

The Relationship among EFL Reading, Vocabulary Knowledge and Grammar Knowledge—In Terms of Threshold Hypothesis—

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Some researchers (e.g., Alderson, 1984; Nation & Coady, 1988; Laufer, 1992; Haynes, 1993) have shown the intimate relationship between L2/FL vocabulary knowledge and L2/FL reading. On the other hand, other researchers suggest that grammar knowledge plays an important role in L2/FL reading. Leaver, Ehrman & Shekhtman (2005) and Grabe & Fredricka (2011) assert that to be able to read well, we need to know a lot of words, and that we also need to know the grammatical rules.

In this paper, we will examine the relationship among EFL reading, vocabulary knowledge and grammar knowledge in terms of the threshold hypothesis.

キーワード : EFL reading, vocabulary knowledge, grammar knowledge, the threshold hypothesis, Pearson Correlation, Standard Partial Regression Coefficients

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1. Introduction

A number of researchers have proposed that vocabulary knowledge and grammar knowledge greatly contribute to EFL reading. Some researchers (e.g., Alderson, 1984; Nation & Coady, 1988; Laufer, 1992; Haynes, 1993, Farrell, 2009) have shown the intimate relationship between L2/FL vocabulary knowledge and L2/FL reading. On the other hand, other researchers (e.g., Adams, 1980; Grabe, 1991; Urquhart & Weir, 1998; Leaver, Ehrman & Shekhtman, 2005) suggest that grammar knowledge plays an important role in L2/FL reading. Leaver, Ehrman & Shekhtman (2005) assert that to be able to read well, we need to know a lot of words, and that we also need to know the grammatical rules.

According to Grabe (2009), a plausible explanation for how words and grammar processing (i.e., word recognition and parsing) contribute to reading comprehension emerges from Gernsbacher's (1990, 1997) Structure Building Model of discourse comprehension. Gernsbacher states that reading begins when word information starts to enter working memory. Almost simultaneously, the processes of syntactic parsing and proposition formation begin. These latter two processes act on the lexical information, using syntactic information from the words themselves as well as information from word-ordering constraints. As words are accessed and the grammatical structure parsed, the reader engages in structure-building operations (i.e., creating the text model).

In this paper, we will examine the relationship among EFL reading, vocabulary knowledge and grammar knowledge in terms of the threshold hypothesis.

2. Reading Comprehension, Vocabulary Knowledge and Grammar Knowledge

2.1 Reading Comprehension and Vocabulary Knowledge

According to Laufer (1997), Anderson (1999) and (Macaro, 2003), as to the relationship between reading and vocabulary knowledge, no text comprehension is possible, either in one's native language or in a foreign language, without understanding vocabulary of the text. That is, reading ability cannot be dissociated from vocabulary knowledge. However, this is not to say reading comprehension and vocabulary comprehension are the same, or that reading quality is determined by vocabulary alone. Reading comprehension (both in L1 and in L2/FL) is also affected by textually relevant background knowledge and general reading strategies, such as predicting the content of the text, guessing unknown words in context, making inference, recognizing the type of text and text structures, and grasping the main idea of a paragraph. And yet, it has been consistently demonstrated that reading comprehension is strongly related to vocabulary knowledge, more strongly than to any other components of reading (e.g., grammar knowledge, formal discourse structure knowledge, background knowledge and so on).

Grabe (2009) states that in L1 reading research, many studies demonstrate the strong relationship between vocabulary and reading. Stanovich (1986, 2000) has reported on studies that support this relationship, and in his own research, he has reported strong correlations between vocabulary and reading for third- through seventh-grade L1 students ($r = .64$ to $r = .76$). In fact, he (1986, 2000) makes a strong argument for a reciprocal causal relation between reading and vocabulary. That is, vocabulary growth leads to improved reading comprehension, and amount of reading leads to vocabulary growth. Research by Hart and Risley (1995) and Snow et al. (2007) demonstrate the strong role of early vocabulary learning in later reading achievement, describing the importance of vocabulary learning from the age of one to its impact on reading at the age of 16.

Grabe (2009) also describes that in L2 settings, Verhoeven (2000) reported strong relations between vocabulary knowledge and reading abilities in a LISREL multivariate component analysis (i.e., a type of Structural Equation Model). Vocabulary was a predictor variable for reading at .63. In a second major study, Droop and Verhoeven (2003) demonstrated a powerful causal effect of vocabulary on the reading comprehension abilities of third- and fourth-grade language-minority children in the Netherlands. Schmitt, Jiang and Grabe (2011) states that, in a recent article, Nation (2006) concluded that much more vocabulary is required to read

authentic texts than has been previously thought. Whereas earlier research (Laufer, 1992) suggested that around 3,000 word families provided the lexical resources to read authentic materials independently, Nation (2006) argues that, in fact, 8,000-9,000 word families are necessary. Schmitt, Jiang and Grabe (2011) state that, in a text, readers inevitably come across words they do not know, which affects their comprehension. This is especially true of L2/FL learners with smaller vocabulary. Thus, they say that the essential question is how much unknown vocabulary learners can tolerate and still understand a text. Or we can look at the issue from the converse perspective: What percentage of lexical items in a text do learners need to know in order to successfully derive meaning from it? Laufer (1989) explored how much vocabulary is necessary to achieve a score of 55% on a reading comprehension test. This percentage was the lowest passing mark in the Haifa University system, even though earlier research (Laufer & Sim, 1985) suggested that 65%-70% was the minimum to comprehend the English on the Cambridge First Certificate in English examination. She (1989) asked learners to underline words they did not know in a text, and adjusted this figure on the basis of results of a translation test. From this she calculated the percentage of vocabulary in the text each learner knew. She found that 95% was the point which best distinguished between learners who achieved 55% on the reading comprehension test versus those who did not. Hu and Nation (2000) concluded that it takes 98%-99% coverage to allow unassisted reading for pleasure. These studies in fact found that greater vocabulary coverage generally led to better L2/FL reading comprehension. Hu and Nation (2000) compared reading comprehension of fiction texts at 80%, 90%, 95%, and 100% vocabulary coverages. Sixty-six students studying on a pre-university course were divided into four groups of 16-17 participants. Each group read a 673-word story, at one of the aforementioned vocabulary coverage levels. They then completed multiple-choice (MC) and cued written recall (WR) comprehension tests. No learner achieved adequate comprehension at 80% vocabulary coverage, only a few did at 90%, and most did not even achieve adequate comprehension at 95%. This suggests that the minimum amount of vocabulary coverage to make reading comprehensible is definitely above 80% (1 unknown word in 5), and the low number of successful learners at the 90% coverage level indicates that anything below 90% is an extreme handicap. Ninety-five percent coverage allowed 35%-41% of the participants to read with adequate comprehension, but this was still a minority, and so Hu and Nation (2000) concluded that it takes 98%-99% coverage to allow unassisted reading for pleasure.

The best interpretation of these studies is probably that knowledge of more vocabulary leads to greater reading comprehension

2.2 Reading Comprehension and Grammar Knowledge

Grabe and Stoller (2011) claim that strong evidence for the syntactic parsing (i.e., grammar knowledge) in reading comprehension. Leaver, Ehrman and Shekhtman (2005) also assert that in order to be able to read well, we need to know a lot of words, and that we also need to know the grammatical rules. Adams (1980) notes that a reader has to be able to recognize the words and to analyze the syntax in order to understand a written text. Dubin, Eskey and Grabe (1986) states that appropriate grammar and vocabulary development can not be ignored in L2/FL reading instruction. Grabe (1991) considers structure knowledge (i.e., a sound understanding language structure) to be an important item of general component skills and knowledge of reading. He (1991) says that readers recognize and get meaning from words that they see in print, and then use their knowledge of the structure of the language (i.e., grammar knowledge) to begin forming a mental notion of the topic. Urquhart and Weir (1998) say that, in addition to recognized words, the significance of the relationships between them (e.g., syntax) needs to be extracted by the reader. Grabe and Stoller (2002) suggest that L2/FL readers need some foundation of L2/FL grammar knowledge for effective L2/FL reading comprehension. They (2002) also assert that, arguments that L2/FL readers do not need knowledge of grammar, occasionally voiced in the L2/FL literature, are clearly wrong. Grabe (2009) states that it is important to recognize that grammar knowledge—whether referred to as grammatical knowledge, syntactic knowledge, syntactic awareness, or syntactic parsing—is not a linguistic resource or processing skill that is used as needed while reading (a common view among L2/FL teachers and L2/FL methodologists). The process of parsing incoming text clauses for structural information that supports comprehension is something that happens almost every second during fluent reading. The fact that most people are not generally aware of this processing and knowledge resource is because they are such fluent readers. Struggling readers, and L2/FL students in particular, are much more aware that something is not working at the clause level when they do not have the grammatical resources that are needed for comprehension. A careful review of current reading research indicates that grammar knowledge resources are critical even at very advanced levels of comprehension. According to Grabe (2009), Celce-Murcia (e.g., 1991, 2002) has argued on numerous occasions grammatical structure serves discourse-communication needs, and this fact is driven home by a careful exploration of L2/FL reading-comprehension abilities. Grammatical information tells us how to understand the content, how the content fits in with the ongoing discourse, and whether or not we should maintain the general frame of reference for our interpretation or prepare for a shift in perspective. Grabe (2009) describes that the idea of grammar knowledge as a network

of cueing systems operating conjointly is very important. He (2009) suggests a list of the types of knowledge that grammar provides to build text comprehension: 1) Grammatical word order constrains alternative-meaning potential; 2) Grammatical structure identifies parts-of-speech categories for words, the semantic roles of noun phrases in relation to the verb, and the relations between phrasal and clausal units for comprehension processing; 3) Grammatical structure distinguishes main from subordinate information (stressing relative importance of information) and signals given and new information in the sentence; 4) Grammatical information helps us identify (a) major referents in the text (via demonstrative determiners, relative clauses, and focusing constructions), (b) the continuity and reappearance of referents and (c) the continuation or shift of events and ideas via tense, aspect, modality, and location information; 5) Grammatical information specifies and sharpens the information being communicated. It strongly constrains ambiguity of interpretation; 6) Grammatical information indicates the author's attitudes toward events and ideas through prepositional phrases, adverbial phrases, and assorted lexical choices.

These assertions lead to the conclusion that grammatical knowledge is a crucial factor for L2/FL reading.

3. Threshold Hypothesis

3.1 What is Threshold Hypothesis?

Hudson (2007) states that studies tend to find a strong relationship between L2/FL linguistic proficiency and L2/FL reading ability as well as a moderate relationship between L1 reading ability and L2/FL reading ability, depending upon L2/FL proficiency level. According to him (2007), in a correlational study looking at the relationship among L1 reading ability, L2/FL proficiency and L2/FL reading ability, Perkins, Brutton, and Pohlmann (1989) placed 158 Japanese students into one of three levels based on their paper-and-pencil TOEFL test scores. The groupings were: level 1, $n = 32$, TOEFL = 270-374; level 2, $n = 106$, TOEFL = 375-429; level 3, $n=20$, TOEFL = 430-469. In addition to the TOEFL, the students were given random parallel reading comprehension tests, one in Japanese and one in English. They found an overall positive relationship between L1 reading and EFL reading as well as a relationship between EFL proficiency, as measured by the TOEFL score, and EFL reading. Further, they found that there were relatively weak relationships between L1 reading and EFL reading at level 1 and level 2, with correlations at .19 and .24 respectively. However, at

level 3 the correlation reached .64. Thus, the higher the learner's EFL ability is, the stronger the relationship is between L1 and EFL reading. These findings provide support for the argument that there is some general linguistic threshold level at which the L2/FL reader begins to be able to transfer his/her L1 reading skills and strategies to his/her L2/FL reading.

Moreover, several studies related to the threshold hypothesis have been conducted (e.g., Laufer and Sim, 1985a, 1985b; Bossers, 1991; Carrell, 1991; Bernhardt and Kamil, 1995; Lee and Schallert, 1997; Grabe and Stoller, 2002, 2011). These studies have demonstrated the following point: the reduction of difference between good and poor readers in L2/FL is to be attributed to limited control over the language, which causes readers to revert to poor readers' strategies. In other words, due to some deficiency in the L2/FL knowledge, skilled L1 readers become poor L2/FL readers, showing reading behavior similar to that of poor L1 readers. The implication of this result is that a certain amount of L2/FL proficiency is needed before transfer of reading strategies in L1 can possibly occur. This “certain amount” is referred to as a “threshold level of linguistic proficiency” by most of the researchers.

3.2 The Components of Threshold Linguistic Level

According to Laufer (1997), as for the effect of general reading strategies on L2/FL reading, the current view is that since reading in L2/FL is both a reading problem and a language problem, some sort of threshold or competence ceiling has to be attained before existing abilities in the L1 reading can begin to transfer. In other words, even if a reader has good metacognitive strategies, which he/she uses in L1, these will not be of much help in L2/FL before a solid language base has been reached. As we have already discussed, this conclusion has been borne out by empirical evidence (e.g., Laufer and Sim, 1985a; Carrell, 1991; Bossers, 1992; Bernhardt and Kamil, 1995; Lee and Schallert, 1997; Grabe and Stoller, 2002). Since language threshold is essential for L2/FL reading comprehension, an important question is, therefore, what the nature of this threshold is? With regard to the operational definition of language base, many researchers have used established tests such as TOEFL (e.g., Perkins, Brutton and Pohlmann, 1989), the Michigan Test (e.g., Carson, Carrell, Silberstein, Kroll and Kuehn, 1990), and the Descriptive Test of Linguistic Skills (e.g., Block, 1992), the Token Test (Morice and Slaghuis, 1985) and the University of Cambridge First Certificate in English (Laufer and Sim, 1985a) in studies of the L2/FL proficiency and other factors. In these studies, the measures of L2/FL proficiency rely heavily on knowledge of vocabulary and grammatical structures. These factors, though clearly not the only ones, seem to be central components of language proficiency. In addition, a number of researchers (e.g., Schulz, 1983;

Barnett, 1986; Grabe, 1991; Grabe and Stoller, 2002; Farrell, 2009) have concluded that L2/FL learners' reading comprehension is much influenced by their knowledge of vocabulary and grammar either separately or as interactive components.

4. The Relationship among EFL Reading, Vocabulary Knowledge and Grammar Knowledge in Terms of Threshold Hypothesis

In this section, we will investigate the relationship among EFL reading, vocabulary knowledge and grammar knowledge in terms of threshold hypothesis.

4.1 EFL Reading and Vocabulary Knowledge

4.1.1 Research

4.1.1.1 Participants

This study (Hayashi, 2005) was conducted with 196 students of a public senior high school in Hokkaido. They were all first-year students. Moreover, many of them were the same as the subjects of Hayashi (2004).

4.1.1.2 Procedure

As with Hayashi (2004), in order to investigate the subjects' parts of vocabulary knowledge (i.e., the meaning[s] of word and the association of word), grammar knowledge, EFL reading ability and L1 reading ability, we utilized each score of the trial test, which the subjects took in February 2004. As to vocabulary knowledge, in order to investigate the subjects' vocabulary knowledge more closely (i.e., the written form of a word, the grammatical behavior of a word, the collocations of a word and the register of a word) in this research than in Hayashi (2004), we conducted another vocabulary test consisted of fifteen questions also in February 2004, and we added the scores of this test to the scores of the vocabulary test in the first trial test. We utilized the total of the scores of two vocabulary tests as the value of the subjects' vocabulary knowledge.

4.1.2 Results and Discussion

Table 1 Pearson Correlation of the Group A

		VK	GK	JRA
r	ERA	.793**	.412*	.038
p		.000	.000	.743

Table 2 Pearson Correlation of the Group B

		VK	GK	JRA
r	ERA	.500**	.116	.209*
p		.001	.481	.017

Table 3 Pearson Correlation of the Group C

		VK	GK	JRA
r	ERA	.502**	.241**	.530**
p		.000	.000	.000

On the basis of results of the trial test, we divided the participants into three groups (i.e., groups A, B and C) in terms of threshold level. In group A (i.e., when the subjects' EFL proficiency is below the threshold level of the EFL reading comprehension test), vocabulary knowledge (VK) shows high correlation with EFL reading ability (.793**, $p < .000$). Grammar knowledge (GK) also shows moderate correlation with EFL reading ability (.412**, $p < .000$). On the other hand, their L1 reading ability (JRA) shows almost no correlation with their EFL reading ability (.038, $p < .743$). These results are almost the same as the results (i.e., VK: .683**, $p < .000$; GK: .216*, $p < .048$; JRA: .059, $p < .089$) of Hayashi (2004). Thus we can say that, in groups B and C, JRA transfer to ERA, that is, participants' EFL proficiency (ELP) overrides the threshold level and their JRA transfers to their English reading ability (ERA). According to these results, we can claim the following three points: In group A, the data in table 1 show that 1) VK has the strongest relationship with ERA ($r = .793^{**}$); 2) GK has moderate relationship with ERA ($r = .412^{*}$); 3) JRA has almost no relationship with ERA ($r = .038$). In order to further investigate this assertion, we conducted multiple regression and

examined how each factor (i.e., vocabulary knowledge, grammar knowledge and L1 reading ability) contributed to EFL reading ability in group A. The result shows that “Standard Partial Regression Coefficients(6)¹⁾” are as follows: VK = .794**, $p < .000$; GK = .058, $p < .483$; JRA = .144, $p < .051$. From these results, we can argue the following four points: When the subjects' ELP is below the threshold level of the target language text, 1) VK significantly and most effectively contributes to ERA; 2) although GK has moderate relationship with ERA, it hardly contributes to ERA; 3) VK contributes to ERA about 13.7 times as substantially as GK does—this value is almost two times as high as the value (6.5 times) of Hayashi (2004); 4) JRA has no significant influence on ERA. As Hatch (1974), Schulz (1983), Barnett (1986), Grabe (1991) and, Lee and Schallert (1997) concluded, these results lead us to the conclusion that, when readers' FL proficiency is below the threshold level of the target language text, the threshold for reading comprehension is, to a large extent, lexical.

In group B (i.e., when the subjects' ELP is likely to be a bit above the threshold level of the EFL reading comprehension test and their JRA seems to transfer to their ERA weakly—this type of group is not in Hayashi [2004]), VK shows moderate relationship with ERA (.500**, $p < .001$) and, JRA shows weak correlation with ERA (.209*, $p < .017$). On the other hand, GK shows almost no correlation with ERA (.116, $p < .481$). According to these results, we can assert the following three points: In group B, the data in table 2 show that 1) VK has moderate relationship with ERA ($r = .500^{**}$); 2) JRA has weak relationship with ERA ($r = .209^{*}$); 3) GK has almost no relationship with ERA ($r = .116$). In order to investigate this assertion further, we conducted multiple regression. The result shows that standard partial regression coefficients are as follows: VK = .502**, $p < .006$; GK = .074, $p < .673$; JRA = .295*, $p < .045$. From these results, we can argue the following four points: When the subjects' ELP appears to be a bit above the threshold level, 1) VK contribute to ERA most substantially; 2) JRA significantly contributes to ERA; 3) VK contributes to ERA about 1.7 times as substantially as JRA does; 4) VK contributes to ERA about 6.8 times as substantially as GK does; 5) JRA contributes to ERA about 4.0 times as substantially as GK does. From what has been discussed above, we can conclude that, when the subjects' ELP seems to be a bit above the threshold level, VK significantly and most effectively contributes to ERA and that the subjects' JRA significantly but weakly contributes to ERA. On the other hand, the subjects' GK hardly contributes to their ERA.

In group C (i.e., when the subjects' ELP is likely to be moderately above the threshold level of the EFL reading comprehension test), VK and JRA show almost the same correlation with ERA (i.e., .502**, $p < .000$ and .530**, $p < .000$ respectively). On the other hand, GK shows

weak correlation with their ERA (.241**, $p < .000$). According to these results, we can assert the following two points: In group C, the data in table 3 show that 1) VK and JRA have almost the same relationship with ERA ($r = .530^{**}$ and $.502^{**}$ respectively); 2) GK has weak relationship with ERA ($r = .241^{**}$). As in the case of group A, these results are almost the same as the results (i.e., both VK and JRA show significant and moderate correlation with ERA—VK: $.409^{**}$, $p < .001$; JRA: $.493^{**}$, $p < .000$; GK: $.198^*$, $p < .043$) of Hayashi (2004). In order to investigate this assertion further, we conducted the multiple regression. The result shows that standard partial regression coefficients are as follows: VK = $.310^{**}$, $p < .003$; GK = $.168^*$, $p < .028$; JRA = $.301^*$, $p < .011$. From these results, we can argue the following two points: When the subjects' ELP appears to be moderately above the threshold level, 1) VK and JRA almost equally contributes to ERA. This result is almost the same as the result (i.e., VK = $.450^{**}$, $p < .002$; JRA = $.404^{**}$, $p < .001$) of Hayashi (2004); 2) GK weakly contributes to ERA ($.168^*$, $p < .028$). This result is also almost the same as the result (GK = $.088^*$, $p < .036$) of Hayashi (2004). The important point to note is that, even when the subjects' EFL proficiency seems to override the threshold level of the EFL text completely, VK still plays an important role in their EFL reading (i.e., correlation between VK and ERA is $.502^{**}$, $p < .000$; standard partial regression coefficient is $.310^{**}$, $p < .003$ —this value is a little higher than the value of JRA [$.301^*$, $p < .011$]).

4.2 EFL Reading and Grammar Knowledge

4.2.1 Research

4.2.1.1 Participants

This study was conducted with 183 students of a public senior high school in Hokkaido. They were all second-year students.

4.2.1.2 Investigating Participants' Grammar Knowledge More Closely

Hayashi (2005) examined the participants' grammar knowledge in relation to the following two components: morphosyntactic form and meaning. In this study (Hayashi, 2007), in order to investigate the participants' grammatical knowledge more closely, we will investigate the participants' other components of grammar knowledge: six grammatical forms and meanings in Note 2. In order to do this, we added the two scores of two tests (i.e., one is the average score of the quizzes, which participants had taken twice a week for about a year; the other is a score of the last-term exam, by which we examined if the participants had acquired the grammatical items of the above-mentioned quizzes) to the score of the grammatical test in the

trial test, which the participants took in February 2005. We utilized the total of the scores of three grammatical tests as the value of the participants' grammar knowledge.

4.2.1.3 Procedure

In addition to participants' grammar knowledge, in order to investigate the participants' parts of vocabulary knowledge (i.e., the meaning[s] of words and the association of words), EFL reading ability and L1 reading ability, we utilized each score of the trial test. As to vocabulary knowledge, as we had done in Hayashi (2005), in order to investigate the participants' vocabulary knowledge more closely (i.e., the written form of a word, the grammatical behavior of a word, the collocations of a word and the register of a word), we conducted another vocabulary test consisting of twenty questions and we added the score of this test to the score of the above-mentioned vocabulary test in the trial test. We utilized the total of the scores of two vocabulary tests as the value of the participants' vocabulary knowledge.

4.2.2 Results and Discussion

Table 4 Pearson Correlation of the Group A

		VK	GK	JRA
r	ERA	.610**	.583**	.061
p		.000	.000	.723

Table 5 Pearson Correlation of Group B

		VK	GK	JRA
r	ERA	.352**	.292*	.196*
p		.002	.012	.047

Table 6 Pearson Correlation of Group C

		VK	GK	JRA
r	ERA	.556**	.386**	.441**
p		.000	.000	.003

On the results of relationship among the participants' scores of EFL proficiency, EFL reading comprehension and L1 reading comprehension, we divided the participants into three

groups (i.e., groups A, B and C) in terms of threshold level.

In group A (i.e., when the participants' EFL proficiency is below the threshold level of the EFL reading comprehension test), vocabulary knowledge (VK) and grammatical knowledge (GK) show moderate correlation with EFL reading ability (.610**, $p < .000$ and .583**, $p < .000$ respectively). On the other hand, their L1 reading ability (JRA) shows very low correlation with their EFL reading ability (.061, $p < .723$). In Hayashi (2005, the values of the correlations: VK = .793**, $p < .000$; GK = .412**, $p < .000$), when the participants' EFL proficiency (ELP) is below the threshold level of the EFL reading ability (ERA), the results show that VK has much stronger relationship with ERA than GK does with ERA. However, the results of the correlations of this research show that, GK has a little weaker relationship with ERA than VK does with ERA. In order to further investigate these results, we conducted multiple regression (β) and examined how each factor (i.e., vocabulary knowledge, grammar knowledge and L1 reading ability) contributed to EFL reading ability in group A. The results show that standard partial regression coefficients are as follows: VK = .414*, $p < .015$; GK = .349*, $p < .037$; JRA = .045, $p < .736$. From these results, we can argue the following four points: When the participants' ELP is below the threshold level of the target language text, 1) VK significantly and moderately contributes to ERA, which is different from the result of Hayashi (2005, β of VK = .794**, $p < .000$); 2) GK also significantly and moderately contributes to ERA, which is also different from the result of Hayashi (2005, β of GK = .058, $P < .483$); 3) JRA has no significant influence on ERA; 4) According to 1 and 2, we can conclude that, when we investigate the participants' GK in detail, we can find that the participants' GK contributes to their ERA significantly and effectively when the participants' EFP appears to be below the threshold level of the text.

In group B (i.e., the participants' ELP is likely to be a bit above the threshold level of the EFL reading comprehension test and their JRA seems to transfer to their ERA weakly), VK, GK and JRA show weak and significant relationships with ERA (the values of the correlations: VK = .352**, $p < .002$; GK = .292*, $p < .012$; JRA = .196*, $p < .047$ respectively). In Hayashi (2005, VK = .500**, $p < .001$; GK = .116, $p < .481$; JRA = .209*, $p < .017$), when the participants' ELP is a bit above the threshold level of the text, the results show that VK and JRA have stronger relationships with ERA than GK does with ERA. However, the result of this research shows that, GK has a bit weaker relationship with ERA than VK does with ERA, and has a little stronger relationship with ERA than JRA does with ERA. In order to further investigate these results, we conducted multiple regression and examined how each factor contributed to EFL reading ability in group B. The results show that standard partial regression coefficients

are as follows: VK = .267*, $p < .032$; GK = .166, $p < .182$; JRA = .142, $p < .242$. From these results, we can argue the following four points: When the participants' ELP appears to be a bit above the threshold level, (1) VK contribute to ERA most substantially; (2) VK contributes to ERA about 1.6 times as substantially as GK does to ERA; (3) VK contributes to ERA about 1.9 times as substantially as JRA do to ERA; (4) GK contributes to ERA almost as effectively as JRA. From what has been discussed above, we can confirm the following point: When the participants' EFP seems to be a bit above the threshold level, VK significantly and most effectively contributes to ERA. However, we cannot confirm the following point: When we investigate the participants' GK closely, we may find that GK works significantly and efficiently in the participants' ERA when the participants' EFP appears to be a bit above the threshold level of the text. In Hayashi (2005), the results of multiple regression are as the following: VK = .502**, $p < .006$; GK = .074, $p < .673$; JRA = .295*, $p < .045$. Thus, we can confirm the following point: When we precisely examine the participants' GK, the participants' GK contributes to ERA almost as effectively as JRA does to ERA when the participants' ELP appears to be a bit above the threshold level of the text.

In group C (i.e., when the participants' ELP is likely to be moderately above the threshold level of the EFL reading comprehension test), VK, GK and JRA have significant and moderate correlations with ERA (VK = .556**, $p < .000$; GK = .386**, $p < .000$; JRA = .441**, $p < .003$). These results are different from the results (i.e., VK = .502**, $p < .000$; GK = .241**, $p < .000$; JRA = .530**, $p < .003$) of Hayashi (2005). In order to investigate these results further, the multiple regression was conducted. The results show that standard partial regression coefficients are as follows: VK = .331**, $p < .003$; GK = .216*, $p < .043$; JRA = .260**, $p < .009$. These results are different from the results of Hayashi (2005, VK = .310**, $p < .003$; GK = .168*, $p < .028$; JRA = .301*, $p < .011$). From these results, we can argue the following four points: When the participants' ELP appears to be moderately above the threshold level, (1) VK contributes to ERA most substantially; (2) GK and JRA contribute to ERA significantly and effectively; (3) GK contributes to ERA a little less effectively than JRA does to ERA. According these points, we can conclude that when we investigate the participants' GK in detail, we can find that the participants' GK contributes to their ERA significantly and positively when the participants' EFP appears to be moderately above the threshold level of the text.

5. Conclusion

These studies aimed to investigate the role of vocabulary and grammar knowledge in EFL reading more closely. We obtained the result that the participants' vocabulary and grammar knowledge played a significantly effective role in their EFL reading comprehension below and above the threshold level. In addition, we also obtained the result that the participants' vocabulary knowledge significantly played the most important role in their EFL reading comprehension below, on and above the threshold level. Moreover, above the threshold level, we obtained the result that the participants' L1 reading ability contributed to their EFL reading comprehension significantly moderately above the threshold level.

In 1984, Alderson addressed the question of whether L2 reading was a language problem or a reading problem and came to the tentatively qualified conclusion that it appeared to be both a language problem and a reading problem, but with firmer evidence that it was a language problem, for low levels of L2 competence, than a reading problem. We have partly confirmed Alderson's (1984) assertion in this research in terms of the threshold hypothesis. That is, we have confirmed that FL reading is a language problem for low levels of FL competence, and both a language and a reading problem for moderate levels of FL competence.

Notes

1. According to Hatch and Lazaraton (1991), regression is a way of predicting performance on the dependant variable via one or more independent variables. In multiple regression, we examine the possible sources of prediction and test to see which of many variables and which contribution of variables allow us to make the best prediction. In this experiment, a dependent variable is EFL reading ability and independent variables are vocabulary knowledge, grammar knowledge and L1 reading ability.
2. Purpura (2004) divides the area of grammatical knowledge into the following three dimensions: 1) Grammatical form (accuracy): phonological/graphological forms, lexical form, morphosyntactic forms, cohesive forms, information management forms, interactional forms; 2) Grammatical meaning (meaningfulness): phonological/graphological meanings, lexical meanings, morphosyntactic meanings, cohesive meanings, information management meanings, interactional meanings; 3) Pragmatic meaning (appropriateness/ conventionality/ naturalness/ acceptability): contextual meanings, sociolinguistic meanings, sociocultural meanings, psychological meanings, rhetorical meanings.

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