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Dissertation for the Degree of Doctor of Philosophy

Relative Roles of Vocabulary and Grammar in Second Language Reading

by

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Department of English Language and Literature

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Pukyong National University

February 2015

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Relative Roles of Vocabulary and Grammar in Second Language Reading
(단어 지식과 문법 지식이 독해에 미치는 영향)

Advisor: Prof. Yunkyoung Cho

by

Jeesoo Kim

A thesis submitted in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

in Department of English Language and Literature, The Graduate School,

Pukyong National University

February 2015

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Relative Roles of Vocabulary and Grammar in Second Language Reading

A dissertation

by

Jeesoo Kim

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단어 지식과 문법 지식이 독해에 미치는 영향

김지수

부경대학교 대학원 영어영문학과

요약

본 연구는 단어 지식과 문법 지식이 한국 고등학생의 영문 독해에 미치는 영향을 알아보는데 목적이 있다. 독해에서 단어 지식과 문법 지식의 영향은 당연하게 여겨지나, 이 두 요인을 함께 조사한 연구는 드물며 조사를 한 경우에도 각 지식의 상대적인 중요도에 대한 결과는 상이하다. 특히, 독해 능숙도의 영향은 상, 하 집단에서만 관찰되었을 뿐, 보다 일반적인 형태인 상, 중, 하 집단의 영향은 조사되지 않았다. 이에 본 연구는 다음과 같은 두 가지 연구 과제를 설정하여 답을 얻고자 하였다. 첫째, 단어 지식과 문법 지식이 한국 고등학생의 영문 독해에 전반적인 영향을 미치는가? 만일 그렇다면 각 지식의 고유한 기여도는 어느 정도 인가? 둘째, 학생들의 영문 독해 수준을 상중하로 나누었을 때 단어 지식과 문법 지식의 상대적 영향은 상이한가? 만일 그렇다면 그 차이는 어느 정도인가?

총 227명의 한국 고등학교 2학년 학생들이 이 연구에 참가하였으며, 단어 지식은 총 150 문항의 한국어판 Vocabulary Levels Test (단어 수준 시험), 문법 지식은 총 50 문항의 사지선다형 시험, 독해 지식은 두개의 서술문과 두개의 설명문으로 이루어진 총 20 문항의 사지선다형 시험으로 측정하였다. 자료분석은 SPSS(Version 21)를 사용하여 상관분석, 회귀분석, 일원배치분산분석을 실시하였다.

연구 결과는 (1) 모든 학생을 한 집단으로 분석하였을 때 단어 지식과 문법 지식은 모두 영문 독해에 긍정적인 영향을 미치는 것으로 나타났으며, 이 두 지식은 독해력의 38%를 설명하는 것으로 밝혀졌다. 또한 단어와 문법은 영문 독해에 대해 각기 6%와 5%의 설명력을 보이는 것으로 드러났다. 독해력을 바탕으로 구분된 상, 중, 하 집단은 단어 지식과 문법 지식에서도 유의미한 차이를 보였다. 하지만 이 두 지식의 독해에 대한 설명력은 상, 중 집단에만 국한되었으며, 하 집단에서는 유의미한 설명력을 보이지 않았다. 또한 상 집단에서는 문법만이 독해에 대한 설명력(21%)을 가졌고 중 집단에서는 단어만이 설명력(14%)을 보였다. 이로써 단어 지식과 문법 지식이 독해에 미치는 상대적인 영향은 독해자의 이해도를 고려하지 않았을 때는 비슷한 수준이나 독해 수준을 상중하로 나눴을 때는 상이하다는 결과

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를 보여주었다.

이에 본 연구자는 제 2 언어 독해 이론에서 단어 지식과 문법 지식이 구분되어져야하며 독해 발달 모형에 독해 수준별 두 지식의 상이한 중요도가 반영되어야 함을 제안하고자 한다. 또한 교육 현장에서도 능숙한 독해자에게는 문법실력 향상에, 보통 수준의 독해자에게는 단어 확장에 초점이 맞추어져야 한다는 것을 제안한다. 독해력이 낮은 학습자는 단어 지식과 문법 지식보다 더 기초적 지식이 필요한 것으로 보인다. 하지만 독해 수준에 따라 상이한 단어 지식과 문법 지식의 역할에 대한 이해도를 높이기 위해서는 학자들의 많은 연구 참여가 필요하며, 또한 정확한 수준 파악을 위해 표준화 시험의 적용이 요구되는 바이다.

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Relative Roles of Vocabulary and Grammar in Second Language Reading

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Abstract

The purpose of this study was to investigate the relative contribution of vocabulary and grammar knowledge to L2 reading comprehension of Korean high school EFL learners, taking three levels of L2 proficiency into account. The significance of having adequate vocabulary and grammar knowledge in order to comprehend L2 texts is taken much for granted. However, few studies have examined the relative importance of each type of knowledge, and the findings vary. Moreover, the effect of L2 proficiency has yet to be explored in depth, and when studied, it has been examined in a dichotomous manner.

227 Korean EFL students from a high school participated in the present study. Their knowledge of English vocabulary and grammar, and their comprehension of English texts were measured using the following tests: the 150-item Korean version of the Vocabulary Levels Test, a 50-item multiple-choice grammar test, and a 20-item multiple-choice reading comprehension test. The grammar test consisted of a cloze task and an error detection task. The reading comprehension test was made up of two narrative and two expository texts, followed by five questions for each text. The subjects were divided into three sub-groups of L2 reading ability in order to examine

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L2 reading proficiency effects. Thus, the data were analyzed as a whole group as well as sub-groups.

The results of the statistical analyses showed mixed findings. In general, both vocabulary knowledge and grammar knowledge were significantly related to L2 reading comprehension, and compared to grammar knowledge, vocabulary knowledge was found to be relatively superior to grammar knowledge in accounting for L2 reading variance. However, the roles of vocabulary and grammar knowledge in L2 reading were not unanimous among the sub-groups. The results of the ANOVA analyses demonstrated that as the students reading levels increased, so did their levels of vocabulary and grammar knowledge. Nonetheless, multiple regression analyses for the sub-group portrayed distinctive relationships among the three variables. While it was only grammar knowledge that had a predictive power of reading performance in the advanced reading group, it was only vocabulary to have the same quality in the intermediate reading group. For the low reading group, neither vocabulary nor grammar could significantly account for the L2 reading variance.

The findings of the present study have implications for L2 reading theories and pedagogy. First, it is suggested that a distinction should be made between vocabulary and grammar in L2 reading theories. Second, from a pedagogical view point, both vocabulary and grammar should be emphasized in L2 reading instruction, but more attention should be paid to grammar for advanced readers and to vocabulary for intermediate readers. Low-level L2 readers seem to be in need of acquiring more basic skills other than vocabulary and grammar in order to comprehend an L2 text. Finally, in order to achieve a general understanding of the relative roles of vocabulary and grammar among readers of different L2 reading proficiency, more research is called for, and the adoption of standardized testing instruments would enhance research comparability.

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Ⅰ. INTRODUCTION

1.1 Rationale for the Study

As important as it is to achieve fluency and accuracy in reading[1] for language learners, most second language[2] learners struggle to do so. Educators and researchers of second language reading alike have been investigating ways of facilitating reading comprehension. However, the answer is unclear and complicated, largely due to the multifaceted nature of reading itself.

L2 reading research has largely been influenced by that of L1. In the 1970s and 1980s, adopting the reading universal hypothesis of L1 reading researcher Goodman (1967), which emphasized the role of a reader as a meaning constructor not a decoder, many L2 reading researchers devoted themselves to finding out whether or how L1 literacy skills contribute to L2 reading (e.g., Clarke, 1979, 1980; Coady, 1979; Cummins, 1979, 1980; Gollasch, 1980). For example, Alderson (1984) raised the question of whether L2 reading is a reading problem or a language problem. Taking their cue from him, numerous

1) In this study, 'reading' refers to general understanding of a passage.
2) The terms 'second language' and 'foreign language' are used interchangeably unless otherwise specified in this study. The abbreviation of 'L2' refers to a learner's second or foreign language, while 'L1' refers to a learner's first language, in most cases the learner's mother tongue. Since this study is concerned with English learners in Korea, the 'second language' typically represents English.

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L2 reading researchers launched investigations on the issue, and provided substantial evidence for the critical role of language knowledge in L2 reading (e.g., Alderson, 2000; Bernhardt, 2005; Bernhardt & Kamil, 1995; Bossers, 1991; Lee & Schallert, 1997; Taillefer, 1996; Yamashita, 2002). Nevertheless, the operational definitions of L2 knowledge used in the studies differed widely mostly because, like reading, language is a multifaceted construct.

As more research was being conducted in the field of reading comprehension, there was a need to examine the construct of L2 reading in a more systematic way, and a component-skills approach emerged (Haynes & Carr, 1990). This approach regards reading as consisting of multiple cognitive processes and involving various sub-skills (Jeon & Yamashita, 2014). Adopting the approach, researchers examined the components of language knowledge in relation to L2 reading, and it was revealed that vocabulary[3] and grammar[4] were two of the most essential types of language knowledge required for proper L2 reading comprehension (Alderson, 1984; Barnett, 1986; Brisbois, 1995; Nassaji, 2003; Yamashita, 2002). This is reflected in the L2 reading models of Bernhardt (1991, 2000, 2005, 2011), Birch (2007) and Khalifa and Weir (2009).

However, the roles of vocabulary and grammar knowledge[5] in L2 reading are as yet inconclusive since few L2 reading studies incorporated both

3) 'Vocabulary', 'vocabulary knowledge', and 'lexical knowledge' are used interchangeably, and they represent the breadth of vocabulary in this study. Exceptions are specified.

4) 'Grammar', 'grammatical knowledge', 'syntax', and 'syntactic knowledge' are used interchangeably in this study to mean the syntactic knowledge, i.e., the knowledge of how sentences are structured.

5) In the present study 'vocabulary and grammar knowledge' refers to vocabulary knowledge and grammar knowledge as two separate constructs. The expression is used in the interest of conciseness.

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vocabulary and grammar as individual independent variables. Some studies have used the composite score of vocabulary and grammar tests as a language measure (e.g., Lee & Schallert, 1997; Taillefer, 1996; Yamashita, 2002), while other studies have focused on only one of them (e.g., Alavi & Akbarian, 2012; Barry & Lazarte, 1995, 1998; Berman, 1984; Droop & Verhoeven, 2003; Gascoigne, 2005; Hu & Nation, 2000; Kelly, 1990; Laufer & Ravenhorst-Kalovski, 2010; Laufer & Sim, 1985; Lefrançoise & Armand, 2003; Nassaji, 2003; Uljin & Strother, 1990; Verhoeven, 2000).

Even among the studies that investigated the roles of both vocabulary and grammar, the findings were not congruent. While Brisbois (1995), Chen (2009), Guo (2008), Nassaji (2003), and Zhang (2012) found vocabulary more important than grammar in L2 reading, Jeon (2012), Shin and Kim (2012), Shiotsu (2010), Shiotsu and Weir (2007), and van Gelderen et al. (2004), and Zhang (2012) found the opposite. Possible explanations for such discrepancy might be due to differing sample sizes, ages of the participants, L1-L2 distance, L2 use environment, methods of analyses, operational definitions of the variables, or L2 proficiency.

The present study sought to extend the scope of L2 reading comprehension research in relation to L2 vocabulary and grammar knowledge by taking the following issues into account. First, care was taken in the present study to enhance the validity of testing instruments in order to interpret the findings with more certainty. It was found that the reading comprehension test of Guo (2008) contained many word-specific questions, akin to a vocabulary test. Shin and Kim (2012) obscured the distinction between a grammar test and a vocabulary test by using unfamiliar and non-sensical words in their grammar

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test, burdening their subjects with vocabulary problems. Brisbois (1995) altered the vocabulary test to a reading test by asking her subjects to translate the words that were underlined in the L2 passage. This task is problematic especially for the lower-level subjects since those words were never introduced in the lower-level classes, unlike in the upper-level classes. Therefore, the lower-level subjects had to rely on their inferencing skills only in order to perform the translation task. These careless overlaps in measuring the proficiency of the target constructs, vocabulary knowledge and reading comprehension, hampered the credibility of the results. Incorporating finer tools in measuring each construct is thus critical in the present study.

Second, the present study attempted to examine whether the respective roles of vocabulary and grammar knowledge in L2 reading differ in three levels of learners' L2 reading proficiency. Previous studies have investigated the roles of vocabulary and grammar in two reading ability levels (e.g., Brisbois, 1995; Guo, 2008; Nassaji, 2003; Shiotsu, 2010; Shiotsu & Weir, 2007). However, when normal distribution of L2 learners' proficiency levels is assumed, it is more realistic to divide the subjects in three ability groups not two, as the number of intermediate level L2 readers should exceed advanced- or low-level learners. Furthermore, the findings of the study would have more relevant pedagogical implications in a general school setting with diverse L2 reading abilities.

Finally, by investigating the L2 reading of adolescents, the present study sought to expand the diversity of the subjects in a field where, traditionally, adult subjects have predominated. Moreover, since the subjects attend a public high school, they arguably represent a broader spectrum of L2 readers of

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varying abilities than the college students examined in many studies. Therefore, the findings of the present study provide not only theoretical but also pedagogical insights into general L2 reading.

1.2 Research Questions

The present study was embarked on in order to gain a better understanding of the relative roles of vocabulary and grammar in the English reading proficiency of Korean high school students. Since their L2 reading abilities were expected to vary considerably, it was deemed essential to divide the students into reading ability groups and investigate the roles of vocabulary and grammar within each group. Thus the following research questions are formulated:

1) Do vocabulary knowledge and grammar knowledge have any effect on the L2 reading comprehension of Korean high school students as a single group? If so, what is the unique contribution of each knowledge to L2 reading?
2) What is the relative contribution of vocabulary knowledge and grammar knowledge to the English reading comprehension levels of Korean high school students?

1.3 Limitations of the Study

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The present study is limited in a few aspects. First, the number of the participants could have been grater, especially for the analyses of sub-groups. It is recommended that future studies involve a larger number of subjects.

Second, only one type of measurement instruments is used. Thus, there might be a test method effect involved in the results of the study, especially regarding the reading comprehension measure. Multiple-choice questions can disturb the natural process of reading and can be answered without necessarily reading the text. Further research incorporating various types of measurement would add more insight into the roles of vocabulary and grammar in L2 reading.

Finally, since the participants in the present study were all English learners and were students from one high school[6], it is difficult to determine whether the findings from this study can be generalized to other English learners not only inside but also outside of South Korea. Examining the L2 reading of learners from many Korean schools as well as cross-cultural studies would help gain an insight into the roles of vocabulary and grammar in L2 reading.

1.4 Outline of the Study

The subsequent chapters of this dissertation are organized as follows. In Chapter 2, components of L2 reading are examined by drawing on the theories and empirical research in the field. In Chapter 3, a pilot study conducted prior

6) The schools participating in the pilot study and the main study are different, but are located in the same city.

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to the main study is described. In particular, the processes of developing measurement instruments as well as the bases of statistical analyses are detailed. Chapter 4 delineates the methodology used in the present study, including the data collection procedure, scoring, and data analyses. In Chapter 5, the results of statistical analyses are presented and discussed in relation to relevant research. Chapter 6 summarizes the research findings and discusses the pedagogical and theoretical implications of the findings.

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Ⅱ. LITERATURE REVIEW

In an effort to understand the construct of L2 reading, and to elicit critical components of it, this chapter starts by probing the related literature in the late 1960s and early 1970s, when the study of L2 reading started to bloom. It then goes on to cover the later literature. The chapter is divided into six sections. First, one of the earliest psycholinguistic views of L1 reading and how it influenced L2 reading theories are illustrated. Second, the components of L2 reading are described. Third, the components of language knowledge required for adequate L2 reading are examined, and two kinds of essential language knowledge, vocabulary and grammar, are drawn. Fourth, the relation between L2 vocabulary knowledge and L2 reading is examined. Fifth, the role of L2 grammar in L2 reading is examined. Finally, the L2 reading studies incorporating both vocabulary and grammar as separate independent variables are summarized.

2.1. Unitary View of L2 Reading

Relying heavily on L1 reading research, L2 reading researchers followed the models of L1 reading in explaining L2 reading. They came up with different reading models of and approaches to L2 reading according to their perspectives on reading. One of the most influential views of reading in both L1 and L2 is that of Kenneth Goodman.

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In the late 1960s, to caution the then prevalent tendency of reducing English L1 reading to decoding, the widespread emphasis of phonic-centered and word centered approaches of reading in educational settings, Goodman (1967) claimed a reader employs not only graphic input but also syntactic and semantic information when reading. He defined reading as follows:

> Reading is a selective process. It involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectation. As this partial information is processed, tentative decisions are made to be confirmed, rejected or refined as reading progresses. (pp. 126-127)

Underscoring the interaction between a reader and a text, he stated that reading is "a psycholinguistic guessing game" (p. 126). According to him, a reader uses graphic, syntactic, and semantic cues in order to construct meaning from the written language, and the reading processes are cycles of sampling, predicting, testing, and confirming (Goodman, 1970). He assumed that the reading process is universal regardless of language, and demonstrated this through a study in which the processes of English reading of four groups of children with different English dialects and four groups of ESL children with different first languages were investigated (Goodman & Goodman, 1978).

Even though Goodman's reading model includes a bottom-up process by saying, "The reader scans along a line of print from left to right and down the page, line by line" (Goodman, 1967, p. 134), his model is largely interpreted as a top-down approach in sync with that of Smith (1971) by other

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researchers (Alderson, 2000; Stanovich, 1980). However, Goodman (1982) himself denied the label and claimed that it is rather an interactive model. Unlike a bottom-up approach that assumes decoding a text itself is primary in meaning construction, a top-down approach presumes that a reader approaches a text with certain conceptualizations and then comes down to the textual level to construct meaning (Hudson, 2007). It emphasizes the role of a reader as an active constructor of text meaning using his/her pre-existing knowledge, including content, cultural, and context knowledge (Saville-Troike, 2006).

When the approach is applied in L2 reading, L1 literacy fits perfectly as upper level knowledge. Since a reader can compensate his/her lack of linguistic knowledge to some extent in comprehending text with non-linguistic knowledge (Alderson, 2000), L1 literacy becomes a prominent factor in L2 reading, conforming to the approach. As a matter of fact, Goodman and Goodman (1978) report that a bilingual's L1 literacy will facilitate his/her development of L2 literacy.

The importance of L1 literacy skill in L2 reading does not come from top-down processing reading models alone. Cummins (1979, 1980, 1991) asserted the role of L1 in his interdependence hypothesis. Through the examination of numerous bilingual studies, Cummins (1979) proposed in his developmental interdependence hypothesis that "the level of L2 competence which a bilingual child attains is partially a function of the type of competence the child has developed in L1 at the time when intensive exposure to L2 begins" (p. 233).

Both Goodman and Cummins acknowledged the role of L1 literacy in developing L2 literacy, but they had disparate attitudes toward the time when

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L1 literacy functions over the course of L2 literacy development. While Goodman assumed that L1 literacy skills operated from the very beginning stage of L2 reading, Cummins envisioned that they come into effect when L2 readers gain a certain level of L2 competence. According to Cummins' threshold hypothesis, which is concerned with "the cognitive and academic consequences of different patterns of bilingual skills" (Cummins, 1979, p. 227), bilingual children are characterized by one of two language thresholds, lower and higher ones, beyond which they become competent in both languages. The lower threshold is hypothesized as low levels of competence in both languages, resulting in negative cognitive and academic effects. According to him, bilinguals at a lower threshold have not acquired adequate literacy skills in any language, and without these skills their cognitive growth would be hindered.

Similarly, Clarke (1978, 1979, 1980) found that good L1 readers were also good L2 readers based on his study of adult Spanish ESL subjects. Moreover, they were more sensitive to semantics rather than syntax. However, the good reader effect was not as large when subjects were reading in their L2 compared to when subjects were reading in their L1. The findings led him to consider the presence of a "language competence ceiling" and to formulate his short circuit hypothesis. He explained the hypothesis as following:

> [limited] control over the language "short circuits" the good reader's system, causing him to revert to "poor reader strategies" when confronted with a difficult or confusing task in the second language. (Clarke, 1979, p. 138; quotation marks in the original).

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Based on this hypothesis, he asserted that ESL educators must emphasize not only the 'psycho', but also the 'linguistic' in L2 reading (Clarke, 1979, 1980).

Acknowledging the existence of a linguistic threshold or not, Goodman, Cummins, and Clarke have two things in common. First, they consider the fundamental reading process is the same regardless of one's L1 and L2. More specifically, both Cummins and Clarke accommodate Goodman's psycholinguistic model of reading, and develop their hypotheses based on it. Second, they presume that L1 transfer results in positive effects only. This is owing to their conception of the reading universals and their view of reading as "a single unitary construct" (Koda, 2007, p. 29). Upon the premise of the reading universals, there is no need for them to consider any negative outcome of L1 transfer. Moreover, under the unitary view of reading, unlike the componential view, reading cannot be broken down into underlying skill components. Therefore, the unitary view of reading blocks any prospect of transferability of sub-skills and individual sub-skill contribution to L2 development (Koda, 2007).

2.2 Components of L2 Reading

There are few second language reading models, and not a single model is scientifically proven and accepted by L2 researchers. The reasons for this can be attributed to the complex nature of reading itself, diverse contexts of second language reading, and the relatively short history of second language reading study. Although details differ in some extent, second language reading

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models (e.g., Bernhardt, 1991, 2000, 2005, 2011; Birch 2007; Coady, 1979; Khalifa & Weir, 2009; Yorio, 1971) consist of linguistic components, metacognitive components, and world and topic knowledge, all three of which can be interpreted as fundamental to successful reading comprehension. In fact, many L2 reading researchers have studied the effects of these components on second language reading comprehension.

As Alderson (1984) aptly put it, the predicament of second language reading has been conjectured to result from either a reading problem or a language problem. In a similar context, there has been a controversy in viewing second language reading of which comprehension lies either in L1 literacy or in adequate L2 linguistic knowledge. At the same time, many researchers have investigated if L2 proficiency is a mediating variable in second language reading, establishing a threshold level above which L1 literacy plays a critical role.

Clarke (1979), Carrell (1991), Bossers (1991), Bernhardt and Kamil (1995), Taillefer (1996), Lee and Schallert (1997), Yamashita (2002), Asfaha, Beckman, Kurvers and Kroon (2009), and Jiang (2011) all examined the relationships between L1 literacy, L2 literacy and L2 proficiency, and came to the same general conclusion that both L1 literacy ability and L2 language proficiency are significant in L2 reading comprehension, and that L2 language competence is relatively more important than L1 reading ability. This is noteworthy since the conclusions are drawn from studies that comprise both cognate and non-cognate languages; varying levels of proficiency in the target language; diverse age groups consisting of children, adolescents, and adults; various testing methods; and different language learning contexts (i.e., ESL and

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EFL contexts).

Eskey (1988) asserted that "language is a major problem in second language reading, and that even educated guessing of meaning is no substitute for accurate decoding" (p. 97). From a more practical viewpoint, it seems more reasonable to focus on the language aspects in a foreign language class because it is usually the only time for students to be exposed to the target language and to gain the language specific knowledge. Universal aspects of reading can be covered in an L1 language class, although they should be reviewed in an L2 reading class also.

2.3 Components of Language Knowledge in L2 Reading

With the importance of L2 proficiency in L2 reading empirically proven, the next question naturally is how to define language proficiency. Like reading, the construct of language proficiency is complicated. *Merriam-Webster's Collegiate Dictionary* (2003) defines 'language' as "a systematic means of communicating ideas or feelings by the use of conventionalized signs, sounds, gestures, or marks having understood meanings" (p. 699). Emphasizing its three faces, Finegan (1989) provided a more structured definition of 'language' as follows:

> All language users must distinguish among expression, content, and context of use. **Expression** refers to the words, phrases, and sentences. **Content** refers to the meaning of the words, phrases, and

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sentences. **Context** refers to the social situations in which words, phrases, and sentences are uttered. The code that links content and expression is *grammar*. The system that links grammar and interpretation is *grammar in use*, and grammar in use is *language*. Without attention to grammar and context, no one can adequately understand language and how it functions. (p. 5; bold types and italics in the original)

Consolidating a number of definitions, Brown (2007, p. 6) presented the following eight statements regarding the term 'language'.

1. Language is systematic.
2. Language is a set of arbitrary symbols.
3. Those symbols are primarily vocal, but may also be visual.
4. The symbols have conventionalized meanings to which they refer.
5. Language is used for communication.
6. Language operates in a speech community or culture.
7. Language is essentially human, although possibly not limited to humans.
8. Language is acquired by all people in much the same way; language and language learning both have universal characteristics. (p. 6)

As to language proficiency, Hymes (1972) distinguished linguistic competence from communicative competence. Canale and Swain (1980) identified four subcategories of communicative competence: linguistic, discourse,

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sociolinguistic, and strategic competence. Bachman (1990) suggested three components in communicative language ability: language competence, strategic competence and psycholinguistic mechanisms. While complicated as it is, it should also be defined in terms of the four distinctive skills of listening, speaking, reading, and writing. Thus, language proficiency may refer to competence in each skill.

In second language reading models, vocabulary and grammar knowledge account for the critical language knowledge in L2 reading, aside from phonological and orthographic knowledge. Phonological and orthographic knowledge is the basis of recoding, a prerequisite for reading for meaning (Birch, 2007). According to Goodman (1967), recoding differs from decoding because, unlike decoding, recoding does not involve understanding meaning. According to him, readers recode a written text by matching coded graphic input with phonological rules, and those with no knowledge of the language can learn how to recode a written text without understanding the meaning of it. Eskey (1973) argued that excluding the basic reading skill of simple word identification, that is, matching phoneme and grapheme, two reading skills remain: language knowledge and "the ability to follow a given line of argument" (p. 174), which is a culture bound skill. According to him, the former comprises of vocabulary and syntax, and the latter comprises of rhetorics and concepts.

Similar assumptions can be found in other studies. Hoover and Gough (1990) advocated a simple view of reading consisting of two components: decoding and linguistic comprehension. In their simple view, decoding is defined as "[the] ability to rapidly derive a representation from printed input

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that allows access to the appropriate entry in the mental lexicon, and thus, the retrieval of semantic information at the word level" (p. 130), whereas linguistic comprehension refers to "[the] ability to take lexical information (i.e., semantic information at the word level) and derive sentence and discourse interpretations" (p. 131). They contend that the same linguistic competence is involved in reading as in listening, but reading responds to graphic signals rather than acoustic ones. Their simple view of reading is expressed in the following formula:

R (reading) = D (decoding) × L (linguistic comprehension).

From their definition of decoding and linguistic comprehension, a conclusion can be drawn that decoding involves recoding and vocabulary, and linguistic comprehension involves grammar. Therefore, except for recoding, a non-meaning related skill, vocabulary and grammar constitute major parts of language knowledge.

Separability of recoding and meaning-related language knowledge can also be evidenced in the Universal Grammar of Reading proposed by Perfetti (2003). He emphasized the universal aspect of reading that is "writing systems encode spoken language" (p. 3). He explained the Universal Grammar of Reading with three propositions that concern the definition of reading, language, and writing system, respectively. The propositions are as follows (p. 4).

(1) Reading: Writing System → Language

(2) Language → Grammar + Phonology + Pragmatics

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Grammar → Syntax + Morphology

Morphology → Lexical Roots + Inflections

Lexical Roots → Syntactic Categories + Meaning

(3) Writing System → Mapping Principles + Orthography

Mapping Principles → Graphic Units + Language Levels

Orthography → Mapping Details

Proposition 1 describes that "[reading] is jointly defined by a language and by the writing system that encodes the language" (p. 4). Proposition 2 expresses language as an abstract system. Of all the components of language, Perfetti counts phonology and grammar as two most important ones in reading. Proposition 3 asserts that "writing systems can be understood at two levels, a higher level of mapping principles and a lower level of spelling or orthographic constraints" (p. 4). There seems to be a conflict in isolating phonology from language in his propositions to explain recoding. However, his description of the writing system is not in line with recoding as it lacks a phonetic system necessary for recoding. Therefore, phonology and orthography can be tied as essential components of recoding. When those and the other components of the writing system are removed from the Universal Grammar of Reading, only language components remain, and they can be generally expressed as vocabulary and grammar knowledge.

The operational definitions of L2 proficiency vary from study to study. In the empirical studies, as an indicator of the subjects' target language proficiency, Clarke (1979), Carrell (1991), and Bernhardt and Kamil (1995) referred to the class placement; Asfaha, Beckman, Kurvers and Kroon (2009),

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the end-of-semester grades; Jiang (2011), the scores of a comprehensive English test that covered listening comprehension, grammar and vocabulary, cloze, and reading comprehension; and Bossers (1991), Taillefer (1996)[7], Lee and Schallert (1997), and Yamashita (2002), a composite score of grammar and vocabulary tests. Although the measures adopted for L2 proficiency in the previous studies were seemingly arbitrary, vocabulary and grammar stand as the core elements of language knowledge. Wilkins (1972) expressed the importance of having both elements for communication: "Without grammar very little can be conveyed, without vocabulary nothing can be conveyed" (p. 111).

2.4 Significance of Vocabulary in L2 Reading

Defining a word and explaining what it means to know a word are challenging tasks (Read, 2000). Words can be divided into function words and content words depending on their retention of meaning in isolation. Words also have base and inflected forms as well as derivational forms. When word forms share a common meaning, they become part of a word family, but the distinction is not quite clear. Further complications in defining a word are the existence of homographs and lexical phrases. In regard to knowing a word, Nation (2001) provided a comprehensive specification, as shown in Table 1.

7) Taillefer (1996) also added the score of a cloze test to the vocabulary and grammar test scores. She argued that the addition of cloze test was justifiable since her subjects were not familiar with the format of TOEFL where the vocabulary and grammar tests were derived.

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TABLE 1. Features Involved in Vocabulary Knowledge by Nation (2001, p. 27)

Form	spoken	R	What does the word sound like?
		P	How is the word pronounced?
	written	R	What does the word look like?
		P	How is the word written and spelled?
	word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express the meaning?
Meaning	form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	concept and referents	R	What is included in the concept?
		P	What items can the concept refer to?
	associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	constraints on use (register, frequency ...)	R	Where, when, and how often would we expect to meet this word?
		P	Where, when, and how often can we use this word?

The importance of vocabulary in L2 reading is almost commonsensical. Nevertheless, many researchers have tried to prove it empirically. Regarding the weight of vocabulary knowledge in reading, Laufer (1997) states that "No text comprehension is possible, either in one's native language or in a foreign language, without understanding the text's vocabulary" (p. 20). The results of

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a considerable number of L2 reading studies have corroborated her contention (e.g., Alavi & Akbarian, 2012; Droop & Verhoeven, 2003; Hu & Nation, 2000; Kelly, 1987; Laufer, 2010; Laufer & Sim, 1985; Nassaji, 2003; Verhoeven, 2000).

Laufer and Sim (1985) sought to measure the threshold of L2 reading competence for academic texts among EFL students, and the interviews with the students revealed that they primarily relied on the words, followed by background knowledge, and syntax, which was of the least concern for them in interpreting texts. Kelly (1990) contended that understanding a written text is not quite possible without having clear knowledge of vocabulary, and guessing of a word meaning is no substitute for it. This finding is significant because he examined guessing of word meaning using the knowledge of word forms as well as contexts.

Verhoeven (2000) reported that vocabulary knowledge is more important in L2 reading comprehension than in L1 reading comprehension after examining primary school students in the Netherlands. The students' receptive vocabulary knowledge, measured by having them choose a picture among four cards that matched the oral representation, was a predictor variable for reading at .63 in his LISREL multivariate component analysis. In their longitudinal study with third- and fourth- grade children for whom Dutch was a first or second language in the Netherlands, Droop and Verhoeven (2003) also showed a strong causal effect of vocabulary knowledge on reading comprehension.

Correlation-based evidences regarding the significance of vocabulary in L2 reading can be found in many studies. Hazenberg and Hulstin (1996) explored the relationship between vocabulary knowledge and reading comprehension of

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university level materials in Dutch as a second language. They found that all the students whose vocabulary was above a certain level passed the reading test. The Pearson correlation between the vocabulary and reading comprehension scores was .63. Laufer (1992) explored the relationship of L2 vocabulary size, general academic ability and L2 reading comprehension among 64 EFL university students. Overall, the correlation between the L2 vocabulary size and L2 reading comprehension was .51 while a lower correlation of .39 was found between general academic ability and L2 reading comprehension.

Correlational studies using the reading comprehension section of the TOEFL also corroborated the significant role of vocabulary in reading comprehension. Qian (1999) investigated the relationships between the breadth of vocabulary knowledge and the reading comprehension, and the depth of vocabulary knowledge and the reading comprehension of 74 adult ESL students whose vocabulary sizes were bigger than the 3,000 word-family level. Nation's Vocabulary Levels Test, the reading comprehension section of the TOEFL, and the Word Associates Format that measure the meaning and collocates of vocabulary were employed for assessing the breadth of subjects' vocabulary knowledge, reading comprehension, and the depth of their vocabulary knowledge, respectively. A morphological knowledge test was also created and adopted. The product-moment correlation analyses indicated high inter-correlations among all four variables. The stepwise multiple regression analyses revealed that breadth and depth of vocabulary knowledge and morphological knowledge were all significant predictors of the students' reading comprehension. However, while the scores of vocabulary size and vocabulary depth were major contributors in explaining reading comprehension

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variance, the role of morphological knowledge was modest.

Qian (2002) conducted a similar research with a larger population of 217 ESL students. The correlation between vocabulary size and TOEFL reading was .74, and the correlation between the vocabulary depth and TOEFL reading was .77. Moreover, a series of hierarchical multiple-regression analyses revealed that 13% of reading variance was due to depth of vocabulary knowledge alone while 8% was due to breath of vocabulary knowledge alone.

Alavi and Akbarian (2012) found that among Iranian university students studying English as a foreign language a moderate, positive relation between the scores of Vocabulary Levels Test and two item types of the reading section of the TOEFL: guessing vocabulary in the context (r=.58) and stated detail (r=.44). These two variables accounted for about 34% of the students' scores in the vocabulary test. When the students were divided into three vocabulary proficiency groups, the high level group showed significant positive correlations between vocabulary scores and four types of reading comprehension questions which, in order of correlational strength, were: guessing vocabulary, stated detail, reference, and main idea. Only stated detail showed a significant correlation with the vocabulary size for the intermediate-level group, and no significant correlation was found in the low level group.

Some researchers sought to determine the size of the vocabulary needed in order to have adequate understanding of a text. Most of the studies were dedicated to reading in English. Hu and Nation (2000) explored the threshold of lexical coverage for sufficient comprehension of a fiction text among 66 proficient adult ESL students. They created four versions of the text by

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substituting low frequency words with nonsensical words, resulting in 80%, 90%, 95%, and 100% of text coverage with 2000-word-level real words that were supposedly known by the subjects. The text comprehension was measured by a 14 item multiple-choice test and a cued written recall test. The density of unknown words accounted for 48.62% of the multiple-choice test scores and 62.18% of the cued written recall test scores. The two measures of comprehension correlated with each other at .84. The researchers concluded that around 98% of text coverage, "the percentage of running words in the text known by the readers" (Nation 2006, p. 61), may be necessary for most L2 readers to adequately comprehend a fiction text. They added that between 80% and 90% coverage was likely to be a vocabulary threshold level since no proper comprehension was possible below this level.

Nation (2006) examined the size of vocabulary required for unassisted comprehension of reading and listening, using 14 frequency word-family lists from the British National Corpus. When taking 98% as the ideal coverage of a text, he found that "[a] 8,000-9,000 word-family vocabulary is needed for dealing with written text, and 6,000-7,000 families for dealing with spoken text" (p. 79).

Laufer and Ravenhorst-Kalovski (2010) investigated the relationships between the vocabulary size, lexical coverage, and reading comprehension of academic texts written in English among 745 students, most of whom were college students in Israel. Their reading comprehension and vocabulary size were measured by a standardized national test, the English part of the Psychometric University Entrance Test in Israel, and the revised version of Nation's (1983) Vocabulary Levels Test (Schmitt, Schmitt, & Clapham, 2001). The former was

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in a multiple choice format with 60 items that tapped test takers' understanding of words, sentence structure, and global textual information. The latter included 2,000, 3,000, and 5,000 word level parts of the test with 30 items in each level. Lexical coverage was estimated using three older versions of the English part of the Psychometric University Entrance Test, comprising 19,037 words altogether, since the actual test the subjects took was not available.

The correlation between the scores of vocabulary size and reading comprehension was .80. Moreover, the data analyses revealed that the less frequent the vocabulary, the less text coverage it yielded. However, the increase in the reading score did not diminish. Therefore it can be inferred that "even a small increase in lexical coverage (1.19% from 4,000 to 5,000) may be just as beneficial to reading as a larger increase in coverage (2.25% from 3K to 4K)" (p. 24; parentheses in the original). She suggested two lexical threshold levels: an optimal one and a minimal one. An optimal threshold is the knowledge of 8,000 word families and about 98% of text coverage if 'adequate' reading comprehension is defined as 'independent' one. If 'adequate' equals reading with some aid, a minimal threshold level would suffice, and it is between 4K and 5K word knowledge and about 95% of text coverage. Proper nouns were included in both estimates.

Also, with 661 participants, whose ages ranged from 16 to 33 years old, from 12 locations in eight countries, Schmitt, Jiang, and Grabe (2011) studied how lexical coverage affects understanding a written text. To measure the subjects' reading comprehension, they developed a two-part reading test with two moderately long authentic passages (757 words and 582 words): one with

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14 multiple-choice items that required some inferencing skills, and the other with 16 graphic organizer completion items for each passage. The subjects' word knowledge was measured by a 150 item vocabulary checklist test which was also developed by the researchers. The test included 120 real word items, selected from the reading passages based on the frequency counts of word appearance in the texts, and 30 nonwords.

The Spearman correlation between the percentage of lexical coverage and the percentage of reading comprehension was only .407, yet the relationship between them appeared linear, and "a threshold at which comprehension increases dramatically at a specific point in vocabulary knowledge growth" (Schmitt et al. 2011, p. 39) was not detected. The increase in lexical coverage from 90% to 100% yielded the gain in comprehension from 50% to 75% in total. They suggested that to ensure at least 60% comprehension, 98% of text coverage is more reasonable for reading academic texts, which corresponds with the estimates of Hu and Nation (2000) and Laufer (2010).

Researchers who examined the role of vocabulary knowledge in reading comprehension all caution that it should not be interpreted as the one and only factor influencing one's reading competence (e.g., Alavi & Akbarian, 2012; Kelly, 1990; Laufer, 2010; Nation, 2006; Schmitt, Jiang, & Grabe, 2011). However, they make it clear that vocabulary knowledge is one of the key factors for successful understanding of written texts.

2.5 Significance of Grammar in L2 Reading

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While vocabulary has been in the limelight since 1990s, the role of grammar knowledge in L2 reading has not received as much attention among L2 researchers, partly because of the dominance of the communicative approach in L2 learning. As for L1 reading, researchers reached a general consensus on the pivotal role of grammar (Hudson, 2007; Perfetti, 1999; Perfetti, Landi, & Oakhill, 2005). Kintch and van Dijk (1978) argued that "[a] full grammar, including a parser" is "[necessary] both for the interpretation of input sentences and for the production of output sentences" (p. 364). However, although the significant role of grammar in L2 literacy is not denied, the results of empirical studies are largely inconclusive.

The role of grammar has been studied by the comprehensibility of syntactically simplified English texts. Berman (1984) conducted a study on the effects of syntactic simplification among advanced-level EFL Hebrew speaking college students. Two versions of a 300-word-long passage were read by the students: one was the original version, and the other was a reworked version that "[reduced] or modified cases of ellipsis, pronominalization, and substitution" (p. 145). Two groups of the students were assigned to read one version of the text and took a comprehension test consisted of 20 multiple choice items that tapped understanding of factual details, pronominal reference and overall content, and 10 open-ended questions concerning more general ideas, all of which were answered in their L1. The results showed that those who read the syntactically simplified version did better on all types of questions than those who read the original version.

Berman (1984) found the evidence regarding the importance of grammar knowledge in L2 reading from two more sources. One is the work of

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Cojocaru (1977) cited in her study, and the other is her observation of an EFL classroom at an Israeli college. The methodology applied in the study of Cojocaru (1977) was the same as hers except that the text was lexically adapted; the vocabulary items were simplified. The results revealed that most mistakes in the reading comprehension test were caused by the lack of syntactic knowledge and not by the poor word knowledge. In her language classroom observation, she found various hardships that the students experienced when reading in English due to their deficiency in grammar knowledge. Based on the findings of her and Cojocaru's experimental studies and her classroom observation, she asserted that "[efficient] FL readers must rely in part on syntactic devices to get at text meaning" (p. 153).

In a similar vein, Yano, Long, and Ross (1994) examined the effects of simplified and elaborated English texts on the reading comprehension of 483 Japanese college students learning English as a foreign language. Thirteen passages of various lengths were prepared in three versions: original, simplified, and elaborated versions. In the simplified texts, while the length of sentences were maintained, the number of multisyllabic words and embedded clauses were minimized. In the elaborated versions, parenthetical paraphrases or definitions of low-frequency content words were provided, which resulted in a 50% increase in the length of texts when compared to the original texts. The Flesh-Kincaid grade levels, used as readability indices, of the unmodified, simplified and elaborated texts were 12.8, 7.5, and 14.0, respectively. Comprehension was measured by a 30-item multiple-choice test assessing three different comprehension processes: replication, synthesis, and inference. The students were divided into three groups in a quasi-random manner, and each

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group was assigned to read one version of the text. The scores of the reading comprehension test were adjusted for their English proficiency, measured by the Structure Subtest Form A of the Comprehensive English Language Test (CELT, Harris & Palmer, 1982). The mean scores of unmodified, simplified, and elaborated texts were 18.84, 19.37, and 18.88, respectively.

The results of ANCOVA on the reading scores showed that there was a significant text-type effect. A post-hoc Least Significance Difference (LSD) uncovered that the effect was mainly caused by the fact that the reading scores of those who read a simplified text were significantly higher than the reading scores of those who read un unmodified text. The reading scores of those reading an elaborated text were higher than the scores of those reading an original text, but the difference was not significant. Also, no significant difference was found between the scores of simplified and elaborated texts. Since the simplified version of the text was modified syntactically as well as lexically in this study, it can be only assumed that syntactic simplification might have had an effect on the ease of comprehending the text.

While Berman (1984) and Yano et al. (1994) showed the positive effects of syntactic adaptation on L2 reading comprehension, Ulijn and Strother (1990) found no evidence of such effects of it in their study. They studied the effects of syntactic simplification and background knowledge on comprehension by both L1 and L2 speakers. The subjects were four groups of college students. Half of them were native English speakers, and half of them were native Dutch speakers whose English was of a high-intermediate to advanced level. Half of the native speakers of each language majored in computer science while the rest majored in humanities. The reading text was an English

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computer science article, ten sentences of which were syntactically modified. Namely, nominalizations were removed, passive voices were changed into active voices, and participles were rewritten as clauses. Lexical items were kept intact. Reading comprehension was measured by ten true-false questions. A 2×2×2 ANOVA was used with the language register of the text, background knowledge, and language knowledge as independent variables.

The results showed no significant difference between subgroups reading an authentic text and those reading a syntactically simplified one. In contrast, knowledge of computer science facilitated understanding of the texts. Based on these results, Ulijn and Strother (1990) contended that "while a complete conceptual and lexical analysis may be necessary for reading comprehension, a thorough syntactic analysis is not" (p. 38). However, the fact that the reading scores of the Dutch students were significantly higher than those of native English speakers even though the researchers claimed the English proficiency of the Dutch subjects was lower than that of the native subjects casts doubts on the validity of the findings.

The effects of grammar knowledge on L2 reading can also be found in the studies inspecting an English reading test. Bachman, Davidson, Lynch and Ryan (1989) analyzed the reading sections of the TOEFL and found that approximately 70% of the variance in item difficulty was attributable to the grammar related test content and the academic topical content. Alderson (1993) found high correlations between a communicative grammar test and reading comprehension tests with academic language from the English Language Testing Services Revision Project. He concluded that while the results underscored the close relationship between grammatical competence and

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academic reading competence, they could also be interpreted as showing the problematic aspects of reading tests.

Barry and Lazarte (1995) investigated how reading in Spanish as a foreign language could be affected by syntactic complexity among twenty four American high school students, all of whom were native English speakers. Half of the subjects were in a high prior-knowledge group that studied a unit on Incan history, the content domain of the reading text, immediately prior to participating in the study. The other half were in a low prior-knowledge group since they reported not having studied the Incas in their school.

The reading materials were historical essays and covered three topics, and the material for each topic constituted three syntactically modified versions with varying numbers of embedded clauses. Reading materials at level I of syntactic complexity were kernel texts containing all the essential information for the topic with no embedded clauses. Reading materials at level II of syntactic complexity were created by inserting one embedded phrase or clause in 80% to 90% of the sentences of the Level I text, and those at Level III contained one additional embedded phrase or clause in 80% of the sentences of the Level II text. The embedded phrases and sentences contained no essential information pertinent to the topic. Six kinds of reading packages were prepared for the recall task. Each package contained three reading passages, each on a different topic and at a different level of syntactic complexity. A reading package was randomly assigned to the subjects. After reading, they were asked to write everything they remembered of the reading in their L1, English.

A repeated measures ANOVA revealed that in both high prior-knowledge

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and low prior-knowledge groups, levels of syntactic complexity had a significant negative effect on the recall scores of the level I texts as well as on the recall scores of the total texts. In general, students recalled less as the syntactic complexity increased, and those with high prior-knowledge recalled more than those with low prior-knowledge. Moreover, sentence structure complexity seemed to cancel out the advantage of having content domain knowledge as the recall scores at Level III of both groups were not as disparate as those at the other levels.

In 1998, Barry and Lazarte reexamined the data of aforementioned study, taking reading topics into account in addition to prior knowledge and syntactic complexity. The subjects' written recall data were analyzed in a different manner, too. Instead of kernel and total propositions, three types of inferences were probed: within-text inferences, elaborative inferences, and incorrect inferences. Within-text inferences were "logical interpretations for the reading selection", and elaborative inferences were "propositions that combined elements of the text with prior-knowledge structures" (p. 181).

On the whole, the readers in the high prior-knowledge group inferred correctly more often than those in the low-prior knowledge group. Moreover, as syntactic complexity increased, the number of inferences made by the readers also increased not necessarily making more mistakes. Therefore, it could be inferred that while the insertion of embedded clauses with no essential information regarding the topic prevented the readers from recalling the kernel propositions, it nevertheless helped them to make more inferences without any significant increase in incorrect inferences.

Studies of reading in French as a second language provide additional

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evidence of the role of grammar in L2 reading. Gascoigne (2005) compared the grammar test scores to the reading test scores of 49 native speakers of English learning French as a foreign language at a college. They were true beginners and took seven tests for each skill, i.e., grammar and reading, in a semester. The students' knowledge of grammar was determined by form-focused exercise scores, and their reading comprehension was measured by five to ten true/false multiple-choice questions answered after reading an 81- to 206-word long target language passage. When the scores of two tasks were compared by a t-test, no difference was found between them. In addition, performance on either task was comparable in predicting overall exam scores, which were obtained by various activities done in the semester. Thus, the results provide indirect evidence of a positive relationship between grammar knowledge and reading abilities.

Unlike Gascoigne (2005), Lefrançoise and Armand (2003) explored the L2 reading of children, aged 9 to 11 years old. The participants were thirty-eight native speakers of Spanish who had been learning French for approximately seven months at the time of the study, and who were literate in Spanish. The study probed the role of phonological and syntactic awareness in L2 French reading. In doing so, oral competence in L2 and reading in L1 were also taken into account.

Syntactic awareness in French was assessed by means of four types of oral tasks: sentence repetition, grammaticality judgement, correction of the grammatical error, and error replication. For these tasks, four types of sentences with variations in grammaticality and semantics were orally presented to the subjects: grammatical and semantic (GS), grammatical but asemantic[8)]

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(Gs), agrammatical[9] but semantic (gS), and agrammatical and asemantic (gs). Reading comprehension comprised of sentence comprehension and text comprehension tasks. For the former task, 18 sentences were orally presented along with four images per sentence. The subjects had to choose a corresponding image. For the latter task, the subjects read an expository text in each language, Spanish and French, after which they carried out two sub tasks. One entailed answering a written questionnaire that included five multiple-choice and five open-ended questions, and the other required recalling the text orally in their own words. In the oral recall, the number of propositions and arguments that were expressed by the subjects and in the text were computed. In this study, L2 lexical knowledge was controlled as all the L2 words used in the tasks were already familiar to the subjects.

Pearson correlational analyses showed significant high correlations between syntactic awareness and all the measures of reading comprehension, i.e., sentence comprehension (r=.641), questionnaire (r=.598), propositions recalled (r=.613), and arguments recalled (r=.606). However, when hierarchical regression analyses were performed on the components of L2 reading with six predictors, oral competence, L1 reading, syntactic awareness, and three phonological tasks, only oral competence in French was significant in predicting the scores of sentence comprehension, and only L1 reading was the significant predictor text comprehension. Nevertheless, the researchers concluded as following:

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8) The term 'asemantic' was used by the authors to mean 'semantically wrong.'
9) The term 'agrammatical' was also used by the authors to mean 'grammatically wrong.'

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> The ability to reflect on syntax and grammar in the L2 is thus not only related to the capacity to understand a sentence, but also to the ability to understand a text in L2. In fact, syntactic awareness contributes not only to expectations within a sentence but also to proposition and sentence articulation at a more global level, which is measured in text comprehension. These results again underscore the common elements shared by oral and written comprehension processes. (p. 238)

As mentioned, despite the fact that the critical role of grammar in L2 reading is taken granted among practitioners and researchers alike, its role in L2 reading has not yet been sought after with vigor through abundant empirical studies by L2 reading researchers. The importance of grammar has been examined mostly in studies comparing the comprehensibility of simplified texts to that of unsimplified ones (e.g., Berman, 1984; Uljin & Strother, 1990; Yano et al., 1994), in those assessing the correlational relationship between grammatical knowledge and reading comprehension (e.g., Alderson, 1993; Bachman et al., 1989; Barry & Lazarte, 1995, 1998; Lefrançoise & Armand, 2003), and in those estimating the predictability of L2 reading by syntactic knowledge (e.g., Gascoigne, 2005; Lefrançoise & Armand 2003). The results of the studies were not unanimous, and the researchers called for more studies in the area.

2.6 Relative Significance of Vocabulary and Grammar in L2

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Reading

This section reviews previous studies that incorporated both vocabulary and grammar as separate independent variables explaining L2 reading. First, studies reporting the relative weight of vocabulary knowledge over grammatical knowledge in L2 reading comprehension are outlined. Then, the studies indicating relative significance of grammar in reading and those with mixed findings are examined. Finally, a summary of the previous studies is provided.

2.6.1 Literature in Favor of Vocabulary

While most studies have treated vocabulary and grammar as components of one linguistic variable, language proficiency, or are concerned with only one of them, Barnett (1986) explored the differential role of each type of knowledge in L2 reading. The subjects were 131 college students taking a French course in the US. Their knowledge of both vocabulary and grammar was measured by a multiple-choice, rational deletion cloze test. Two stories, each of which was 600 to 650 words long, were used for the test, and each story had fifty deletions of every fifth to ninth word. For each blank, three possible choices were provided. While half of blanks were intended to measure the subjects' grammar knowledge, the other half assessed their vocabulary knowledge. After completing the cloze test in thirty minutes, they were assigned to read the original unmutilated version of the same story as in the cloze test with the addition of approximately 300 words. They read it for ten minutes and then wrote what they recalled from the text in English for fifteen

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minutes. Grammar and vocabulary scores were divided into three levels of approximately equal proportion: low, medium, and high.

A two-factor analysis of variance yielded significant recall differences due to syntactic knowledge and vocabulary knowledge. In addition, the interaction of the syntax and vocabulary scores had a significant effect on recall. In general, the subjects' recall scores increased as their levels of vocabulary proficiency and syntactic proficiency increased. However, when their level of either syntax or vocabulary was low, the level increase in the other knowledge domain did not lead to higher recall scores. In general, the results suggested that syntax and vocabulary are distinct and necessary forms of knowledge for comprehending L2 texts.

Although Barnett (1986) used an ANOVA to prove the independent and interactive role of each linguistic knowledge, namely vocabulary and grammar, in L2 reading, most of the evidence come from correlational studies and/or those with regression analyses (e.g., Brisbois, 1995; Chen, 2009; Gou, 2008; Jeon, 2012; Shin & Kim, 2012; Shiotsu & Weir, 2007; van Gelderen, Schoonen, de Glopper, Hulstijn, Snellings, Simis, & Stevenson, 2003; Zhang, 2012). The relative importance of vocabulary and grammar in L2 reading was compared in the studies yielding disparate results.

Brisbois (1995) examined the contributions of L2 vocabulary and grammar to L2 reading as separate variables representing L2 knowledge, in addition to L1 reading skills. The subjects were 131 English-speaking French learners, 84 beginners and 38 at the upper levels, at a US Air Force Academy. The L2 grammar test consisted of multiple-choice and cloze items, and the L2 vocabulary test was made up of fifty lexical items selected from the passages

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in the L2 reading test, for which the subjects were required to write the definition in English or the English equivalent. Both L1 and L2 reading comprehension tests were performed in a similar fashion, except that one more test, the Nelson-Denny Reading Test (NDRT), was employed to measure L1 reading ability. The common reading comprehension test comprised three historical passages, about 200 to 250 words long. Immediately after having read the passages, the subjects were asked to carry out a free written recall task.

For the beginners, L2 reading was significantly correlated with L2 vocabulary (r=.35), L2 grammar (r=.26), L1 recall protocols (r=.33), and NDRT (r=.24). L2 vocabulary and L2 grammar were also significantly correlated with each other (r=.57). For the upper level subjects, significant correlations were found between L2 reading and the L1 recall protocol scores (r=.45), and between the vocabulary and the grammar scores (r=.50) only. Likewise, hierarchical multiple regression analyses yielded different results regarding the roles of L2 vocabulary and grammar in predicting L2 reading depending on the subjects' level of L2 classes. While both predictors proved to be significant for beginners, only L2 vocabulary achieved significance for upper level subjects. Overall, she concluded that "the variance of the L2 vocabulary scores contributed more to that of the L2 reading comprehension scores than did the variance in the L2 grammar scores, which in most cases contributed the least" (pp. 576-577).

However, as the author acknowledged, the limitations of the study lies in the facts that the size of the upper level groups was not big enough for the use of multiple regression analyses and that the sizes of two levels were not

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equivalent. Moreover, the selection of the lexical items favored upper level subjects since the items had not yet been introduced in the beginning-level curriculum. While the L2 grammar mean score of upper level subjects was about two times higher than that of beginners, L2 vocabulary mean scores of both level subjects yielded a little more than a four-fold difference.

In the study of Nassaji (2003), the English reading of sixty adult Farsi speakers who were graduate students at a Canadian university was investigated employing five independent variables: English vocabulary (semantic) knowledge, English word recognition, phonological processing skill, orthographic processing skill, and syntactic processing skill. The subjects' English reading comprehension was assessed by the reading comprehension section of the Nelson-Denny reading test, which comprised eight reading passages and a total of 36 multiple-choice questions, each with five options. The vocabulary section of the same test was used as a measure of the subjects' English vocabulary knowledge. Syntactic processing skill was measured by a syntactic judgement task with 30 English sentences which incorporated various syntactic properties.

All the independent variables were significantly correlated with each other and with L2 reading comprehension. The correlation between the vocabulary knowledge measure and the L2 reading measure was the strongest (r=.59). Syntactic knowledge was also found to be positively correlated with L2 reading comprehension (r=.44) as well as with the vocabulary knowledge (r=.55). When the subjects were divided into two groups of skilled and less-skilled readers based on the median split of readers' raw scores on the L2 reading comprehension test, a one-way discriminant function analysis revealed that lexical-semantic knowledge was the most discriminating variable,

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accounting for 69% of the shared variance in the difference between the two groups of readers. Syntactic knowledge was also significant in discriminating the readers into two groups, and accounted for 36% of the shared variance in the difference. In sum, he concluded that it was the lexical/semantic processing skill that was more strongly related with reading comprehension.

Guo (2008) investigated the respective roles of L2 vocabulary, L2 grammar, and metacognitive awareness in L2 reading comprehension among 278 Chinese college students leaning English as a foreign language. Each of the three kinds of knowledge of interest were assessed through two measures. The participants' knowledge of English vocabulary was measured by Vocabulary Levels Test (Nation, 1990) and Depth of Vocabulary Knowledge Measure (DVK) (Qian & Schedl, 2004). To evaluate their English grammar, the sentence combination sub-test of the Test of Adolescent and Adult Language-Fourth Edition (TOAL-4) (Hanmill, Brown, Larsen, & Wiederholt, 2007) and an 11-item syntactic awareness questionnaire developed by Layton, Robinson and Lawson (1998) were used. The former was intended to assess low-level syntactic awareness by asking the test-takers to write one grammatical sentence combining two given sentences. The latter consisted of seven items that assessed the ability to formulate the rules of syntax and to identify what the rules are and four items that measured the ability to reflect on one's knowledge and performance in relation to syntax. L2 reading measures were the reading comprehension section of TOEFL and the Gary Silent Reading Tests (GSRT) (Weiderholt & Blalock, 2000) consisting of 13 reading passages, each with five multiple-choice questions.

All correlations among each measure of L2 vocabulary, L2 grammar and L2

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reading were significant. With regard to subjects' TOEFL scores, vocabulary size and depth were positively correlated (r=.431, r=.353, respectively) as with the scores of GSRT (r=.434, r=.372). The correlation coefficients between TOEFL scores and subjects' TOAL-4 scores and the syntactic awareness questionnaire scores were .131 and .265, respectively. The correlation coefficients between GSRT scores and subjects' TOAL-4 scores and the syntactic awareness questionnaire scores were .129 and .126, respectively. The coefficients of the correlations between L2 vocabulary measures and L2 grammar measures ranged from .170 to .299. Therefore, the results of correlational analysis showed that while both lexical knowledge and syntactic knowledge were significantly correlated with the L2 reading measures, the correlation between lexical knowledge and L2 reading was more pronounced.

However, confirmatory factor analyses showed that "[vocabulary] knowledge was so highly correlated with syntactic awareness that they were not separate psychological construct" (p. 33). The contribution of two factors, vocabulary knowledge/syntactic awareness and metacognitive awareness, to L2 reading was examined through structural equation modeling. The results showed that vocabulary knowledge and syntactic awareness together explained 81% of the L2 reading variance (β=.79). Therefore, it is not legitimate to interpret relative importance of either vocabulary or syntax separately with the results of confirmatory factor analyses other than those of correlational analysis, which demonstrated a higher correlation between vocabulary knowledge and L2 reading than between syntactic knowledge and L2 reading.

2.6.2 Literature in Favor of Grammar

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Some studies report on the relatively significant role of grammar over vocabulary in L2 reading. Information regarding the respective roles of vocabulary and grammar in L2 silent reading can be obtained in the study of Jeon (2012), although the original purpose of her study was to investigate the role of oral reading fluency in L2 reading. The data from 255 grade 10 EFL students in South Korea were analyzed. A total of nine tests were used in the study to assess nine variables: three oral reading fluency tests and six non-oral fluency tests. The non-oral tests included a word knowledge test, a grammar test, and a reading comprehension test. The word knowledge test measured the knowledge of fifty English words selected from a list of words in the Seventh National Curriculum Revision (South Korean Ministry of Education, 1997). The grammar section of a retired General Test of English Language Proficiency (G-TELP) Level 4, consisting of 20 multiple-choice items, each with four options, was used to measure the students' grammar knowledge. The reading comprehension section of the same test, G-TELP Level 4, was used to assess the students' silent reading comprehension, which consisted of four short reading passages, each followed by five multiple-choice questions. Correlational analyses revealed that L2 silent reading scores were significantly correlated with the scores of both the word knowledge test (r=.467) and the grammar knowledge test (r=.589), and the word knowledge and the grammar knowledge were significantly intercorrelated (r=.458). The size of correlation between grammar and L2 reading was bigger than that between vocabulary and L2 reading in this study, suggesting a larger role of syntactic knowledge than lexical knowledge in L2 reading.

Shiotsu and Weir (2007) reported the results of three consecutive SEM

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analysis studies regarding the relative importance of syntactic knowledge and vocabulary breadth in predicting L2 learners' reading comprehension performance: two preliminary studies and one main study. All tests incorporated in the studies were split into parallel halves in order to conduct SEM analyses as in van Gelderen et al. (2003, 2004). In the first study, 107 adult ESL students with various L1s and nationalities at a UK university participated. The reading comprehension test consisted of four 600 to 1,000 word long academic passages followed by short answer, true-false with justification, and table/flowchart or sentence completion tasks. There were a total of 20 items. The vocabulary test comprised two 500-word academic passages with 10 blanks, which needed to be filled by the words provided in a word bank. The subjects' knowledge of syntax was measured by a sentence completion task with 30 items, each followed by four options.

The SEM results showed that syntactic knowledge (β=.47) had a little more power in explaining reading comprehension than lexical knowledge (β=.42) did. The strength of correlations of the predictors with reading scores supported this. Reading comprehension scores were significantly correlated with scores of syntax (r=.62) and vocabulary (r=.60). The scores of the vocabulary test and those of the syntactic knowledge test were also significantly correlated (r=.62). Vocabulary and syntax jointly accounted for 55% of the reading variance. These results are quite different from the results of other SEM analysis studies in that both the correlation coefficient and the standard regression weight of syntactic knowledge were bigger than those of vocabulary knowledge, which suggests that while both vocabulary and syntax are significant predictors of L2 reading performance, syntax appears to contribute slightly more to L2 reading

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than vocabulary does.

The second study of Shiotsu and Weir (2007) was conducted with 183 Japanese EFL learners attending three universities in Japan. The reading comprehension test consisted of four passages, each followed by five multiple-choice questions designed to measure one's global understanding of a passage. A pruned version of the Vocabulary Levels Test with 60 items was used to assess the breadth of participants' English knowledge. The test of syntactic knowledge was in the same format as the one used in the first study, but the actual items as well as the number of the items were different. The syntactic knowledge test of the second study had 32 items. The SEM analyses yielded similar results to those of the first study showing the relative importance of grammar. Syntax explained L2 reading performance more than vocabulary did (β=.61 vs. β=.34). The reading comprehension scores were significantly correlated more with syntax (r=.89) than with vocabulary (r=.85). The scores of the vocabulary test and the syntactic knowledge test were also significantly correlated (r=.62). The scores of vocabulary and syntactic tests together explained 83% of the L2 reading variance. As in the first study, all the variables were significantly correlated with each other. Moreover, syntax as a stronger predictor of L2 reading was also supported by the results of statistical analyses. This time, the magnitude of the difference between vocabulary and syntax as predictors of L2 reading performance was bigger.

The third, main-study of Shiotsu and Weir (2007) analyzed data from a much bigger pool of 591 Japanese EFL learners attending five universities in Japan, and employed the same measurement instruments as the second study. The data were analyzed as a single group and then as two subgroups of high

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and low achievers of English. The criteria used for dividing the subjects were the status of the university they were attending and their majors, namely English or non-English major, at the time of the study.

The results of the SEM analysis of the single group and the previous two studies were alike. More of the subjects' reading performance was accounted for by their syntactic knowledge rather than by their lexical knowledge (β=.64 vs. β=.25). Also, the subjects' reading performance was significantly correlated more with their grammar scores than with their vocabulary scores (r=.85 vs. r=.79). The scores of vocabulary test and those of the syntactic knowledge test were also significantly correlated (r=.84). Seventy four percents of the reading variance was accounted for by syntax and vocabulary. These results corroborate and heighten those found in the second study.

Subgroup analyses yielded similar results. For the high achievers (n=343), syntax was more important than vocabulary in reading comprehension (β=.50 vs. β=.19). The correlation coefficients of syntax and grammar with reading were .62 and .52, respectively. The scores of the vocabulary test and those of the syntactic knowledge test were also significantly correlated (r=.67). The scores of vocabulary and syntactic tests together explained 41% of the L2 reading variance. For the low achievers, the reading comprehension scores were explained much more by syntax than vocabulary (β=.62 vs. β=.26). The correlation coefficients of syntax and grammar with reading were .78 and .82, respectively. The scores of vocabulary and syntactic tests jointly accounted for 67% of the L2 reading variance. Not only the significance of both predictors but also the relative significance of syntax over vocabulary was maintained in the subgroup analyses as in the single group analysis. Also, a larger L2

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reading variance was explained by vocabulary and syntax in the lower group.

In sum, based on the findings from the three studies, Shiotsu and Weir (2007) contend that while both vocabulary breadth and syntactic knowledge are significant predictors of L2 reading, the relative significance lies in syntactic knowledge. It is noteworthy that the tendency of the findings were the same irrespective of L1 background, and the subjects' L2 learning experience.

Shiotsu (2010) carried out a research study exploring the effects of L2 linguistic and non-linguistic factors on both comprehensibility and reading speed of L2 reading by 219 L1-Japanese EFL college students. The factors included L2 vocabulary breadth, L2 word recognition efficiency (real word recognition, pseudoword recognition, irregular letter string recognition, lexical familiarity effect, orthographic regularity effect, and synonym/antonym recognition), L2 phonological awareness, L2 working memory, L2 syntactic knowledge, and language-independent metacognitive knowledge of text and reading. Since the interest of the present study is placed in L2 reading comprehension, the findings relevant to the issue will be reviewed here.

As in the third study of Shiotsu and Weir (2007), Shiotsu (2010) investigated L1-Japanese EFL learners from five universities in Japan, and the data from them were analyzed as one group as well as two subgroups of L2 reading ability. There were a total of 219 subjects divided between higher and lower groups consisting of 128 and 91 subjects, respectively. The criteria used in dividing the subjects into two ability groups were the same as in Shiotsu and Weir (2007). The instruments used to assess learners' syntactic and vocabulary knowledge as well as reading comprehension were also the same as the ones applied in the second and third studies of Shiotsu and Weir (2007).

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However, regarding the grammar and reading comprehension tests, the subjects' answers were scored according to Clustered Objective Probability Scoring (COPS), developed by Shizuka (2000, 2004). In COPS, the test takers rate their level of confidence in their answer, and their score is adjusted based on their confidence level and their actual answer.

The findings of the two studies, Shiotsu (2010) and Shiotsu and Weir (2007), are much alike. First, the simple bivariate correlation between syntax and reading was higher than that between vocabulary and reading (r=.84 vs. r=.70). Syntax and vocabulary was also substantially correlated (r=.77). Second, multiple regression analyses revealed the greater power of syntax over vocabulary as a predictor of reading comprehension of the whole group (β=.73 vs. β=.13). However, there was some variation regarding the number and kind of significant predictor variables. The regression model of the whole group consisted of three predictors, syntax, vocabulary and lexicality (β=.09). The model accounted for about 72% of L2 reading. For the better reader subgroup, the regression model was with two predictor variables, and while syntax remained a strong predictor of reading (β=.68), word latency took the place of vocabulary and lexicality (β=.18). The regression model explained 48% of reading. For the poorer reader subgroup, three predictors emerged just as significant as in the whole group: syntax (β=.56), lexicality (β=.22), and vocabulary (β=.18). They accounted for about 47% of reading.

While the findings were not exactly the same as those of Shiotsu and Weir (2007), the significance of syntax in relation to reading was even more pronounced in the study. Also, the role of vocabulary in L2 reading remained significant. Shiotsu (2010) concludes that "Passage Reading comprehension test

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performance is best accounted for by the breadth of knowledge in the target language syntax and additionally by the breadth of target language vocabulary" (p.153).

2.6.3 Literature with Mixed Findings

While many studies have found that vocabulary or grammar plays a more important role in L2 reading, Chen (2009) produced mixed findings according to the measurement instruments of vocabulary knowledge. He investigated the influence of vocabulary breadth and depth, and syntactic knowledge on English reading comprehension among 138 Taiwanese EFL college students. To measure the students' English vocabulary breadth, version 1 of the Vocabulary Levels Test (Schmitt, 2000) was adopted. The Word Associates Test developed by Read (1998) was utilized to assess the depth of the students' English vocabulary. The syntactic knowledge test consisted of 20 multiple-choice items from the structure and written expression section of TOEFL and the structure section of the General English Proficiency Test (GEPT). A 20 multiple-choice item reading comprehension test was made up of three passages from GEPT with 10 questions and one passage from the TOEFL with 10 questions.

Significant correlations were found among the scores of all measures as in the previous studies. The correlation coefficients between English reading and each of the three kinds of language knowledge, i.e., vocabulary breadth, vocabulary depth, and syntactic knowledge were .543, 452, and .501, respectively. The correlation coefficients between syntactic knowledge and each of the two vocabulary measures, i.e., vocabulary breadth and vocabulary depth,

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were .447 and .344, respectively. If vocabulary knowledge was represented by the scores of VLT test, it was more strongly correlated than syntactic knowledge with English reading, but when the scores of the WAT was used as the subjects' vocabulary knowledge measure, the correlation between syntactic knowledge and reading comprehension was stronger than that between vocabulary and reading, though the difference was modest.

Shin and Kim (2012) also reported mixed findings regarding the relative roles of vocabulary and grammar in L2 reading, this time not depending on the measures used to assess vocabulary knowledge as in Chen (2009) but depending on the kinds of statistical analyses conducted. A total of 337 native Korean speakers leaning English at a Korean college participated in the study. Two measurement instruments were adopted for each of the three constructs, i.e., vocabulary, grammar and reading comprehension. For assessing the participants' vocabulary knowledge, the Vocabulary Levels Test and a test developed by the researchers were used. The latter comprised thirty sentence completion multiple-choice questions, and the option words were nouns, verbs, adjectives, and adverbs. Grammatical knowledge was measured by two 25-item sentence completion multiple-choice tests. The items in the first grammar test were adopted from the Preliminary English Test (PET) (Hashemi & Thomas, 1996) and the First Certificate in English (FCE) (Carne, Hashemi, & Thomas, 1996). The second grammar test was researcher-designed, and unfamiliar and nonsensical words were used in the stem sentences on the assumption that these would make the test takers focus on the syntactic features, enhancing the validity of the test. The reading comprehension test consisted of three passages taken from the FCE and 15 multiple-choice questions, each with four options.

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One immediate written recall task was also conducted to measure the students' L2 reading abilities.

Again, Pearson Product-Moment correlation coefficient analyses revealed that all the variables were significantly and positively correlated with each other. The reading comprehension test scores were correlated with each of the scores of the Vocabulary Levels Test and the researcher-designed vocabulary test, producing the correlation coefficients of .582, and .547, respectively. The correlation coefficients between the recall sores, and the scores of the Vocabulary Levels Test and the researcher-designed vocabulary test were .500 and .498, respectively. The reading comprehension test scores were correlated with each of the scores of the first grammar test (r=.636) and the second grammar test (r=.556). The recall scores were also correlated with the scores of the first grammar test (r=.565) and the second grammar test (r=.512). The coefficients of the correlations between vocabulary measures and grammar measures ranged from .575 to .671. On the whole, the results of zero-order correlation analyses disclosed that the correlation between grammatical knowledge and L2 reading was stronger than that between vocabulary knowledge and L2 reading comprehension. The only exception to this was when the scores of Vocabulary Levels Test, the second grammar test, and the reading comprehension test were used for the correlational analyses.

However, when structural equation modeling (SEM) was conducted to identify the latent structure, L2 reading was more strongly correlated with vocabulary (R=.88) than with grammar (R=.16). Moreover, only the beta value of vocabulary knowledge was significant (β=.565). Vocabulary knowledge accounted for 77% of the L2 reading variance while grammar knowledge

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explained 3% of it. The combined knowledge of vocabulary and grammar accounted for 96% of the reading variance. The researchers suggested that the shrunken role of grammar in this analysis might be due to the high correlation between vocabulary and grammar (*R*=.98). Nevertheless, the standardized regression weights of both vocabulary measures were smaller than those of grammar measures: .730 and .747 vs. .910 and .817. The researchers concluded that "[the] SEM analysis indicated that the variables of vocabulary knowledge and grammatical knowledge made contributions to the prediction of reading comprehension performance, with vocabulary knowledge outperforming grammar in predictive power" (pp. 188-189).

Zhang (2012) also conducted an SEM analysis with the data obtained from 172 Chinese EFL leaners attending a graduate school in China. As in Chen (2009), the Vocabulary Levels Test and Word Associates Test were used to measure breadth and depth of vocabulary knowledge, respectively. Two measurement instruments were used, measuring two types of grammar knowledge. First, a timed grammatical judgement task measured learners' implicit knowledge of grammar. It consisted of 98 sets of grammatical and ungrammatical sentences. Second, a grammatical error correction task, comprising 20 sentences, each with four underlined parts, taken from the grammatical structure section of retired TOEFL tests was used to measure learners' explicit grammar knowledge. The students were required to identify an ungrammatical part among four underlined parts, and then to rewrite it correctly. The reading comprehension test was composed of six passages, each with three multiple-choice questions. Each of the three questions was designed to measure three sub-skills of reading comprehension: identifying co-references,

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making textual inferences, and getting the gist of a text. The scores of the three sub-skills of reading comprehension were used in the SEM analysis.

Between vocabulary and reading measures, five significant correlations were produced, but only four significant correlations were found to be significant between grammar and reading measures. The coefficients of the former correlations ranged from .184 to .343, and those of the latter correlations ranged from .181 to .336. The degree of correlation differed from one another depending on the measurement type, leaving it difficult to compare the relative strength of correlation of vocabulary and grammar with reading. Unlike the aforementioned studies, vocabulary and grammar were significantly correlated only in one instance when the scores of the Vocabulary Levels Test and the grammatical error correction task were used (r=.191). The correlations among the reading comprehension measures were significant but not very strong; the coefficients ranged from .194 to .382. The SEM analysis suggested that while vocabulary knowledge made significant and unique contribution to L2 reading comprehension (β=.423), grammatical knowledge did not (β=.660), and vocabulary knowledge and grammatical knowledge together accounted for 81% of the reading variance. Like Shin and Kim (2012), Zhang (2012) asserted that the SEM analysis suggested vocabulary knowledge was the stronger predictor of the subjects' reading comprehension abilities than grammatical knowledge was.

Another SEM analysis study was performed by van Gelderen et al. (2003). They were concerned with the effects of three different components of knowledge and skills in L1, L2, and L3 reading comprehension. The components were linguistic knowledge, the speed of accessing that knowledge,

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and metacognitive knowledge. The subjects of the study were 338 Dutch grade 8 students. Dutch was the first language for 281 of them (MD), and the second for 57 of them (BD). All of them were learning English at school, so English represented their second or third language just as Dutch represented their first or second language. The Reading Proficiency tests were comprised of short passages followed by multiple-choice questions. The Dutch test consisted of 30 questions, and the English test consisted of 35 questions. The vocabulary tests were also in a multiple choice format, with 75 items in Dutch and 65 items in English. Grammatical knowledge was assessed by having students fill in a blank with the correct form of a word or use the correct word order in sentences. The Dutch and English tests had a total of 69 and 80 items, respectively. The MD group showed the tendency of scoring higher in almost all measures than the BD group, although the difference between them was smaller in English measures compared to Dutch ones.

To conduct the SEM, all tests were split into two parallel parts. With respect to Dutch reading, the analysis showed that there was no difference between the MD group and the BD group. The regression weights suggested that vocabulary knowledge (β=.38), grammatical knowledge (β=.29), and metacognitive knowledge (β=.25) all had unique contributions to the prediction of Dutch reading proficiency. The speed or fluency measures had no unique contribution. All the variables jointly explained 70% of the Dutch reading variance. With respect to English reading, the two groups, MD and BD, showed no difference as with Dutch reading. Only grammatical knowledge (β =.51) and metacognitive knowledge (β=.33) were found to make unique contributions in predicting English reading proficiency variance while

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vocabulary knowledge did not (β=-.01). The researchers assumed that there was a suppressor effect between grammatical knowledge and vocabulary knowledge since they were highly inter-correlated (*r*=.77). 69% of English reading was accounted for by all the variables.

Although this study does not provide direct evidence of the relative roles of vocabulary and grammar in L2 reading, Dutch reading and English reading could be interpreted, of course with caution, as L1 reading and L2 reading, respectively, since the BD group represents only 20% of all the subjects in the study. In this respect, the study underscores the stronger role of grammatical knowledge in L2 reading unlike the results reported in the studies mentioned above.

The data of the MD group members (*N*=281), whose first language was Dutch, that were analyzed by van Gelderen et al. (2003) were reexamined in 2004 by the same authors in order to explore the roles of components of L1 (Dutch) and L2 (English) reading comprehension. L2 reading scores were strongly correlated with vocabulary knowledge (*r*=.63), grammatical knowledge (*r*=.80), and metacognitive knowledge (*r*=.87). However, the standardized regression weights suggested that only vocabulary knowledge (β=.26) and metacognitive knowledge (β=.70) made significant contribution to L2 reading. All the components, namely vocabulary knowledge, grammatical knowledge, metacognitive knowledge, word recognition, and sentence verification, together accounted for 83% of English reading variance. Overall, the SEM analysis revealed the relatively more substantial role of vocabulary knowledge than grammatical knowledge in predicting L2 reading abilities, which contradicts the inference made above regarding the study results of van Gelderen et al.

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(2003). This result is in accordance with the results found in the other SEM analysis studies of Shin and Kim (2012) and Zhang (2012).

2.6.4 Summary

After Barnett (1986), many researchers followed suit by examining L2 reading in relation to vocabulary and grammar as separate variables. While the significance of both vocabulary and grammar was predominantly acknowledged in L2 reading, the relative weight of each type of knowledge is largely inconclusive. The findings were not in accordance with the analysis applied, target languages, ages of the subjects, or their L2 proficiency.

For instance, among the correlational studies, Brisbois (1995), Nassaji (2003), Guo (2008), and Chen (2009) found that the degree of correlation between vocabulary and reading is more considerable than that between grammar and reading. However, Shin and Kim (2012), van Geldren et al. (2003, 2004), Jeon (2012), Shiotsu and Weir (2007) and Shiotsu (2010) report that the opposite is true. Multiple regression and SEM analyses resulted in different findings, too. Chen (2009), Shin and Kim (2012), and van Gelderen et al. (2004) found that one's vocabulary knowledge accounted for more L2 reading performance than grammar knowledge did, but evidence to the contrary was also obtained in the studies of van Gelderen et al. (2003), Shiotsu and Weir (2007), and Shiotsu (2010).

While the target language of most studies was English (e.g., Chen, 2009; Guo, 2008; Jeon, 2012; Nassaji 2003; Shin & Kim, 2012; Shiotsu, 2010; Shiotsu & Weir, 2007; Zhang, 2012), French and Dutch learning was

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investigated in the studies of Brisbois (1995) and van Gelderen et al. (2003, 2004). While Brisbois (1995) suggested the relative importance of vocabulary in comprehending L2 texts, van Gelderen et al. (2003, 2004) came up with differing results. They found that grammar played a more important role in L2 reading in their former study but vocabulary was more important in their later study.

Most researchers carried out their study with adult L2 learners (e.g., Brisbois, 1995; Chen, 2009; Guo, 2008; Nassaji 2003; Shin & Kim, 2012; Shiotsu, 2010; Shiotsu & Weir, 2007; Zhang, 2012), but the subjects of van Geldren et al. (2003, 2004) were children. Also, adolescents participated in the study of Jeon (2012). However, no consistent findings regarding the relative importance of vocabulary and grammar in L2 reading were observed in these studies.

Only a few studies have investigated the effect of L2 proficiency on the roles of vocabulary and grammar in relation to L2 reading so far (e.g., Barnett, 1986; Brisbois, 1995; Nassaji 2003; Shiotsu, 2010; Shiotsu & Weir, 2007). Among them, only Barnett (1986) separated the subjects into three proficiency groups while the others investigated the proficiency effect in two levels. However, since she examined the effects of the three levels of vocabulary and grammar on L2 reading, the relative importance of vocabulary and grammar in the levels of L2 reading could not be inferred from the study with much certainty. Furthermore, when dividing the subjects, she opted for the approximate numerical equivalence, obscuring the existence of real differences of competence in their vocabulary and grammar knowledge.

Among the studies that studied the proficiency effect on L2 reading in two

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levels, the criteria applied in partitioning subjects differed. Brisbois (1995) utilized the class placement, Nassaji (2003) the median split of the reading scores, and Shiotsu (2010) and Shiotsu and Weir (2007) the type of the universities the subjects were attending and their majors. The findings of the studies were divergent in respect to the relative importance of vocabulary and grammar, which seems natural as the levels in those studies were not absolute and comparable but only relative. Nevertheless, none of the findings of the previous studies matched any apparent differences, opening the door for more studies to be conducted to reach a solid conclusion.

Since the causes of discrepancies in the findings of previous literature cannot be pinpointed as they are not characterized by a common pattern, the present study sets out to probe the relative roles of vocabulary and grammar in L2 reading. In doing so, achieving the validity of the assessment tool for each construct is the first and foremost step, which was not fulfilled in many of the previous studies. Most studies focused on the L2 reading of adults, and the differential roles of vocabulary and grammar in three different L2 reading ability groups were not investigated much. Therefore, the present study investigates the roles of vocabulary and grammar in L2 reading of Korean adolescents and examines the effect of L2 reading ability.

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Ⅲ. PILOT STUDY

As a precursor to the main study, a pilot study was conducted to test the reliability of the test instruments and to ascertain any possible problems in the research design. A major concern of this pilot study was the enhancement of the research design and methodology of the main study by applying any resolutions of the complications that arise from it.

3.1 Research Questions

The purpose of the pilot study was to explore the relationships between EFL high school students' vocabulary and grammar knowledge in reading comprehension. Based on the purpose of the study, the following research questions were investigated.

1) How do vocabulary knowledge and grammar knowledge relate to L2 reading comprehension?
2) What are the unique contributions of vocabulary knowledge and grammar knowledge in L2 reading comprehension?

3.2 Participants

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Ninety six eleventh graders from five intact classes attending a public high school in Busan participated in the study. They were all males and native speakers of Korean. Two English teachers from the participating school testified that the overall English level of the school is below average when compared to all high schools in Busan. The participants' average age was eighteen, and they had studied English for an average of 8.9 years. All but four students had an extended stay of more than a month in an English-speaking country. Two students travelled and studied English in the U.S., one in the Philippines, and one in New Zealand for forty days, two months, three months, and a year, respectively. However, the scores of those students were included for analyses since no abnormality was found.

3.3 Instruments

The pilot study employed three different measurements designed to assess the participants' vocabulary knowledge, grammar knowledge, and reading comprehension in isolation as it was critical to measure a designated construct unaffected by other competencies of interest. All the test items were prepared in a multiple-choice format. The directions and response options were provided in Korean where possible.

Specifically, in order to measure the participants' vocabulary knowledge, this study used the Korean version of the Vocabulary Levels Test (VLT; see Nation, 1990 and Schmitt et al., 2001)[10] with some adaptation. The VLT is

10) For the Korean version of the VLT, refer to http://www.victoria.ac.nz/lals/about/staff/paul-nation.

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discrete, selective, and context-independent according to the dimensions of vocabulary assessment used by Read (2000). It was referred to by Meara (1996) as "the nearest thing we have to a standard test in vocabulary" (p. 38). In the present study, the original VLT[11] was adapted in two ways. First, the 10,000-word level section was excluded since it was deemed beyond a level appropriate for high school students. Second, only half of the original VLT items were used in this study mainly because of time restrictions, resulting in 60 instead of 120 test items. The estimated reliability (Cronbach's alpha) of the vocabulary test was .97.

As a measure of the participants' grammar knowledge, a 25-item sentence completion multiple-choice test was developed and administered. There were four options for each item, and they were semantically similar in most cases. The items were adopted from the Preliminary English Test (PET), the First Certificate in English (FCE), and Grammar for IELTS (Hopkins & Cullen, 2008). To verify that the test focuses on grammar knowledge exclusively, it went through several stages. Specifically, its vocabulary level was examined by using the VocabProfile (Cobb, 2002), and its readability index was calculated on the Readability Test Tool website[12]. In addition, two experienced English professionals scrutinized the test for the difficulty of its vocabulary and its suitability. The stages were repeated until the two professionals reached an agreement. The final version of the test was made up of 93.88% of 1000

11) The original VLT consists of six sub-sections representing different frequency levels of vocabulary: 2,000, 3,000, 5,000, academic, and 10,000 levels. Each section is comprised of ten item clusters. In each item cluster, six English words are provided with numbers from 1 to 6 in a column, and three Korean words and definitions are on their right. The testee should write the number of corresponding English word beside the Korean definition.

12) Refer to www.read-able.com.

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(K1) words[13] and 5.71% of 2000 (K2) words. There was only one word above the K2 level, 'vacation', and it was considered fairly easy for the participants, according to the two professionals. The readability indices confirmed the facileness of the sentences used for the test. The Gunning Fog and the Flesch-Kincaid index scores were 5.5 and 3.3 respectively. The estimated reliability (Cronbach's alpha) of the grammar test was .88.

Although there is no definitive construct of reading comprehension available (Alderson, 2000), increasing the content validity of the test was a major concern when developing the test. To this end, two major factors considered were the text features and the subskills of reading. Four texts from two high school English textbooks (Kim et al., 2009; Kim et al., 2008), which were not used by the participating school were adapted for the present study. The rationale for using these texts is that they are expected to match the participants' English proficiency level or at least that of their English textbook.

As shown in Table 2, two narrative and two expository texts were chosen as representatives of most encountered text types by EFL learners. When choosing a part from a text, care was taken not to disturb the original information and to maintain it as a self-contained unit. One of the texts was used verbatim, and for the rest, a few sentences, mostly examples, were deleted. The mean length of the texts was 230 words long.[14] The equivalence in text difficulty was not strictly pursued. The texts varying in difficulty were

13) Proper nouns were treated as K1 words. Compound nouns whose meanings were mere addition of each noun that belonged to K1 word band were also treated as K1 words.

14) The two experienced high school English teachers certified that most students would feel comfortable reading an up to 200-word passage, which is of comparable length to the texts used in the National Academic Aptitude Test in Korea, and that a longer text would make it hard for students to concentrate on reading it.

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selected to avoid floor and ceiling effects (Nagy, Anderson & Herman, 1987). The level of vocabulary and the readability of the texts were checked through the VocabProfile (Cobb, 2002) and the Readability Test Tool website. The average proportion of the 2000 most frequently used words is .912. Fog index scores ranged from 8.9 to 11.0 and those of Flesch-Kincaid ranged from 6.3 to 8.6.

TABLE 2. Text Features of the Reading Comprehension Test

Topic	Text Type*	Number of words	Frequent-2K words	Gunning Fog	Flesch-Kincaid
An Apple Tree	N	232	90.9%	8.9	6.3
The Multilingual Era	E	230	93.5%	10.2	8.6
The Mystery of Love	N	241	93.8%	11.0	7.8
Geyser: A Wonder of Mother Nature	E	216	86.6%	10.3	8.3
Mean		230	91.2%	10.1	7.8

* N=Narrative, E=Expository

Each text was followed by five or six multiple-choice questions with four options, with a total of 22 test items. Questions requiring six sub-skills of reading were incorporated so that the test could assess varying degrees of comprehension. First, the gist questions required the test takers to identify the proper title and the purpose of texts and to recognize the emotion of the main character of a text. Second, the literal questions tested understanding of textually explicit details of a text. Third, the conjunction questions required test takers to determine the relationship between two clauses and sentences. Fourth, the co-reference questions assessed the test takers' ability to identify

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pronominal reference. Fifth, the sequence questions asked the participants to properly position a given sentence in the text. Finally, the inference questions tested the participants' ability to make propositional explanatory inferences concerned with a consequence and to establish links between different parts of a text. The necessary reading subskills are context specific, so it was not possible to apply all six subskills invariably in the four texts of the study. Nevertheless, four to five of them were measured per text in the test, as it was intended to include as many subskills as possible. The estimated reliability (Cronbach's alpha) of the reading comprehension test was .88.

3.4 Data Collection Procedures

A test booklet, including a vocabulary test followed by a grammar test and a reading comprehension test, was prepared. The tests were administered to the participants by the researcher during scheduled English classes. Before the participants started the tests, the researcher provided a brief overview of and instructions for the tests in order to ensure that they understood each test section. To prevent any learning that might occur in the course of test-taking from being applied in answering the previous questions, participants were told to take each test in the order that they were presented in the test booklet and not to go back to previous sections. There was no specified time limit for each section other than the one for the whole test. The approximate time spent for the three tests was 45 minutes. Participants were encouraged to answer all items sincerely, and in the case of an unknown answer, they were asked to

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leave it blank instead of guessing blindly.

3.5 Scoring and Data Analyses

For all the test items, each correctly answered item received one point, and no points were allocated to incorrectly answered and unanswered items. The composite score of each test was subject to analyses. In order to address the two research questions, correlation and multiple regression analyses were completed on SPSS version 21. Specifically, zero-order correlation analyses were first conducted to examine the bivariate relationships between vocabulary/grammar knowledge and reading comprehension. In addition, multiple regression analyses were conducted to explore the predictive power of vocabulary and grammar knowledge for reading comprehension for the Korean EFL adolescent learners.

Before conducting and interpreting the results of the multiple regression analysis, the fitness of the data was examined. Following Abbott (2010), the fulfillment of three assumptions of regression was inspected: normal distribution of data, homoscedasticity of variables, and normal distribution of the standardized residuals. First, the normality of data distribution was examined by visual means of histograms and on the basis of Abbott's (2011) skewness and kurtosis index values. The skewness index value was obtained by dividing the skewness value by the standard error of skewness. The kurtosis index was obtained following the same fashion. If the resulting index value exceeds three, the distribution is not considered balanced and normally distributed (Abbott, 2011). All the test results in the present study tended to

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be negatively skewed and showed platykurtic distribution, but the skewness and kurtosis indices of all data were within the acceptable range.

Furthermore, homoscedasticity of vocabulary and grammar test results in relation to reading comprehension test was checked by looking at scatterplots, and they showed balanced patterns of scatter around regression lines. The linearity of relationships among the three test scores was also probed, and they were in linear relationships.

Lastly, the distributions of the standardized residuals were inspected through histograms and their skewness and kurtosis index values. The skewness index of the standardized residuals was 1.35, while the kurtosis index was 1.06. The indices confirmed the normal distribution of the standardized residuals. Multivariate extreme scores were also examined by distance and influence statistics. Centered leverage values, Cook's distance values, and DfBeta measures all showed no extreme outliers in the data.

To gain insight into the roles the predictors play in the multiple regressions, structure coefficients, product measures, and commonality coefficients were calculated using the values obtained by multiple regression analyses (Nathans, Oswald, & Nimon, 2012). Structure coefficients[15] were computed to show the bivariate correlation between the participants' vocabulary/grammar knowledge and their reading scores predicted by the multiple regression model. Product measure[16] was also calculated to show the importance of each predictor variable (i.e., vocabulary knowledge and grammar knowledge) based on the

15) Structure coefficients were calculated by dividing the bivariate correlation between an independent and a dependent variable by the multiple correlation coefficient for the regression containing all independent variables.

16) Product measure was calculated by multiplying the variable's zero order correlation by its beta weight (Pratt, 1987).

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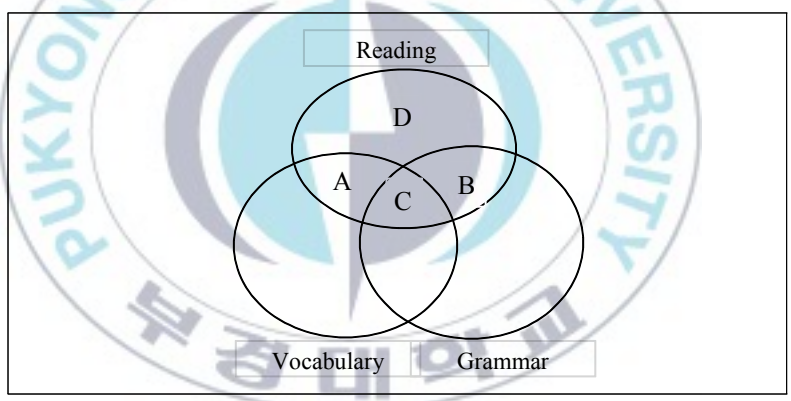
partitioning of the regression effect (Pratt, 1987). Finally, the commonality analysis was conducted to partition the regression effect into non-overlapping components of variance, and the commonality coefficients show exactly how predictor variables contribute unique and shared variance to the regression equation. In the present study, reading variance can be divided into four sections when reading, vocabulary, and grammar are inter-related, as shown in Figure 1.

FIGURE 1. Partition of Variance of Reading in a Regression with Vocabulary and Grammar



Sections A, B, and C describe the reading variance that can be accounted for by vocabulary and grammar,[17] and can be computed as R^2 through the regression analyses. Specifically, Sections A and B are uniquely explained by vocabulary and grammar respectively, and the commonality coefficients for the unique effect of each of the predictors were calculated by squaring semipartial correlations (Abbott, 2010). In contrast, Section C is where reading variance

17) Section D is the reading variance that is not explained by vocabulary and grammar.

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can be explained by the intersection of vocabulary and grammar, and the shared variance is calculated by subtracting the commonality coefficients for the unique effects of vocabulary and grammar from the multiple R^2 (i.e., the proportion of the variance in reading explained by the regression model).

3.6 Results

3.6.1 Relationships Among Vocabulary, Grammar, and L2 Reading Comprehension

The descriptive statistics of the three tests are presented in Table 3. The mean scores of the vocabulary and grammar tests were 36.15 and 13.43, respectively, while that of the reading comprehension test was 10.48.

TABLE 3. Descriptive Statistics of Test Scores (N=96)

Test	Full score	Mean	SD	Min	Max
Vocabulary	60	36.15	15.29	3	57
Grammar	25	13.43	6.03	0	25
Reading	22	10.48	5.62	0	22

To explore the bivariate relationships among vocabulary knowledge, grammar knowledge and reading comprehension, zero-order correlation analyses were conducted. As presented in Table 4, both the vocabulary and grammar test results were positively correlated with reading comprehension. Vocabulary and reading were strongly correlated, $r(94)=.792$, $p=.000$, and the correlations between grammar and reading were also strong, $r(94)=.794$, $p=.000$.[18)]

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Furthermore, the coefficient of determination, r^2, showed that vocabulary and grammar shared similar amount of variance with reading. Specifically, the participants' vocabulary knowledge explained 62.8% of their performance on the reading comprehension test, and their grammar knowledge explained 63.0% of their reading variance. In addition, as r^2 values of .02, .13, and .26 can be interpreted as estimates of small, medium, and large effect sizes (Cohen, Cohen, West & Aiken, 2003), both vocabulary and grammar had very large effect sizes.

TABLE 4. Zero-order Correlations with Reading Comprehension (N=96)

Predictor variable	*r*	r^2	*F*	*df*	Sig.
Vocabulary	.792	.628	158.679	94	.000
Grammar	.794	.630	160.330	94	.000

However, since there was also a significantly strong positive correlation between vocabulary and grammar, r=.776, p=.000, with a r^2=.602, it is not valid to determine the relative importance of each independent variable in reading, based on the zero-order correlation coefficients alone, especially with the influence of the other independent variable being excluded. For instance, it is possible that the part of vocabulary that is not correlated with grammar has no significant effects on reading, while the part of grammar not correlated with vocabulary demonstrates its significance in reading, and vice versa. In such cases, it is hard to decide how the knowledge of vocabulary and grammar is uniquely related to L2 reading. For this reason, the next section is

18) Correlations above .10 are considered small, above .30 medium, and above .50 large (Cohen, 1988).

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devoted to discussing the unique contributions of each predictor to the variances in reading comprehension scores.

3.6.2 Predictive Power of Vocabulary and Grammar Knowledge for Reading Comprehension

To explore the predictive power of vocabulary and grammar knowledge for reading comprehension for the Korean EFL adolescent learners, multiple regression analyses were conducted. The results showed that the overall regression model was statistically significant ($F(2, 93)=113.025$, $p=.000$), suggesting that reading comprehension can be predicted significantly above chance level from scores on vocabulary and grammar tests combined. As shown in Table 5, R^2 value indicated that vocabulary and grammar together explained 70.9% of the reading score variance. Furthermore, each of the predictor variables (i.e., vocabulary and grammar) in the regression model made a statistically significant contribution. Specifically, grammar obtained larger beta weight ($\beta=.450$, $p=.000$.) than vocabulary ($\beta=.443$, $p=.000$), demonstrating that it made slightly larger contribution to the regression equation, while holding the other variable constant.

Sole reliance on using beta weight to interpret multiple regression analyses is not justified, however, in the case where predictors are correlated (Pedhazur, 1997). For this reason, structure coefficients and product measures were calculated to verify the importance of each predictor variable. As shown in Table 6, the squared structure coefficient (rs^2) demonstrated that grammar explained only a marginally larger amount (89.0%) of the variance than

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vocabulary (88.6%) in ŷ, the predicted values of reading when variance was allowed to be shared between vocabulary and grammar. Similarly, the results of product measure (Pratt, 1987) demonstrated that grammar accounted for a larger portion of variance in reading (.357), which is 50.4% of the regression effect (R^2=.709), than vocabulary did (.351).

TABLE 5. L2 Reading Comprehension Related to Vocabulary and Grammar (N=96)

Model	Unstandardized Coefficients		Standardized Coefficients			Correlations	
	B	SE	Beta	t	Sig.	Partial	Semi-partial
1 Vocabulary	.291	.023	.792	12.60	.000	.792	.792
2 Vocabulary	.163	.033	.443	5.00	.000	.460	.279
Grammar	.419	.083	.450	5.07	.000	.465	.284
			$R^{2=}$.709				

Although all these statistics clearly demonstrated that vocabulary and grammar contributed similar amounts to the regression equation, they did not show the unique contribution of each variable to the regression equation. Thus, commonality coefficients were consulted to gain this information. The results in Table 6, also presented in Figure 2, can be interpreted as the amount of variance in L2 reading accounted for by each predictor variable. The commonality coefficient of 'unique to vocabulary' (.078) indicates that 7.8% of the variance in L2 reading is uniquely accounted for by vocabulary, while 8.1% of the variance in L2 reading is uniquely explained by grammar. Where vocabulary and grammar exert a common effect, 55% of the variance in L2

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reading can be explained. This suggests that vocabulary and grammar variables account for more variance in reading when combined than in isolation. Furthermore, while their unique effect sizes are medium, their combined effect size is very large based on Cohen et al.'s (2003) criteria that r^2 values of .02, .13, and .26 are proposed to be interpreted as estimates of small, medium, and large effect sizes.

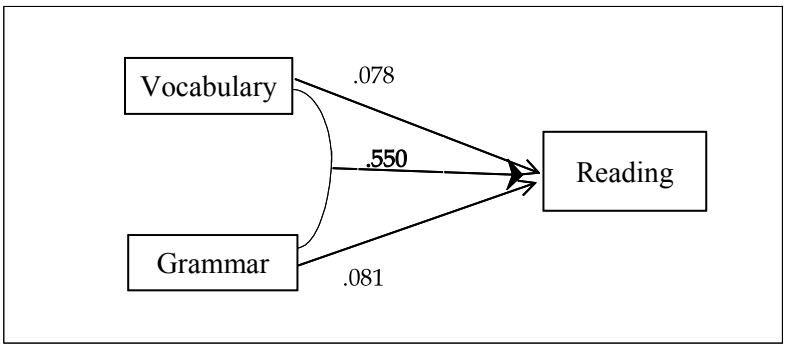
TABLE 6. Summary of Statistics Determining Independent Variable Contributions to Regression Effects (N=96)

Predictor Variable	β	r_s (structure coefficient)	r_s^2 (squared structure coefficient)	r (correlation)	Pratt (product measure)	Commonality coefficients	
						Unique[1)]	Common[2)]
Vocabulary	.443	.941	.886	.792	.351	.078	.550
Grammar	.450	.942	.890	.794	.357	.081	.550

Note: 1) "Unique" indicates the amount of the variance that the independent variable contributes to the regression model that is not shared with the other variable.

2) "Common" indicates the amount of the variance that the independent variable contributes to the regression model that is shared with the other variable.

FIGURE 2. Commonality Coefficients for Reading Comprehension (N=96)



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3.7 Conclusions and Limitations

The results of zero order correlational and multiple regression analyses manifest that both vocabulary and grammar are significantly correlated with the L2 reading performance of Korean highschool students. Moreover, the two types of linguistic knowledge accounted for about 71% of their reading ability. They also had unique effects on reading. The students' breadth of vocabulary and grammatical knowledge could predict an almost equal amount of their L2 reading variance, but grammatical knowledge showed stronger predictability, however minor it was.

The findings of the present study, however, should be interpreted with caution due to a few methodological problems. First, only half of the Vocabulary Levels Test was used, so the test scores may not be representative of their breadth of vocabulary knowledge. Second, the number of items of grammar test was small compared to that of vocabulary test. Moreover, since each item required different grammatical knowledge in answering it, testing only twenty five kinds of grammatical knowledge may not delineate one's grammatical competence. The addition of more items may increase the credibility of the score as an index of one's grammatical ability. Third, the participants of the study were limited in number as well as in gender. A study with a large sample of learners with both genders may add important insights to the limited database and understanding of relative roles of vocabulary and grammar knowledge in L2 reading. Finally, the roles of vocabulary and grammar in L2 reading were examined treating the subjects as a homogeneous group. However, their roles may not be unanimous in different L2 reading

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ability groups. Overcoming these limitations, the main study explores the roles of each type of language knowledge in L2 reading of larger subjects of both sexes, divided into three different L2 reading ability groups.

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Ⅳ. RESEARCH METHOD

This chapter describes the participants of the study and the instruments utilized to assess their vocabulary and grammar knowledge as well as their L2 reading comprehension. This is followed by a description of the data collection procedures and the manner of scoring and analyzing data.

4.1 Participants

Two hundred twenty seven Korean high school students leaning English as a foreign language in seven intact classes participated in the study. They were all native speakers of Korean composed of 106 males and 121 females, and all were eleventh graders attending a public high school in Busan, South Korea. They had been taking English as a compulsory subject for seven years. Two English teachers from the school asserted that the students' English proficiency level was of an average level compared to that of other Korean eleventh graders based on results of national tests of educational achievement. Three students were found to have stayed in English speaking countries, Canada and the United States, for more than a year, and their data were excluded from the analyses.

4.2 Instruments

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One questionnaire and three measurement instruments were employed in the study. The questionnaire was designed to obtain background information about the participants including their age, years of learning English, and any experience of living in an English speaking country. Each of the three constructs of interest, namely breadth of vocabulary knowledge, grammar knowledge, and L2 reading comprehension, was operationalized as the score of a multiple-choice test. Care was taken so that each instrument assessed the designated construct unaffected by the other competencies of interest. However, since three constructs were measured in less than 150 minutes, the testing tools had to be familiar to the participants so that they did not have to dedicate too much time trying to understand them. Moreover, it was assumed that the students would pay more attention to the tests if they thought the tests looked easy (Shohamy, 1984). For these reasons, all the tests were prepared in a multiple-choice format as the participants were very much used to multiple-choice tests like most students in Korean schools, and the directions and response options were provided in Korean wherever possible.

4.2.1 Vocabulary Test

The Korean version of the Vocabulary Levels Test (VLT)[19] was employed to measure the breadth of participants' English vocabulary (see Appendix 1). The Vocabulary Levels Test is the most widely used vocabulary test when

19) It was downloaded from Paul Nation's home page, http://www.victoria.ac.nz/lals/about/staff/paul-nation.

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assessing the size of one's English vocabulary (Schmitt, 2010). It was originally developed by Nation (1983, 1990) with four frequency levels of vocabulary—2,000, 3,000, 5,000, and 10,000 levels—and a non-frequency level, the university word list level, vocabulary. The frequency counts used were the General Service List (West, 1953), Thorndike and Lorge (1944), and Kučera and Francis (1967). The university level words are sampled from the University Word List (Xue & Nation, 1984) which was developed from two main lists of Campion and Elley (1971) and Praninskas (1972). Each of their lists is derived from approximately 300,000 running words of academic texts. Characteristics of the vocabulary in each level are described in the Table 7.

TABLE 7. Vocabulary Types of the Vocabulary Levels Test
(Nation, 1990, p. 263)

Vocabulary level	Type of vocabulary
2,000-word level	The General Service List; the vocabulary of simplified reading books
3,000-word level	A basis for beginning to read unsimplified texts
5,000-word level	A wide vocabulary
The university word level	The specialized vocabulary of university texts
10,000-word level	A large wide vocabulary

Later, Schmitt et al. (2001) revised and extended the Nation's VLT, producing two interchangeable versions: version 1 and version 2. Version 1 of the VLT was used in the study. The revised VLTs consist of the same five levels of vocabulary as the original VLT, but academic vocabulary is tested using the Academic Word List (AWL) (Coxhead, 1998, 2000) that was developed from a corpus of 3.5 million running words of academic texts and

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accounts for 10% of the total tokens in the corpus. Like the original VLT, the revised ones are made up of nouns, verbs and adjectives in a 3: 2: 1 ratio to reflect the real distribution of these word parts in English (Schmitt et al., 2001). To be exact, there are five noun clusters, three verb clusters and two adjective clusters in each level of a Schmitt et al. version. Each cluster is made up of six numbered options containing three target words and three short definitions for the target words. Test takers are required to write the number of the word that matches a provided definition next to it. Below is a sample cluster of the Schmitt et al. versions of VLT:

This is a vocabulary test. You must choose the right word to go with each meaning. Write the number of that word next to its meaning.

1 business
2 clock _____ part of a house
3 horse _____ animal with four legs
4 pencil _____ something used for writing
5 shoe
6 wall

The rationale for using the VLT as a measure of the students' vocabulary knowledge is as follows. First, as Nation (2001) stated, the VLT measures receptive knowledge of vocabulary and taps into the partial knowledge of a word. Schmitt et al. (2001) claimed that it should "be seen as providing an indication of whether examinees have an initial knowledge of the most frequent meaning sense of each word in the test" (p. 62). Since reading is also a receptive activity in a sense, and often the degree of lexical knowledge can be heightened through reading, the characteristic of the VLT was felt

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suitable for the present study.

Second, the students' breadth of vocabulary knowledge can be obtained by the results of the VLT. Originally the VLT was developed with a diagnostic purpose in mind, so the test result provides the vocabulary size of each level instead of a test taker's overall vocabulary size. However, the purpose of the using the instrument in the present study does not lie in obtaining exact vocabulary size of the participants but in obtaining the general information of their vocabulary size, so the VLT conformed to the requirements to be used as the measure of participants' lexical knowledge.

Third, the discrete nature of the VLT ensures that the test is solely focused on measuring vocabulary knowledge. There is no possibility of it overlapping with the other constructs, grammar and reading. Therefore, the construct validity is guaranteed.

Finally, as mentioned above, the VLT is a most widely used test. Thus, use of this test tool makes it possible to compare the results of the present study with many other existing studies. The decision of the applicability of findings of this study in other contexts can also be facilitated by using the common tool.

In the Korean version of the VLT, the test rubric as well as the cues were provided in Korean. Unlike in the pilot study, the full version with a total of 150 items was employed in the study. The internal consistency reliability of the vocabulary test was excellent with Cronbach's alpha of .96 in this sample.

4.2.2 Grammar Test

The grammar test consisted of two multiple choice tasks, each with 25 items

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(see Appendix 2). One, GT1,[20] was finding the missing part of a stem sentence from four options provided, the same task used in the pilot test, and the other, GT2, was locating the ungrammatical part among four underlined parts of a sentence.[21] GT2 was incorporated as well as GT1 to measure the students' syntactic knowledge to reduce the possibility of task effect. The target grammatical knowledge in both tasks was the same, so a total of 25 different types of grammatical knowledge were used in the grammar test. Since there exists no comprehensive list of the types of grammatical knowledge (Urquhart & Weir, 1998), the researcher included in the test as many essential grammar types as possible, using available commercial tests and a basic grammar book as a guide. As in the case of developing GT1, sentences of GT2 were adopted from the Preliminary English Test (PET), the First Certificate in English (FCE), and Grammar for IELTS (Hopkins & Cullen, 2008), and were designed in the form of an error detection task. When choosing the distracters for an item, not only the grammatical focus but also the number of words and the interval between the options were considered so that different grammatical forms are underlined, and the four options are spread out in a sentence.

Alderson (1993) cautioned that a grammar test should be separated from a reading test. Too much dependency on the other construct in a grammar test would obscure the construct validity of it, and vice versa, although the construct of either grammar or reading is hard to define. In any case, the researcher opted to base the grammar test on decontexualized sentences so as

20) GT1 is the same grammar test used in the pilot study.
21) Except only one instance from each of the tasks, one stem sentence was used for each item.

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to minimize the need for reading. To further increase the construct validity of GT2, the same process applied in making GT1 was administered. First, the level of the vocabulary in the task was checked through VocabProfile (Cobb, 2002) in order to reduce vocabulary difficulty. Second, the readability[22] of the task was examined to check that the sentences used are not complicated and difficult to understand. Third, two experienced English instructors reviewed the appropriateness of the task.

As shown in Table 8, the final version of the task contained 91.9% of 1000 (K1) words and 5.4% of 2,000 (K2) words after several revisions. The words beyond the K2 level (2.7%) were considered fairly easy for the participants, according to the two professionals. The readability indices of GT2 were almost identical with those of GT1: the Gunning Fog and the Flesch-Kincaid index scores were 5.3 and 3.3, respectively. Two professionals also confirmed the simplicity and suitability of the task. The internal consistency reliability (Cronbach's alpha) of the grammar test was .85 in this sample.

TABLE 8. Text Features of the Grammar Test

Grammar Test	Number of Items	Frequent-1K words	Frequent-2K words	Gunning Fog	Flesch-Kincaid
Part 1	25	93.9%	5.7%	5.5	3.3
Part 2	25	91.9%	5.4%	5.3	3.3
Mean	25	92.9%	5.5%	5.4	3.3

22) The readability test tool on www.read-able.com was used.

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4.2.3 Reading Comprehension Test

The same reading comprehension test used in the pilot study was also utilized in the main study after a few revisions (see Appendix 3). First, two items were eliminated to give equal weight on each text resulting in a total of 20 items in the test. Originally, two of the texts were followed by six questions instead of five. After the items were deleted, the comprehension of each of the four texts was checked with recourse to five multiple-choice questions. The deleted items were those with the lowest scores in the pilot study. Second, the use of Korean was maximized in the multiple-choice options[23]. Third, an English word in an option was changed into an even simpler word. The estimated internal consistency reliability was acceptable with a Cronbach's alpha of .73 in this sample.

4.3 Data Collection Procedure

Three tests were taken in three consecutive days, as shown in Table 9. The students took one test per day, and the order of the tests taken were the same as in the pilot study. They took the vocabulary test, the grammar test, and then the reading comprehension test. The tests were taken in their regular English classes. Therefore, the time of tests taken in a day varied class by class but not the days. The tests were proctored by two English teachers of

23) It was found that Question number 19 had two answers because of the dubious meaning of a Korean word in an option during the first defence session.

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the school. They had a full understanding of the tests and the purpose of the study. Before each test, the teachers gave a brief overview of the test to the students, and for the vocabulary test, the teachers explained how to complete an example test item. The students were encouraged to answer all the questions sincerely but to leave them blank rather than guess blindly when they did not know the answer. Since a regular class lasted for 50 minutes, allocated time for a test was equal to that. However, the average time taken for each test, not counting the time needed to distribute and explain the test, was approximately 30 minutes. No student found the allocated time insufficient.

TABLE 9. Test Battery Description

Day	Task	No. of Items	Approximate time taken
1	Vocabulary Test	150	30 min
2	Grammar Test	50	30 min
3	Reading Comprehension Test	20	30 min

4.4 Scoring and Data Analysis

Every correctly answered item received one point, and every incorrectly answered and unanswered item received no points. Since the students had sufficient time to complete the test, unanswered items were treated as unknown. The sincerity of the answers was also checked, and students were deemed to have taken the test with care as no consecutively repeated answers

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or any patterns of answers were found. However, some students left many items unanswered. For the vocabulary test, 26 students did not answer 10,000 frequency level word items. For the grammar test, two students answered only first 4 items of the GT2. In the case of the reading comprehension test, 10 students answered less than 10 questions. The main reason for the unanswered items is presumed to be fatigue since all those unanswered items lied at the end of the test. Besides, 10,000 level word items were of the highest difficulty, so the students might not have answered those at the level not only because of weariness but also because of a lack of knowledge. Moreover, the weariness some of the students might have succumbed to during the reading comprehension test might have been caused by the fact that it was the last test. Three day long tests might have led them to feel tired and bored.

As the tests were taken in three days, not all the participants took every test in the test battery. Students were absent for various reasons. As shown in Table 10, eight students, one student, and seven students were absent from the vocabulary test, grammar test, and reading comprehension test, respectively.

TABLE 10. Number of Test Takers

No. of students	Vocabulary Test	Grammar Test	Reading Comprehension Test
present	219	226	220
absent	8	1	7
total		227	

Some of the test data were excluded from the analyses in the following order (see Table 11). First of all, the test results of the three students who

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had an extended stay in English speaking countries were removed Then, the data of those students who were absent for any test day were removed. A total of 13 students failed to take the complete set of tests. Finally, some of the scores of partially performed tests were not used. In the grammar test, only two students did not answer one or two items. For the reading comprehension test, data elimination criterion was set at more than 10 questions unanswered. As mentioned above, there seemed to be sufficient time to complete the test, so unfinished tests were judged as having been completed insincerely. However, three students, who answered until item number fifteen, appeared to be lacking knowledge for the last five questions considering their performance on previous items. Therefore, their data were kept, but other incomplete data were eliminated. After the data reduction process, the study included data from 200 students.

TABLE 11. Sample Size by Reduction Criteria

Reduction Criteria	Reduction Size	Sample Size
Original	0	227
Prolonged ESL	3	224
Absence	13	211
GT incomplete	2	209
RCT incomplete	9	200

The test scores of the 26 students who had provided some incomplete answers for the vocabulary test were included for the analyses. Close inspection of their scores revealed that their level of vocabulary knowledge was generally rather low. The elimination of all their data could have resulted in losing a meaningful portion of the lower-level students' information. Many

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students claimed that 10,000 items were too difficult, and it was proven by the low scores at that level. Thus, the researcher decided to use the scores of 2,000, 3,000, 5,000, and academic word level items only, discarding the scores of 10,000 word level items.

As in the pilot study, zero-order correlation and multiple regression analyses were conducted using SPSS version 21 to answer the research questions. In order to answer the first research question, the data were analyzed as a whole group. For the second research question, the students were divided into three groups with different reading abilities—advanced, intermediate, and low—based on the scores of the reading comprehension test. To verify the group differences of the reading abilities, a one-way ANOVA was performed, and Scheffé tests were conducted as a post hoc analysis. Then, the respective roles of vocabulary and syntactic knowledge in L2 reading of the each group were investigated. Before interpreting the results of the regression analyses, three assumptions of regression were checked in the same manner as in the pilot study. To recap, the assumptions were that there are a normal distribution of the test scores and a normal distribution of the standardized residuals, and a homoscedasticity of the variables.

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Ⅴ. RESULTS AND DISCUSSION

This chapter presents the main results of the analyses that reveal the interrelationships among the variables and relative roles of vocabulary and grammar in second language reading of Korean high school students. Descriptive statistics are reported first as background data. This is followed by reports on the correlational, ANOVA, and the regression data. The statistical data of all subjects regardless of group are presented first, and the data of each of the three sub-groups with different reading levels follow. The findings of the study are discussed in relation to the previous literature.

5.1 Relative Roles of Vocabulary and Grammar in L2 Reading of the Participants as One Group

Table 12 summarizes the descriptive statistics of the test results for all subjects as a whole. The mean scores of the three measures are generally comparable. The mean scores of the vocabulary and grammar tests were 73.31 and 24.59, respectively, and that of the reading comprehension test was 10.39. The skewness and kurtosis indices were smaller than 3.00 in absolute values, so the values were in the acceptable range of normal distribution.

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TABLE 12. Descriptive Statistics of Test Scores (N=200)

Test	*k*	Mean	SD	Min	Max	Skew[1]	Kurt[2]
Vocabulary	120	73.31	21.98	6	114	-2.48	-0.78
Grammar	50	24.59	8.00	8	45	2.47	-1.15
Reading	20	10.39	3.64	3	19	0.35	-2.27

NOTE: [1] Skewness Index; [2] Kurtosis Index

TABLE 13. Zero-order Correlation for All Variables (N=200)

Variable	Vocabulary	Grammar	Reading
Vocabulary	--	.705***	.577***
Grammar		--	.567***
Reading			--

*** $p < .0001$

Pearson product-moment correlation coefficients were computed to assess the bivariate relationships among the variables of vocabulary, grammar, and reading. They were all positively correlated with each other, and all the correlations were significant, as shown in Table 13. There was a strong correlation between the vocabulary scores and the reading scores, $r(198)=.577$, $p<.001$. The correlation between the grammar scores and the reading scores was also strong, $r(198)=.567$, $p<.001$. However, the correlation between the vocabulary scores and the grammar scores was the strongest, $r(198)=.705$, $p<.001$. As all the correlations were statistically significant, their effect sizes were interpreted based on the rules of thumb suggested by Cohen (1988). Since all the correlation coefficients were bigger than .50, the effect sizes of three correlations were considered large. The proportion of the reading variance that was shared by both independent variables was examined by calculating the

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coefficient of determination, r^2. 33% of the reading variance was accounted for by the participants' vocabulary knowledge, r^2=.33. Their grammar scores explained 32% of the reading variance, r^2=.32.

A multiple linear regression analysis was utilized to develop a model for predicting the students' reading comprehension test scores from their vocabulary test scores and grammar test scores since vocabulary and grammar scores were significantly correlated with each other. Before interpreting the results of the analysis, assumptions for regression were further checked. As mentioned above, normal distributions of test scores were confirmed by histograms and skewness and kurtosis indices. Normal distribution of the standardized residuals was verified in the same manner. The histogram was in a bell shape. The indices of skewness and kurtosis were －0.53 and －1.14, respectively. Moreover, scatterplots showed that the case values scattered around the regression line approximately equally. Therefore, it was concluded that using the multiple regression analysis with the data was valid.

TABLE 14. Summary of Statistics Determining Independent Variable Contributions to Regression Effects (N=200)

Predictor Variable	b	β	r_s (structure coefficient)	r_s^2 (squared structure coefficient)	Pratt (Product measure)	Commonality coefficients	
						Unique[1)]	Common[2)]
Vocabulary	.058	.353	.931	.867	.204	.063	.271
Grammar	.144	.318	.914	.836	.180	.051	.271

Note: All measures were statistically significant at p = .00.

The prediction model was statistically significant, $F(2, 197)=61.424$, $p<.001$, and accounted for approximately 38% of the reading variance (R^2=.384). Also,

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each of the predictor variables (i.e., vocabulary and grammar) made a statistically significant contribution to the regression model, $p<.001$. Their relative roles were examined by multiple regression weights, structure coefficients, product measures and commonality coefficients as presented in Table 14.

Unstandardized regression weights, b weights, showed that with an additional point gained in the vocabulary test or the grammar test, the reading comprehension test score is likely to increase .058 or .144 points, respectively, when the other predictor is held constant in the regression model. However, standardized regression weights, β weights, revealed that one standard deviation change in the vocabulary or grammar test score was associated with the change of .353 or .318, respectively, in the outcome variable, the expected reading comprehension test scores, with the other predictor held constant. Structure coefficients are bivariate correlations between an observed predictor variable and the predicted criterion scores. Structure coefficients of the vocabulary and grammar test scores were .931 and .914, respectively. Their effect sizes were calculated by squaring the values, and the squared structure coefficients showed that vocabulary and grammar shared 86.7% and 83.6% of their respective variance with the variance from the predicted reading comprehension scores. Product measures were calculated by multiplying the independent variables' zero order correlations by their beta weights. The product measures of vocabulary and grammar test scores were .204 and .180, respectively. Since their sum equalled the multiple R^2 for the regression model, the relative importance of vocabulary compared to grammar can be derived from the product measures.

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As seen so far, β weights, structure coefficients and product measures all demonstrated the relative significance of vocabulary over grammar in explaining the reading variance, although the difference between them was marginal. However, in order to gauge unique and common effects of independent variables on the outcome variable, commonality coefficients were calculated. Commonality coefficients of unique effects are obtained by squaring part correlations. The number equals the R^2 change. Thus, the order of data entered to the regression model does not have any effect in retrieving commonality coefficients. Since commonality coefficients sum to the multiple R^2 for the regression model, the commonality coefficients of common effect was obtained by subtracting commonality coefficients of unique effects from the multiple R^2 for the regression model. Vocabulary alone accounted for 6.3% of the reading variance when the grammar variable was held constant, while grammar explained 5.1% when the vocabulary variable was held constant. The correlated part of vocabulary and grammar explained 27.1% of the reading variance. Since all the values of commonalities were positive, it was concluded that there were no suppressor effects despite the strong correlation between the independent variables (Amado, 1999). Based on the criteria of Cohen et al. (2003), the unique effects of vocabulary and grammar were small to medium, while the common effect was large.

The results suggested that both vocabulary knowledge and grammar knowledge might have had a significant effect on L2 reading comprehension of Korean high school students. Although vocabulary and grammar shared a large part with each other, their individual role in L2 reading also appeared valid. The unique effects of vocabulary and grammar on L2 reading were

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similar, but that of vocabulary seemed slightly larger.

The finding that having competence in both L2 vocabulary and grammar is important in L2 reading comprehension corresponds to those from many of previous studies including the pilot study (e.g., Bossers, 1991; Lee & Schallert, 1997; Taillefer, 1996; Yamashita, 2002). Among them, the correlational study of Lee and Schallert (1997) is particular since the authors uncovered a similar result from EFL Korean adolescents as in this study. Another study that is relevant in terms L1, L2, and age of the subjects is that of Kim (1995). Through a qualitative analysis of Korean high school students' L2 recall protocols, she found that vocabulary and syntax are two major sources of problems in L2 reading. However, the applicability of this finding is not limited to those EFL leaners in Korean secondary schools. Jeon and Yamashita (2014) conducted a meta-analysis of 57 correlational studies, based on subjects of a different L1, L2, age range, and L2 proficiency, to examine "the overall average correlation (weighted for sample size and corrected for measurement error) between passage-level second language (L2) reading comprehension and 10 key reading component variables investigated in the research domain" (p. 160). They found that vocabulary and syntax are two strongest correlates of L2 reading.

The results from the pilot study with 96 male students at a different Korean high school also indicate the positive roles of vocabulary and grammar with similar weight. In the pilot study, the relatively greater role of grammar was observed, whereas vocabulary had a stronger effect in L2 reading in the main study. Nevertheless, the differences in both the pilot and the main studies are minimal. Therefore, the robustness of the present finding, i.e., the comparable

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importance of vocabulary and reading in L2 reading, is much supported by previous literature as well as the results of the pilot study.

5.2 Relative Roles of Vocabulary and Grammar at Three Levels of L2 Reading Comprehension

The roles of vocabulary and grammar in L2 reading comprehension were further explored to account for the students' L2 language proficiency. As the students' reading comprehension ability levels varied to a large extent, they were grouped into three ability levels in order to examine the roles of vocabulary and grammar at different levels of L2 reading ability.

The criterion used in dividing the students into three groups was the average score of the reading comprehension test. The students whose reading scores were higher than the average score plus one standard deviation were assigned to the advanced-level reading group (AR), and those with lower reading scores than the average minus one standard deviation were assigned to the low-level reading group (LR). The students whose reading scores were lower than the average plus one standard deviation and those with reading scores higher than the average minus one standard deviation were placed in the intermediate-level reading group (IR). The reading scores of the advanced, intermediate, and low reading groups ranged from 14 to 19, from 8 to 13, and from 3 to 7, respectively (see Table 15). The data were examined for outliers, skewness and kurtosis. No distinguishable outliers were found by the inspection of scatter

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plots. The skewness and kurtosis indices were smaller than 3.00 in absolute values as shown in Table 15.

TABLE 15. Descriptive Statistics of Test Scores by Groups

Reading Level	Test	Mean	SD	Min	Max	Skew[1]	Kurt[2]
Advanced (N=43)	Vocabulary	91.00	16.04	40	114	-2.94	2.39
	Grammar	30.98	7.43	16	45	-0.23	-1.50
	Reading	15.35	1.40	14	19	2.58	0.04
Intermediate (N=108)	Vocabulary	73.56	19.67	6	109	-2.84	1.16
	Grammar	24.46	7.31	12	44	2.38	-0.28
	Reading	10.56	1.76	8	13	-0.09	-2.77
Low (N=49)	Vocabulary	57.20	19.24	14	101	0.26	-0.17
	Grammar	19.24	5.67	8	32	-0.01	-1.19
	Reading	5.67	1.20	3	7	-1.38	-1.18

NOTE: [1] Skewness Index; [2] Kurtosis Index

The number of the subjects in the advanced, intermediate, and low reading groups were 43, 108 and 49, respectively. The size of the IR group was more than twice as big as those of the AR and LR groups. However, since the study was intended to explore whether and/or how the effects of L2 grammar and vocabulary knowledge on L2 reading comprehension differ depending on the readers' level of language proficiency (reading ability), the students were divided into groups not of the same size but with different reading abilities. Moreover, the bigger size of the IR group only reflected general dispersion of EFL learners. Technically speaking, the small sizes of the AR and LR groups nevertheless met the minimal number of subjects needed for the use of a multiple regression analysis which was suggested by Kamil, Langer, and Shanahan (1985). According to them, a minimum of 20 subjects are needed

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for each independent variable in order to conduct a multiple regression analysis. Since all the groups of the present study, in which two independent variables were observed, vocabulary knowledge and grammar knowledge, are made up of more than 40 subjects, this requirement is fulfilled.

Table 15 summarizes the descriptive statistics of the vocabulary, grammar and reading test results of each group. In the AR group, the mean scores of vocabulary, grammar, and reading tests were 91.00, 30.98, and 15.35, respectively. In the IR group, the average scores of vocabulary, grammar, and reading tests were 73.56, 24.46, and 10.56, respectively. The mean scores of vocabulary, grammar, and reading tests in the LR group were 57.20, 19.24, and 5.67, respectively. The mean scores of all three tests were the highest for the AR group, and the lowest for the LR group.

To examine the discrepancy of the test scores among the groups, a one-way ANOVA was conducted. Test scores differed significantly across the three groups. F values for the reading, vocabulary, and grammar scores are as follows: $F(2, 197)=440.165$, $p<.001$; $F(2, 197)=36.850$, $p<.001$; and $F(2, 197)=32.429$, $p<.001$, respectively. A post-hoc Scheffé test revealed that every kind of test score significantly differed from one group to another, $p<.001$. The comparison of the confidence interval (CI) of each test score also corroborated these findings. As for the reading test, the mean score of the AR group was 15.35, 95% CI [14.92, 15.78]; that of the IR was 10.56, 95% CI [10.22, 10.89]; and that of the LR was 5.67, 95% CI [5.33, 6.02]. For the vocabulary test, the mean score of the AR group was 91.00, 95% CI [86.06, 95.94]; that of IR was 73.56, 95% CI [69.81, 77.32]; and that of the LR was 57.20, 95% CI [51.68, 62.73]. The mean scores of the grammar test of AR,

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IR, and LR groups were 30.98, 95% CI [28.69, 33.26]; 24.46, 95% CI [23.07, 25.86]; and 19.24, 95% CI [17.62, 20.87], respectively. These results are illustrated in Figure 3, 4, and 5. For all three tests, there are gaps between the intervals, confirming that the groups are distinct in all measures (Cumming, 2012). Evidently, as the students' reading score goes up, so do their vocabulary and reading scores.

Figure 3. 95% Confidence Intervals of Reading Test Scores

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Figure 4. 95% Confidence Intervals of Vocabulary Test Scores

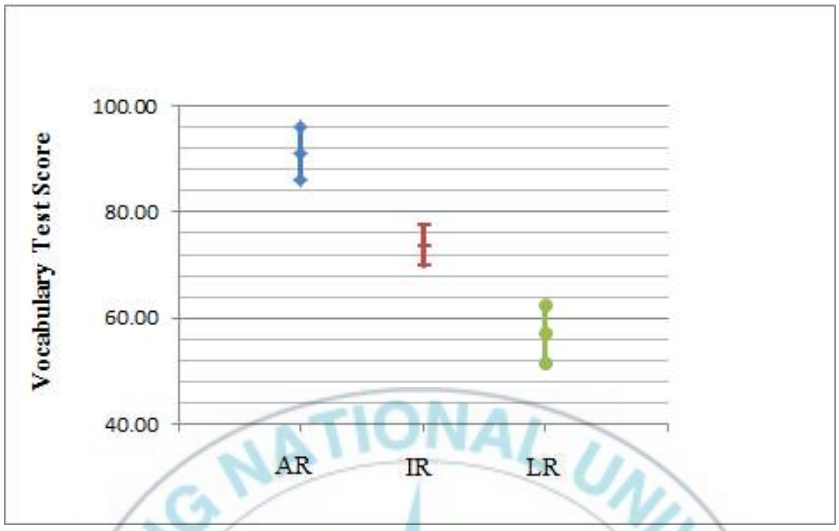

Figure 5. 95% Confidence Intervals of Grammar Test Scores

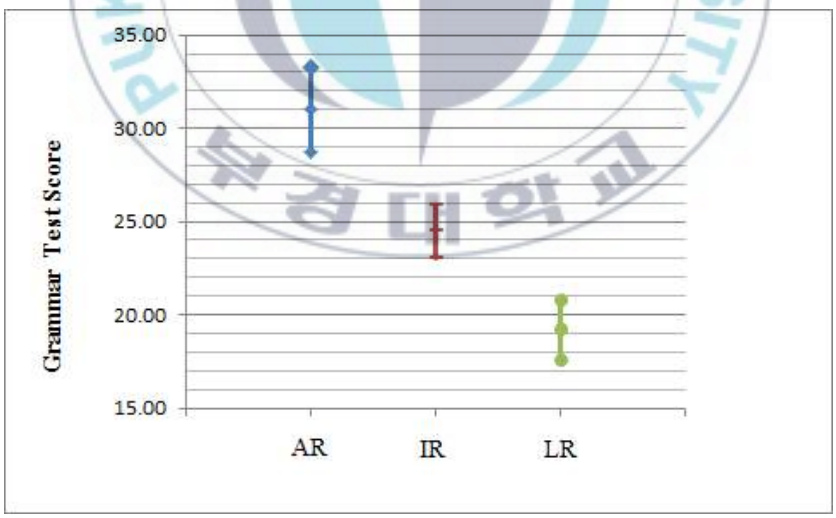

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TABLE 16. Zero-order Correlations Among All Variables By Groups

	Variable	1	2	3
AR Group	1 Vocabulary	--	.569***	.314*
	2 Grammar		--	.458**
	3 Reading			--
IR Group	1 Vocabulary	--	.632***	.350***
	2 Grammar		--	.319***
	3 Reading			--
LR Group	1 Vocabulary	--	.578***	.083
	2 Grammar		--	.150
	3 Reading			--

Note: One, two, and three asterisks refer to the statistical significance levels of $p<.05$, $p<.01$, and $p<.001$, respectively.

Bivariate relationships among the variables were examined by computing Pearson product-moment correlation coefficients. The results are shown in Table 16. All the correlations among the variables were statistically significant for the AR and IR groups. For the LR group, while the vocabulary and grammar scores were significantly correlated, $r(47)=.578$, $p<.001$, neither showed significant correlation with the reading score. As in the LR group, the effect of the correlation between the vocabulary and grammar scores was large, by the standard of Cohen (1988), in both the AR and IR groups: $r(41)=.569$, $p<.001$ and $r(106)=.632$, $p<.001$, respectively. However, the effects of the correlations between the vocabulary and reading scores and between the grammar and reading scores were medium in both the AR and IR groups. While the correlation coefficient of grammar and reading, $r(41)=.458$, $p<.01$, was bigger than that of vocabulary and reading, $r(41)=.314$, $p<.05$, in the AR group, the correlation coefficient of vocabulary and reading, $r(106)=.350$, $p<.001$ was bigger than that of grammar and reading, $r(106)=.319$, $p<.001$, in the IR group.

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The coefficient of determination, r^2, suggested that the vocabulary scores explained 9.8% (r^2=.098) and 12.3% (r^2=.123) of the reading score variance for AR and IR groups, respectively, while the grammar scores accounted for 20.9% (r^2=.209) and 10.2% (r^2=.102) of the reading score variance for the AR and IR groups, respectively. However statistically insignificant they were, the coefficient of determination for the vocabulary and reading scores was r^2=.007, and that for the grammar and reading scores was r^2=.023 in the case of the LR group. According to the cutoff values of r^2 determining their effects as small (r^2=.02), medium (r^2=.13), and large (r^2=.26) suggested by Cohen et al. (2003, p. 93), only the r^2 of the grammar and reading scores of the AR group showed medium to large effect, while the r^2 of the vocabulary and reading scores of the AR group and r^2 of the grammar and reading scores of the AR and the IR groups seemed to have a small to a medium effect. For the LR group, r^2 of the vocabulary and reading scores had a negligible effect of .007, and that of the grammar and reading scores had a small effect of .023, but none of the effects were statistically signigicant.

Since the correlations do not reveal causal relationships among the variables, hierarchical multiple regression analyses were conducted to predict L2 reading outcomes using the scores of the vocabulary and grammar tests as predictors for each group. Assumptions of regression were checked before running the analyses, and no abnormality was observed. Skewness and kurtosis indices of the variables are summarized in Table 15. Examined by their VIF values and Tolerance, the data also met the assumption of collinearity, indicating that multicollinearity was not a concern. None of the VIF values were greater than 10, and no Tolerance was less than 0.1.

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The prediction model was statistically significant only for the AR and IR groups but not for the LR group. In the AR group, the linear combination of language measures was significantly related to the reading comprehension index, $F(2, 40)=5.43$, $p<.01$. The model accounted for approximately 21% of the variance of reading comprehension ($R^2=.214$). Of the two predictor variables, only grammar reached the statistical significance to be predictive of reading comprehension when the variable vocabulary was statistically controlled: $t(40) = 2.42$, $p<.05$. Vocabulary did not make a statistically significant contribution in the regression model, $t(40)=.463$, $p=.646$.

The individual contribution of each predictor variable to the regression effect was examined by various measures, which are presented in Table 17. The β weight, product measure, structure coefficient, and squared part correlation (the unique effect of the commonality coefficient) all indicated the relatively greater contribution of grammar over vocabulary to regression effects in the AR group. When the variable vocabulary was held constant, a one standard deviation increase in grammar would result in the increase of 0.413 in reading. The squared structure coefficient indicated that grammar alone accounted for about 98% of the predicted reading score. The product measure also revealed the greater weight of grammar on the regression effect. The part of grammar that is not shared with vocabulary uniquely explained about 12% of reading variance, while the intersection of vocabulary and grammar accounted for about 9% of it. Therefore, the multiple regression results suggest that the one with a higher grammar score is likely to get a better reading score, and the increase in the vocabulary score does not necessarily lead to a higher reading score in the AR group.

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For the IR group, the linear regression model was statistically significant, $F(2, 105)=8.46$, $p<.001$. Vocabulary and grammar accounted for about 14% of the reading variance ($R^2=.139$). However, when the role of the individual predictor variable in the regression model was examined, it was only vocabulary that was statistically significant, $t(105)=2.116$, $p<.05$. Grammar did not make a statistically significant contribution in the regression model, $t(105)=1.395$, $p=.166$.

As shown in Table 17, the relative importance of vocabulary as a predictor variable over grammar in the IR group was also supported from the larger β weight, product measure, structure coefficient, and the squared part correlation of vocabulary than those of grammar. According to the regression model, as there is one standard deviation gain in the vocabulary score, the predicted reading score would rise by 0.274 when the variable grammar is held constant. About 89% of predicted reading variance could be accounted for by vocabulary. The unique variance explained by vocabulary alone was approximately 4%, and by the intersection of vocabulary and grammar was approximately 9%. These results suggest that, in the IR group, one's reading comprehension improves as one's vocabulary size increases, while grammar knowledge may not have a unique role.

The regression equation predicting reading scores with vocabulary and grammar scores was not statistically significant in the LR group, $F(2, 46)=.531$, $p=.592$; $R^2=.023$. Although not significant, the relatively greater contribution of grammar to regression effects could be assumed from the β weight, product measure, structure coefficient, and the squared part correlation of grammar (see Table 17). While the unshared part of vocabulary with

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grammar explained statistically insignificant reading variance, grammar uniquely accounted for about 2%, and the shared part about 1% of it. Based on these results, it could be assumed that there are variables other than vocabulary and grammar that are more important in predicting one's reading in LR group.

TABLE 17. Summary of Statistics Determining Independent Variable Contributions to Regression Effects by Groups

Group	Predictor Variable	b	β	r_s (structure coefficient)	r_s^2 (squared structure coefficient)	Pratt (Product measure)	Pearson r	Commonality coefficients	
								Unique[1)]	Common[2)]
AR	Vocabulary	.007	.079	.679	.461	.025	.314	.004	.094
	Grammar*	.077	.413	.990	.981	.189	.458	.115	.094
IR	Vocabulary*	.022	.274	.942	.887	.087	.350	.037	.086
	Grammar	.039	.163	-.858	.737	.052	.319	.016	.086
LR	Vocabulary	.000	-.005	.556	.309	-.000	.083	.000	.007
	Grammar	.032	.153	1.001	1.002	.023	.150	.016	.007

Note: All measures in the rows of Grammar in AR and Vocabulary in IR were significant at $p<.05$.

The regression model that predicts the students' L2 reading comprehension from their vocabulary and grammar scores accounted for more reading variance in the AR group than in the IR group. The LR group came last, but the prediction model was not significant for the group. When the raw regression weights were compared, the order of relative significance of vocabulary in the regression model was IR, AR and LR, and that of grammar was AR, IR, and LR. Therefore, even when statistical significance is not considered, the orders show that both vocabulary and grammar seem to be least effective in explaining reading variance in the LR group, while grammar in the AR group and vocabulary in the IR group appear to be more powerful predictor variables.

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Before discussing the relative roles of vocabulary and grammar in the L2 reading of sub-groups, whether vocabulary and grammar are working in tandem or whether they are in fact separate constructs, remains to be answered since the two are highly correlated in all the groups, i.e., a single group and all three subgroups. The inseparability of vocabulary and grammar has been suggested in previous literature. Nation (2001) asserted that knowing a word is comprised of knowing its form, meaning and use, making it clear that vocabulary and grammar are indivisible. In explaining what grammar is, Purpura (2004) used the term 'lexico-grammatical knowledge' to include the lexical semantic aspect in grammar. The interdependent nature of lexical and grammatical knowledge can also be found in the generative syntax. Chomsky (1995), the advocate of the generative syntax, claimed that the features regulating syntactic structures are included in the properties of lexis. These postulations all lead one to think of vocabulary and grammar as one construct not two.

However, the present study provides evidence drawing a distinction between vocabulary and grammar, while not denying their common qualities. The evidence comes from the single group and sub-group analyses. First, in the single group analyses, although the degrees of correlations between vocabulary and L2 reading and between grammar and L2 reading as well as those of the relative importance of vocabulary and grammar as predictors of L2 reading were similar, the results of the commonality analysis exposed unique effects of the predictors, providing grounds for the distinction between the two. Vocabulary breadth and syntactic knowledge uniquely accounted for 6% and 5% of the subjects' L2 reading performance respectively after the effect of the

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other predictor was statistically controlled for in the analysis. Despite the fact that some parts of the overlapping features of the two predictors explained more of the L2 reading variance, it is noteworthy that vocabulary and grammar individually had a unique effect on reading, nevertheless.

Next, vocabulary and grammar were not collectively accountable for L2 reading across the subjects' reading levels. It was either vocabulary or grammar that was predictive of the L2 reading of the AR and IR groups. Taking the similar sizes of the correlations between vocabulary and grammar in the sub-groups of different reading levels into account, it is reasonable to conclude that the discrepancy in the roles of vocabulary and grammar as predictors of L2 reading resulted from the characteristics of each kind of language knowledge.

Distinct features of vocabulary knowledge and grammar knowledge were not always acknowledged in previous literature. In fact, Guo (2008) failed to distinguish vocabulary knowledge from syntactic awareness in his factor analysis explaining L2 reading, and the two constructs were treated as a single psychological construct, not separate ones. However, upon closer inspection, his measures revealed several problems. First, the internal consistencies of the two measures of syntactic awareness were questionable since Cronbach's alpha values were only .60 and .62. The low reliability of the measures might have been caused by their easiness, although he did not report any ceiling effect. Second, while the participants of the study were EFL college students majoring in English in China, one of the measures, the sentence combination sub-test of TOAL-4, was designed for adolescents and young adults and assessed low-level syntactic awareness as he described. The other measure, the syntactic

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awareness questionnaire, also asked of fairly rudimentary grammar points despite his claim of it assessing high-level syntactic awareness. An example of the questions is provided below:

> How do you know that this happened in the past? The sentence is "The ball was rolling down the hill?" (Guo, 2008, p. 73; quotation marks in the original)

Finally, one of the reading comprehension measures, the TOEFL reading comprehension sub-test, contained too many word-specific questions. Of the 50 items, 17 items specifically asked of the definitions of the target words. While it is controversial that inferring the meaning of an unknown word is part of reading process, overuse of such items consequently lowers the construct validity. In short, Guo's results need to be reexamined especially because of the measures' reliabilities and the constructs' validities.

In another factor analysis study regarding L2 reading comprehension and speed, Shiotsu (2010) found that his eight components (four passage scores, sentence reading speed, syntactic knowledge, synonym/antonym decision latency, and vocabulary breadth) fell into two factors: careful text processing power and lexical-semantic processing efficiency. While syntactic knowledge fell into only one of the factors, careful text processing power, vocabulary breadth seemed to belong to both factors. He further carried out structural equation modelling analyses with the data and uncovered that the two factors were related. His findings give partial evidence that despite their similarities, vocabulary and grammar are two separate forms of linguistic knowledge.

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The roles of vocabulary knowledge and grammar knowledge in L2 reading across the subgroups were not unitary in the present study. The results of ANOVA demonstrated that vocabulary and grammar scores differed significantly across the three reading ability groups. As the subjects' L2 reading scores increased, so did their vocabulary and grammar scores. This highlighted the importance of vocabulary and grammar knowledge in comprehending L2 texts.

Nevertheless, the roles of breadth of vocabulary and grammar knowledge differed in predicting the subjects' L2 reading performance across the three groups. In the AR group, it was only grammar that could explain reading, and in the IR group, vocabulary was the sole statistically significant predictor of reading. However, none of these language competences were legitimate predictors of reading in the LR group. These results are seemingly consistent with the correlations between each predictor and L2 reading. The correlation between grammar and reading was higher in the AR group, and the correlation between vocabulary and reading was higher in the IR group. However, vocabulary was not significantly correlated with reading in the AR group, and neither was grammar in the IR group. Therefore, it can be concluded that grammatical knowledge had a greater effect on advanced readers, while it was the breadth of vocabulary that had a similar effect for average readers. For poor readers, vocabulary and grammar knowledge were not related to their reading.

The present study upholds the view that vocabulary and grammar are two separate kinds of knowledge despite their shared features based on the findings of the present study and Shiotsu (2010). Since no previous studies have

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examined the relative roles of vocabulary and grammar in L2 reading of three reading ability groups, it is not possible to make a direct comparison between the findings of this study and those of previous studies. Of the studies that probed the relationships among vocabulary, grammar, and reading, only a few of them took L2 proficiency into consideration, and they did it in a dichotomous way. Having explored the relationships associated with differing L2 proficiency level or not, previous studies resulted in mixed findings. For example, with advanced EFL learners in a Chinese graduate school, Zhang (2012) found lexical knowledge a more substantial contributor, not grammatical knowledge, to L2 reading comprehension through an SEM analysis. However, the opposite was true for L1 Dutch EFL children in the study of van Gelderen et al. (2004). While Nassaji (2003) found that lexical knowledge plays the most discriminating function between skilled and less-skilled readers among adult ESL students at a Canadian graduate school, Shiotsu (2010) and Shiotsu and Weir (2007) claimed that it was syntactic knowledge that contributed the most to the reading comprehension of L1 Japanese EFL college students even when they were divided into two groups of better and poorer readers. There can be numerous causes for the inconsistent results: L1-L2 distance, age, L2 proficiency, measures for the competence of each construct, etc.

As just mentioned, Shiotsu (2010) and Shiotsu and Weir (2007) reported that syntax consistently plays a more important role than vocabulary irrespective of reading ability. However, two matters should be considered when interpreting their findings. One is that the criterion used for dividing the subjects into two reading ability groups was not an individual subject's reading score but the

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types of colleges the subjects attended, i.e., private and national universities, and their majors, i.e., English major and non-English majors. The other is the wide gap of the readability between the passages. Of the four passages used for the reading comprehension test, the Flesh Kincaid grade level scores for the two easy passages were 8 and 10, and those for the two difficult passages were 14 and 15. Shiotsu (2010) reported the results of statistical analyses based not only on the combined scores of whole passage readings taken together but also on the reading scores of individual passages. However, since each passage was followed by only five questions, one cannot interpret the results with confidence as being indicative of the differences in the level of the reading materials. Since the descriptive scores of each passage for the sub-groups were not reported in his study, one can only suspect the existence of possible floor and ceiling effects. In short, separating the subjects by L2 reading levels using relative scales among themselves prevents the interpretation of the findings across studies. Thus, the incorporation of a standardized proficiency measure is essential for explaining the roles of vocabulary and grammar in different levels of L2 reading in a rather definite manner (Jeon & Yamashita, 2014; Shiotsu, 2010).

Nevertheless, the findings of the present study suggest that differentiating L2 learners into three levels helps to clarify the relative roles of vocabulary and grammar in L2 reading comprehension since there tends to be L2 learners in three levels, i.e., advanced, intermediate, and low, in most educational settings. The prominent role of grammar among advanced L2 readers, and that of vocabulary among intermediate L2 readers can be explained by “The Matthew Effects”, a term coined by Stanovich (1986) to illustrate the importance of

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individual differences in reading. According to him, advanced readers improve because they read more and thus acquire more reading skills by reading, including inferring the meaning of an unknown word. In the case of the AR group in the present study, the students' vocabulary was extensive, so they could have inferred the meaning of any unknown words, which leaves vocabulary as a non-affective factor of their reading difficulty. Vocabulary not interfering with reading comprehension, grammar played one of the key roles of reading success for them. However, the IR group must have encountered difficulties because of unknown words, so vocabulary was the only significant predictor of their reading. These findings corroborate those of Alavi and Akbarian (2012). They studied the effect of vocabulary knowledge in five types of L2 reading questions among Iranian college students. They were divided into three groups with differing levels of vocabulary. The study found that vocabulary knowledge accounted for the inference of unknown words by those in the group of the highest level of vocabulary knowledge only.

The lack of relatedness among the constructs of vocabulary, grammar, and L2 reading among poor readers of the present study can be explained in many ways. First, it could have been caused by the restriction in the range of the pool. A wider range with more subjects could have revealed a different picture. Second, the floor effect[24] could have prevented vocabulary and grammar knowledge from playing a role in comprehending the text. In other words, the relatively high difficulty of the reading materials for the poor readers could have made it difficult to capture their processes facilitating the

24) The mean reading score of LR group was 5.67 whereas those of AR and IR groups were 15.35 and 10.56, respectively.

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two types of language knowledge.

Finally, for poor readers, having other skills and knowledge could be more critical. As in this study, Taillefer (1996) reported that knowledge of vocabulary and grammar along with L1 reading comprehension ability did not predict reading scores of French L1 EFL college students with low L2 proficiency. Likewise, Alavi and Akbarian (2012) found that the breadth of vocabulary knowledge of their low level EFL subjects at Iranian universities was not a significant contributor to L2 reading. Two of the basic elements of L2 reading that were left out in the present study were phonological and orthographic knowledge, the basis of decoding a text. Birch (2007) considered this as a prerequisite for reading for meaning. Hoover and Gough (1990) also contended that decoding is a foundation of reading along with linguistic competence. Therefore, the poor readers in the study could have lacked decoding skills.

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VI. CONCLUSIONS AND IMPLICATIONS

6.1 Conclusions

The overall aim of this study was to advance the understanding of the relative roles of vocabulary and grammar in L2 reading, particularly taking L2 reading ability into account in the context of Korean secondary education. The specific research objectives were 1) to explore if both breadth of vocabulary and grammar knowledge had effects on the English passage comprehension of Korean high school students as a single group; 2) to evaluate unique contribution of breadth of vocabulary and grammar knowledge to the English passage comprehension of Korean high school students as a single group; and 3) to assess relative roles of breadth of vocabulary and grammar knowledge among three levels of L2 reading comprehension: high, intermediate, and low.

This chapter will summarize the findings of the present research regarding the aforementioned objectives and offer conclusions based on the findings. Implications of the present study for L2 reading theories as well as L2 reading pedagogy will be discussed, followed by recommendations for the future research.

The present study investigated the relative roles of vocabulary and grammar in the English passage reading of Korean high school students. In order to gain a general understanding of the roles of vocabulary and grammar in L2 reading, the students were treated as a single group and their data were analyzed accordingly. The results of the bivariate correlational analysis and the

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multiple regression analysis demonstrate the positive roles of vocabulary and grammar with equal significance. The commonality analysis unveils that while the intersection of vocabulary and grammar accounts for most of the expected reading variances, they make unique contributions to L2 reading, too. Vocabulary and grammar together explains about 38% of the students' reading performance, of which about 6% and 5% is uniquely explained by vocabulary and grammar, respectively. Therefore, it can be concluded that both breadth of vocabulary and grammar knowledge seem to have positive and equal effects on the English passage reading of the Korean high school students. Enlarging one's vocabulary as well as increasing one's grammar knowledge may lead to better understanding of an English passage.

The relative roles of vocabulary and grammar among the three levels of L2 reading appear to be discrete. The results of ANOVA suggest that vocabulary and grammar knowledge are likely to be significantly related to the L2 reading of all levels, i.e., advanced, intermediate, and low. In other words, as the students reading level increases, so do the levels of vocabulary and grammar, even though the direction of the change was not verified by the analyses. However, multiple regression analyses of the subgroups show that the relative roles of vocabulary and grammar are not unanimous across the groups of differing L2 reading abilities. The role of grammar seems more prominent for advanced L2 readers, while vocabulary plays a major role in the reading performance of intermediate L2 readers. Approximately 21% of the advanced level group reading is accounted for by its grammar knowledge, of which 12% is uniquely explained by grammar to the exclusion of vocabulary. For the intermediate level readers, their breadth of vocabulary accounts for

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approximately 14% of their reading performance, and 4% of it is attributable to vocabulary knowledge alone. As for poor readers, although the importance of breadth of vocabulary and grammar knowledge in their L2 reading comprehension can not be denied, neither type of language knowledge can predict their L2 reading performance. In sum, on the grounds that advanced readers have already acquired sufficient vocabulary as is implied by the results of ANOVA, it seems that the more their grammar improves the better their understanding of L2 passages. For intermediate L2 reading level students, enlargement of their vocabulary may result in improved L2 reading comprehension. While the critical factor of poor L2 readers' comprehension could not be revealed by this research, it is suggested in the literature that they are likely to be short of more basic knowledge, namely, decoding skills.

The findings substantiate the unique roles of vocabulary and grammar in L2 reading, even though they share many features. The unique roles are evidenced by the results of correlational and commonality analyses of the students as a single group as well as three groups of different L2 reading abilities. The results of commonality analyses clearly demonstrate a unique role of either vocabulary or grammar when their common characteristics were statistically removed from each other. Moreover, the differential role of vocabulary and grammar is accentuated by the results of the multiple regression analyses of the sub-groups mentioned above. In conclusion, despite their common characteristics, vocabulary and grammar appear to have their distinctive roles in L2 passage reading comprehension.

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6.2 Implications

The findings of the present study have implications for theories of L2 reading and L2 reading pedagogy. First, it might be necessary to make a distinction between vocabulary and grammar in L2 reading theories. Treating the two types of language knowledge as one may obscure the exact process and nature of L2 reading comprehension. As it appears that vocabulary comes to an effect in L2 reading comprehension prior to grammar, their roles may need to be reflected likewise in L2 reading development models. Second, from a pedagogical view point, both vocabulary and grammar should be emphasized in L2 reading instruction. However, the relative weight of each type of knowledge may differ depending on the L2 reading level of L2 learners.

More attention may need to be paid on grammar for advanced L2 readers, whereas expanding the size of vocabulary is likely to be a matter of urgency for intermediate L2 readers. Effective grammar instruction can be delivered through meaning focused and communicative grammar-practice procedures and activities (Ur, 2009). Also, Scriverner (2010) recommends that a teacher ask concept questions, not yes-no questions, so that he/she can better diagnose the true understanding of students in the grammar class. He further suggests having students make a sentence within an established context with specific challenge in order to focus on a certain grammatical feature.

L2 learners' vocabulary size can be expanded through the exercise of extended reading for two reasons (Day & Bamford, 1998). First, they are likely to encounter more words by reading more. Second, as the volume of reading material increases, so does the frequency of the encounters with a

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given word, thereby reinforcing the acquisition of the word. However, vocabulary acquisition through extensive reading alone comes with the caveat that readers are not guaranteed to learn vocabulary in large numbers (Laufer & Hulstijn, 2001). Pulio (2009) suggests that reading texts on a familiar topic and providing background knowledge as a pre-reading activity can help students infer the meanings of unknown words. Matching the reader's vocabulary size to that of the reading material is another way to make the material readable so that the reader can benefit from all the positive effects of extensive reading, including learning vocabulary. Direct teaching of vocabulary through various activities, such as selective attention, recognition, manipulation, interpretation, and production activities, in addition to reading also promotes vocabulary learning (Paribakht & Wesche, 1997).

Poor readers seem to require closer attention of L2 practitioners, as it appears urgent to have them escape from the Vicious Circle of L2 reading illustrated by Nuttall (1982) and substantiated by Coady (1997) and Pulio and Hambrick (2008). According to her, many L2 readers are trapped in a Vicious Circle of *Doesn't understand*, *Reads slowly*, *Doesn't enjoy reading*, and *Doesn't read much*. The opposite of this is the Virtuous Circle of *Enjoys reading*, *Reads faster*, *Understands better*, and *Reads more*. The poor readers could be assisted in many ways so as to escape from this so-called Vicious Circle, and teaching vocabulary and grammar would be one of them. However, they may need to learn more elementary skills first, such as L2 decoding skills.

As the present study is limited in several respects in making generalizations of the findings, future research studies are called for. To that end, several

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recommendations are made here. First, the effects of L2 reading ability should be re-examined for two main reasons. One is that the number of subjects in the AR and LR groups were low for multiple regression analyses, and the other is that, to the author's knowledge, no other study has investigated the relative roles of vocabulary and grammar with regard to three L2 reading levels. Second, utilizing measurement instruments other than multiple-choice tests should also be used to reduce the task effect. Third, a comparative study, in which different educational settings are compared, such as middle and high schools, may further illuminate the issue. Finally, in order to understand the exact nature of L2 reading of those with varying L2 reading abilities, appropriate reading materials should be utilized as a reading assessment tool. That way, possible ceiling and floor effects might be prevented, revealing more clearly the roles of vocabulary and grammar in L2 reading. Moreover, the adoption of standardized testing instruments would enhance research comparability.

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APPENDIX 1

VOCABULARY TEST (KOREAN)

A vocabulary levels test: Version 1

이 테스트는 영어 단어 테스트입니다. 각각의 뜻에 해당하는 영어 단어를 골라 다음의 예와 같이 빈 칸에 그 번호를 써 넣으시오.

1	business	
2	clock	_____ 벽
3	horse	_____ (동물의) 말
4	pencil	_____ 연필
5	shoe	
6	wall	

다음과 같이 답하시오.

1	business	
2	clock	__6__ 벽
3	horse	__3__ (동물의) 말
4	pencil	__4__ 연필
5	shoe	
6	wall	

위의 왼 쪽에 있는 세 개의 단어는 이 테스트를 조금 더 어렵게 하기 위해 있는 것으로 이 단어들에 해당하는 뜻은 오른 쪽에 없습니다. 위의 예에서 business, clock, shoe가 이에 해당합니다.

모든 문항을 답하시오.

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APPENDIX 2

GRAMMAR TEST

Part 1

[1-25] 각 문장을 읽고 빈칸에 들어갈 말로 가장 적절한 것을 고르시오.

1. The man with all the birds _____ on my street.

   a. live b. have lived c. lives d. is lived

2. Jenny _____ at the party very long.

   a. hasn't staying b. isn't stay

   c. didn't stay d. didn't stayed

3. _____ his homework yesterday?

   a. Did Tom finish b. Did Tom finished

   c. Was Tom finish d. Was Tom finished

4. Jenny gave _____ for his birthday.

   a. a book her little brother

   b. her little brother a book

   c. to her little brother

   d. a book for her little brother

5. _____ was the weather like when you were on holiday?

   a. How b. Where

   c. When d. What

6. My sister and her boyfriend _____ next year.

   a. is getting married b. are getting married

   c. is getting marry d. are getting marry

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7. I don't know _____ people in this class, do you?

a. much b. few c. many d. less

8. Each of the _____ got a book.

a. child b. childs c. children d. childrens

9. I don't have a phone here. Can I use ___?

a. you b. your c. yours d. your one

10. The new doors were ___ to unlock without a key.

a. easy b. easily c. ease d. with ease

11. This factory makes some of ___ cameras in the world.

a. good b. best

c. the best d. the most best

12. The man _____ to Jenny is from Korea.

a. talks b. is talking

c. talked d. talking

13. You _____ to listen carefully to your teacher.

a. should b. must

c. ought d. had better

14. We had such a great week _____ we went walking in the mountains.

a. that b. where c. when d. if

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15. My parents told ___ this course.

a. me to take b. me taking

c. me take d. I take

16. _____ is bad for your health.

a. Smoke b. To smoke c. Smoked d. Smoking

17. If the decision _____ before he arrived, he would have been very angry.

a. was made b. was being made

c. would have been made d. had been made

18. I've worked here _____ three years.

a. for b. since c. from d. in

19. The woman ____ helped me was Ann.

a. which b. who c. what d. where

20. Neither my mother _____ here.

a. nor my sister is b. nor my sister are

c. and my sister is d. and my sister are

21. I _____ to a party.

a. invited b. was inviting

c. was invited d. was inviting

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22. I don't know how to fix a car, so _____ at the shop now.

a. I'm fixing my car

b. I'm having my car fixed

c. I need my car fixed

d. I have my car fixing

23. _____ more money, go to the bank before six o'clock.

a. You need b. You should need

c. Should you need d. Should need you

24. I saw an old friend yesterday, and he asked me _____ in Busan.

a. what was I doing b. what have I done

c. what I was doing d. what I was done

25. We talked _____ for our vacation.

a. about we go to Canada

b. about we going to Canada

c. about gone to Canada

d. about going to Canada

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Part 2

[1-25] 밑줄 친 부분 중 어법상 어색한 곳을 한 군데 고르시오.

1. Carla is a student, but she are not in school today.
   ① ② ③ ④

2. Last Friday at school, Jenny felt sick so she decides to go home.
   ① ② ③ ④

3. Does Tome come to class late yesterday?
   ① ② ③ ④

4. Tom bought a new computer of his brother last month.
   ① ② ③ ④

5. How was your life in high school like when you were a student, Teacher?
   ① ② ③ ④

6. My friend and I am going to go to Seoul this summer.
   ① ② ③ ④

7. There isn't many information on this website.
   ① ② ③ ④

8. We invited every members of the club to the picnic.
   ① ② ③ ④

9. I have a pet. It's name is Squeak, and it's a turtle.
   ① ② ③ ④

10. My closely friend always gives me candy whenever she visits me.
    ① ② ③ ④

11. As far as I know, he is the most tall in the world!
    ① ② ③ ④

Collection @ pknu

12. The number of people bought their own house is increasing.

① ② ③ ④

13. Here's the bus! It should arrive here twenty minutes ago.

① ② ③ ④

14. Why don't you start out early or you don't have to hurry?

① ② ③ ④

15. My parents don't allow me going out after 6 p.m.

① ② ③ ④

16. In spite of he is order than his sister, Tom is not as responsible as her.

① ② ③ ④

17. If he were here right now, he will help us.

① ② ③ ④

18. Jenny goes everywhere by her bike.

① ② ③ ④

19. She is the woman about who I told you.

① ② ③ ④

20. Busan is not only hot during the summer also humid.

① ② ③ ④

21. It was late, and I was getting much worry about my sister.

① ② ③ ④

22. Jenny had the waiter to bring her some tea.

① ② ③ ④

23. Had known I, I would have told you.

① ② ③ ④

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24. Please tell me how can I open this bottle.

① ② ③ ④

25. Jenny isn't interested in look for a new house.

① ② ③ ④

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APPENDIX 3

READING COMPREHENSION TEST

[1-5] 다음 글을 읽고 질문에 답하시오.

When I was younger, I used to silently pray that I would be nothing like my father when I grew up. Other kids my age were proud to say that their dads were their heroes, which really bothered me. I secretly envied them because I did not have a father like that. My father was so serious in everything he did. His brow was always wrinkled, a sign of his constant watch over his family. It was his own way of saying that his expectations were not being met. My grandmother could not remember a time when my father had done anything wrong. He was too perfect to be a role model for me. I felt timid and self-conscious around him. It is true that my father wanted me to make the right decision at every crossroad in my life, but always from his perspective. My father was always offering words of advice. ___A____ they may have been ancient proverbs or old sayings, they were always "Daddy originals" to me. "When you're prepared, you'll never be scared," he would tell me when I was up late studying for a test. He always stressed the importance of preparation. "Haste makes waste," was his response when I would bring home a math exam full of careless mistakes. In short, I ___B___ to relax or be just average on any exam.

1. 위 글에 드러난 'I'의 심경으로 가장 적절한 것은?

① 기쁨 ② 실망함 ③ 억눌림 ④ 평화로움

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2. 위 글의 빈칸 A에 들어갈 말로 가장 적절한 것은?

① However ② Unless ③ Nevertheless ④ Although

3. 위 글의 빈칸 B에 들어갈 말로 가장 적절한 것은?

① could afford ② couldn't afford ③ could agree ④ couldn't agree

4. 위 글의 내용과 일치하는 것은?

① 글쓴이는 아버지를 닮고 싶었다.

② 아버지는 유쾌한 분이셨다.

③ 아버지는 가정에 소홀하셨다.

④ 아버지는 조언을 많이 하셨다.

5. 다음 중 위에서 언급된 아버지의 말씀과 맥락이 같은 것은?

① 늦는 것이 안 하는 것보다 낫다

② 인생에서 가장 소중한 것은 공짜로 주어진다.

③ 계획을 하지 않는 것은 실패하기를 계획하는 것이다.

④ 표지를 보고 그 책의 진가를 평가하지 마라.

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[6-11] 다음 글을 읽고 질문에 답하시오.

The Ethnologue, which provides one of the world's most comprehensive lists of languages, counts almost 7,000 languages worldwide. ( ) However, these languages are unevenly distributed among the world population. The top 12 languages account for almost 50% of the world population. Chinese has always been reported to have more native speakers than any other languages. ( ) English is falling quickly in the world rankings. Only 50 years ago, it was clearly in second place. ( ) Spanish has grown to be roughly the same size as English in terms of the number of native speakers, and may overtake English in the future. As a matter of fact, Spanish is already challenging English in some parts of the United States, where a number of towns have a predominantly Spanish speaking population. _____ the number of native speakers is not as important as it used to be in providing a world language status. The number of second language speakers is of growing importance. Estimates for second language users of English are far greater than its first language users. ( ) Although the number is down from the past (90%), English presently makes up for almost 50% of the web pages in the world. Considering that the second most dominant language on the Internet, Chinese, makes up a mere 8%, this is still an overwhelming figure.

6. 이 글에서 가장 중요하게 다루고 있는 내용은?

① 일부 언어가 전체 모국어 사용자의 대부분을 차지

② 스페인어의 중요성 증가

③ 제2 외국어로서의 영어의 중요성 증가

④ 인터넷에서 영어의 영향력 감소

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7. 위 글에서 밑줄 친 빈칸에 들어갈 말로 가장 적절한 것은?

① Moreover ② However

③ For example ④Therefore

8. 모국어로 가장 많은 사람이 쓰는 것으로 알려진 언어는?

① Chinese ② English

③ Spanish ④ 알 수 없음

9. 위 글의 내용과 일치하는 것은?

① 세계 인구의 반 정도가 쓰는 모국어는 오십 개 정도이다.

② 지난 50년간 모국어로서의 영어 순위는 변함이 없다.

③ 현재 미국 전역에서 영어를 모국어로 사용하는 인구가 가장 많다.

④ 언어의 지위는 모국어 인구수로 결정된다.

10. 글의 흐름으로 보아, 주어진 문장이 들어가기에 가장 적절한 곳은?

Now, it is being challenged by languages like Spanish and Hindi-Urdu.

① ② ③ ④

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[11-15] 다음 글을 읽고 질문에 답하시오.

Have you ever been struck by Cupid's arrow? Why do we fall in love with James as opposed to Michael, Christine instead of Lisa? Psychologist John Money believes that all human beings have something called a "love map." Long before you fall in love with a particular person, you have already developed a mental map that determines who you will fall in love with. ( ) According to him, children develop these love maps between the ages of five and eight through their family, friends, and experiences.( ) You like certain things about your friends and relatives. ( ) You dislike others or you connect them with unpleasant events. Gradually, these experiences begin to form a pattern in your mind. From this unconscious pattern, an image of your ideal love begins to form. ( ) Then in your teenage years, your love map becomes quite specific. You imagine exactly how your true love will look—his or her face shape, hair length, height, as well as personality, manners, and other features. So, long before your true love walks into your life, you have already constructed some basic elements of your ideal love. Then when you actually see someone who seems to fit the image, you fall in love with him or her and project your unique love map onto this person.

11. 위 글의 목적으로 가장 적절한 것은?

① 사랑의 정의를 설명하려고

② 사랑의 방법을 분석하려고

③ 이상형에 관한 정보를 제공하려고

④ 이상형에 관한 한 이론을 소개하려고

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12. 밑줄 친 him이 가리키는 것은?

① Cupid ② James

③ Michael ④ John Money

13. 글의 흐름으로 보아, 주어진 문장이 들어가기에 가장 적절한 곳은?

For example, as a child you get used to the way your mother speaks and listens, scolds, and pats you and how your father jokes, walks, and smells.

① ② ③ ④

14. 위 글의 내용과 일치하는 것은?

① 진정한 사랑을 만나기 전에 이상형이 형성된다.

② 8살 이후에 러브맵이 만들어진다.

③ 경험에 의한 패턴은 한 순간에 만들어진다.

④ 십대 이후 이상형은 구체성을 잃는다.

15. 위의 글을 읽고 알 수 있는 내용은?

① 큐피드의 화살은 사실 사랑과 관계없다.

② 사랑의 대상은 주관적 판단에 의해 결정된다.

③ 경험과 이상형은 관련이 없다.

④ 이상형과 실제 사랑은 무관하다.

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[16-20] 다음 글을 읽고 질문에 답하시오.

A geyser is a natural hot water spring. The word geyser comes from the famous Icelandic geyser, named The Great Geysir. When a geyser erupts, boiling-hot water, steam, and gases shoot out of a hole in the ground. It erupts upward for a matter of minutes or hours. This happens from time to time with quiet periods before it activates again. Geysers form in parts of the world where there are many active volcanoes, such as New Zealand, Iceland, Russia, and the United States. The first stage in the creation of a geyser is where water flows down through the cracks in rocks to fill an underground reservoir. _____ this reservoir is positioned over rocks which are heated from below by magma, the heat in the rocks is great enough to turn some of the water to steam. Like a mighty underground pressure cooker, this incredible heat produces great pressure, making water and steam shoot upward. Geysers may change over time as the geologic conditions change. The shape and size of the underneath structure or the amount of underneath water flowing into the geyser may change easily by earthquakes. For this reason, the geysers that used to be inactive for centuries can become active again. Likewise, currently active ones may stop erupting in the future.

16. 위 글을 읽고 답할 수 <u>없는</u> 것은?

① Geyser는 무엇인가?

② Geyser는 어디서 형성되나?

③ Geyser 는 어떻게 형성되나?

④ Geyser의 폭발은 얼마나 높은가?

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17. Geyser 폭발시의 분출물로 본문에 언급된 것은 몇 가지인가?

① 2가지 ② 3가지 ③ 4가지 ④5가지

18. 위 글의 빈칸에 들어갈 말로 가장 적절한 것은?

① If ② After

③ Although ④ Because

19. 위 글의 내용과 일치하는 것은?

① Geysers는 쉬지 않고 분출한다.

② Iceland에는 활화산이 많다.

③ 지열로 인해 물이 증기로 변한다.

④ Geysers는 전 세계 어디서나 볼 수 있다.

20. 위의 글을 읽고 알 수 있는 내용은?

① The Great Geysirs는 세상에서 가장 크다.

② New Zealand의 geyser는 사라질 수 있다.

③ 현재까지 The Great Geysirs는 변화하지 않았다.

④ Geyser는 지진으로 인해 생겨난다.

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