Effects of Macrorule Use on Main Idea Comprehension in Japanese EFL Reading

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Abstract

Main idea comprehension is one of the most important aspects of text comprehension (Grabe & Stoller, 2011). In the model of text comprehension, readers construct local and global coherence in micro- and macro-processing (e.g., Kintsch & van Dijk, 1978). Although the model assumes that readers use summarization rules (i.e., macrorules) in main idea comprehension, this hypothesis has not been fully examined. Thus, the current study investigated whether EFL learners’ ability to use macrorules affected their main idea comprehension. An experimental study was conducted with 72 Japanese senior high school students. A summary task and multiple choice questions were adopted to measure their macrorule use and main idea comprehension. Based on the result of the summary task, the participants were divided into those who were good and poor at macrorule use (i.e., skilled and less skilled groups, respectively). The correct answer rate for the multiple choice questions was significantly higher in the skilled group. According to answer patterns, the skilled group was better at understanding specific main ideas than the less skilled group, while the less skilled group was more likely to identify details as main ideas. These results suggest that EFL learners’ macrorule use contributes to their main idea comprehension, and that less skilled readers may rely on microprocessing.

1. Introduction

When reading a text, readers are required to understand various types of information from details to main ideas. Main idea comprehension is such an important part of text comprehension that it is at the heart of reading instruction (Grabe & Stoller, 2011). However, Stevens (1988) pointed out that many students have difficulty understanding main ideas even when reading in their first language (L1). Moreover, this difficulty may negatively affect the quality of main idea comprehension. Williams, Taylor, and Ganger (1981) demonstrated that a specific main idea is more difficult to understand than a general paragraph topic. To improve main idea comprehension, teachers can ask their students to write a text summary (Grabe & Stoller, 2011). In fact, previous studies have shown that a summary task well reflects readers’ main idea comprehension (Goldman, Saul, & Coté, 1995; Riley & Lee, 1996). In the model of text comprehension, readers
use macrorules, or rules to condense text information into the gist, when summarizing a text (e.g., Kintsch & van Dijk, 1978). This model suggests that readers’ ability to use macrorules affects their main idea comprehension. Nevertheless, few empirical studies have investigated whether this hypothesis applies only to L1 reading or to second language (L2) reading as well. Therefore, the present study will reveal the effects of macrorule use on main idea comprehension in reading English as a foreign language (EFL).

1.1 Micro- and Macro-Processing

According to the model of text comprehension, readers construct local and global coherence, which are called micro- and macro-processing, respectively (Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983). In microprocessing, readers interpret a text as a set of micropropositions, or semantic units. Individual micropropositions are connected on the basis of the semantic relationships, which leads to local coherence. In macroprocessing, micropropositions are integrated into a macroproposition that characterizes the text as larger fragments. Moreover, macropropositions are integrated into a higher-level macroproposition that represents a still larger fragment of the text. Macroprocessing continues recursively until a single macroproposition that represents the whole text (e.g., a title of the text) is constructed. As a result of macroprocessing, readers construct the hierarchical representation in Figure 1.

![Figure 1. Hierarchy of micro- and macro-propositions (adapted from van Dijk & Kintsch, 1983, p. 191). The letters P and M represent a micro- and macro-proposition, respectively.](image)

The model assumes that readers use macrorules to integrate micropropositions into a macroproposition. Macrorules can be classified into two main sub-categories: selecting important information from a text (i.e., selection), and transforming and reducing text information into the implicit gist (i.e., transformation). When macropropositions are written explicitly, readers just have to select information to include in a summary. However, macropropositions are not always written in a text (e.g., Kintsch & van Dijk, 1978). In that case, readers themselves have to transform subordinate text ideas into the implicit macroproposition (e.g., I went to the station, bought a ticket, and went to the platform. → I traveled by train.). Because of the above features, transformation is more difficult in L1 and L2 reading (Brown & Day, 1983; Kim, 2001).
1.2 Main Idea Comprehension

Because macroprocessing continues recursively, there are several levels of macropropositions (e.g., Kintsch & van Dijk, 1978), such as macropropositions that summarize a paragraph, several paragraphs, or the whole text. This study focuses on readers’ understanding of paragraph-level macropropositions, which is one of the main purposes of reading instruction. In English classes and examinations, students are usually asked about such macropropositions. Paragraph-level macropropositions have been called main ideas in previous studies (Stevens, 1988; Williams, Taylor, & de Cani, 1984; Williams et al., 1981). From these studies, a main idea can be defined as a one-sentence summary that represents the whole expository paragraph.

As stated in Stevens (1988), main idea comprehension is difficult even in L1 reading. Williams et al. (1981) investigated main idea comprehension in L1 expository reading using several tasks such as multiple choice questions. In some cases, the participants could only understand what the paragraphs were written about (i.e., a general paragraph topic), failing to grasp the specific main idea that was stated about the general paragraph topic. This means that they identified different information as the main idea. The tendency was that as the participants’ age increased, their main idea comprehension was less likely to be about the general paragraph topic and more likely to reach the specific main idea. This study also demonstrated that a specific main idea is more difficult to comprehend. However, past studies have not deeply discussed the quality of main idea comprehension, which differs among readers. Therefore, the present study not only analyzed the correct answer rate but also investigated what kind of information was identified as the main idea, using the same kind of multiple choice questions shown in Table 1.

Table 1
An Example of the Multiple Choice Questions in the Present Study

<table>
<thead>
<tr>
<th>Paragraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul Lucas can often be seen walking barefoot around the city of Mountain View, California. People are sometimes surprised to see him walking without any shoes or socks, but Lucas doesn’t mind at all. He likes to walk barefoot, and so do the 640 other members of Dirty Sole Society, the club that Lucas started. Lucas got the idea for the name of the club from the movie Dead Poets Society, in which a teacher encourages his students to live freely.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiple Choice Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Uniqueness of Paul Lucas. (General Paragraph Topic)</td>
</tr>
<tr>
<td>(b) Shoes-free life of Paul Lucas. (Specific Main Idea)</td>
</tr>
<tr>
<td>(c) The movie Paul Lucas saw. (Detail)</td>
</tr>
<tr>
<td>(d) Family of Paul Lucas. (Not-Mentioned)</td>
</tr>
</tbody>
</table>

1.3 Effects of Macrorule Use on Text Comprehension

Although the model of text comprehension assumes that macrorule use is one text comprehension process (e.g., Kintsch & van Dijk, 1978), few previous studies have investigated this assumption. Winograd (1984) researched whether L1 eighth-grade students’ macrorule use...
affected the quality of their written summaries (i.e., similarity of summaries between the students and adults) and text comprehension. The results showed, however, that the students' macrorule use had a significant effect on the summary quality, but not text comprehension. These results suggested that macrorules were strategies available only for the summary task, and that macrorule use was not directly related to text comprehension.

One reason macrorule use did not affect text comprehension in Winograd's study may be that the study did not distinguish main ideas and details. As readers use macrorules to integrate text information into a macroproposition (e.g., Kintsch & van Dijk, 1978), macrorule use is more likely to affect one's understanding of main ideas than details. In addition, text comprehension questions in the study only measured the participants' understanding of explicit information, but not implicit main ideas. This suggests that the effects of transformation use, which transforms text information into an implicit superordinate main idea, were not reflected. Therefore, the effects of macrorule use are probably noticeable by focusing on main idea comprehension.

1.4 Overview of the Present Study

In summary of the above discussion, although the model of text comprehension hypothesizes that readers' ability to use macrorules affects their text comprehension (e.g., Kintsch & van Dijk, 1978), this idea has not been discussed thoroughly enough, and Winograd (1984) disagreed with the assumption. However, based on the assumption and the definition of a main idea (e.g., Stevens, 1988), macrorule use is likely to greatly affect main idea comprehension among several levels of text comprehension. Additionally, it may have effects on the quality of main idea comprehension. In L1 reading, identification of specific main ideas increased with age, while vague understandings of general paragraph topics decreased (Williams et al., 1981). Brown and Day (1983) indicated that one reading ability that develops with age is macrorule use. These previous studies suggest the possibility that readers' ability to use macrorules affects the quality of their main idea comprehension. Therefore, the purpose of this study is to investigate whether readers' ability to use macrorules affects their main idea comprehension in Japanese EFL reading. The following two research questions (RQs) were posed:

RQ1: Does macrorule use affect main idea comprehension?
RQ2: Does macrorule use affect the quality of information identified as the main idea?

Following the methodology of past studies, macrorule use and main idea comprehension were measured through a summary task (Kim, 2001; Ushiro et al., 2009; Ushiro, Nakagawa, Kai, Watanabe, & Shimizu, 2008) and multiple choice questions (Williams et al., 1984; Williams et al., 1981). A pilot study was conducted to select materials in which participants could perform well in both the tasks. In the experimental study, the participants were classified into groups on the basis of their tendency to use macrorules. To address RQ1, the correct answer rate of the multiple
choice questions was compared among the groups. This provided a quantitative analysis of the effects of macrorule use on main idea comprehension that were suggested in the model of text comprehension (e.g., Kintsch & van Dijk, 1978). For RQ2, the percentages of each choice identified as the main idea were compared in the multiple choice questions. This analysis of answer patterns clarified whether the difference in macrorule use led to the difference in the quality of main idea comprehension.

2. Method

2.1 Materials

a. Reading Texts: Because the current study focused on the effects of macrorule use on main idea comprehension, the texts used in the experiment needed to be easy for all the participants to understand, at least literally, before using macrorules (Ushiro et al., 2009). Therefore, six expository texts from the pre-second grade STEP test (Society for Testing English Proficiency, 1999, 2000, 2001, 2005) were collected for the pilot study.

In order to measure transformation use in the summary task, explicit titles and main ideas that could be constructed by transforming other text information were removed from the texts (Afflerbach, 1990), on the basis of discussion with an English native speaker. When readers include such titles or main ideas in a summary, it is difficult to judge whether they are using selection or transformation. Table 2 shows the length and readability of the reading texts without the titles and main ideas.

Table 2

<table>
<thead>
<tr>
<th>Text</th>
<th>FKGL</th>
<th>Words</th>
<th>Sentences</th>
<th>Original Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silk King</td>
<td>8.5</td>
<td>264</td>
<td>15</td>
<td>Jim Thompson</td>
</tr>
<tr>
<td>Runner</td>
<td>8.4</td>
<td>258</td>
<td>16</td>
<td>Glenn Cunningham</td>
</tr>
<tr>
<td>Barefoot</td>
<td>8.8</td>
<td>252</td>
<td>14</td>
<td>The Dirty Sole Society</td>
</tr>
<tr>
<td>Game</td>
<td>7.9</td>
<td>291</td>
<td>20</td>
<td>Searching for Fun</td>
</tr>
<tr>
<td>Mask</td>
<td>8.8</td>
<td>215</td>
<td>13</td>
<td>New Masks, New Selves</td>
</tr>
<tr>
<td>Ad</td>
<td>8.5</td>
<td>277</td>
<td>19</td>
<td>Commercial Classrooms</td>
</tr>
</tbody>
</table>

Note. FKGL (Flesch-Kincaid Grade Level) was provided by Microsoft Word 2010’s readability measurement tools.

b. Multiple Choice Questions: The multiple choice questions were designed to measure participants’ main idea comprehension of a paragraph (Williams et al., 1984; Williams et al., 1981). Four questions were written for each text. The answer choices consisted of four noun phrases in English: (a) a general paragraph topic about which the paragraph was written (a
2.2 Pilot Study

The pilot study was conducted to select texts for the experimental study. Texts were selected for which the pilot study participants (i.e., undergraduates and graduates) performed well in both the summary task and multiple choice questions. As the pilot study participants were assumed to be better readers than the experiment participants (i.e., senior high school students), it was believed that the experiment participants would have difficulty using macrorules and understanding the main ideas in texts that were difficult even for undergraduates and graduates.

2.2.1 Participants

A total of 12 Japanese undergraduates and graduates participated in the pilot study. They were majoring in various fields: Engineering Sciences, Health and Physical Education, Humanities, Human Sciences, International Studies, Nursing Sciences, and Social Sciences. All the participants had studied English for at least six years. They were randomly divided into two groups: a summary group (n = 6) and a main idea comprehension group (n = 6). The summary group was instructed to read and summarize the six texts, whereas the main idea comprehension group was instructed to read the texts and answer the multiple choice questions.

2.2.2 Procedure

a. Summary Task: First, the participants in the summary group were given an explanation of the summary task. On the basis of previous studies that researched EFL learners’ summarization (Ushiro et al., 2009; Ushiro et al., 2008), the participants were allotted 15 minutes to read and summarize each text. As in these studies, the readers were told to summarize the text in their L1 to eliminate the possible influence of English writing proficiency. Because Brown and Day (1983) suggested that the summary length affects writers’ use of transformation, this study limited the summary length to 120 characters in Japanese, as in Ushiro et al. (2008). Additionally, the participants were allowed to look at the text while writing the summary to exclude the influence of...
memory on macrorule use (Kim, 2001). The entire procedure of the summary group lasted 100 minutes, including a 10-minute rest after the participants had finished half the texts.

b. Multiple Choice Questions: The main idea comprehension group was given an explanation of the multiple choice questions. After reading each paragraph, they answered the multiple choice question about its content. The participants selected the most appropriate choice as the main idea. While answering a question, they were not allowed to refer to the previous paragraph, as in past studies (Williams et al., 1984; Williams et al., 1981). Although answer time was not limited, all the participants finished each text within 10 minutes. The entire procedure took about 60 minutes, including a 10-minute rest after the participants had finished half the texts.

2.2.3 Scoring
a. Summary Task: Prior to conducting the pilot study, two raters analyzed and classified all the texts into idea units (IUs) based on Ikeno's (1996) criteria (see Appendix A). The inter-rater agreement rate was 97.47%. All the disagreements were resolved through discussion. In the scoring of macrorule use, the following criteria were adopted. When an important IU to be included in a summary was produced, it was judged that selection had been used one time. When several IUs in the text were transformed into an important superordinate idea, it was judged that transformation had been used one time. Thirty percent of a total of 36 summaries were randomly selected. Following the above criteria, two raters scored whether the participants wrote appropriate summaries using macrorules. As the inter-rater reliability was sufficiently high ($r = .86$), the remaining 70% of the summaries were scored by the author. The mean number of times the summary group used selection and transformation was calculated for each text. Additionally, the percentage of the participants who used selection and transformation was calculated for each text.

b. Multiple Choice Questions: The multiple choice questions were scored on a three-point scale. Two points were given to a specific main idea as a completely correct answer, and one point was given to a general paragraph topic as a partially correct answer. No points were given to detailed or not-mentioned information because they were distracters. As each text had four questions, the maximum score was eight for each text. The summed points were divided by the maximum score to calculate the correct answer rate for each text. In addition, the percentage of each choice identified as the main idea was calculated for each text. The number of times each choice was selected in a text was divided by the total number of answers.

2.2.4 Results
Tables 3 and 4 show the results of the pilot study. The results of the summary task revealed that all the participants in the summary group frequently used selection in each text. With regard to transformation, more than half of the learners could not use this rule in “Game” and “Mask,” and
this macrorule was rarely used in these texts. On the other hand, most readers used transformation with relative frequency in “Runner,” “Barefoot,” and “Ad.”

In response to the main idea comprehension questions, no one identified a not-mentioned choice as the main idea, and the mean correct answer rate was high enough in all the texts. The participants in this group selected a high percentage of specific main ideas, especially in “Barefoot” and “Ad.” In sum, the participants performed well in both the summary task and multiple choice questions for these texts. “Barefoot” and “Ad” were selected for the multiple choice questions and summary task in the experimental study, respectively.

Table 3
Results of the Summary Task in the Pilot Study

<table>
<thead>
<tr>
<th>Text</th>
<th>Percentage of the Participants Who Used Macrorules</th>
<th>Number of Times of Macrorule Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selection</td>
<td>Transformation</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Silk King</td>
<td>6</td>
<td>100.00</td>
</tr>
<tr>
<td>Runner</td>
<td>6</td>
<td>100.00</td>
</tr>
<tr>
<td>Barefoot</td>
<td>6</td>
<td>100.00</td>
</tr>
<tr>
<td>Game</td>
<td>6</td>
<td>100.00</td>
</tr>
<tr>
<td>Mask</td>
<td>6</td>
<td>100.00</td>
</tr>
<tr>
<td>Ad</td>
<td>6</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 4
Results of the Multiple Choice Questions in the Pilot Study

<table>
<thead>
<tr>
<th>Text</th>
<th>Percentage of Each Choice Identified as the Main Idea Among All Answers</th>
<th>Correct Answer Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Idea</td>
<td>Paragraph Topic</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Silk King</td>
<td>15</td>
<td>62.50</td>
</tr>
<tr>
<td>Runner</td>
<td>11</td>
<td>45.83</td>
</tr>
<tr>
<td>Barefoot</td>
<td>21</td>
<td>87.50</td>
</tr>
<tr>
<td>Game</td>
<td>12</td>
<td>50.00</td>
</tr>
<tr>
<td>Mask</td>
<td>14</td>
<td>58.33</td>
</tr>
<tr>
<td>Ad</td>
<td>19</td>
<td>79.17</td>
</tr>
</tbody>
</table>

Note. The number of all answers was n = 24 in each text.

2.3 Experimental Study
2.3.1 Participants
A total of 72 Japanese secondary high school students participated in the experimental study.
They were third-year students who belonged to advanced EFL classes. All the participants had studied English for at least five years. They did not usually receive summary instruction in the regular classes. Among the participants, 10 students whose summaries were shorter than 80% of the restriction on the summary length (Ushiro et al., 2009) and one participant whose correct answer rate for the multiple choice questions was an outlier were excluded from the data analyses; consequently, 61 students remained.

2.3.2 Materials, Procedure, and Scoring

The “Ad” and “Barefoot” texts were selected from the pilot study. The experiment was administered as part of a regular class. The whole procedure lasted about 35 minutes. After given an explanation of each task, the participants performed the summary task and multiple choice questions. In the experimental study, the answer time for the multiple choice questions was limited to 10 minutes, the time in which the main idea comprehension group of the pilot study finished each text. For the scoring, the same criteria were adopted as in the pilot study. For the summary task, 30% of all the summaries were randomly selected, and two raters scored the summaries. As a high inter-rater reliability was calculated ($r = .96$), the remaining 70% of the summaries were scored by the author. The number of times each student used selection and transformation was calculated. For the multiple choice questions, the correct answer rate and the percentage of each choice identified as the main idea were calculated.

2.3.3 Data Analyses

The purpose of the current study is to investigate whether Japanese EFL learners’ ability to use macrorules affects their main idea comprehension. Thus, this study compared main idea comprehension between those who used macrorules with different tendencies. First, the participants were divided into groups according to their tendency to use macrorules. A cluster analysis using the Ward procedure and squared Euclidean distance was conducted on the number of times each participant used selection and transformation in the summary task. To address RQ1, a $t$ test was performed to compare the correct answer rates of the multiple choice questions because the participants were divided into two groups (see Section 3.1). The alpha level was set at .05. To answer RQ2, answer patterns in the multiple choice questions were also compared in the percentage of each choice identified as the main idea.

3. Results and Discussion

3.1 Grouping the Participants on the Basis of Macrorule Use

A cluster analysis was performed on the number of times selection and transformation were used in the summary task. In light of a resulting dendrogram and the tendency of macrorule use in previous studies (e.g., Kim, 2001), the participants were divided into groups. The threshold was
set at 21. This created two clusters (see Appendix B), and 46 and 15 students belonged to the first and second clusters, respectively. Table 5 presents the results of the summary task in the experimental study. The learners in the second cluster seemed to use selection and transformation more than those in the first cluster.

Table 5
Results of the Summary Task in the Experimental Study

<table>
<thead>
<tr>
<th>Cluster</th>
<th>n</th>
<th>Selection</th>
<th>Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>46</td>
<td>1.85 1.40</td>
<td>.98 .75</td>
</tr>
<tr>
<td>Second</td>
<td>15</td>
<td>3.47 1.13</td>
<td>2.47 .74</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>2.25 1.50</td>
<td>1.34 .98</td>
</tr>
</tbody>
</table>

To confirm the differences, a one-way Multivariate Analysis of Variance (MANOVA) was conducted on the number of times selection and transformation were used (see Figure 2), with cluster as a between-subjects variable. Although the sample size differed between the clusters, the gap in n sizes between cells was within the acceptable ratio of four to one (Tabachnick & Fidell, 2001). Additionally, Box's test of equality of covariance matrices was not significant ($p = .748$). The result of a one-way MANOVA showed a significant effect of cluster, Wilks' lambda = .379, $F(2, 58) = .379, p < .001, \eta^2 = .62$. Post hoc tests showed that the students in the second cluster were significantly better at using selection, $F(1, 59) = 16.55, p < .001, \eta^2 = .22$; and transformation, $F(1, 59) = 45.20, p < .001, \eta^2 = .43$. In the results of a one-way MANOVA, the participants in the first and second clusters could be labeled as the less skilled and skilled groups, respectively.

3.2 Correct Answer Rate in the Multiple Choice Questions

Table 6 shows the results of the multiple choice questions. To answer RQ1, a $t$ test was performed to compare the correct answer rate between the less skilled and skilled groups. Levene's test indicated that these groups had equal variance ($p = .849$). The results revealed that the skilled group had a significantly higher correct answer rate, $t(59) = 2.29, p = .026, r = .29$. This result demonstrates that macrorule use contributes to main idea comprehension, as the model of text comprehension hypothesizes (e.g., Kintsch & van Dijk, 1978). Previous studies have not agreed on whether macrorule use affects text comprehension. Although the model assumes effects
of macrorule use on text comprehension, such effects were not observed in Winograd (1984). One reason may be that Winograd’s study did not focus on main idea comprehension in text comprehension. Macrorule use is likely to be one of the text comprehension processes, especially for main idea comprehension. By focusing on main idea comprehension, this study was able to identify the effects of macrorule use on text comprehension.

Table 6
Results of the Multiple Choice Questions in the Experimental Study

<table>
<thead>
<tr>
<th>Group</th>
<th>Main Idea</th>
<th>Paragraph Topic</th>
<th>Detail</th>
<th>Not-Mentioned</th>
<th>Correct Answer Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>M</td>
</tr>
<tr>
<td>Less Skilled</td>
<td>114</td>
<td>61.96</td>
<td>28</td>
<td>15.22</td>
<td>40</td>
</tr>
<tr>
<td>Skilled</td>
<td>43</td>
<td>71.67</td>
<td>10</td>
<td>16.67</td>
<td>6</td>
</tr>
</tbody>
</table>

*Note.* The number of all answers was \( n = 184 \) and \( n = 60 \) in the less skilled and skilled groups, respectively.

3.3 Answer Patterns in the Multiple Choice Questions

To address RQ2, the percentage of each choice the less skilled and skilled groups identified as the main idea was compared in order to investigate differences in the quality of main idea comprehension. In Figure 3, both groups rarely selected not-mentioned choices. This indicates that the participants did not have trouble understanding the text, at least literally.

Concerning the specific main ideas and details, different tendencies were observed between the two groups. Specific main ideas constituted 71.67% of all the answers in the skilled group, but just 61.96% in the less skilled group. As demonstrated by the correct answer rate, this difference confirms that macrorule use leads to main idea comprehension, especially to specific main ideas. On the other hand, the less skilled group was more likely to identify details as the main ideas than the skilled group. One possible explanation is that the less skilled group relied on microprocessing

![Figure 3. Percentage of each choice identified as the main idea among all answers (%).](image-url)
because of insufficient macrorule use. In microprocessing, less skilled readers analyze individual detailed micropropositions. However, they were probably not skilled at macrorule use enough to integrate details into a main idea.

4. Conclusion

The current study investigated the effects of macrorule use on main idea comprehension. A cluster analysis divided the participants into two groups: the less skilled and skilled groups, who were good and poor at macrorule use, respectively. First, the result of a t test that compared the correct answer rate provided the answer to RQ1. The skilled group had a significantly higher correct answer rate than the less skilled group. In previous studies, Kintsch and van Dijk’s model assumed the effects of macrorule use on text comprehension (e.g., Kintsch & van Dijk, 1978), but such effects were not observed in Winograd (1984). In the current study, however, the effects of macrorule use were revealed by focusing on main idea comprehension in text comprehension. As the model hypothesizes, the current study demonstrated that macrorule use especially contributes to main idea comprehension. Next, the analysis of answer patterns compared the percentage of each choice identified as the main idea, which answered RQ2. The skilled group selected a higher percentage of specific main ideas, while details occupied higher percentages of the less skilled readers’ answers. These differences indicated the effects of macrorule use on the quality of main idea comprehension. Furthermore, these tendencies suggested the possibility that the participants in the less skilled group relied on microprocessing because of poor macroprocessing. This meant that the less skilled learners were mainly engaged in analyzing individual details, but could not integrate them well into a main idea.

The current study’s findings have pedagogical implications. The results of the multiple choice questions demonstrated that macrorule use contributed to main idea comprehension. This suggests that teachers’ instructions on macrorule use can improve students’ main idea comprehension: how to select important ideas from a text and how to transform text information into a superordinate idea. Kim (2001) stated that summarization skills, including macrorule use, do not develop with age, especially in the L2 condition, and that it is necessary to give learners explicit instruction on summarization in L2 classes. In fact, Day (1986) and Friend (2001) demonstrated that instruction increases L2 learners’ macrorule use. Based on these previous studies and the present study, it appears that instruction enhances readers’ macrorule use, which in turn contributes to main idea comprehension. As transformation was more difficult to use than selection (Brown & Day, 1983; Kim, 2001), it is more effective for teachers to instruct transformation after selection. This order would reduce the burden on students, especially those who cannot use macrorules well.

The current study has several limitations. First, time for the experiment was limited because it was conducted as part of a regular class. This meant that only one text was used in each task,
which may be an insufficient number. In particular, a statistical analysis could not be conducted on
the percentage of each choice identified as the main idea in the multiple choice questions. Further
studies should use more texts and questions with enough time to confirm the results of the answer
patterns identified in the present study. Second, it should be noted that macrorule use in one text
does not necessary affect main idea comprehension in another text. To examine the effects of
macrorule use on main idea comprehension, the summary task and multiple choice questions were
conducted in this order in this study. Taking text reference during these tasks into consideration,
however, they could not be conducted in the same text. Future studies should investigate more
direct effects than the effects found in this study.

Finally, this study has suggestions for further research. First, it is possible that macrorule use
affects main idea comprehension and vice versa. This study revealed that macrorule use improved
main idea comprehension, but readers may become better at macrorule use as they understand
main ideas. It is worth investigating whether there is interaction between the two and what the
interaction is like. Second, there is still room for exploring whether macrorule use contributes to
understanding higher-level macropropositions over a paragraph. As this study showed that
students’ macrorule use affected their main idea comprehension in a paragraph, the effects may
apply to more global-level text comprehension. Previous studies stated that it is difficult to
integrate several paragraphs into such a macroproposition, regardless of L1 and L2 reading
(Brown & Day, 1983; Ushiro et al., 2008). However, further studies that explore the issue would
provide clues to resolving the difficulty mentioned in the past studies and provide deeper insights
into global-level text comprehension.

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References


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Appendices

Appendix A: IUs in "Ad"

(1) In today's society advertisements are becoming more and more popular. / (2) Places [ (3) you can find them on ] include the television, / (4) the radio, / (5) and even clothing. / (6) Advertisements also appear / (7) in newspapers / (8) and magazines, / (9) and on signs at sports events. / (10) These days, more and more of these ads are being made for children. / (11) Companies know that / (12) children are important customers. / (13) American elementary-school students alone, for example, spend almost 15 billion dollar per year / (14) on such products / (15) as toys, / (16) clothes, / (17) and snacks. / (18) In addition, of course, children also have a lot of influence on / (19) what their parents buy. / (20) Until recently, schools were one place / (21) where children could escape from ads. / (22) But companies have been finding new ways / (23) to bring commercial messages into the classroom. / (24) The makers [ (25) of Coca-Cola / (26) and Pepsi-Cola, for example, ] have each paid millions of dollars / (27) to schools in the state of Colorado. / (28) Now, only one company's drinks can be sold at each school. / (29) The companies can also put advertisements / (30) on school walls / (31) and in playgrounds. / (32) The schools have used the money / (33) they have received / (34) to buy musical instruments, / (35) sporting goods, / (36) and new computers. / (37) Some parents / (38) and teachers aren't happy with / (39) ads in schools. / (40) They say / (41) that ads make students / (42) think more / (43) about spending money / (44) than studying. / (45) But those [ (46) who agree with in-school advertising ] say / (47) that children already see so many ads / (48) that seeing a few more at school doesn't matter. / (49) They believe / (50) that money from companies can help / (51) schools give children a better education. / (52) People will probably continue / (53) to argue / (54) about advertising in schools / (55) for a long time. / (56) But even if most schools decide / (57) not to allow ads, / (58) companies will surely find other ways / (59) to appeal to children.
Appendix B: *Dendrogram for Macrorule Use*

![Dendrogram](image)

*Note.* The hierarchical clustering used Ward’s method and squared Euclidean distance. Each number indicates the participants’ identification.