



## Reverse Cohesion Effect in Second-Language Reading Comprehension: A Preliminary Study

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July 12, 2020

**Reverse Cohesion Effect in Second-Language Reading Comprehension:  
A Preliminary Study**

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The author declares that there no conflicts of interest with respect to this preprint.

This research was supported by Grant-in-Aid for JSPS Fellows.

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**Abstract**

This study investigated the effect of text cohesion on second-language reading comprehension. Twenty Japanese undergraduates read both low- and high-cohesion texts in English and performed free written recall. The results show that low-proficiency readers recall more information from high-cohesion texts than from those with low cohesion. However, highly proficient readers had the opposite tendency, indicating that the benefits of high cohesion are restricted to relatively poor readers while proficient readers are assisted by low-cohesion texts.

*Keywords:* L2 reading, text cohesion, expository text, comprehension, free written recall

## **Reverse Cohesion Effect in Second-Language Reading Comprehension:**

### **A Preliminary Study**

Readers have to build mental representations of situations described in a text to achieve coherent text comprehension (cf. Kintsch, 1998). Successful reading requires that readers understand not only the explicit information but also the message evoked or conveyed by the text. Among the various factors that affect reading (e.g., readers' knowledge, proficiency, use of strategy, text type, and text features), text features in particular have a direct and significant effect on a reader's comprehension. Previous research (McNamara et al., 1996) has focused on the feature of *text cohesion* (the degree to which the concepts, ideas, and relations within a text are explicit) in the development of coherent and readable texts.

To make difficult texts more readable, first-language (L1) researchers have investigated the effect of revising texts, and they report that high-cohesion texts containing explicit and sufficient information support readers' memory of the text and their generation of inferences (Gilbert et al., 2005). However, a high-cohesion text is not always facilitative for all readers; some researchers have highlighted that a low-cohesion text may benefit highly knowledgeable readers, a phenomenon called the *reverse cohesion effect* (O'Reilly & McNamara, 2007). This occurs because some readers may experience an inhibited generation of inference when information is too clearly described in high-cohesion texts. Thus, a consistent understanding of what type of cohesion is effective for readers remains elusive.

As for second-language (L2) studies, Ogiso (2018, 2019) explored the effects of text cohesion on readers' comprehension and inference generation. Empirical studies revealed that low-cohesion texts facilitated inference generation and comprehension among relatively high-proficiency readers, but it remained to be investigated whether high or low cohesion facilitates

comprehension among relatively low-proficiency readers who find it difficult (or are unable) to connect information and infer the implicit message of the text (McNamara & Kintsch, 1996) as compared to L1 readers. Although there was a tendency of reverse cohesion effect even in L2 reading, it may be predicted that, for less proficient L2 readers who tend to have reading problems, high-cohesion texts would have positive effects on comprehension.

Thus, the present preliminary study examined whether text cohesion differently affects Japanese readers' comprehension depending on their L2 reading proficiency and aimed to determine the implications for L2 classroom instruction and material editing.

## **Method**

### **Participants**

Twenty Japanese university students participated. Because of the absence and missing data, four participants' data were excluded. Participant's general English proficiency was estimated to be at the basic to independent level (A1 to A2) per the Common European Framework of Reference for Language based on standardized test scores.

### **Materials and Procedure**

**Experimental texts.** Two expository texts (each with two versions, high- and low-cohesion) were adopted from McNamara et al. (2011) and revised for L2 readers in terms of word difficulty and passage length. In the high-cohesion texts (see Table 1), the following methods were used to facilitate readers' text comprehension: (a) replacing pronouns with noun

phrases; (b) adding descriptive elaborations; and (c) adding sentence connectives (cf. McNamara et al., 1996).

Table 1

*An Example of High-Cohesion Text ("Effects of Heat")*

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Heat can move from one object **to another object**, or **it can move from one place to another place**. Heat moves from warm object to cooler ones. **For example**, you can warm your cold hands by holding a cup of warm soup. **Your hands become warmer because** heat moves from the soup, through the cup, to your hands. **The heat from the soup also moves above the cup**. **Thus**, you can feel warm air rising above the cup.

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*Note.* Bold text = linguistic cues, anaphoric expressions, and explanatory information added in the high-cohesion text.

Note that to confirm the differences between high- and low-cohesion texts, *deep cohesion*, a value indicating the causal and logical connectives within a text, was calculated using Coh-Metrix. The value of deep cohesion for low-cohesion texts was smaller than for high-cohesion texts. Table 2 shows the textual features of each text.

Table 2

*Experimental Texts Used in the Experimental Study*

Text	High-cohesion			Low-cohesion		
	Words	FKGL	DC	Words	FKGL	DC
Effects of Heat	338	5.4	99	264	3.2	56
The Needs of Plants	359	4.0	99	245	3.4	89

*Note.* FKGL= Flesch-Kincaid grade level, DC = deep cohesion (calculated by Coh-Metrix), DC refers to a level of causal and logical connectives in the texts.

**Written recall task.** To measure the participants' text comprehension, a free written recall task was conducted. After reading, participants were asked to write all information concerning the text they could remember, without referring to the text; they completed this task in Japanese, and no time limit was imposed.

**L2 reading proficiency test.** To examine and consider the effects of the participants' L2 reading proficiency, a 26-item test was adopted from the standardized English test for Japanese (EIKEN test). Participants were asked to perform this test before reading experimental texts.

### Scoring and Analysis

First, participants were divided into either high- or low-proficiency reader groups based on the result of the L2 reading proficiency test, and an independent Welch's *t*-test was conducted to examine the differences between groups. Second, based on Ikeno's (1996) scoring criteria and method, the recall production rate was calculated. Moreover, because the number of

segmentations for each text differed an arcsine transformation was performed on the total production rates.

Finally, to confirm differences of high- and low-cohesion texts' recall production in light of readers' proficiency, a 2 (proficiency: high-proficiency, low-proficiency)  $\times$  2 (text: high-cohesion, low-cohesion), two-way mixed analysis of variance (ANOVA) was conducted on the mean recall rates, with readers' proficiency set as a between-participant variable and text as a within-participant variable.



## Results

### L2 Reading Proficiency Test

Before performing the main analysis, the participants were divided into either a high- ( $n = 5$ ) or low- ( $n = 11$ ) proficiency group, based on a median split. The mean score of the high-proficiency group ( $M = 9.80$ ,  $SD = 1.10$ ) was significantly higher than that of the low-proficiency group ( $M = 5.91$ ,  $SD = 1.97$ ),  $t(13) = 5.05$ ,  $p < .001$ ,  $d = 2.20$ .

### Written Recall Task

Table 3 shows descriptive statistics concerning the mean recall rate for each text. Figure 1 also shows the production rate on the written recall task. The average recall rate for the high-cohesion texts was slightly larger than that for the low-cohesion texts as a whole (high-cohesion text:  $M = 24.58$ ; low-cohesion text:  $M = 22.36$ ).

The results of the ANOVA showed no significant main effects of proficiency,  $F(1, 14) = 2.28$ ,  $p = .153$ ,  $\eta_p^2 = 0.14$ , and text,  $F(1, 14) = 0.15$ ,  $p = .705$ ,  $\eta_p^2 = 0.01$ . However, a tendency for significant interaction of proficiency  $\times$  text was noted,  $F(1, 14) = 107.22$ ,  $p = .058$ ,  $\eta^2 = .23$ . Specifically, marginal differences existed between the recall productions of the high- and low-cohesion texts (high-cohesion text:  $M = 24.47$ ; low-cohesion text:  $M = 19.78$ ) among the low-proficiency readers ( $p = .051$ ).

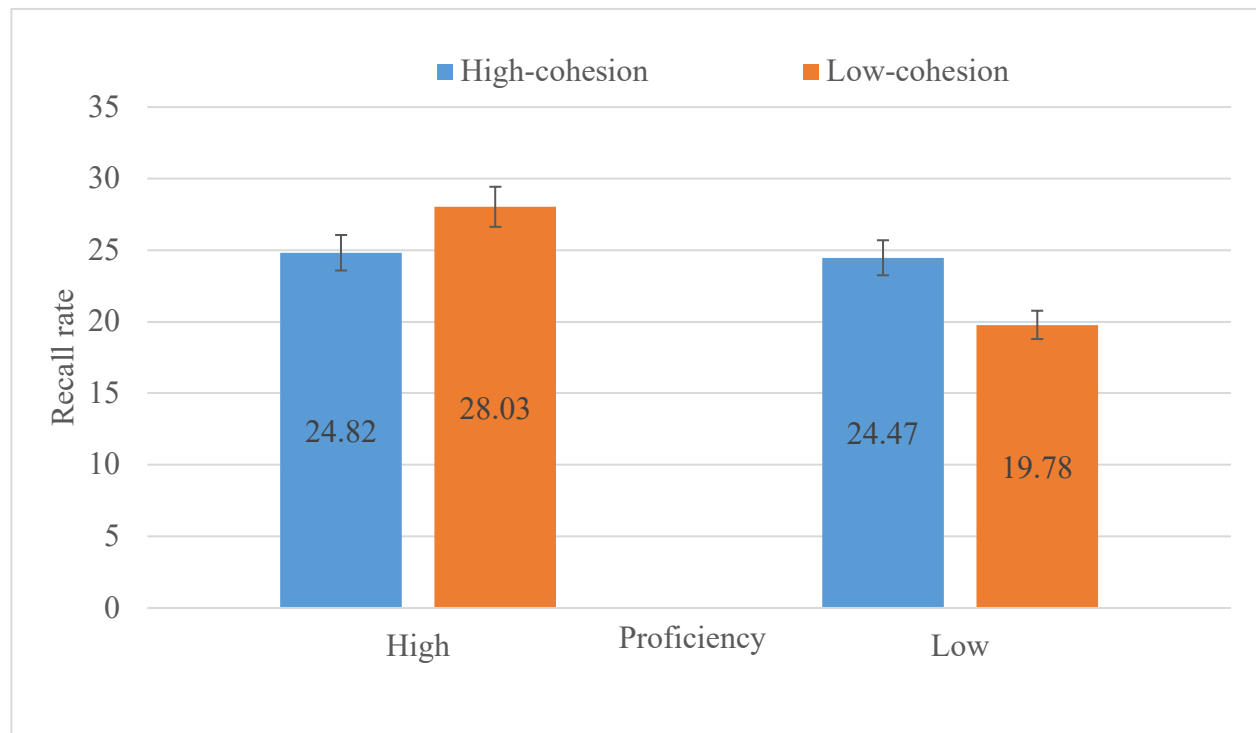
Table 3

*Descriptive Statistics for the Percentages of Recall Production With Arcsine Transformation*

Proficiency	n	High-cohesion		Low-cohesion	
		M	SD	M	SD
High	5	24.82	4.30	28.03	9.40
Low	11	24.47	6.17	19.78	5.69
Total	16	24.58	5.50	22.36	7.79

Figure 1

*The Recall Production Percentages for High- and Low-Cohesion Text Reading Between High- and Low-Proficiency Readers*



### Discussion

These results suggest that both the cohesion effect and the reverse cohesion effect hold for L2 reading as well as L1 reading. That is, the high-cohesion texts seemed to facilitate the understanding of the relatively poor readers, whereas the low-cohesion texts possibly improved the understanding of the high-proficiency readers. This interpretation is reasonable given that informative high-cohesion texts, which eliminate the reader's need to guess the missing information due to gaps in the text, have positive effects on the comprehension of low-proficiency readers (Gilbert et al., 2005). On the other hand, the comprehension of high-proficiency readers, who can infer intersentential relations and hidden messages, would be facilitated by low-cohesion texts (O'Reilly & McNamara, 2007). This tendency is also supported by Ogiso (2018), who showed that high-proficiency readers (who generate inferences relatively frequently) produce more inferences when reading low-cohesion texts than high-cohesion texts.

In sum, although the low-proficiency L2 readers were assisted by the high-cohesion texts, the comprehension of the high-proficiency readers was facilitated by the low-cohesion texts. This study sheds light on cohesion effects in L2 reading and provides evidence of the interactional effects of text cohesion on reading comprehension. The results of this study should provide new insights for L2 reading research. In addition, our results suggest that teachers and material developers should consider the levels of text cohesion and reading proficiency so as to offer English learners more readable and suitable materials.

Although this study revealed interesting opposed effects of text cohesion in L2 readers, there are some limitations to be noted. First, this study could not conduct fine-grained analyses (e.g., LME) due to the limited sample sizes of participants and items. Moreover, this study only determined tendencies in the significance levels yielded by traditional statistical analysis

(ANOVA). Thus, for greater generalizability, more cautious replication studies with ampler data and finer statistical inferences are needed.

Second, although this study's main goal was to explore the effects of text cohesion for relatively low-proficiency readers and confirm a reverse cohesion effect in L2 reading, the range in proficiency was fairly small due to the preliminary nature of this study. Future studies should investigate the effects of text cohesion in readers with a wide range of L2 proficiency to gain a more comprehensive picture of the reading mechanism in L2 reading.

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