English Teaching, Vol. 71, No. 3, Autumn 2016
DOI: 10.15858/engtea.71.3.201609.79

The Role of Vocabulary and Grammar in Different L2 Reading Comprehension Measures

Jeong-Won Lee
(Chungnam National University)

Lee, Jeong-Won. (2016). The role of vocabulary and grammar in different L2 reading comprehension measures. *English Teaching, 71*(3), 79-97.

The present study examined the comparative role of vocabulary and grammar in different test measures of L2 reading comprehension. A total of 83 students were asked to take three reading tests with a different technique each (multiple-choice, cloze, and recall), a vocabulary test, and a grammar test, and to respond to a questionnaire. The findings were as follows: 1) learners' reading performance differed across the three reading test measures, and the two language variables exerted different influences in L2 reading as measured by the cloze test technique; and 2) concerning the comparative contribution of the two language variables to L2 reading comprehension according to learners' L2 proficiency, the contribution was significant exclusively in the recall test, and it varied depending upon their L2 proficiency. This research demonstrates the importance of taking into account the type of test techniques in studies of the relative role of vocabulary and grammar knowledge in L2 reading.

Key words: L2 reading, L2 proficiency, vocabulary, grammar, test techniques, reading comprehension measures

1. INTRODUCTION

It is well known that the reading construct is comprised of complex cognitive process as well as a variety of subskills such as linguistic knowledge, background knowledge, metacognitive knowledge, and knowledge for construction of textual meaning, just to name a few (Grabe, 2009a; Jeon & Yamashita, 2014; Koda, 2005; Urquhart & Weir, 1998). Among these variables that affect effective reading comprehension, linguistic knowledge (vocabulary and grammar) has drawn special attention (Alderson, 1984; Barnett, 1986; Brisbois, 1995; Nassaji, 2003; Yamashita, 2002; Zhang, 2012) in terms of the formation of

propositions that help discourse comprehension for text construction (Kintsch, 1998; Perfetti & Britt, 1995) as well as semantic processing of the text (Alderson, 2000).

In particular, successful reading comprehension has long been acknowledged as having a close relationship with vocabulary knowledge (knowledge of meanings of individual words), which suggests that the more vocabulary knowledge a reader has, the more reading comprehension she can achieve successfully (Grabe, 2009a; Koda, 2005; Nassaji, 2003; Urquhart & Weir, 1998). On the other hand, a few empirical studies of the relationship between L2 reading comprehension and grammatical knowledge indicate that grammatical knowledge is a crucial feature for coherence building of text construction in L2 reading (Alderson, 2000; Fender, 2001).

Concerning the query about the relative role of vocabulary and grammar knowledge in L2 reading, mixed findings have been obtained. Most studies show the relative predominance of vocabulary knowledge in L2 reading comprehension (Brisbois, 1995; Nassaji, 2003; Ulijn, 1984; van Gelderen, Schoonen, Glopper, Julstijn, Simis, Snellings, & Stevenson, 2004; Shin & Kim, 2012; Zhang, 2012), while a couple of studies reported a more significant role of grammar knowledge in L2 reading comprehension over vocabulary knowledge (Shiotsu, 2010; Shiotsu & Weir, 2007).

Some studies also claim that the relative contribution of these two types of linguistic knowledge depends upon research conditions such as learners' L2 proficiency (Droop & Verhoeven, 2003), their L2 reading ability (Kim & Cho, 2015), and reading task types (Jung, 2012). Given that these two types of linguistic knowledge—vocabulary and grammar—pertain to L2 reading comprehension, the issue of whether each type of knowledge accounts for more variance in L2 reading comprehension remains unclear (Bernhardt, 2005; Zhang, 2012).

One more factor to be considered regarding the features affecting L2 reading comprehension ability is that different reading comprehension measures have been engaged in the previous studies to measure L2 reading proficiency (e.g., multiple-choice, cloze, recall), and that those techniques measure different aspects of L2 reading comprehension to some degree (Alderson, 2000; Kobayashi, 2002). Then the relative contribution of vocabulary and grammar knowledge to L2 reading comprehension may also depend upon how L2 reading comprehension is measured (Shiotsu & Weir, 2007; Zhang, 2012) since measurement tools for reading comprehension affect and probably determine how readers perform in the assessment of reading comprehension (Bernhardt, 1991; Riley & Lee, 1996; Wolf, 1993). Accordingly, the interplay between reading comprehension processes as measured by different test techniques and the role of two major linguistic knowledge—vocabulary and grammar—in the process could be a contributory factor for better understanding of successful reading comprehension.

Curiously, however, little research has been done to examine the issue until recently.

Accordingly, the current study aims at investigating the relative contribution of EFL college students' vocabulary and grammar knowledge to their reading performance across different reading comprehension test measures.

2. LITERATURE REVIEW

2.1. The Relative Contribution of Vocabulary and Grammar to L2 Reading

It has long been acknowledged that vocabulary knowledge is the key distinguishing feature in successful L2 reading performance compared to grammar knowledge (Brisbois, 1995; Nassaji, 2003; Shin & Kim, 2012; Ulijn, 1984; Zhang, 2012). However, the issue of whether vocabulary and grammar knowledge accounts for more variance in L2 reading still remains inconclusive.

Ulijn (1984) argues that vocabulary knowledge contributes much to L2 reading comprehension, whereas grammar knowledge does little. Nassaji (2003) investigated ESL learners' higher-level text processing and reported that vocabulary knowledge showed a stronger correlation with L2 reading than grammatical knowledge, even though grammatical knowledge also correlated significantly with L2 reading. Brisbois (1995) touched upon the issue with two groups of English-speaking French learners divided by their reading proficiency. He determined that overall L2 reading bears more on vocabulary than grammar knowledge, although there were slight variations depending upon the learners' different reading proficiency levels.

Recently, both Zhang (2012), who examined advanced Chinese EFL learners, and van Gelderen et al. (2004) who studied Dutch-speaking EFL learners provided support for the findings of the previous research that vocabulary knowledge is more important in predicting L2 reading comprehension than grammatical knowledge, even though grammatical knowledge showed stronger correlation with reading comprehension than vocabulary knowledge in van Gelderen et al. (2004). In the Korean context, Shin and Kim's (2012) finding also suggests that vocabulary knowledge is a better predictor of reading performance than grammar knowledge.

On the other hand, a few studies can be found that claim a comparable or greater role of grammatical knowledge in L2 reading. Barnetts (1986), measuring grammar, vocabulary, and reading comprehension in L2 separately for research validation, found that the learners' reading comprehension depends upon both vocabulary and grammar knowledge in a symmetrical pattern. Both Shiotsu (2010) and Shiotsu and Weir (2007) also found clearly that grammatical knowledge holds stronger predictive power in L2 reading performance than does vocabulary knowledge. Conclusively, Alderson (1984, 2000)

affirms that there could possibly be a close relationship between grammatical knowledge and reading ability.

2.2. Test Techniques in L2 Reading

The studies aiming at measuring L2 learners' reading comprehension ability have employed a variety of test techniques depending upon the operational definition of the construct of reading comprehension, such as multiple-choice, cloze, and recall, to name a few. These test techniques bear distinctive characteristics and strengths as reading comprehension measures.

The multiple-choice test technique, by far the most representative format to assess reading, aims at training and measuring learners' ability to think by asking them to examine each alternative very carefully to arrive at the best answer (Munby, 1968). The technique can be accepted in any test setting with a certain degree of authenticity and perfect reliability if the test components—test questions and distracters, in particular—are constructed with great care.

It is a well-proven claim that the cloze procedure largely addresses more language knowledge such as grammar and vocabulary than overall reading comprehension (Alderson, 2000; Hughes, 2003; Koda, 2005). Nonetheless, the test technique has been widely used as a valid measure of reading comprehension because learners' sensitivity to syntactic and lexical constraints in context can be taken as a reliable measure to assess reading ability (Bachman, 1982; Jonz, 1991; Nunan, 1985).

The recall test is a widely used technique to assess both L1 and L2 reading comprehension ability (Riley & Lee, 1996). It is also famous in that it assesses reader-text interaction directly "without procedural contamination from additional task requirements" such as test questions (Koda, 2005, p. 237). In other words, it provides an overall picture of how learners process information in the text for storage, retrieval, and reconstruction (Bernhardt, 1991), in spite of the problem that it hinges strongly on memory.

It has been aptly pointed out that these different types of reading comprehension test techniques may make a different contribution to L2 learners' reading performance (Kobayashi, 2002; Riley & Lee, 1996), which, in turn, probably lead learners to access sources of language knowledge (e.g., vocabulary and grammar) differently when completing the test. Nonetheless, however, relatively few studies have been conducted to investigate the relationship of reading comprehension as measured by different test techniques to L2 learners' relative reliance on vocabulary and grammar knowledge when they perform a reading test.

3. RESEARCH DESIGN

3.1. Participants

In this study, 83 college students participated: 21 males (25.3%) and 62 females (74.7%). The students in five intact English language classes were randomly assigned into 3 groups, and those in each group were tested with the three different reading comprehension test techniques—multiple-choice, cloze, and recall—developed based on three expository texts with different text difficulty levels. The participants were 22.18 years old on average, ranging from 20 to 27. In addition, in order to address the function of their L2 proficiency level, one of the most frequently reported variables that affect L2 reading (Alderson & Urquhart, 1988; Lee & Schallert, 1997), they were divided into two groups based on their TOEIC scores: 45 high-level students (54.2%) who scored above 800 with an average of 881, and 38 low-level students (45.8%) who scored less than 800 with an average of 694.

3.2. Materials

3.2.1. Reading texts

Three expository texts with a range of different topics were used for the present study. The topic of each text was chosen with care to minimize the potential effects of cultural bias or student familiarity with it (Alderson & Urquhart, 1988; Clapham, 1996; Hale, 1988). The titles of the texts were “The Lost Are Found” (henceforth called “Cities”), “Learning to Speak Klallam” (henceforth called “Language”), and “A Day on a Tall Ship” (henceforth called “Ship”), all from Zukowski/Faust (2002). The lengths of the three texts were almost the same: 527 words for the Cities text, 528 for the Language text, and 529 words for the Ship text, respectively.

Text difficulty was determined by the Flesch Reading Ease Formula, one of the most widely accepted readability indices. According to the index, the readability scores were 60.20 for the Cities text, 69.95 for the Language text, and 76.11 for the Ship text with an average of 68.75, which indicates that the first was the most difficult and the last was the easiest, with the second in between the two. In addition, the two L2 proficiency groups did not show any significant differences in their familiarity with the three text topics ($p > .05$).

3.2.2. Reading tests

To address relative influence of vocabulary and grammar knowledge on L2 reading comprehension across different reading test techniques, three test techniques were included

in the study: multiple-choice, cloze, and recall. For the multiple-choice technique, the students were asked to answer five questions with four choice options accompanying each text. The questions mainly tapped into the students' global understanding of the texts such as finding the gist and making textual inference to measure their comprehensive understanding of the texts (Shiotsu & Weir, 2007; Zhang, 2012).

For the cloze test, fixed-ratio deletion was adopted with every 24th word deleted, resulting in 20 blanks in total for the three texts each, considering the text difficulty. The deletion type is believed to be comparable, and equally reliable and valid with rational deletion (Bachman, 1985; Jonz, 1990). Great caution was taken not to delete proper nouns and numbers. The cloze test results were scored using the exact word method in favor of practicality and reliability, although the appropriate word scoring method has been mostly advised and used in terms of face validity of the test (Brown, 2010).

For the recall test, students were asked to read the text on the test sheet, and write down anything they can remember from the text on the back of the test sheet in Korean, their mother tongue, in order to increase scoring validity (Alderson, 2000; Chang, 2006; Kobayashi, 2002; Wolf, 1993). Idea units were counted in the text for scoring. Though it is not an easy process to define idea units (Alderson, 2000), the propositions in the three texts based on pausal units were analyzed (Johnson, 1970): 54 units for the Cities text, 53 units for the Language text, and 50 units for the Ship text. Based on these idea units in each text, the researcher and an experienced Korean English teacher scored the recall test outcomes. The inter-rater reliability of the results was $\alpha = .85$. Upon scoring, one point was given for each unit in the recall texts with no partial points in order to ensure scoring accuracy and consistency.

TABLE 1

Test Booklets

Version A	Version B	Version C
	Reading test (15 minutes each)	
Cities: multiple-choice	Cities: cloze	Cities: recall
Language: recall	Language: multiple-choice	Language: cloze
Ship: cloze	Ship: recall	Ship: multiple-choice
	Vocabulary test (10 minutes)	
	Grammar test (20 minutes)	
	Questionnaire (5 minutes)	

The counterbalanced design was used to prevent any order effects of test presentation, since the students had to respond to the three different reading comprehension tests. For this purpose, three versions of the text booklets were prepared (versions A, B, and C), as in Table 1. The three versions were randomly distributed to the students for about a third of them to complete each version.

3.2.3. Vocabulary and grammar tests

The Vocabulary Levels Test (VLT) was used to measure students' vocabulary knowledge. VLT has been known as a more accurate measure that focuses solely on receptive knowledge of vocabulary than traditional types such as the multiple-choice fill-in-the-blank test (Nation, 2001; Schmitt, Schmitt, & Clapham, 2001). It is also widely used to measure vocabulary size (Schmitt, 2010). The students were first given some sample items to familiarize them with the test format, and then were asked to answer 45 items in total.

To measure students' grammatical knowledge, 25 multiple-choice items were taken from the CBT TOEFL structure section. The items consisted of basic grammatical features on which L2 learners frequently make errors, such as subject-verb agreement, adjective/adverb functions, verbs, prepositions, relative pronouns, comparisons, participial constructions, and conjunctions.

3.2.4. Questionnaire

Along with the tests, a simple questionnaire was given to the students to check their background information such as gender, age, and TOEIC score. Additionally, the participants were asked to respond to the questionnaire to confirm the difficulty level of the three test techniques and text familiarity on a 4 Likert-scale from "strongly disagree" to "strongly agree" for each item, after taking all the tests.

3.3. Data Analyses

The test results were analyzed using the SPSS statistical package, version 22.0. First, descriptive statistics were calculated, and then a *t*-test was performed to check for any statistical difference in test results and their perception of test difficulty between the two groups. Finally, a Pearson Product Moment Correlations and multivariate analysis of variance (MANOVA) were conducted to examine whether their vocabulary and grammar test results play a distinctive role across the three reading comprehension measures.

4. RESULTS AND DISCUSSION

The participants performed differently across the three reading test measures. As shown in Table 2, in total, they received the lowest scores in the recall test, followed by the cloze test, and very high scores in the multiple-choice test. They performed very poorly in the

recall test regardless of their L2 proficiency, since the test is known to ask students to construct their own ideas about the text in a more specific and detailed fashion, resorting much to memory (Alderson, 2000); however, they did not think the test was the most difficult one, as shown in Table 3, since they might think they could rather easily handle the task of writing down anything that came to their minds. The cloze procedure requires test-takers to make use of their linguistic expectations, background experience, and some strategic competence along with a calculated guess to close the gaps (Brown, 2010), which must place a heavy cognitive demand on their undertaking of the procedure. On the other hand, considering that the multiple-choice test in this study aimed at examining a global understanding of the texts, asking them to find the gist and make textual inference, the participants were not likely to have much difficulty in choosing the correct answers.

According to the *t*-test results in Table 2, the students showed a significant difference in their reading test performance in the cloze test between the two language proficiency groups. This outcome is corroborated by the result in Table 3, in that they thought the cloze test was the most difficult test technique, and that the two groups' perception of test difficulty differed significantly in the cloze test. Thus, a certain degree of L2 proficiency may be a prerequisite to perform successfully on an L2 reading comprehension test that calls largely for simultaneous cognitive and linguistic processing (Alderson, 1984; Alderson & Urquhart, 1988; Lee & Schallert, 1997). It can be safely inferred, therefore, that the cloze test is one of the best measures to assess L2 learners' reading comprehension ability (Alderson, 2000; Brown, 2010; Hughes, 2003).

TABLE 2

Means for Test Results Between Two Groups

Tests	*M (SD)*			*t*	*p*
	High (*N* = 45)	Low (*N* = 38)	Total (*N* = 83)		
Reading					
MC (average = 5)	4.24 (.83)	3.92 (.94)	4.10 (.89)	1.663	.100
Cloze (average = 20)	13.67(2.70)	12.05(2.60)	12.93(2.76)	2.762	.007
Recall (average ÷ 52)	12.53(7.86)	12.26(7.57)	12.41(7.68)	.159	.874
Vocabulary (total = 45)	41.33(2.59)	39.29(3.23)	40.40(3.06)	3.202	.002
Grammar (total = 25)	19.00(3.11)	16.95(2.98)	18.06(3.20)	3.054	.003

TABLE 3

Mean for Perceived Test Difficulty Between Two Groups

Tests	*M (SD)*			*t*	*p*
	High (*N* = 45)	Low (*N* = 38)	Total (*N* = 83)		
MC	2.36 (.61)	2.50 (.51)	2.42 (.57)	1.161	.249
Cloze	2.58 (.62)	2.87 (.58)	2.71 (.62)	2.206	.030
Recall	2.33 (.77)	2.47 (.73)	2.40 (.75)	.850	.398

In order to find evidence for the relative contribution of vocabulary and grammar to L2 reading comprehension ability as measured by different test techniques, Pearson Product Moment Correlations were carried out first to confirm the relationships of the two language variables of vocabulary and grammar to the three reading test measures. As shown in Table 4, a different pattern of correlation in the two variables was found. The two variables had some relationships with the cloze test in both groups (vocabulary, p = .013; grammar, p = .017), and the result was corroborated in further analyses below in Tables 5 and 6. Meanwhile, in the recall test a significant correlation between grammar and test type was found among high-level learners (p = .033), while a correlation between vocabulary and test type among low-level learners (p = .025). Such an interesting discrepancy was manifested again in the results shown in Tables 7, 8, 9, and 10.

TABLE 4

Correlations Between Test Techniques and Language Variables

		MC			Cloze			Recall		
		High	Low	Total	High	Low	Total	High	Low	Total
Vocabulary	*r*	.041	.204	.169	.351	.399	.427	.111	.363	.222
	p	.791	.219	.127	.018	.013	.000	.468	.025	.043
Grammar	*r*	.320	.165	.281	.284	.386	.389	.318	.269	.287
	p	.032	.323	.010	.050	.017	.000	.033	.102	.009

A multivariate analysis of variance (MANOVA) was then conducted to confirm whether any different influences in students' vocabulary and grammar knowledge (independent variables) exist in their reading test performance across the three different reading test measures (dependent variables). First, as seen in Table 5 showing the results of analyzing all the participants' outcomes, the values of Wilk's Λ for both vocabulary and grammar variables were statistically significant, which indicates that the two language variables play a certain role respectively in any of the three reading measures. That is, it can be definitely argued that vocabulary and grammar knowledge are crucial components of L2 reading comprehension (Alderson, 1984; Clarke, 1980; Cziko, 1980; Jung, 2012; Lee & Schallert, 1997; Taillefer, 1996).

TABLE 5

MANOVA Test Results Based on the Effect of Wilk's Lambda[a] in Total

Effect	Value	*F*	Hypothesis *df*	Error *df*	*p*
Intercept	.021	1166.517[b]	3.000	76.000	.000
Vocabulary	.822	2.611[b]	6.000	152.000	.019
Grammar	.837	2.356[b]	6.000	152.000	.033

a. Design: Intercept + Vocabulary + Grammar
b. Exact statistic

In order to ascertain the distinctive contribution of the two language variables to any of the three reading tests, between-subjects effects were analyzed, as in Table 6. As a result, the two language variables made a different contribution to the three different reading measures. That is, both vocabulary and grammar knowledge influenced the students' performance in the cloze test, with *p*-values of .005 and .036, respectively, whereas both failed to play any significant roles for the multiple-choice and recall tests.

Unlike the other two types of reading test measures that ask test-takers to run the normal course of reading when dealing with the reading text, in the cloze test the mutilated reading passage serves as the test tool itself, disrupting the normal process of reading. This implies that learners may have to be engaged in complex processing of semantic and syntactic constraints in a local or wider context to close the gaps for comprehension of the passage when completing the cloze procedure (Bachman, 1982; Jonz, 1991; Lee, 2011). It has been argued in a number of studies that the cloze procedure, in general, measures lexical and grammatical knowledge (Alderson, 2000; Cohen, 1980; Hughes, 2003; Koda, 2005). In systematic processing, the learners may have to first come up with appropriate words for the blanks depending upon their active lexical processing, and then determine the words' corresponding syntactic features and their syntactic relations among words based on their grammatical ability.

On the basis of the findings of the study, it could be convincingly argued that the relative role of vocabulary and grammar knowledge in L2 reading seems to hinge also upon the types of reading comprehension measures as well as other factors such as learners' L2 proficiency (Droop & Verhoeven, 2003), L2 reading proficiency (Kim & Cho, 2015), and reading task types (Jung, 2012). Accordingly, more investigation is needed to understand L2 reading processes employed in different reading test measures and how to measure reading comprehension in accordance with different purposes of assessing reading. This suggests that what matters in the issue of the comparative contribution of vocabulary and grammar knowledge to L2 reading does not only consist of which variable among the two contributes to L2 reading more, but in which variable contributes how in which conditions.

One more noteworthy consideration is the role of grammar in L2 reading "that has been almost ignored" and even devalued (Urquhart & Weir, 1998, p. 269). From the perspective of the findings of the current study, the impact of grammatical knowledge is most likely to vary in accordance with the reading test measures. That is, the distinct role of grammar may be magnified in a reading test technique that calls for "[t]he ability to parse sentences into their correct syntactic structure" to understand text (Alderson, 2000, p. 37), such as in the cloze procedure (Barnett, 1986).

Lastly, unlike the studies that used the multiple-choice test format (e.g., Shin & Kim, 2012; van Gelderen et al., 2004; Zhang, 2012) and recall tests (e.g., Barnett, 1986; Brisbois, 1995) to measure L2 reading ability and reported the relative superiority of vocabulary

knowledge as a better predictor of L2 reading over grammar knowledge or closely comparable effects of the two language features on L2 reading, the present study failed to do so. It can be speculated that the contribution of vocabulary and grammar to L2 reading may differ depending upon how the reading comprehension test is constructed with various types of reading materials (Alderson, 2000; Shohamy, 1984). This may well involve further research that is comprehensive and in-depth, taking into account more elaborate test constructions and the judicious choice of reading test materials.

TABLE 6

Between-Subjects Effects in Total

Source	Dependent Variable	Type III *SS*	*df*	*MS*	*F*	*p*
Corrected model	MC	8.018[a]	4	2.005	2.733	.035
	Cloze	163.581[b]	4	40.895	6.935	.000
	Recall	518.429[c]	4	129.607	2.340	.062
Intercept	MC	1326.183	1	1326.183	1808.090	.000
	Cloze	12737.197	1	12737.197	2159.857	.000
	Recall	11447.402	1	11447.402	206.706	.000
Vocabulary	MC	2.396	2	1.198	1.634	.202
	Cloze	66.313	2	33.157	5.622	.005
	Recall	106.875	2	53.438	.965	.386
Grammar	MC	3.792	2	1.896	2.585	.082
	Cloze	40.800	2	20.400	3.459	.036
	Recall	243.694	2	121.847	2.200	.118
Error	MC	57.211	78	.733		
	Cloze	459.985	78	5.897		
	Recall	4319.643	78	55.380		
Total	MC	1458.000	83			
	Cloze	14495.000	83			
	Recall	17620.000	83			
Corrected total	MC	65.229	82			
	Cloze	623.566	82			
	Recall	4838.072	82			

a. R^2 = .123 (Adjusted R^2 = .078)
b. R^2 = .262 (Adjusted R^2 = .225)
c. R^2 = .107 (Adjusted R^2 = .061)

The results of the MANOVA in the two L2 proficiency groups led to an interesting result, as seen in Tables 7, 8, 9, and 10, in that a significant difference was found only in the recall test in both groups, and that the two language sources brought about different effects on the recall test scores depending upon L2 learners' language proficiency. That is, grammar knowledge made a significant contribution to the recall test results in high-level learners, while vocabulary knowledge did so in their low-level counterparts. This result is supported partly by Shin and Kim's (2012) study reporting that vocabulary knowledge was a significant predictor of L2 reading comprehension as measured by a recall task as well as a

multiple-choice test. Comparing their study participants who were assumedly of intermediate L2 proficiency level to the so-called low-level students of the current study with an average TOEIC score of 694 and plausibly at an intermediate proficiency level, a possible explanation could be that vocabulary knowledge plays a crucial role in L2 reading performance among L2 learners at the intermediate level when reading comprehension ability is measured by the recall test.

TABLE 7

MANOVA Test Results Based on the Effect of Wilk's Lambda[a] in the High Group

Effect	Value	*F*	Hypothesis *df*	Error *df*	*p*
Intercept	.024	516.498[b]	3.000	38.000	.000
Vocabulary	.821	1.313[b]	6.000	76.000	.262
Grammar	.718	2.278[b]	6.000	76.000	.045

a. Design: Intercept + Vocabulary + Grammar
b. Exact statistic

TABLE 8

Between-Subjects Effects in the High Group

Source	Dependent Variable	Type III *SS*	*df*	*MS*	*F*	*p*
Corrected model	MC	5.059[a]	4	1.265	2.004	.112
	Cloze	61.509[b]	4	15.377	2.380	.068
	Recall	511.114[c]	4	127.779	2.319	.074
Intercept	MC	578.286	1	578.286	916.028	.000
	Cloze	5556.007	1	5556.007	859.759	.000
	Recall	4991.605	1	4991.605	90.588	.000
Vocabulary	MC	1.885	2	.943	1.493	.237
	Cloze	24.736	2	12.368	1.914	.161
	Recall	74.480	2	37.240	.676	.514
Grammar	MC	3.831	2	1.915	3.034	.059
	Cloze	15.539	2	7.769	1.202	.311
	Recall	409.087	2	204.544	3.712	.033
Error	MC	25.252	40	.631		
	Cloze	258.491	40	6.462		
	Recall	2204.086	40	55.102		
Total	MC	841.000	45			
	Cloze	8725.000	45			
	Recall	9784.000	45			
Corrected total	MC	30.311	44			
	Cloze	320.000	44			
	Recall	2715.200	44			

a. R^2 = .167 (Adjusted R^2 = .084)
b. R^2 = .192 (Adjusted R^2 = .111)
c. R^2 = .188 (Adjusted R^2 = .107)

Considering that the recall test calls for higher cognitive demand for effective storage, retrieval, and reconstruction strategies of information from the text (Bernhardt, 1991), it

seems possible that L2 learners perform the given test task differently according to their L2 proficiency. In the present study, high-level learners scored 41.33 out of 45 (91.11%) for the vocabulary test and 19.00 out of 25 (76%) for the grammar test, which indirectly indicates that syntactic knowledge comes into play on the basis of sufficient lexical knowledge when tackling the complicated task, while low-level learners do not have enough cognitive capacity left to manage grammatical features because their capacity is burdened while processing lexical information to complete the task (Kim & Cho, 2015). This outcome implies that a balanced approach to teaching vocabulary and grammar is called for in teaching L2 reading (Barnett, 1986).

TABLE 9

MANOVA Test Results Based on the Effect of Wilk's Lambda[a] in the Low Group

Effect	Value	*F*	Hypothesis *df*	Error *df*	*p*
Intercept	.022	450.125[b]	3.000	31.000	.000
Vocabulary	.658	2.405[b]	6.000	62.000	.037
Grammar	.782	1.350[b]	6.000	62.000	.249

a. Design: Intercept + Vocabulary + Grammar
b. Exact statistic

TABLE 10

Between-Subjects Effects in the Low Group

Source	Dependent Variable	Type III *SS*	*df*	*MS*	*F*	*p*
Corrected model	MC	4.699[a]	4	1.175	1.381	.262
	Cloze	65.962[b]	4	16.490	2.959	.034
	Recall	695.609[c]	4	173.902	4.025	.009
Intercept	MC	555.789	1	555.789	653.535	.000
	Cloze	5233.402	1	5233.402	938.942	.000
	Recall	5432.288	1	5432.288	125.733	.000
Vocabulary	MC	2.526	2	1.263	1.485	.241
	Cloze	26.285	2	13.142	2.358	.110
	Recall	459.625	2	229.812	5.319	.010
Grammar	MC	1.002	2	.501	.589	.560
	Cloze	23.942	2	11.971	2.148	.133
	Recall	193.207	2	96.604	2.236	.123
Error	MC	28.064	33	.850		
	Cloze	183.933	33	5.574		
	Recall	1425.760	33	43.205		
Total	MC	617.000	38			
	Cloze	5770.000	38			
	Recall	7836.000	38			
Corrected total	MC	32.763	37			
	Cloze	249.895	37			
	Recall	2121.368	37			

a. R^2 = .143 (Adjusted R^2 = .040)
b. R^2 = .264 (Adjusted R^2 = .175)
c. R^2 = .328 (Adjusted R^2 = .246)

Furthermore, this result confirms the claim that L2 reading ability is largely related to L2 learners' language proficiency as well as their language knowledge (Alderson, 1984; Clarke, 1980; Cziko, 1980; Jung, 2012; Lee & Schallert, 1997; Taillefer, 1996). That is, the comparative role of vocabulary and grammatical knowledge in L2 reading may be a function of the developmental stage of L2 learners' reading ability (Droop & Verhoeven, 2003; Zhang, 2012). One issue that requires further thorough investigation is how to find convincing evidence of the processing link between syntactic and/or semantic information and storing and retrieving text message in the recall test task.

5. CONCLUSION

The present study explored the relative role of vocabulary and grammar knowledge in L2 reading performance, taking into account the participants' L2 proficiency—high and low—and the three different reading comprehension measures—multiple-choice, cloze, and recall—with 83 college students. The findings of the study are summarized below.

The learners' reading comprehension performance proved to differ across the three reading test measures (Alderson, 2000; Kobayashi, 2002; Lee, 2011), and the two language variables of vocabulary and grammar exerted different influence respectively in L2 reading as measured by the three test techniques. Results of the MANOVA conducted to scrutinize the extent of the contribution of vocabulary and grammar knowledge to L2 reading measured by three different reading test measures showed that the two language variables accounted for variance in learners' L2 reading comprehension as measured by the cloze test technique, with vocabulary knowledge outperforming grammar knowledge. An appropriate level of L2 proficiency may affect successful L2 reading comprehension that specifically requires efficient, simultaneous cognitive and linguistic processing (Alderson, 1984, 2000; Lee & Schallert, 1997; Taillefer, 1996). Therefore, the relative role of vocabulary and grammar in L2 reading is highly likely to hinge upon the types of reading comprehension measures, though thorough exploration is required to ascertain the reading process employed in different reading test measures. This indicates that vocabulary and grammar knowledge deserve continuous and balanced attention in EFL classroom teaching (Zhang, 2012), and that one needs to take into consideration how to measure L2 learners' reading ability accurately and purposefully (Lee, 2011).

Furthermore, the study sheds light on the role of grammar that has been underestimated in L2 reading (Shiotsu & Weir, 2007; Urquhart & Weir, 1998). As mentioned above, grammar knowledge explained a certain proportion of variance in learners' L2 reading test scores, and the role of grammar seems to differ depending upon the type of test techniques. That is, the distinct role of grammar knowledge may be maximized in a reading test that

require "[t]he ability to parse sentences into their correct syntactic structure" to comprehend text message as in the cloze test (Alderson, 2000, p. 37).

Concerning the comparative contribution of the two language variables to L2 reading comprehension according to learners' L2 proficiency, an interesting result was obtained that the contribution was significant exclusively in the recall test, and that it differed depending upon their L2 proficiency. Vocabulary knowledge bore a relationship with L2 reading comprehension in high-level learners, while grammar knowledge explained low-level learners' performance in the reading test. The findings that are divergent from those in previous studies (Brisbois, 1995; Droop & Verhoeven, 2003; Zhang, 2012) reveal that the vocabulary and grammar knowledge bear differing relations to L2 reading performance according to the developmental stage of learners' L2 proficiency, favoring a more significant role of vocabulary knowledge among learners at low-level L2 proficiency.

This discrepancy of the findings could be attributable to potential effects from how L2 reading comprehension is measured. Pedagogically speaking, the findings of the current study imply suggestions for what is to be emphasized in L2 reading instruction specially for those at a particular stage of L2 proficiency so as to appropriately take care of the difficulties they might encounter when performing reading (Shiotsu & Weir, 2007; Zhang, 2012).

The findings of the present study largely suggests that what apparently matters in the issue of the distinctive role of vocabulary and grammar knowledge in L2 reading performance depends not only on which language variable affects more on L2 reading, but on which variable does so under which conditions. Furthermore, it has to be kept in mind that the successful development of reading comprehension ability is most likely to be attributable to other factors such as background knowledge, metacognitive knowledge, reading strategies, knowledge for construction of textual meaning, and the like, as well as the two types of linguistic knowledge (Grabe, 2009a; Jeon & Yamashita, 2014; Koda, 2005; Urquhart & Weir, 1998).

This study has some limitations, such as the learner population, the research design (quantitative only), assessment procedures of L2 reading comprehension including the selection of texts, subskills tested, test formats, and factors not considered in the current study but influential in reading comprehension mentioned above. Nevertheless, it will suffice for the present study to bring attention to the issue of the apparent relative influence of vocabulary and grammar knowledge in L2 reading comprehension depending upon the type of reading comprehension measures.

Lastly, it should be mentioned that all too often the research community assumes readily and anticipate eagerly that a single study is quite able to offer substantial and compelling evidence to the research questions under investigation, which is not the case in most instances. Confirmation of evidence gathered from this study is possible when comparable

studies are conducted with similar research questions and methods, but with different learners (Grabe, 2009b).

REFERENCES

Alderson, J. C. (1984). Reading in a foreign language: A reading problem or a language problem? In J. C. Alderson & A. H. Urquhart (Eds.), *Reading in a foreign language* (pp. 1-27). London: Longman.

Alderson, J. C. (2000). *Assessing reading*. Cambridge: Cambridge University Press.

Alderson, J. C., & Urquhart, A. H. (1988). This test is unfair: I'm not an economist. In P. L. Carrell, J. Devine & D. Eskey (Eds.), *Interactive approaches to second language reading* (pp. 168-182). Cambridge: Cambridge University Press.

Bachman, L. F. (1982). The trait structure of cloze test scores. *TESOL Quarterly, 16*, 61-70.

Bachman, L. F. (1985). Performance on cloze tests with fixed-ratio and rational deletions. *TESOL Quarterly, 19*, 535-556.

Barnett, M. A. (1986). Syntactic and lexical/semantic skills in foreign language reading: Importance and interaction. *The Modern Language Journal, 70*(4), 343-349.

Bernhardt, E. B. (1991). *Reading development in a second language: Theoretical, empirical, and classroom perspectives*. Norwood, NJ: Ablex.

Bernhardt, E. B. (2005). Progress and procrastination in second language reading. *Annual Review of Applied Linguistics, 25*, 133-150.

Brisbois, J. E. (1995). Connections between first- and second-language reading. *Journal of Reading Behavior, 27*, 282-299.

Brown, H. D. (2010). *Language assessment* (2nd ed.). White Plains, NY: Pearson Education.

Chang, Y.-F. (2006). On the use of the immediate recall task as a measure of second language reading comprehension. *Language Testing, 23*(4), 520-543.

Clapham, C. M. (1996). *The development of IEFLTS: A study of the effect of background knowledge on reading comprehension*. Cambridge: Cambridge University Press.

Clarke, M. A. (1980). The short circuit hypothesis of ESL reading—or when language competence interferes with reading performance. *The Modern Language Journal, 64*, 203-209.

Cohen, A. D. (1980). *Testing language ability in the classroom*. Rowley, MA: Newbury House.

Cziko, M. (1980). Language competence and reading strategies: A comparison of first- and second-language oral reading errors. *Language Learning, 30*, 101-116.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*, 78-103.

Fender, M. (2001). A review of L1 and L2/ESL word integration skills and the nature and L2/ESL word integration development involved in lower-level text processing. *Language Learning, 51*, 319-396.

Grabe, W. (2009a). *Reading in a second language: Moving from theory to practice*. New York: Cambridge University Press.

Grabe, W. (2009b). Epilogues: Reflections on second language reading research and instruction. In Z.-H. Han & N. J. Anderson (Eds.), *Second language reading research and instruction: Crossing the boundaries* (pp. 192-205). Ann Arbor, MI: University of Michigan Press.

Hale, G. A. (1988). Student major field and text content: Interactive effects on reading comprehension in the Test of English as a Foreign Language. *Language Testing, 5*(1), 49-61.

Hughes, A. (2003). *Testing for language teachers* (2nd ed.). Cambridge: Cambridge University Press.

Jeon, E. H., & Yamashita, J. (2014). L2 reading comprehension and its correlates: A meta analysis. *Language Learning, 64*(1), 160-212.

Johnson, R. (1970). Recall of prose as a function of the structural importance of linguistic units. *Journal of Verbal Learning and Verbal Behavior, 9*, 12-20.

Jonz, J. (1990). Another turn in the conversation: What does cloze measure? *TESOL Quarterly, 24*, 61-83.

Jonz, J. (1991). Cloze items types and second language comprehension. *Language Testing, 8*, 1-22.

Jung, J. (2012). Relative roles of grammar and vocabulary in different L2 reading tasks. *English Teaching, 67*(1), 57-77.

Kim, J., & Cho, Y. (2015). Proficiency effects on relative roles of vocabulary and grammar knowledge in second language reading. *English Teaching, 70*(1), 75-96.

Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge: Cambridge University Press.

Kobayashi, M. (2002). Method effects on reading comprehension test performance: Text organization and response format. *Language Testing, 19*(2), 193-220.

Koda, K. (2005). *Insights into second language reading: A cross-linguistic approach*. Cambridge: Cambridge University Press.

Lee, J.-W. (2011). A comparison of constructed response formats as measures of EFL reading comprehension. *English Teaching, 66*(2), 151-169.

Lee, J.-W., & Schallert, D. L. (1997). The relative contribution of L2 language proficiency and L1 reading ability to L2 reading performance: A test of the threshold

hypothesis in an EFL context. *TESOL Quarterly, 31*(4), 713-739.

Munby, J. (1968). *Read and think*. Harlow: Longman.

Nassaji, H. (2003). Higher-level and lower-level processing skills in advanced ESL reading comprehension. *The Modern Language Journal, 87*(2), 261-276.

Nation, P. (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.

Nunan, D. (1985). Content familiarity and the perception of textual relationships in second language reading. *RELC Journal, 16*, 43-51.

Perfetti, C., & Britt, M. (1995). Where do propositions come from? In C. Weaver, S. Mannes & C. Fletcher (Eds.), *Discourse comprehension: Essays in honor of Walter Kintsch* (pp. 11-34). Hillsdale, NJ: Lawrence Erlbaum.

Riley, G., & Lee, J. F. (1996). A comparison of recall and summary protocols as measures of second language reading comprehension. *Language Testing, 13*, 173-189.

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Basingstoke: Palgrave Macmillan.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behavior of two new versions of the Vocabulary Levels Test. *Language Testing, 18*, 55-88.

Shin, Y., & Kim, Y. (2012). Assessing the relative roles of vocabulary and syntactic knowledge in reading comprehension. *Korean Journal of Applied Linguistics, 28*(2), 169-198.

Shiotsu, T. (2010). *Components of L2 reading: Linguistic and processing factors in the reading test performances of Japanese EFL learners*. Cambridge: Cambridge University Press.

Shiotsu, T., & Weir, C. J. (2007). The relative significance of syntactic knowledge and vocabulary breadth in the prediction of reading comprehension test performance. *Language Testing, 24*, 99-128.

Shohamy, E. (1984). Does the testing method make a difference?: The case of reading comprehension. *Language Testing, 1*(2), 147-170.

Taillefer, G. E. (1996). L2 reading ability: Further insight into the short-circuit hypothesis. *The Modern Language Journal, 80*, 461-477.

Ulijn, J. M. (1984). Reading for professional purposes: Psycholinguistic evidence in a cross-linguistic perspective. In A. K. Pugh & J. M. Ulijn (Eds.), *Reading for professional purposes: Studies in native and foreign languages* (pp. 66-81). London: Heinemann.

Urquhart, A. H., & Weir, C. J. (1998). *Reading in a second language: Process, product, and practice*. New York: Longman.

van Gelderen, A., Schoonen, R., Glopper, K. D., Hulstijn, J., Simis, A., Snellings, P., & Stevenson, M. (2004). Linguistic knowledge, processing speed, and metacognitive

knowledge in first- and second-language reading comprehension: A component analysis. *Journal of Educational Psychology, 96*, 19-30.

Wolf, D. F. (1993). A comparison of assessment tasks used to measure FL reading comprehension. *The Modern Language Journal, 77*, 473-489.

Yamashita, J. (2002). Mutual compensation between L1 reading ability and L2 language proficiency in L2 reading. *Journal of Research in Reading, 25*(1), 81-95.

Zhang, D. (2012). Vocabulary and grammar knowledge in second language reading comprehension: A structural equation modeling study. *The Modern Language Journal, 96*(3), 558-575.

Zukowski/Faust, J. (2002). *Steps to academic reading 2: Out of the ordinary*. Canada: Thomson Learning.

Applicable levels: Tertiary

Jeong-Won Lee
Department of English Education
College of Education, Chungnam National University
99 Daehangno, Yuseong-gu
Daejeon 305-764, Korea
Phone: 042-821-5333
Email: jeongwon@cnu.ac.kr

Received on June 1, 2016
Reviewed on July 15, 2016
Revised version received on August 15, 2016