The Relations and Comparisons Between Reading Comprehension and Reading Rate of Japanese High School EFL Learners

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ABSTRACT

The current study investigated the relation and comparison of reading comprehension and reading rate in Japanese high school EFL learners. One hundred and forty-eight tenth-graders in a Japanese high school participated in this study. Results showed that the relation between reading comprehension and reading rate was weak, but significant (r = .24, p < .01, N = 127). Using cluster analysis, the participants were divided into four groups based on their scores: the low to middle-comprehension, low-rate group (LMCLR), the low-comprehension, the high comprehension, low-middle rate group (HCLMR), middle-rate group (LCMR), and the high-comprehension, high-rate group (HCHR). Results indicated that two in-between groups might exist before reaching full development of reading ability. It is suggested that reading rate can be improved independently from reading comprehension, but the two variables can compete in some students. Accordingly, students should be instructed how to read both accurately and quickly.

INTRODUCTION

Reading fluency has become a popular topic in both reading research and teaching. In the United States, the NRP (National Reading Panel) was created to improve the reading ability of young children. It identified five important areas for reading improvement: alphabetics, fluency, comprehension, teacher education, and technology in reading instruction (National Institute of Child Health and Human Development, 2000). What is important here is that comprehension and fluency were separated from each other. Reading fluency should be taught with guided oral reading or independent silent reading, while reading comprehension should be taught with vocabulary instruction, reading strategy lessons, instructions for text organization, or summary writing (National Institute of Child Health and Human Development, 2000). Consequently, oral reading fluency has often been used as the scale for assessing reading fluency development (see, for example, Miller & Groff, 2008). This measurement is taken according to a process called

Curriculum-Based Measurement (CBM): students read textbooks in a content area such as science or social studies, and the number of words correctly read per minute (wcpm) is calculated. Then, the results are charted (Deno & Marston, 2006). This NRP trend has revived interest in the research topic of reading comprehension and reading rate.

Grabe (2009) proposed that reading fluency consists of four elements: automaticity, accuracy, reading rate, and prosodic structuring. Automaticity is a processing operation that is "rapid, relatively resource-free, not subject to interference, unconscious, and hard to suppress" (p. 291). Accuracy is primarily associated with fluent word recognition, which is not only rapid and automatic, but also complete and accurate. Reading rate is an overall rate of reading fluently with ease of comprehension throughout an extended text. Finally, prosodic structuring is the ability to process text chunks appropriately, and this ability can be the cause or result of reading expressively.

As far as the text-level reading fluency (reading rate) is concerned, there is a controversy about its relationship with text-level reading accuracy, namely reading comprehension. It is often pointed out that two different viewpoints on reading rate exist in the field (e.g., Breznitz, 2006; Carver, 2000). If it is regarded as an ability possessed by a reader, reading rate can be a dependent variable in statistical analysis (Breznitz, 2006). In contrast, if it is considered a componential skill for better reading comprehension, reading rate could be one independent variable with reading comprehension being a dependent variable (Carver, 2000). Especially in the second language (L2) reading research literature, reading fluency, including reading rate, has not been a popular topic, because it has often been thought that a trade-off between accuracy and fluency may arise at very early stages of the L2 learning process. The case might be that L2 repeated reading research is suggestive to shed light on the relationship between reading accuracy and fluency (Taguchi, Takayasu-Mass, & Gorsuch, 2004). Grabe (2009) insists that the build-up of fluency skills should not be constrained by a simultaneous need for building accuracy after new L2 knowledge is learned and practiced. Therefore, in the current study, reading comprehension and reading rate are looked upon as two separate abilities, and the relations and comparisons between the two are examined. This research topic is expected to introduce some discoveries about reading accuracy and fluency in an L2 reading setting.

When research methodologies concerning reading rate and reading comprehension are reviewed, it is apparent that defining and operationalizing the two variables have not been consistent. Reading comprehension has often been defined as an ability to understand or grasp meaning from printed texts. Walczyk (2000) points out that reading comprehension ability is estimated to be lower if time pressure is a factor in the assessment because comprehension is affected by language proficiency level. Without time limitations, reading comprehension can be measured more accurately due to the lack of pressure (Carver, 2000). However, according to the L2 reading research review by Lee and Shallert (1997), reading comprehension is often examined with reading sections of the first language (L1) standardized tests under time pressure, such as the Nelson-Denny Reading Test and the Adult Basic Learning Examination. The degree of comprehension is usually elicited by multiple-choice questions (MCQs) or recall protocol after reading the test passages. Thus, in L2 reading, most of the reading comprehension measurements are expected to be distorted because of the time pressure.

Conversely, reading rate is defined as the speed with which a reader processes an extended text and grasps the meaning of each sentence without skipping any words. Carver (2000) refers to this way of reading as "rauding" and gives the definition of rauding rate as the fastest speed at which an individual can silently and accurately read relatively easy passages (with accuracy of

more than 64%). After the reading time is measured, the reading rate is usually worked out by words read per minute (wpm). Thereafter, reading accuracy while reading rapidly is checked by MCQs or recall protocol. As mentioned above, in L1 reading fluency research, oral reading fluency is also measured by having students read a passage for one minute. Then, the words read correctly per minute (wcpm) can be calculated. Shiotsu (2010) points out, however, that it is difficult to secure accuracy in measuring reading rate, because the effect of memory in checking comprehension, which is often examined after the text is removed, might degrade data precision by measuring the maintenance of memory, not the reading accuracy in reading rapidly. Because of these problems, a standard method of measuring reading rate has not yet been established. Therefore, in the following literature review, the operationalization of reading rate in each study is explained in detail each time it is referenced.

In the present study, reading comprehension is measured by MCQs after students read passages without time pressure, which is thought to be the most effective research methodology. Using Carver's (2000) definitions and methodology, reading rate is calculated by words read per minute (wpm) while students read passages with an accuracy rate above 64%. The objectives of this research are to investigate the relations and comparisons between reading comprehension and reading rate in Japanese high school EFL (English as a Foreign Language) learners. The results shed light on the questions relating to passage-level reading fluency in the L2 reading research.

BACKGROUND

L1 Literature Review

The literature in L1 research describes two major models of reading that treat reading comprehension and reading rate as separate variables (Carver, 1990, 2000; Hudson, Pullen, Lane, & Torgesen, 2009). First, these two models will be reviewed in detail. Then, based on those models, empirical studies that investigated the relations and comparisons between reading comprehension and reading rate (oral reading fluency) will be presented (Spear-Swerling, 2006; Jenkins & Jewell, 1993; Saiegh-Haddad, 2003), and the findings will be summarized.

Carver (1990, 2000) has investigated the relationship between reading comprehension and reading rate in his "rauding" theory. Reading achievement is the convergent ability of both reading comprehension and reading rate. In Carver's theory, "rauding" refers to literally reading a text without skipping any words, in contrast to skimming or scanning. Rauding efficiency (RE) is an integrated score of both rauding accuracy (RA) and rauding rate (RR). To be exact, rauding efficiency is the square root of rauding accuracy multiplied by rauding rate ($RE = \sqrt{RA \times RR}$). Here, rauding accuracy refers to the ability to comprehend a passage accurately, and it is measured by either a reading comprehension test with MCQs without a time limit or a reading vocabulary test. As mentioned in the previous section, rauding rate refers to the fastest rate at which one can read a passage with more than 64% accuracy. Its measurement is usually accomplished by having students read easier passages silently and calculating words read per minute (wpm) or by an oral reading measurement in which students read the passage orally as fast as they can and the number of words read per minute is recorded. Rauding efficiency is the concept of general reading ability. In other words, it is the ability to understand a passage accurately and quickly. This is the final attainment of the causal model of reading achievement. Therefore, it is usually calculated by standardized reading comprehension tests administered with

a time limit. Thus, Carver (1990, 2000) separated reading comprehension from reading rate in the frame of his "rauding" theory, and used different measurements for the two abilities.

Recently, Hudson et al. (2009) proposed a conceptual model of reading fluency. In Hudson's model, reading comprehension and reading fluency are divided into two different abilities, and they both have a mutual relationship. In addition, reading fluency has a subcomponent: decoding fluency. General processing speed and Rapid Automatized Naming (RAN) are supposed to be basic cognitive processing skills and have an influence on both reading fluency and its sub-skill of decoding fluency. The elements of reading comprehension (metacognition, knowledge, vocabulary, passage context, and social context), those of reading fluency (orthographic knowledge, sight word vocabulary, decoding fluency, multiple cue efficiency), and those of decoding fluency (phonemic awareness fluency, letter sound fluency, and phonogram fluency) are also presented in the model[1]. As for the measurement of reading fluency, oral reading fluency is thought to be an appropriate measure, as long as the students read a longer passage (rather than, say, reading for just one minute) and some clarifying questions are given after reading. This clarification is considered important because some students could be "word callers" (those reading aloud without comprehending the content). Both of these two models (Carver, 1999, 2000; Hudson et al., 2009) have points in common. They both separate reading comprehension from reading rate (reading fluency in reading extended texts), and they both agree that there is an influential relationship between reading comprehension and reading rate.

In some studies of L1 reading research, reading rate is regarded as one aspect of reading fluency (see Grabe, 2009). In recent studies, oral reading fluency is often used to measure the variable of reading rate, when words read correctly per minute (wcpm) is usually calculated. To date, only a few empirical studies have investigated the relations and comparisons between reading comprehension and reading rate. Even though the number is limited, the results of these studies are expected to offer important implications for the current study. Spear-Swerling (2006) investigated the componential skills that contribute to reading comprehension and reading rate, as well as their relationship. Sixty-one elementary school children in the U.S.A. participated in this study. Their reading comprehension, reading rate (oral reading fluency), word recognition ability (real word and pseudo-word naming), vocabulary knowledge, listening ability, and RAN were measured. The main finding was that reading comprehension and reading rate were explained by partly different sets of variables. Reading comprehension was explained by oral language and word accuracy, and reading rate was influenced by word speed and word accuracy, suggesting that the two could be different from each other. The correlation coefficient between the two was moderate ($r = .57$, $p < .001$).

Jenkins and Jewell (1993) examined the relationship between reading comprehension and reading rate and the way it develops as children grow older. Reading comprehension and reading rate of 355 first- to sixth-grade elementary school children were assessed. Their reading comprehension was measured by two types of standardized reading comprehension tests with MCQs, and their reading rate was measured by oral reading fluency. The relationship between the two was calculated in grade-by-grade correlation coefficients. The results show that the correlation coefficients changed from $r = .88$ to $r = .60$ as the participants got older. During one of the reading comprehension tests, a significant difference was found between fourth and sixth grade students. In another test, another significant difference was found between second and fifth grade students. This suggests that efficient decoding leads to better comprehension during the early stages of reading, but in higher grades, reading comprehension might require skills

different from efficient decoding and fast reading, such as integrating information or making use of background knowledge.

Saiegh-Haddad (2003) looked into the relationship between reading comprehension and reading rate with 50 L2 English bilingual participants (22 Arabic natives, and 28 Hebrew natives) at Haifa University. Their reading comprehension was measured by recall tests, that is, after reading paragraphs on a computer screen, they reported the content in their L1. Their reading rate was examined through oral reading. The score was calculated by the number of pauses (any pause longer than two seconds) and decoding mistakes, but not by the total reading time. The results were as follows: the correlation coefficient between the reading comprehension and reading rate in the L1 tests was weak and not statistically significant, whereas, in L2 it became moderate ($r = .43$, $p <.05$ for Arabic natives, $r = .65$, $p < .001$ for Hebrew natives). In discussing these results, the researchers proposed that L2 proficiency was not high, even with adult participants. This led to higher correlation coefficients in the L2 reading setting. In contrast, L1 proficiency had already been fully developed in adults, which brought about a low correlation coefficient in L1 reading.

The results of these three empirical studies can be synthesized as follows: reading comprehension and reading rate develop side by side while participants' language proficiency remains low. However, these two variables progress differently as children grow older. In other words, reading comprehension requires different sub-skills as children's language proficiency develops, such as integration of information or background knowledge. In adult reading, comprehending the text is not simply being able to read quickly.

L2 Reading Research Review

In L2 reading settings, reading fluency (including reading rate) has not been the subject of debate because it has been thought to be a secondary trait compared to accuracy development (Grabe, 2009). L2 repeated reading research (Taguchi & Gorsuch, 2002; Taguchi et al., 2004) might be a good start to investigate this issue. Matsui and Noro's (2010) study is a study about extensive reading, but can also be suggestive in that they indirectly deal with the relationship between reading comprehension and reading rate. Chang (2010) gives a timed reading activity integrated into normal lessons at college in Taiwan, which looks into the relationship between reading comprehension and silent reading rate through pre-post test research design. In L2 reading fluency research, Lems (2006) directly examines the relationship between reading comprehension and reading rate. Thus, there are only a couple of studies on the relationship between reading comprehension and reading rate.

In L2 reading intervention research, Taguchi and Gorsuch (2002) researched students' reading comprehension and reading rate by means of repeated reading. Repeated reading is a teaching method based on the Automatic Information Processing Model, which presumes that reading ability will improve if lower level skills such as decoding or word recognition are automatized (LaBerge & Samuels, 1974). A sample consisting of 18 Japanese university students was divided into an experimental group ($n = 9$) and a control group ($n = 9$). The experimental group was given 28 repeated reading sessions lasting 30 to 40 minutes each for ten weeks. In each session, students read the same passage seven times. The control group read extensively from Science Research Associates (SRA) for exactly the same amount of time. A reading comprehension test and a silent reading rate test were administered before and after the intervention. The results showed reading comprehension improved significantly in both groups

before and after the treatment, but the difference between the two conditions was not statistically significant. The reading rate of the experimental group was enhanced significantly (from 113.25 to 153.50), whereas that of the control group was not (from 115.70 to 126.19), and the difference between the two groups was not significant. Therefore, it was concluded that repeated reading training improved silent reading rate, but it did not give a more beneficial influence on reading comprehension because 28 repeated reading sessions were not enough to benefit both reading comprehension and reading rate clearly.

Taguchi et al. (2004) compared repeated reading with extensive reading to improve reading comprehension and reading rate. The participants were 20 Japanese university students who were assigned to either a repeated reading group ($n = 10$) or an extensive reading group ($n = 10$). They were given 42 sessions of each condition for 17 weeks. Each repeated reading session was programmed to have them read a passage five or six times, and each extensive reading session gave them the time to read favorite books from an extensive reading library. Reading comprehension and reading rate tests (pre-test and post test of the intervention) were administered before and after the sessions. The results showed that in the repeated reading group, the average reading rate improved significantly between the first four sessions and the last four sessions (from 83.97 to 107.04). In contrast, the group difference, compared between the pre- and post-test scores, was not found to be significant either in reading rate or in reading comprehension, although both groups did receive a significant benefit from reading repeatedly in each condition. It was concluded that repeated reading and extensive reading improved reading comprehension and reading rate almost to the same extent, but the effect of repeated reading was more prominent in reading rate than in reading comprehension. This suggests that reading comprehension and reading rate both develop differently from each other.

Matsui and Noro (2010) studied the effects of 10-minute extensive reading on Japanese junior high school students' reading comprehension and reading rate. One hundred twenty-two Japanese junior high school students were divided into an experimental group ($n = 60$) and a control group ($n = 62$). The students in the experimental group completed about 20 extensive reading sessions, while the control group received the same number of regular lessons. Their reading comprehension and reading speed were measured by the Edinburgh Project on Extensive Reading test (EPER). A 2x2 ANOVA was conducted for reading comprehension, reading speed, and reading efficiency (wpm multiplied by accuracy rate). Reading comprehension did improve between pre-test and post-test in both groups, but no significant difference was found between the groups. However, as for their reading speed and reading efficiency, growth was found to be significant only in the experimental group. The study indicated that extensive reading sessions were more effective for reading rate than for reading comprehension, at least at the early stages of extensive reading. From these results, it seems that reading comprehension and reading rate advance at a different pace, and that reading rate could be improved earlier at a higher degree than reading comprehension.

Chang (2010) conducted a 13-week timed reading activity integrated into the normal curriculum. Eighty four college students in Taiwan were divided into an experimental group and a control group. Pre-test and post-test of reading rate and reading comprehension were administered. The result showed that the students with the timed reading increased their reading rate significantly by 29 wpm (25%) while the students in the control group gained only 7 wpm (5%), which was not statistically significant. On the other hand, the reading comprehension scores of the experimental group improved by 0.63 out of 13 points, with those of the control group being 0.58. The group with speed reading intervention gained only marginally in their

comprehension score in contrast to the control group, without significant difference between the two groups. It suggests that the improvement of reading rate can be achieved earlier than that of reading comprehension. These intervention studies imply that L2 reading fluency practices, such as repeated reading, extensive reading, and timed reading, might enhance reading rate more effectively than reading comprehension. However, they do not look into the direct relationship between reading comprehension and reading rate.

Conversely, Lems (2006) empirically studied the relationship between reading comprehension and reading rate measured by oral reading fluency with 232 adult English language learners at a private urban university in the American Midwest. Reading comprehension was measured by the final scores on standardized reading achievement tests. To test reading rate, the students read a passage aloud for one minute and the number of words correctly read per minute (wcpm) was calculated. The two variables were shown to have a weak but significant correlation of .256 ($p < .001$). The reason for this result is that once decoding skills are established, reading comprehension would require reading strategies other than decoding skills, otherwise L1 transfer of reading skills might have a stronger influence on reading comprehension. While this discussion is very informative to the field, the study is not based on a particular model of reading, which remains to be investigated.

In summary, these L2 reading studies were conducted with different objectives and with different operationalizations from one another. Nevertheless, they all suggest that reading comprehension and reading rate might develop separately. The study reported here focuses on the relations and comparisons between reading comprehension and reading rate more directly, based on the L1 model of reading achievement (Carver, 1990, 2000), which operationalized reading comprehension and reading rate as two different variables. The research questions are as follows:

1. What is the relation between reading comprehension and reading rate in Japanese high school EFL learners?
2. If the learners are divided into groups and compared, how is the relation between reading comprehension and reading rate in each group different from one another?

METHOD

Participants

The participants in the present study included 148 Japanese high school first-year students, who had had experience with English learning for 3 to 3.5 years. The scores of those who were thought to have made errors on the tests were left out, so 131 students were included in the descriptive statistics ($N = 131$), and the scores of 4 additional students were omitted from the correlation analysis for normal distribution. When the scores were normalized in the cluster analysis, scores from two students were eliminated as outliers; thus, the final number of participants was 125 ($N = 125$).

Materials and Procedures

Reading Comprehension Tests

Reading comprehension is usually measured by having students read a passage with MCQs or recalling the content of the passage they just read. In the present study, passages with

MCQs were adopted because the scoring was thought to be more objective than scoring students' recall. Participants read six passages with five MCQs per passage for 30 possible points. Four of the six passages were taken from the sample tests of English proficiency (Tests B and C) by the Society for Testing English Proficiency (STEP), which is widely known as an English testing association in the Japanese educational setting. Those passages had the difficulty levels equivalent to the STEP second- and pre-second-grade tests. The other two were from the STEP third-grade tests from 1999 and 2001. The subjects of the passages were "Part-time Jobs in the U.S.A.," "Police Officers in the U.S.A.," "A Strange Experience for Uncle George," "Sleep and Dreams," "Cheerleaders in the U.S.A.," and "Animal Therapy." The students were given three passages to read without time pressure per session. There were two sessions, making a total of six passages read. The answers were analyzed, and the reliability of the whole test was measured using Cronbach's alpha ($\alpha = .84$). By asking after the tests, it was secured that none of the passages had previously been read by the students.

Reading Rate Tests

As is apparent from the above sections, there is no standard way to measure reading rate. Therefore, each study uniquely defines and operationalizes the construct. The current study utilizes Carver's (1990, 2000) definition of reading rate as the fastest rate that one can read an easy passage with more than 64% accuracy. However, the accuracy rate was lowered to 50%, which is said to be appropriate for Japanese high school students. This is because only the accuracy is made much of in Japanese L2 reading classes, students are trained to read accurately, and, therefore, they are accustomed to reading slowly. In order to encourage them to read rapidly, the accuracy rate for measurement should be lowered, it is pointed out (see Taniguchi, 1992). Two passages from fourth-grade STEP exams in 2004 and 2006 were used to collect the data. The subjects of the passages were "Maki's Dream" and "Sally's Cooking Lesson." The passage to be read was printed on one side of the test paper, and five MCQs were printed on the reverse side. The students had to read the passage, record their reading time on a large stop watch at the front of the classroom, turn over the paper, and then answer the questions, thus checked reading accuracy in measuring the reading rate. Once they turned over the sheet, they were not allowed to reread the passage. The average reading rate (wpm) of the two trials was calculated for the final score of the variable. The reliability of the tests was computed by the correlation coefficient between the two trials ($r = .75$). The average accuracy of the scores was 73%, which suggests the measurement was acceptable according to Carver's (1990, 2000) definition mentioned above. A check was done after the tests to verify that the students had not previously read the passages.

Analysis

The analysis was completed with Microsoft Excel 2003, SPSS 12.0J, and Civil Works normal distribution check tool ver. 102. First, the descriptive statistics were calculated. Then, the normal distribution of each variable was checked, and the outliers were eliminated. Thereafter, a correlation analysis of all the remaining participants was conducted. Next, in order to look into the comparison of the variables, a cluster analysis was completed, and the participants were divided into groups. The statistical difference of the variables between the groups was analyzed with a one-way ANOVA and multiple comparisons. By doing so, the characteristics of each

group were discovered. Finally, the correlation coefficient between reading comprehension and reading rate in each group was calculated, and the difference in the relationship was compared on the basis of individual differences in each group.

RESULTS

Table 1 shows the results of descriptive statistics of reading comprehension and reading rate, including a reading accuracy check during the measurement of reading rate. In calculating the reading rate score (wpm), those who recorded over 300 wpm were left out from data analysis because they were thought to be skimming the passage and skipping some words (Fukkink, Hulstijn, & Simis, 2005). The average reading accuracy during the measurement of reading rate was 73%; therefore, the measurement was believed to be successful. Although the accuracy scores of 11 students were below 50%—the bottom line for Japanese high school students as previously noted—their data were not removed because the accuracy check tests were given in their target language, English, and their contents seemed to be more difficult than just simply checking the passage outline, and thus lowering their accuracy check sores. Moreover, the reading rates of all those 11 participants were under the average wpm, and therefore judged to not have skipped words and were therefore included in the results of descriptive statistics.

Table 1. Descriptive Statistics of Reading Comprehension and Reading Rate

Measures	Test Max	M	SD	Max.	Min.
Reading Comprehension	30	15.4	5.8	28.0	1.0
Reading Rate					
words read per minute (wpm)		93.8	33.5	195.5	38.2
reading accuracy check	10	7.3	2.0	10.0	2.0

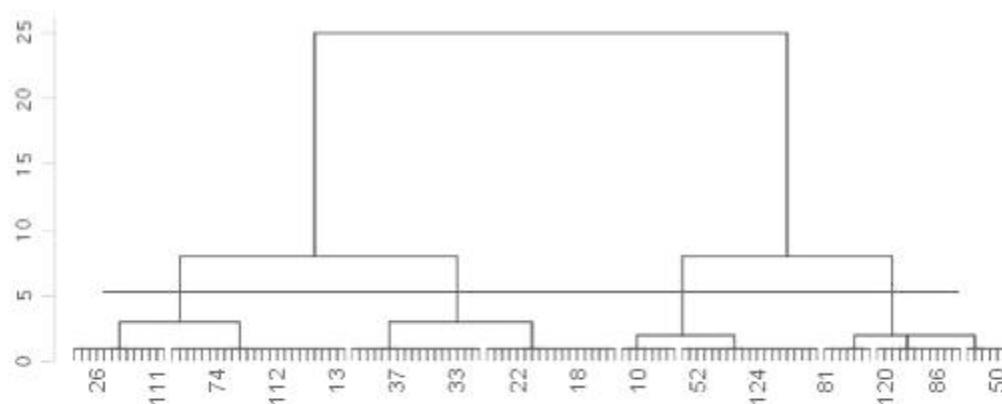*Note.* $N = 131$. wpm = words per minute.

Before the correlation analysis, the normal distribution of the variables was checked. In the distribution of reading rate scores, the scores of four students were regarded as outliers, judging from the histogram and Tukey's box plot. Following the exclusion of these four scores, the normal distributions of both reading comprehension and reading rate were attained. Thereafter, the correlation analysis between the two was conducted. The correlation coefficient was significant but weak ($r = .24$, $p < .01$, $N = 127$).

Table 2. Between-Groups Differences in Reading Comprehension and Reading Rate Measures

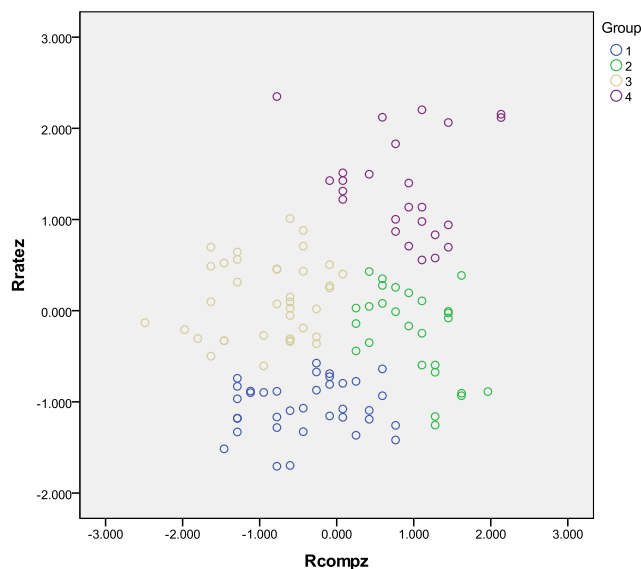| Measure	Group 1 ($n = 36$)		Group 2 ($n = 27$)		Group 3 ($n = 37$)		Group 4 ($n = 25$)		$F (3, 121)$	p	$\eta2$
	M	SD	M	SD	M	SD	M	SD			
Reading Comprehension	-0.40	0.67	0.99	0.49	-0.89	0.62	0.85	0.68	67.89	<.001	.63
Reading Rate	-1.05	0.29	-0.23	0.49	0.12	0.42	1.36	0.56	154.62	<.001	.79
Intercorrelaion (RC-RR)	.10		-.47 *		.16		-.10				

Next, a cluster analysis was conducted to establish groups so the comparison of reading comprehension and reading rate could be investigated. To measure the distance among the data, squared Euclidean distance was used, and Ward's method was adopted for the clustering procedure. These were chosen because they are considered typical procedures to clarify learners' characteristics (Isoda, 2004). The scores of the dependent variables of reading comprehension and reading rate were standardized because of the differences in the measurement units. Figure 1 shows a dendrogram based on the results of an agglomerative cluster analysis. On the basis of the changes of the distances and the characteristics of the acquired clusters, the cut-off point was set. As a result, four groups were established. The descriptive statistics of each cluster, the results of a one-way ANOVA conducted to check the difference among the clusters, and the correlation coefficients between reading comprehension and reading rate in each group are all shown in Table 2. The results of a one-way ANOVA showed that reading comprehension and reading rate among the four clusters were significantly different from one another: F (3, 121) = 67.89, $p <$ .001, η^2 = .63 for comprehension, and F (3, 121) = 154.62, $p <$ .001, η^2 = .79 for rate.

Figure 1. Dendrogram Based on Results of an Agglomerative Cluster Analysis

Tukey's post-hoc comparison indicated that the scores of reading rate were all significantly different from group to group. Equally, the scores of reading comprehension are significantly different from group to group except in Group 2 and Group 4, where their differences were not significant. Therefore, Group 1 (G1) was named *low to middle comprehension, low rate* (LMCLR), Group 2 (G2) was named *high comprehension, low to middle rate* (HCLMR), Group 3 (G3) was named *low comprehension, middle rate* (LCMR), and Group 4 (G4) was named *high comprehension, high rate* (HCHR). Figure 2 indicates the scatter diagram and the location of each group. The correlation coefficients between reading comprehension and reading rate were weak and non-significant for all groups except in G2: G1 (r = .10, *ns*, n = 36), G3 (r = .16, *ns*, n = 37), and G4 (r = -.10, *ns*, n = 25). However, G2 had a moderate negative correlation with statistical significance (r = -.47, $p <$ .05, n = 27).

Figure 2. Reading Comprehension Scores, Reading Rate Scores, and
the Four Groups by Cluster Analysis

DISCUSSION

The results of the study will be discussed in the context of the research questions. The first research question asked, "What is the relationship between reading comprehension and reading rate?" The results showed the relationship was significant but weak ($r = .24$, $p < .01$, $N = 127$). These results were consistent with those of Lems (2006) and they supported the implications of Taguchi and Gorsuch (2002), Taguchi et al. (2004), Matsui and Noro (2010), and Chang (2010), stating that reading rate and reading comprehension develop at a different pace and that the two are thought to be different variables. These results also contradicted the studies of L1 children by Spear-Swerling (2006) and Jenkins and Jewell (1993); they were also different from those of L2 cases in Saiegh-Haddad (2003).

Spear-Swerling (2006) tested elementary school children whose reading comprehension and reading rate could be explained by a slightly different set of sub-components. Word reading accuracy was the common factor for L1 children's reading comprehension and reading rate. This is why the moderate correlation coefficient between the two was found. Jenkins and Jewell (1993) pointed out that L1 children's reading comprehension could develop side by side with their reading rate. They stated that the contents of children's passages are mostly composed of simple, narrative texts, which leads to easy understanding provided that they can decode the written texts efficiently. This occurs in L1 literacy development because children's oral proficiency develops before they learn to deal with written materials. As a result, the correlation between reading comprehension and reading rate becomes moderate or strong in L1 children's reading. However, in L2 reading acquisition, learners often have a hard time decoding and accessing word meanings. Moreover, the contents of the passages are not always easy, narrative ones. In fact, they might be somewhat complicated expository ones. Even if learners are able to read quickly, they cannot always fully comprehend the passages. Consequently, the correlation between reading comprehension and reading rate weakens (Lems, 2006).

Saiegh-Haddad (2003) showed that university students in Israel had no significant relationship between reading comprehension and reading rate in their L1 reading, but that they had a moderate correlation coefficient in their L2 reading. It was discussed that the participants' L2 might not have developed fully, so the relationship became moderate with statistic significance. As previously mentioned, this study used different methods for measuring the variables from other ones—recall tests and reading rate by pauses and decoding mistakes measured reading comprehension. Therefore, the comparison of the results must be done with caution. However, it is plausible that the materials for both reading comprehension and reading rate in the L2 reading were not so difficult for the participants. Therefore, the results proved to be something similar to those of L1 children's reading, which contradicts the results of the present study.

Japanese high school EFL learners with low to intermediate language proficiency participated in this study. The passages were all taken from STEP fourth- to pre-second- grade exams, which are suitable for third-grade junior high school students and high school students. Easier passages were used in readings rate tests, while more difficult ones were given in reading comprehension tests. Fujita (2011) revealed in L2 reading of Japanese high school students that reading comprehension was influenced by vocabulary and syntactic knowledge, whereas reading rate was affected by sight word reading and decoding efficiency. Considering these, reading easier passages quickly and reading ones that are slightly more difficult accurately are two different abilities for low-to-intermediate Japanese high school EFL learners.

The next research question concerned the group comparison of the relationship between reading comprehension and reading rate. According to the cluster analysis results, the participants were divided into four groups: LMCLR, HCLMR, LCMR, and HCHR. Among all groups, the correlation coefficients were weak and not statistically significant. Only the HCLMR group had a moderate negative correlation that reached significance ($r = -.47$, $p < .05$, $n = 27$). It is suggested that some students in the HCLMR group were able to read the passages accurately, but not quickly. In brief, some Japanese high school students have a relatively low reading comprehension and a low reading rate. Then, there are two in-between groups. Finally, in others, both reading comprehension and reading rate reach higher levels.

In one of the "in-between groups," the students' reading rate is faster, although their reading comprehension is low, which indicates that only reading rate can be improved while reading comprehension cannot. These results support those of extensive reading or repeated reading studies such as Taguchi and Gorsuch (2002), Taguchi et al. (2004), and Matsui and Noro (2010). According to the reading fluency theory of the automatic information-processing model (Samuels, 2006), beginning readers have to allocate a great deal of attention to decoding skills. Therefore, they cannot concentrate their limited attention on comprehension. However, as reading fluency develops, those decoding skills are executed automatically. Eventually, attention is devoted solely to comprehension. The results of this group are in accordance with Samuels' theory, that is, the phase where reading rate goes from low to middle exists, while reading comprehension still remains low.

Another in-between stage showed that the students' reading comprehension is at a higher level, but their reading rate remains low to middle. As just indicated above, only in this group (HCLMR) did the two variables compete with each other, resulting in a negative correlation. A more careful examination revealed that some students in this group had nearly perfect reading comprehension ability, but they read just as slowly as the beginners. The difference between the two variables was quite large, which led to the negative correlation in this group. It is likely that

these students gave priority to reading accurately over reading quickly. This might be a result of reading instruction and reading assessment in Japanese high school classrooms, in which only accuracy is counted as an index of reading ability.

Verspoor and van Dijk (2011) point out that the two component variables of a language skill can be "supportive," "competitive," or "conditional." The data on individual differences in L2 reading in the present study indicate that, before reading comprehension and reading rate reach the final "supportive" stage, some students are in the stage where reading comprehension is conditional on reading rate (as in the LCMR group). Still others are in the phase where reading comprehension is competitive with reading rate (as in the HCLMR group). How do reading comprehension and reading rate develop? Further research, including longitudinal studies, should be conducted to clarify this issue.

CONCLUSION

The current study investigated the relation and comparison between reading comprehension and reading rate among Japanese high school EFL learners. The finding was that the relationship between reading comprehension and reading rate was significant but weak. Thus, reading comprehension and reading rate were shown to be different variables. The comparison between the two variables showed that some students are in either of the two kinds of in-between groups before reaching full development of these skills.

The findings suggest that reading classes should target the improvement of reading comprehension and reading rate differently. In Japanese high school EFL classes, much effort has been given to reading materials intensively, using vocabulary and grammar knowledge. This leads to better reading comprehension. However, since the relationship between reading comprehension and reading rate is weak, since reading comprehension could be conditional on the development of reading rate, and since the relations between the two might become competitive in some students, effort should be focused on the improvement of reading rate. Extensive reading or repeated reading could serve as alternative methods of instruction in some parts of reading classes. Grabe (2009) refers to these methods as implicit learning, while intensive reading as explicit learning. Japanese high school EFL learners need both explicit and implicit learning. The important point here is the balance and priority between the two kinds of learning according to the situations.

The current study has several limitations. First, the number of participants should be expanded. An increased number of participants in each group would enable a more exhaustive examination of the phases of reading ability. Second, the measure of reading rate could be more sophisticated. The materials for reading rate measurement should be more controlled because the level of difficulty and the content of each passage could otherwise distort the results. Furthermore, online measurement of reading rate could elicit more stabilized data (Shiotsu, 2010). Finally, since the development of a language skill is a dynamic process, a longitudinal study on reading development, focusing on the component skills of reading comprehension and reading rate, should be conducted. Thus, a dynamic growth model could be brought into an investigation (Lowie, Caspi, van Geert, & Steenbeek, 2011).

The relations and comparisons between reading comprehension and reading rate have not been fully explored. This study presented a framework to investigate this issue. Further studies would bring about better teaching instructions in L2 reading classes.

ENDNOTES

[1] Hudson et al. (2009) presented a multidimensional model of reading fluency. Not all the variables are defined one by one in their report. However, some of them can be guessed and explained as follows. The elements of reading comprehension are metacognition, knowledge, vocabulary, passage context, and social context. Metacognition is the ability to regulate one's own thinking while reading. Knowledge, passage context, social context are supposed to be general knowledge or background knowledge around the text. Those of reading fluency (orthographic knowledge, sight word vocabulary, decoding fluency, multiple cue efficiency) are all related to word recognition. Orthographic knowledge is the knowledge about English word spelling, and sight word vocabulary is the size of the vocabulary one can process from memory without analyzing. Multiple cue efficiency is the efficiency to integrate graphophonic and morphosyntactic cues to determine the exact pronunciation. Those of decoding fluency (phonemic awareness fluency, letter sound fluency, and phonogram fluency) are the abilities concerned with the transformation of letters into sounds.

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