The Relationship between Word Recognition Skills and Reading Comprehension in English of EFL Thai Students

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Abstract

The relationship between word recognition and reading comprehension processing skills in English of Thai students learning English as a foreign language was investigated. The subjects were 60 high school students of a public school. The instruments used to collect data were word recognition (three word-type-paper-based tests: realword, nonword, and pseudoword) and reading comprehension tests. The statistical methods employed for analyzing the data were Descriptive (for calculating mean and standard deviation), Pearson Product Moment (for analyzing the correlation), and Multiple Regression (for analyzing the predictive values of the predictors). The descriptive statistics reveal the highest mean of realword (44.15) and the lowest mean of pseudoword (24.73). These means reflect the word recognition capability of students in recognizing 95.99 percent of the realword and 68.69 percent of words sounding like real English word. The analysis of Pearson Product Moment displays two correlations between realword and reading comprehension, and between pseudoword and reading comprehension. This result addresses the objective of this study. Finally, the results of Multiple regression analysis indicate 1) that the three predictors account for about 25 % of the variance in the comprehension scores and 2) that realword and pseudoword scores make a contribution to comprehension score.

บทคัดย่อ

งานวิจัยนี้ศึกษาความสัมพันธ์ระหว่างทักษะในการถอดรหัสคำและการอ่านภาษาอังกฤษเพื่อความเข้าใจของนักเรียนระดับ

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มัธยมศึกษาตอนปลายสังกัดโรงเรียนรัฐบาล เรียนภาษาอังกฤษเป็นภาษาต่างประเทศจำนวน ๖๐ คน กลุ่มตัวอย่างทั้งหมด ๖๐ คนนี้ ถูกกำหนดให้ทำแบบทดสอบ ๒ ชุด คือ แบบวัดความรู้ความสามารถในการถอดรหัสคำ ประกอบด้วยแบบทดสอบย่อย ๓ ประเภท ได้แก่ realword pseudoword และ nonword และแบบวัดความสามารถในการอ่านเพื่อความเข้าใจ คะแนนจากแบบทดสอบทั้งสองถูกวิเคราะห์ด้วยสถิติเชิงพรรณาและอนุมานผลของการวิเคราะห์ด้วยสถิติเชิงพรรณา แสดงให้เห็นค่าเฉลี่ยสูงของคะแนนจาก realword test (๔๔.๑๕) และค่าต่ำสุดของคะแนนจาก pseudoword test ค่าเฉลี่ยทั้งสองนี้ชี้ให้เห็นถึงความสามารถในการถอดรหัสคำประเภท realword ซึ่งสูงกว่าความสามารถในการถอดรหัสคำประเภท pseudoword (ร้อยละ ๙๕.๙๙ และ ๖๘.๖๙ ตามลำดับ) ผลของการวิเคราะห์ข้อมูลด้วยสัมประสิทธิ์สหพันธ์ Pearson Product Moment แสดงให้เห็นถึงความสัมพันธ์ระหว่างความสามารถในการถอดรหัสคำ (realword, pseudoword และ nonword) สามารถพยากรณ์ความสามารถในการอ่านเพื่อความเข้าใจได้ร้อยละ ๒๕ และความสามารถในการถอดรหัสคำ realword และ pseudoword มีผลต่อการอ่านเพื่อความเข้าใจ

Introduction

Reading, according to cognitive theory, is an interactive process consisting of two subprocesses: lower-level and higher-level (Bell & Perfetti, 1994; Carr & Levy, 1990; Segalowitz, Watson, & Segalowitz, 1994). The former pertains primarily to word recognition, while the latter pertains to the integration of information carried by words, clauses, and paragraphs to construct a representation of the text (Beck & Carpenter, 1986; Hulstijin, 1991). This interactive reading process assumes that the information from readers' pre-existing knowledge and the information from print process simultaneously and influence each other. However, studies on eye movements in first language reading have demonstrated that readers make extensive use of printed information, that is, they directly fixate on about two thirds of the words (Beck & Carpenter, 1986; Perfetti, 1984). Additionally, other studies have found that the absence of a single letter in a word causes difficulties for readers in decoding, which affects their comprehension (Koda, 1996; Perfetti, 1984). These results have revealed that readers rely extensively on graphic information and that the lower-level processes are critical in predicting difficulties or problems in reading comprehension in children and adult L1 (first language) readers (Bell & Perfetti,1994). Therefore, it can be concluded that word recognition is linked directly to comprehension.

In second language reading, readers are often found to employ the same processes as those used in their L1 reading. However, studies in L2 (second language)reading have revealed that readers' L2 reading process is slower and less successful, because of their long eye fixations, which are almost three times as long as those of the native speakers. These long eye fixations result from the lack of

sufficient word-recognition skills (Beck & Carpenter, 1986; Hulstijn, 1991; Perfetti, 1984). This word recognition skill deficiency stems from the fact that unlike L1 readers, normally fluent in their native language before learning to read, second language (L2) readers are demanded to read before attaining any real proficiency in their L2, thus, lacking sufficient linguistics knowledge to decode words on printed pages. Another factor is that L2 readers have prior reading experience which potentially affects their L2 reading process, especially if readers read in a second orthography as well as a second language. Research has shown that L2 readers may transfer word-processing procedures and cognitive strategies from reading in their L1 to reading in the L2. The similarity or dissimilarity between the two orthographies can predict the level of difficulty that the reader might experience in developing reading proficiency (Koda, 1992). If, however, word recognition skills in the L2 could eventually be automatized through learning and practice, as they have been for skilled L1 readers, this automatization could free more cognitive resources for use in the higher-level comprehension processes, improving L2 reading efficiency and comprehension (Perfetti & Lesgold, 1979; Perfetti, 1985; 1988).

Even though empirical evidence has indicated a critical role of word recognition skills, few L2 reading studies have looked into these skills and their relationship to L2 reading comprehension. Rather, the researcher has focused on higher-level processing or the top-down processes that use schemata, background knowledge, and text organization (Carrell, Pharis, & Liberto, 1989; Carrel & Eisterhold, 1988).

In Thailand, most of the studies on EFL reading comprehension have also emphasized top-down reading processes, for example, psycholinguistic-based reading instruction (Dhanesschaiyakupta, 1990), and the use of schemata and background knowledge (Wirotanan, 1997). Therefore, in light of the past studies and based on recent results of studies in L1 and L2 reading, it is time to turn our attention to investigate the importance of bottom-up processes in L2 reading comprehension, with particular attention to word recognition skills of the L2 readers. This study is aimed to address this issue.

Literature Review

Reading in a Native and Second Languages

Reading for comprehension involves the activation of networks of various knowledge and component skills (Perfetti, 1985; Underwood & Batt, 1996). The first step of reading is to recognize words, that is, to register the printed text and decode words. Then, readers identify the orthographic form and access the corresponding words in the mental lexicon (Carpenter & Just, 1981; Perfetti, 1985). Once the words are recognized, a variety of other sources of information are accessed. The sources include word meanings and syntactic possibilities, linguistic patterns, and readers' memory of preceding context. The interaction of these sources allows readers to construct

ongoing and updated linguistic and conceptual representations (Beck & Carpenter, 1986). Finally, readers' prior knowledge plays a critical role in interpreting, organizing and integrating information derived from the text to construct meaning (Haenggi & Perfetti, 1994). This process of reading illustrates how the lower-level (bottom-up) processing information from the printed page is integrated with the higher-level (top-down) processing information derived from readers' prior knowledge to construct future meaning.

For L1 readers, since they normally have proficiency in their native language before learning to read, it was suggested that linguistic knowledge by itself does not guarantee the development of good verbal processing skills.

Many L1 studies have indicated that while L1 readers show a strong relationship between reading and listening comprehensions, difficulties with the 'word recognition skills' can predict L1 reading comprehension problems even in college-level readers (Bell & Perfetti, 1994). Other studies showing considerable variance in word recognition skills in native-speakers have suggested that two specific dimensions of linguistic knowledge, orthographic and phonological, independently influence word recognition, and that the two dimensions may not develop at the same rate as other aspects of linguistic knowledge (Koda, 1994).

Successful readers usually display a combination of text-driven information from the lower-level processes and conceptually guided information from the higher-level processes (Perfetti & Roth, 1981). However, they will rely immensely on the lower-level processes because, according to Perfetti & Roth, the lower-level processes are more definitive and essential, that is, they can carry on without higher-level processes, but not vice versa. Poor readers are found to be dependent on the higher-level processes to compensate for deficiencies in word recognition (Stanovich, 1980; 1991).

During the past two decades, studies in L2 and FL (foreign language) reading have been shifted from psycholinguistic-based reading theory to interactive-based models of reading. Researchers have adopted the concept of reading as a multilevel-cognitive processing operation into the context of L2 and FL reading (Geva & Ryan, 1993; Segalowitz, Poulsen, & Komoda, 1991). The results of these studies have revealed that L2 readers employ the same processes in reading their L1 and L2 (Cohen, 1994; Geva, Wade-Woolley & Shany, 1997; Segalowitz, Segalowitz, & Wood, 1998; Wade-Woolley, 1999). However, it has been observed that L2 readers, despite being highly skilled in an L2, do not perform as well on L2 reading tasks as on those in their L1. Moreover, readers' L2 reading process is slower than that of their L1 reading. (Chitiri & Willows, 1997; Geva, Wade-Woolley, & Shany, 1997; Hulstijn, 1991).

This inefficient L2 reading process is highly likely due to the fact that many L2 readers must learn a second orthography in addition to a second language can present additional problems for L2 reading. It is theorized that L2

readers transfer cognitive strategies from reading in their L1 orthography to reading in the new orthography (Koda, 1994). If the readers' specific orthographic processing skills for the L1 are fully automatized, it is possible that they could be of no use to L2 reading, necessitating that orthographic processing in the L2 be learned as an entirely new skills; on the other hand, there is also possibility that automatized orthographic processing skills for the L1 could interfere with the readers' processing of the L2 orthography. If the latter is the case, modification or suppression of the L1 skills may be difficult or impossible to accomplish, and L2 reading comprehension may develop more slowly, because changes must be made in the operation and coordination of the sub-skills necessary for reading in the L2 (Brown & Hayes, 1985).

Word Recognition

Word recognition refers to the processes in which readers obtain both phonological codes (pronunciations) and context appropriate lexical meaning from visually displayed words (Koda, 1996) to construct meaning from printed pages.

As it is widely accepted that word recognition is linked directly to comprehension deficiency, there are two ways to demonstrate the causal relationships between word recognition and reading comprehension. First, the meaning-construction process in reading is restricted to textual information. If the readers misinterpret the text, the comprehension effort is hardly a success. Then, it requires that the readers possess strong word recognition in order to extract sufficient and accurate information from the text. On the contrary, if the readers lack this visual sampling skills, the meaning-constructing process is impaired (Koda, 1996). Second, reading is a complex process which involves many components that must be operative at the same time in order to construct meaning for comprehension (Bell & Perfetti, 1994). To accomplish this within the capacity limitations, word recognition must become automatized, that is done without attention. Active attention cannot be directed to many tasks at the same time. This limited capacity requests that some subprocesses in a complex task be automated. The automaticity of word recognition is necessary to allow attention to be focused on the higher-level subprocesses involved in comprehension (Perfetti, 1984; LaBarge & Samuels, 1974).

L2 Word Recognition

L2 word recognition, although as important as and has some similarities to L1 word recognition, is, to a certain extent, different from L1 word recognition. The first difference is that early L1 word recognition is the matter of matching the known pronunciation of words to their unknown written forms. In other words, children start to develop their L1 word recognition at a very young age when they have already acquired pronunciations of the words they will encounter in print in their mental lexicon. In order to learn to read, the children recognize the written forms of the printed words by transforming these novel words into their

phonological forms (Ehri, 1991; Gough & Juel, 1991). On the contrary, L2 word recognition is not simply the matching between the known sounds of the words and their unknown written forms. The matter of this fact is that L2 reading involves more than one language. When starting learning a second language, L2 learners have to learn a new set of linguistic representations, including phonological codes, semantic codes, and syntactic rules, at the same time as they learn to recognize the written forms of new words in the new language (Geva, Wade-Woolley, & Shany, 1997; Koda, 1992). Thus, the development of L2 word recognition is more complicated than that of L1 word recognition because it requires a number of extra sub-processes.

Another aspect causing the difference between L1 and L2 word recognition is the complex nature of L2 word recognition. The complex nature stems from the differences between L1 and L2 orthographies causing what is called 'orthographic effects'.

The fact regarding types of orthography indicates that different types of orthographies involve different word recognition strategies. Many cross-linguistic studies have revealed that L2 readers having different orthographic backgrounds (alphabetic, syllabic, or logographic) use different strategies (phonological and orthographic strategies) when reading English as an L2 and, furthermore, that the strategic variations are identified with their orthographic systems (Koda, 1989; 1990).

Another orthographic effect results from the range of the difference between L1 and L2 orthographies called 'orthographic distance. Koda (1996, p. 445) has defined this term as "the extent to which the L1 and L2 orthographic systems share similar structural and representational properties". Due to the fact that orthographic systems vary from language to language, it is hypothesized that L2 word recognition efficiency could be facilitated by the extent to which the two orthographic systems share the same structural properties. When reading in an L2, readers encounter the change from one orthographic system to another, readers with related L1 orthographic backgrounds possess superior word recognition performance than those with unrelated orthographic backgrounds (Green & Meara, 1987; Koda, 1988; Koda, 1996) and that L1 and L2 orthographic similarities facilitate L2 word recognition (Koda, 1996).

In summary, the review literature indicates that the basic processes of reading in L1 and an L2 are the same in that they consist of the lower-level (word recognition skills) and higher-level (reading comprehension skills) processes and that the lower-level processes are the foundation of reading processes. Although word recognition has the same role and influence on L1 and L2 readers, L2 word recognition processes are more complicated due to the prior reading experience of L2 readers and the orthographic effects. Readers with different orthographic backgrounds develop different word recognition strategies used to read in their native language. When L2 readers encounter reading task in a second

language, they will transfer the strategies developed and used in their L1 to their L2 reading.

Objective of the Study

This study was aimed to examine the relations between word recognition skills (the lower-level processing skills) and reading for comprehension (the higher-level processing skills) of high-school Thai students learning English as a foreign language.

Research Questions

1. Is there a significant positive correlation between the comprehension scores and the three word test scores ?

2. How well do the three predictors; realword, nonword, and pseudoword scores, make a relative contribution to comprehension scores?

Methodology

Subjects

The population of this study is eleventh graders of Sainumpeung School, a public school located in Bangkok. Two reasons underlay the selection of these students. First, the students in this school were considered good representatives of Thai public school students, since most secondary schools not only in Bangkok, but also in other provinces are public schools that are under the same standardized curriculum controlled by the Ministry of Education. Second, as once an English teacher at this school, the researcher received good collaboration from former colleagues, school director, and especially from students resulting the validity to data.

As the purpose of this study was to investigate the relationship between word recognition skills and reading comprehension, it required that students possess sufficient English proficiency to engage in the experimental tasks. Two criteria were used for participant selection. First, all subjects had to start studying English in the fifth grade as the latest to ensure that they had English orthographic background. Second, they must score at least 60 % of the placement test. With these two criteria, the total number of qualified students was 378 from whom 60 students were selected randomly.

Instrumentation

English Placement Test

This test is a 40-item and 30-minute test aimed at measuring reading comprehension at the sentence level. The 40 items were taken from the problem numbers 61-100 from the English Placement test Form A developed by Spann and Strowe and Form C developed by Corrigan, Dobson, Kellman, Spann, and Tyma. The EPT was determined a valid standardized instrument as it is used to place beginning to advanced-intermediate level students ability in intensive English programs, and it had been used to place students in the English Language Institute at the University of Pittsburgh.

Word Recognition Test

This test, widely known as 'lexical decision task', was consisted of 3 subtests: realword, pseudoword, and nonword tests. students' used to assess students' decoding skill. For these students to decode words, they

relied on either phonological or orthographic mechanisms depending on the mechanism developed to read Thai, their first language., or on word familiarity. The three subtests are as followed:

Realword test. This test consists of 46 pairs of letter strings. In each pair, the students had to deicde which of the words in each pair was a real (correctly spelled) English word, choosing between a real word and a homophonous pseudoword (e.g., word and wurd) (Adapted from materials used in Olsen, Kliegl, Davidson, & Folta, 1985, as quoted in Bell & Perfetti, 1994).

Nonword test. This test consists of 40 pairs of letter strings and students had to decide which of the words in each pair looked most like an English word, chosing between legal (orthographically regular and pronounceable) and illegal (orthograohically irregular and unpronounceable) nonword (e.g.reeze and, rkega). (Adapted from materials used in Stone & Van Orden, 1993).

Pseudoword test. The test contains 36 pairs of letter strings, and students were instructed to read the word silently, and to decide which of the words in each pairs, when pronounced, would sound like a word that really exist in English, deciding between two legal pseudowords (e.g., neech and teech), one being a homophone of an existing word in English. (Adapted from materials used in Olson, Kliegl, Davidson, & Folta, 1985, as quoted in Bell & Perfetti, 1994).

Reading Comprehension test

The test containing 40 questions was taken from the reading subsection of the Michigan Standardized Reading Sub-Section Test (Forms I and J). The test contained 8 short reading passages, each of which consisted of 5 multiple choice questions.

Variables

Two experimental tests, word recognition and reading comprehension, were used to examine the relationship between word recognition processing and reading comprehension processing skills of the subjects. Therefore, there were two sets of variables: predictor and criterion (see Table 1), which are discussed in the following sections.

Table 1 Predictor and Criterion Variables

Task	Test Type	Predictor Variable	Criterion Variable
Lexical Decision Task	Realword test	Test Score	-
	Nonword test	Test Score	-
	Pseudoword test	Test Score	-
Reading Comprehension task	Reading Comprehension test	-	Test Score

Procedure

All tests were 'paper and pencil' tests and were administered one after another. Each test form had printed instructions in English, but the directions for each one were also given to the students orally in Thai. The word recognition tests were administered first, starting with the realword test. The nonword and pseudoword tests were administered later sequentially. Each test had a time limit of four minutes. After finishing the word recognition tests, the subjects had a 5-minute break to relax before starting the reading comprehension test.

After the word recognition tests and the 5-minute break, the reading comprehension, which contained 40 items, was administered. As this test was a standardized one, the test-taking time was already determined. Subjects were allowed 30 minutes to do this test as designated in the test. The entire testing session from the beginning, which was the test orientation, until the ending of the reading comprehension test lasted for approximately 1.30 hrs.

Data Analysis

As the aim of this study was to investigate the correlation between word recognition and reading comprehension processing skills, the scores of word recognition and reading comprehension tests were analyzed by Pearson product moment correlation coefficient. The Multiple Regression was also used as a part of the analysis in order to find out predictive value of each word recognition test.

Results and Discussion

Table 2 Descriptive statistics for word recognition and reading comprehension tests.

Test type	Points	Mean	S.D.	Percentage
Realword	46	44.15	2.12	95.99
Nonword	40	36.73	2.23	91.82
Pseudoword	36	24.73	0.75	68.69
Reading	40	16.33	5.16	40.82

From all mean scores, it was clear that the subjects in this study performed best in the realword test which was congruent with the results of other studies in word recognition which were conducted with subjects from various orthographic backgrounds (Haynes & Carr, 1990; Gairns, 1992, cited in Koda, 1996).

From the three studies, it was evident that readers with any orthographic background were capable of identifying actual English words. Consequently, it was undoubted that Thai students, with alphabetic background, also performed best in the realword test. For the worst performance, the subjects in this study,

like those in Strouse's study, performed worst in the pseudoword test. A potential reason to explain their worst performance is the notion of cognitive transfer. When the subjects read in an L2, they will transfer L1 word recognition strategies to facilitate them in their L2 reading. However, the strategy transferred did not facilitate them due to the fact that the strategy required to cope with pseudoword is the 'phonological one'. That is, they had to convert each letter into sound, and finally string each letter sound together to construct the sound of that word. This strategy will occur through the 'phonics approach.' However, from a short informal interview, the researcher found that the majority of the subjects were primarily taught to read through the 'whole-word approach' which helped establish them with the 'orthographic strategy', relying on visual information. Through this strategy, students saw the word as a whole and figured out the pronunciation of that word. This strategy will be successfully utilized if the words that the readers encounter are familiar to them.

By contrast, if the words are novel ones, it means that the readers do not have the pronunciations of these words in their repertoire to retrieve from. Thus, orthographic strategy is useless.

Pseudowords were completely unfamiliar to the subjects; therefore, they needed to convert the letters into sound meaning that they had to rely on the phonological strategy which they did not possess. As a result, they performed the pseudoword test with the least success.

Another crucial point needed to be looked into is the subjects' good performance on the nonword test. The words used on the nonword test in this study were chosen from Stone & Van Orden's list of legal and illegal nonwords and used in a manner unique to the present study: a word was chosen from the list of legal nonwords, and then a second word was chosen from the list of illegal nonwords that would match the legal word's first letter (e.g. frane, feche), or some other letter collocation in the legal word (e.g. kneam, nkapi). The students in this study were more accurate in choosing the correct word among these pairs of legal and illegal nonwords than they were in choosing between the legal words of pseudoword, suggesting that they were using visual orthographic information over phonological information in making their word identification decisions.

Table 3 Correlations among word recognition and reading comprehension test scores.

	Real word	Nonword	Pseudoword	Reading
Realword	1.00	.1299	.2040	.4112**
	(60)	(60)	(60)	(60)
	p = .	p = .323	p = .118	p = .001
Nonword		1.0000	.3387	-.0156
		(60)	(60)	(60)
		p = .	p = .008	p = .906
Pseudoword			1.0000	.3136**
			(60)	(60)
			p = .	p = .015
Reading				1.0000
				(60)
				p = .

** Correlation is significant at the 0.01 level (1-tailed)

From Table 3, it is apparent that among 6 correlations, three are significant. However, the correlations taken into consideration were those between the two predictive variables which were realword and pseudoword that significantly correlated with reading comprehension with the correlation values of .411 and .314 respectively. Although no correlation was found between nonword and reading comprehension, a conclusion regarding the relationship between word recognition and reading comprehension could be drawn.

The correlation between pseudoword and reading comprehension also provides such empirical support. Although decoding pseudowords required students to make grapheme/phoneme correspondences, some students could rely on visual orthographic information. The reason is that pseudowords were constructed following the English orthographic rules; thus, the combinations of some of these words may appear like actual English words which students arefrequently exposed to. These results are congruent with the results of Koda's (1992) and Strouse' s (1997) studies. of L2 reading. Koda conducted a study of L2 reading using English-speaking readers of Japanese. The result of her study showed a strong correlation between word recognition and paragraph-level reading comprehension. Strouse conducted a study with Taiwanese high–school students studying English as a second language. Her objective was to find the relationship between word recognition using

realword, nonword, pseudoword tests; and vocabulary and listening skills and reading comprehension. Regarding the relationship between word recognition and reading comprehension, her results clearly displayed the correlation between realword and pseudoword, but not nonword and reading comprehension. As a consequence, the results of this study do confirm the first research question that there is a relationship between word recognition and reading comprehension. These two correlations can confirm the first research question.

Table 4 Multiple Regression Analysis

Multiple R	.49760
R Square	.24761
Adjusted R Square	.20730

Variables		B	SE B	Beta	T	Sig T
Realword	-	.90748	.28896	.37266	3.141	.0027
Nonword		.37665	.28495	-.16319	-1.322	.1916
Pseudoword		.25862	.11043	.29283	2.342	.0228

This Table illustrates the results o the Multiple regression analysis. The R squared value of the three predictors combined is .247. When considering each variable individually, the R squared values of realword, nonword, and pseudoword are .372, -.163, and .292 respectively. These values show that the three

This Table illustrates the results o the Multiple regression analysis. The R squared value of the three predictors combined is .247. When considering each variable individually, the R squared values of realword, nonword, and pseudoword are .372, -.163, and .292 respectively. These values show that the three predictors account for approximately 25% of the variance in the comprehension scores (F=6.143, df=3, 56, p=.0011). However, the contribution of each individual predictor is evident in realword and pseudoword, but not nonword given that the three predictors in the equation. That is the average realword and pseudoword scores are significant predictors accounting for approximately 37% and 29% of the variance in the comprehension scores (F= 3.14, df=3, 56, p=.0027; F=2.342, df=3, 56, F=.022).

These results are partly congruent with those of Strouse. That is, in Strouse's study, only realword variable significantly accounted for reading comprehension. A possible explanation is the difference between L1 and L2 orthographies. The difference between Thai and English is less than between Chinese and English. Both Thai and English are alphabetic scripts which require either phonological or visual orthographic strategy for decoding words. However, Chinese is logographic script relying

on only orthographic strategy. Due to L1 orthographic background, Thai students possess two strategies from which they can choose to attack both realword (orthographic strategy) and pseudoword (phonological strategy). In contrast, Taiwanese, with logographic background, possess only orthographic strategy enabling them to cope only with realword.

The results of the Multiple regression provide the answer to the second research question in that realword variable makes the best contribution to comprehension. The second best variable is pseudoword and nonword variable does not make a relative contribution. However, in the overall, the three predictors account for about 25% of the variance in the comprehension scores which is higher than that of Strouse which was only 20%.

Both the results of the Correlation and Multiple regression analyses provide empirical support for the theory that there is a relationship between word recognition and reading comprehension strategies and that word recognition strategies also play an important part in L2 reading comprehension.

Conclusion

Component skill analyses have much to offer in learning about the complicated process of reading in a second language, since interactions between higher processing and word recognition strategies have been shown to influence reading comprehension skill in both L1 and L2 readers. This study, in part, showed positive correlations between lower-level processing skills and reading comprehension. That is, significant correlations were found between real words and reading comprehension and pseudoword and reading comprehension in the entire sample. Other positive correlations were not found.

It has been suggested that orthographic and phonological processing are independent processes, even in L1 readers, and that experience in reading can lead to lexical knowledge that goes beyond decoding. During L2 learning, these processes might be expected to be even more variable. Perfetti (1991) suggests that specific lexical knowledge is built by practice. Word representations are strengthened by experience with print, increasing the quality of lexical representation and making spelling more reliable and quickly accessed. The effect of spelling and word identification practice in the L2 orthography, along with probable L1 strategy transfer, can help to explain the difference in the students' performance on the realword and pseudoword tests. However, adequately explaining their performance on the nonword test requires further investigation.

Research focusing on the component skills of the reading process in various L2s could provide additional insight into the particular problems faced by second language readers. Knowing more about the L2 reading process could also lead to the development of better materials that might, for instance, focus on building both orthographic and phonological

strategies in the beginning readers. This could lead to the automatization of the necessary word recognition skills at the beginning of the reading process, allowing readers to gradually devote more cognitive resources to the higher-level processes needed for reading comprehension in an L2. Better sequencing of beginner materials could give these learners more practice in the lexical processing of word identification and decoding, as well as syntactic processing, before asking them to construct the mental representation of a text message that comprehension requires. Thus, they would be better prepared for typical reading like summarizing and making inferences, and, eventually, for comprehending the large amounts of text required for academic study in English.

Recommended future study

One possible future study would be to examine the relationship of vocabulary knowledge and decoding with reading comprehension in Thai students as it is acknowledged that vocabulary knowledge plays a significant role in reading comprehension (Koda, 1994). This significant role of vocabulary was found in Strouse' s. Another possible future study would be to investigate the relationship between word recognition and reading comprehension processes in students with different levels of English proficiency. The expected results on the basis of the theories of limited cognitive capacity and automatization would be that students with high proficiency would outperform those with low proficiency in word recognition and reading comprehension tests. Additionally, the correlation between word recognition and reading comprehension scores will be more robust in high proficient than in the low proficient groups.

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