \eta^2 = .10$. Similarly, a significant simple main effect of Task was found both in the -Local condition, $F(1, 64) = 35.77, p < .001, \eta^2 = .36$, and in the +Local condition, $F(1, 64) = 6.05, p = .017, \eta^2 = .09$.

These results provided the following three findings: (a) when the local cues were highly available, the sentence-based inferencing was facilitated (i.e., -Local vs. +Local in the sentence-based task); (b) when the local cues were unavailable for lexical inferencing, the global cues contributed to the success in discourse-based inferencing (i.e., sentence-based vs. discourse-based task in the -Local condition); and (c) even when the local cues were adequately available, the additional informative global cues led to the better performance of lexical inferencing (i.e., sentence-based vs. discourse-based task in the +Local condition).

These results clearly demonstrate the importance of global cues for successful lexical inferencing. Although some studies have indicated that L2 learners have trouble with discourse-based inferencing (e.g., de Bot et al., 1997; Frantzen, 2003; Haynes & Baker, 1993), this study demonstrated the role of global cues in its success by controlling the local and global cue availability. As a result, the findings in the current study strongly support the advantage of using global cues for lexical inferencing and further indicate the significance of considering cue availability for lexical inferencing in Japanese EFL reading.

3.3 Patterns of Cue Use

As noted in Section 3.2.1, this study indicated that it was important to provide global cues for lexical inferencing, regardless of the learners' DVK. To reveal how global cues contributed to successful lexical inferencing, we qualitatively analyzed the relationship between the participants'
answers for the lexical inferencing tasks and the patterns of using local cues which the participants circled in the experimental session. This section illustrates two sets of qualitative data: responses in (a) the –Local condition, and in (b) the +Local condition collected from the sentence-based and the discourse-based tasks. These two sets of data indicate the different patterns of using cues for lexical inferencing.

Table 5

Proportions (%) of Local Cues Used in the –Local Condition

<table>
<thead>
<tr>
<th>Task</th>
<th>Attempt</th>
<th>n</th>
<th>But</th>
<th>he</th>
<th>always</th>
<th>has</th>
<th>a</th>
<th>good</th>
<th>repartee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence-based</td>
<td>Failure</td>
<td>13</td>
<td>.08</td>
<td>.00</td>
<td>.08</td>
<td>.23</td>
<td>.00</td>
<td>.23</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>Success</td>
<td>2</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.50</td>
<td>.00</td>
<td>1.00</td>
<td>.00</td>
</tr>
<tr>
<td>Discourse-based</td>
<td>Failure</td>
<td>6</td>
<td>.15</td>
<td>.00</td>
<td>.08</td>
<td>.23</td>
<td>.08</td>
<td>.15</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Success</td>
<td>9</td>
<td>.75</td>
<td>.00</td>
<td>.13</td>
<td>.00</td>
<td>.13</td>
<td>.63</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note.* The incorrect answers were as follows: no response (*n* = 9), *choices* (*n* = 2), *idea* (*n* = 1), and *repartory* (*n* = 1) in the sentence-based task; no response, *repartory*, *belief*, *noble heart*, *feeling*, and *performance* (*n* = 1, respectively) in the discourse-based task.

For the qualitative data (a), Table 5 displays the pattern of the local cue use in inferring the meaning of *repartee* in Text 1 in the –Local condition. The result showed 13 out of 15 participants failed to reach the correct meaning in the sentence-based task. Due to the lack of local cue availability, most learners did not use these cues within the sentence to identify the meaning of *repartee*. Even though the local cues were used, it resulted in many incorrect inferences such as *repartory* by conducting word-form analogy. As some previous studies have mentioned (e.g., Huckin & Bloch, 1993), such an inappropriate use of local cues would confuse lexical inferencing. On the other hand, there were clear differences of local cue use between the successful and failed groups when inferring the meaning of *repartee* in the discourse-based task. Table 5 also shows that the successful learners used *But* within the sentence, which was almost never used in the sentence-based task. Considering the following contexts of Text 1, the learners considered the broader context surrounding *repartee* in the discourse-based task:

...When he's performing in the real world of cheap bars, though, members of the audience are sometimes not so romantic. They yell rude things at him. But he always has a good *repartee*. When a man in fancy, colorful clothing said something to him, he responded by calling the man "this bedizened fool." ... [Underlines were added by the authors.]

Focusing on the context conjoined by *But*, the learners seemed to find an adversative relationship: an unfavorable situation "They yell rude things at him" and a *good repartee*. Thus, it is notable
that the availability of local cues (e.g., But) was increased by adding the global cues in the discourse-based task.

Next, for the qualitative data (b), Table 6 describes the patterns of using local cues when the participants attempted to infer the meaning of jettison in Text 2 in the +Local condition. The results indicated that the overall tendency in the sentence-based and discourse-based task was similar. The participants frequently used responsibilities and disappeared as local cues.

Table 6
Proportions (%) of Local Cues Used in the +Local Condition

<table>
<thead>
<tr>
<th>Task</th>
<th>Attempt</th>
<th>n</th>
<th>His</th>
<th>father</th>
<th>jettisoned</th>
<th>his responsibilities</th>
<th>and</th>
<th>disappeared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence-based</td>
<td>Failure</td>
<td>12</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.17</td>
<td>.92</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Success</td>
<td>7</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.71</td>
<td>.14</td>
</tr>
<tr>
<td>Discourse-based</td>
<td>Failure</td>
<td>10</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.10</td>
<td>.80</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Success</td>
<td>5</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.20</td>
<td>1.00</td>
<td>.20</td>
</tr>
</tbody>
</table>

Note. All the errors were as follows: be burdened with (n = 3), carry out (n = 2), justify (n = 2), disappointed (n = 1), overcome (n = 1), and no response (n = 1) in the discourse-based task.

In the sentence-based task, almost all the incorrect answers were based on the syntagmatic relationship, “jettisoned + his responsibilities (92%).” On the other hand, the learners who succeeded in the sentence-based task concentrated on the paradigmatic relationship between jettison and disappear (100%). The word disappear in this sentence was used as a negative meaning and the learners seemed to notice that the target word jettison also represented a negative meaning such as “abandon his responsibilities,” not a positive meaning like “accomplish his responsibilities.” In contrast, all the learners who made successful discourse-based inferencing used the local cues responsibilities (100%) rather than disappear (60%). The target word jettison appeared in the following context:

When Tomas was 15 years old, the family business suddenly collapsed. His father jettisoned his responsibilities and disappeared. The helpless mother decided to free all the slaves and sell all the property. … [Underlines were added by the authors.]

While the cue responsibilities does not always convey an accurate meaning of jettison only in a single sentence, the remaining context can add further information to the local cue responsibilities (i.e., responsibilities here is related to “the collapse of family business”). Therefore, the second example also demonstrates that the unavailable local cues for the sentence-based inferencing turned into available ones by connecting with the available global cues, resulting in better performance of lexical inferencing.
These two sets of data found that global cues can make local cues more effective even if the condition of the cue availability is +Local or –Local.

4. Conclusions

Inferring the meaning of unknown words is an essential strategy for successful text comprehension. Past studies have suggested that the use of global cues leads to accurate lexical inferencing, but L2 learners have trouble in identifying the meaning of unknown words from global cues (e.g., de Bot et al., 1997; Frantzen, 2003; Huckin & Bloch, 1993). Therefore, this study aimed to further investigate how EFL learners attempt discourse-based lexical inferencing, focusing on their DVK and the availability of local and global cues.

There were three main findings in this study. Firstly, EFL learners can infer the meaning of unknown words more successfully by using global cues than by using only local cues. This finding was suggested by the result that the effect of global cues was found, regardless of whether the local cues were available or unavailable (i.e., both in the –Local and +Local conditions). Secondly, learners’ DVK was a key factor in discourse-based lexical inferencing. The results of this study showed that EFL learners with greater DVK can make better use of global cues than learners with smaller DVK. Thirdly, the detailed analysis of the patterns of using local cues showed that global cues distributed in the text increased the availability of local cues. On this point, past studies suggested only that the meanings inferred based simply on local cues were often inconsistent with the whole text meaning (e.g., Frantzen, 2003; Huckin & Bloch, 1993); so, it had not been revealed whether such inconsistent meanings could be modified when global cues were provided. Actually, the use of global cues made local cues more effective because global cues are constructed through the learners’ coherent text comprehension. In addition, the effectiveness of learners’ use of global cues was found to have a close relationship with learners’ DVK. Thus, the present study is significant not only because it supports the previous studies suggesting the effectiveness of using global cues in lexical inferencing (e.g., Frantzen, 2003; Haynes & Baker, 1993), but also because it demonstrates the significant role of learners’ DVK and local cue availability in discourse-based inferencing success.

According to the present study, the following pedagogical implications can be stated. EFL teachers should consider the importance of both (a) their students’ vocabulary knowledge, especially DVK, and (b) the appropriateness of the texts for lexical inferencing tasks. One vocabulary teaching method to deepen students’ lexical knowledge is to introduce related words such as synonyms and collocations. This can help them construct paradigmatic and syntagmatic connections in their mental lexicon. Because the present study showed that development of learners’ DVK contributed to successful discourse-based inferencing, teachers can develop their students’ skills to achieve successful lexical inferencing by providing such vocabulary enhancement activities to grow learners’ DVK.
In addition, based on the results that the discourse-based inferencing heavily depended on the availability of both local and global cues, it might be necessary for teachers to carefully manipulate the cue availability in texts and local sentences. For instance, teachers can evaluate the target words in terms of whether local cues semantically constrain the possible meanings. Another way in which the implications could be applied to classroom activity is to use the local cue availability as an indicator of task difficulty. In lexical inferencing training, the first step should be the inferencing of words whose meanings are strongly constrained by local cues. In the next step, teachers can present target words in the condition where local cues are not available and the use of global cues is required for lexical inferencing. In this way, students’ skills in discourse-based lexical inferencing can be cultivated step by step.

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References


Appendices

Appendix A: Rating Criteria of the Cue Availability Adapted From Webb (2008, pp. 235–236)

<table>
<thead>
<tr>
<th>Availability</th>
<th>Rating criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unavailable</td>
<td>1) It is extremely unlikely that the target word can be guessed correctly. The text contains no contextual clues and may be misleading.</td>
</tr>
<tr>
<td></td>
<td>2) It is unlikely that the exact meaning of the target word can be inferred.</td>
</tr>
<tr>
<td>Available</td>
<td>1) Information in the context may make it possible to infer the meaning of the target word. However, there are a number of choices.</td>
</tr>
<tr>
<td></td>
<td>2) Participants have a good chance of inferring the meaning correctly. There are few meanings that are logical apart from the correct meaning.</td>
</tr>
</tbody>
</table>

Appendix B: Example Format of the Lexical Inferencing Task

(1) 下線部の単語の意味を周りの文脈から推測して日本語で書きなさい。

His father **jettisoned** his responsibilities and disappeared.

意味は__________________________

(2) この文で **jettisoned** の意味を特定する手掛かりとした語句に丸をつけなさい。

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