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The Relationship Among English Phonological Awareness, Reading Ability and Vocabulary Size of Chinese High School Students With Learning Difficulties*

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This study focuses on the relationship among English phonological awareness, reading ability and vocabulary size of Chinese high school students with learning difficulties, trying to investigate how reading and vocabulary interrelate and influence learners' phonological awareness. In this study, phonological awareness tests, reading tasks and vocabulary size tests were conducted. Thirty-six students with learning difficulties (group one) were assessed. Meanwhile, another 43 students (group two) took part in phonological awareness and vocabulary size tests. Test results were analyzed based on the Psycholinguistic Grain Size Theory and we found that group two had many advantages over group one. The Pearson correlation analysis showed that word reading and vocabulary size interrelated with phonological awareness, but the multiple regression analysis further revealed that only word reading accounted for significant variance in phonological awareness. These results indicate the necessity of having further studies and examining the role of phonological awareness and reading in English learning. This study tries to provide some new ideas to help high school students with learning difficulties change learning strategies and improve their English study.

**[phonological awareness/reading/vocabulary size/psycholinguistic grain size/
음운인식/읽기/어휘량/심리언어학의 과립 사이즈]**

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I. INTRODUCTION

Phonological awareness is the ability to be aware of the sound units in spoken language. It is considered to be highly related to literacy and reading abilities in transparent languages like English. Studies on phonological awareness and literacy can be traced back to the 1980s when low-literate adults were taken as target participants. These studies have shown that low-literate adults tended to be lack of phonological awareness and poor in reading and that phonological awareness plays an important role in literacy acquisition. (Byrne & Fielding, 1991; Stahl & Murray, 1994; Van Orden, Pennington, & Stone, 1990). The study of Durgunoğlu and Öney (2002) focused on Turkey illiterate women also showed that participating in literacy programs can effectively improve their phonological awareness and reading skills.

Phonological awareness is also a vital predicator of youngsters' primary reading abilities (Adams, 1990). Research on preschoolers (Liberman, Shankweiler, Fischer, & Carter, 1974), kindergarten children (Stahl & Murray, 1994) and primary school students aged from 6 to 9 (Mcbridge-Chang, 1995) all proved that early phonological awareness development is vital to later reading development. Besides, research on the relationship between phonological awareness and reading abilities of EFL learners from France, Spain and Japan also show that learners' reading skills can be predicted by their phonological awareness (Comeau, Cormier, Grandmaison, & Lacroix, 1999; Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Yoshikawa & Yamashita, 2014).

Besides literacy and reading, another important concept that is relevant to phonological awareness is vocabulary size. Studies on the role of vocabulary in phonological awareness developments in L1 context reveal that expansion of learners' vocabulary size can improve their reading skills and accuracy. Furthermore, the research on the effect of vocabulary size on phonological awareness in L2 context also reveals that newly acquired words can help learners distinguish sounds better (Gorman, 2012) and phonological awareness can be predicted from their vocabulary skills to some degree (Chiang & Rvachew, 2010).

In the 1990s, most of the studies on phonological awareness focused on young learners because some researchers assumed that phonological awareness worked only in the childhood. However, recently, Anthony's studies from 2002 to 2004, with large samples and multiple measures, show that phonological awareness itself is continuous which means that it not only has imperative influence on children's early reading acquisition but also works for adults in their future study (Anthony & Francis, 2005). Moreover, based on the Psycholinguistic Grain Size Theory, which was proposed by Ziegler and Goswami (2005), phonological development plays an important role in reading and reading is a continuous process from childhood to adulthood. The study on Japanese adult learners (Yoshikawa & Yamashita, 2014), Korean adult beginning learners (D. Bae, 2010) and Taiwan junior high

school students (Lee, 2006) all recognized the role of phonological awareness in EFL learners' acquisition. All in all, the research on phonological awareness has the following features. First, it is usually connected to literacy, reading and vocabulary study. Second, it mainly focuses on those who have low phonological awareness. Third, due to the continuity of phonological awareness developments, research objects of phonological awareness not only include young learners but also adolescents and adult beginners.

In China, after nine years of compulsory education, students who successfully enter high school are all faced with much more fierce competition and much more difficult course contents, among which English classes require students to acquire a large amount of new and upper-class words. This requirement makes English learning in the senior high school stage become more challenging and important. Since the study on phonological awareness of high school students in China is still limited, this study will focus on senior high school students with learning difficulties to investigate whether there is any relationship existing between phonological awareness, reading abilities and learners' vocabulary size. In the current study, we address two research questions:

1) Is there any correlation between phonological awareness, reading and vocabulary size among Chinese high school students with learning difficulties?
2) Based on the Psycholinguistic grain Size Theory, how do reading and vocabulary size influence their phonological awareness?

II. THEORETICAL BACKGRUNDS AND LITERATURE REVIEW

1. Phonological Awareness

Phonological awareness is defined as "sensitivity to the sound structure of language. It demands the ability to turn one's attention to sounds in spoken language while temporarily shifting away from its meaning" (Yopp & Yopp, 2009, p. 12). In accordance with Johnston and Watson (2004), phonological awareness can be taken as the ability to be aware of sound segments in our spoken language: syllables, onset and rimes, and the smallest units known as phonemes. Thus phonological awareness is considered to include syllable awareness, onset-rime awareness and phoneme awareness.

Syllable awareness, which can be referred to the ability to distinguish between the phonons that constitute syllables, can be further defined as the ability to recognize different combinations of phonemes in word structures that are constructed based on alphabetic principles (Wright & Jacobs, 2003). The onset-rime awareness refers to the ability to tell apart onset and rimes in the word. In the basic structure of a syllable, a syllable consists of

onset and rime. In a syllable, onsets are consonant sounds and precede a vowel. In a CVC (consonant-vowel-consonant) structure, the first C is the onset. However, in a word that is in a VC (vowel-consonant) structure, such as “it” and “is”, there is no onset. A word like “candy” has two syllables, and thus in each syllable, there is an onset. Rimes are used to distinguish whether one word rhyme with the other. In a typical syllable structure, rime is the sequence of nucleus and coda. Nucleus is the vowel and coda is a consonant. When two words rhyme, it is said that they have the same rime units. Phoneme awareness is all about the knowledge of phonemes. A phoneme is the smallest distinctive unit in a sound, which makes two words different from each other. It is the last and deepest understanding of speech that children acquire (Stahl & Murray, 1994). Examples like comparisons of “fall” and “hall”, “pat” and “hat”, “pin” and “pan” show that changes in consonants or vowels will change the meaning of two words. Various studies on onset-rime awareness and phoneme awareness show that both are predictors of English reading abilities but compared with onset-rime awareness, which takes effect in the primary, phoneme awareness is a much more potent indicator in children’s future learning and reading (Hulme et al., 2002).

2. Reading Ability

As a complex cognitive process, reading is defined to be “a process in which novel orthographic codes have to be mapped onto pre-existing phonological codes (spoken words), which are associated to meaning prior to reading” (Ziegler, Perry, & Zoriz, 2014, p. 1). This process can be simply divided into just two processes, phonological decoding and reading comprehension. For reading ability hereafter, we only talk about phonological decoding.

Phonological decoding is a process where learners transform printed words independently into oral expressions (Share, 1995). Based on this hypothesis, the process of decoding unfamiliar words is also a process in which learners are able to learn word-specific orthographic information. Learners can acquire both word-specific and general orthographic representations in this process. The model used to analyze phonological decoding is the Dual Route Cascaded (DRC) model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) in which real words are translated through word-specific knowledge and nonwords are spelled through grapheme-phoneme correspondence (GPC) rules. Research on phonological decoding shows that it not only functions among young children (Manis, 1985; Reitsma, 1983a, 1983b) but also works among adult skilled readers (Brooks, 1977).

3. Vocabulary Size

Vocabulary size is also considered to be one of the elements that have close relationships with phonological awareness and reading abilities. The theory that is the most frequently used to analyze vocabulary developments is the lexical restructuring theory proposed by Metsala and Walley (1998). Vocabulary development plays an important role in lexical restructuring and this causes lexical restructuring to add more words to the lexicon in turn. This interrelationship has influences on the development of phonological awareness in many aspects.

The lexical restructuring theory proposes that the process of word restructuring comes before and influences the development of segmentation ability and phoneme awareness (Stadler, Watson, & Skahan, 2007). It also emphasizes that vocabulary growth encourages word restructuring in the lexicon (Walley, 1993) and that enriching reading experiences is helpful to further improve and maintain phoneme awareness (Metsala & Walley, 1998). In accordance with Carroll (2003), the basic assumption of the lexical restructuring theory agrees that the emergence of changes in word representations in children's lexicons depends largely on the awareness of individual phonemes. To differentiate phonemes in dense and sparse neighborhoods, children have to find the same sound units as well as sound units that are different from the target word (Munson, Kurtz, & Windsor, 2005). The relationship between vocabulary and phonological awareness can also be reflected in the proposal that children with larger vocabularies have more words lexicalized and do better in telling apart from similar-sounding words (Munson, Kurtz, & Windsor).

On the other hand, various studies have proved that vocabulary expansion is the impetus for early reading development, especially word recognition skills (Nation & Snowling, 1998; Plaut, McClelland, Seidenberg, & Patterson, 1996). In the process of word reading, printed words are split into two groups: real words that can be analyzed with word-specific knowledge and nonwords that are spelled with Grapheme-Phoneme Correspondence rules. An important variable in discriminating the two groups is vocabulary size. For children, a larger vocabulary means the chance to be better at decoding words in their lexicon, to be more familiar with Grapheme-Phoneme Correspondence rules and to be more aware of the subtle differences between sound units (Goswami, 2001; Metsala, 1997; Walley, Metsala, & Garlock, 2003).

4. The Psycholinguistic Grain Size Theory

The Psycholinguistic Grain Size Theory was first put forward by Ziegler and Goswami and was defined as "a cross-language reading theory that focuses on the grain size of lexical units which are converted into phonological structures during visual word recognition in different orthographic systems" (2005, p. 3). It can be seen as a framework within three

dimensions of spelling-to-sound mappings, availability, consistency and granularity.

In accordance with the Psycholinguistic Grain Size Theory, reading development is closely connected to phonological development (Ziegler & Goswami, 2005). Phonological development is the base of reading, and thus understanding the process of phonological development is of great importance for understanding reading development. In a similar way, knowing reading development makes it possible to understand skilled reading. Since languages differ in both phonological structure and consistency, the grain sizes of lexical representations and reading strategies will also be different. As a result, skilled reading in different orthographies will be influenced by these differences too.

Psycholinguistic Grain Size Theory of reading has two main proposals as follows.

Firstly, differences in phonology and orthography will cause early difficulty in reading acquisition. Since phonology and orthography favor different grain sizes and each language has its own consistency, phonology usually prefers larger grain sizes, while orthography prefers small grain sizes. Also, in languages that are consistent, children are more likely to acquire small grain size of phonemes without much trouble. However, in languages that do not have consistent letter-sound correspondences like English, or languages that do not show grapheme-phoneme correspondences like Chinese, additional correspondence rules for bigger grain sizes (words, syllables and rimes) need to be learned.

Secondly, what is important is that in this process, phonological recoding skills and reading strategies are also developed in accordance with orthographies. For example, in alphabetic languages like Greek, Spanish or Italian whose grapheme-phoneme correspondence rules are consistent, children use grapheme-to-phoneme correspondence rules to learn to read. However, in languages like English, which is less consistent in orthography, children rely more on larger grain sizes (e.g., rimes) since small grain size units (graphemes) are inconsistent and hard to learn (Ziegler & Goswami, 2005).

III. METHOD

1. Research Design

Materials used in this research include phonological awareness test of English, word reading test and vocabulary size test. The phonological awareness test is made up of the syllable awareness test which includes syllable counting and syllable segmentation tests, onset-rime awareness test which includes rime recognition and rime generation tests, and the phoneme awareness test which includes phoneme blending and phoneme addition tests. Syllable counting and segmentation tasks were designed based on Senior One English textbooks, in which high frequency words were chosen to be testing items. Items in rime recognition and rime generation

tasks were selected and revised in accordance with Stadler et al. (2007). Furthermore, the phoneme blending test was made upon Roswell and Chall (1963) and the phoneme addition task was designed on the basis of Bruce (1964). Word reading test includes high-frequency real word reading, low-frequency real word reading and nonword reading tests, among which target words in real word reading tests are from Senior One English textbooks and nonwords were selected and revised from test materials of Bruck (1990) and Gathercole, Willis, Baddeley, & Emslie (1994). Finally, the vocabulary size test was designed based on the Vocabulary Size Test 14000 (Laufer & Nation, 1999).

2. Participants

Participants in this research are 36 students with learning difficulties in English (group one) from QJ high school, an intermediate-level high school in the midland of China. Students who have learning difficulties are those selected by their class teacher. They have problems in remembering words and phrases cannot catch up with course syllabus and often fail in the exams. All these participants use Mandarin as their mother language and have learned English as a foreign language since the third grade in primary school with no extra English learning experiences in institutions or abroad. Twenty-one of them are male and 15 of them are female. Participants were selected based on their overall performances in English during mid-term and final exams. Besides this, 43 students (group two) were randomly selected in accordance with teacher's recommendation.

3. Procedure

Both group one and group two members participated in the phonological awareness test and the vocabulary size test. Participants were given 20 minutes to finish phonological awareness tasks and 30 minutes to complete the vocabulary size test. After all participants had finished the two tests, group one participants were given 5 minutes to be familiar with the rules of the word reading task and then completed the test one by one. Data analysis was completed by SPSS 23.0. Correlational analyses were completed through Pearson Correlation Analysis. The linear relationship was examined by the multiple regression analysis.

IV. FINDINGS AND DISCUSSION

1. Descriptive Statistics of Participants' Overall Performances in All Tests

The overall performances of both group one and group two can be seen in Tables 1, 2

and 3 as follows. It can be found from Table 1 that participants in group one with learning difficulties in English scored 9 points lower than participants in group two. That is to say, compared with participants in group two, participants in group one can be assumed to be likely to have weaker phonological awareness. Furthermore, Table 2 shows how the two groups performed in phonological awareness and vocabulary testing items. Among all the three sub items, group two participants scored higher than their group one counterparts and they showed to have greater advantages in the phoneme awareness tests, which suggest that phoneme awareness may be a more potent element in predicting phonological awareness among high school learners. The difference between group one and group two in the vocabulary size test can also be seen in Table 2. Participants in group two also had a higher score than their peers in group one. Although this is only a narrow gap, it still can be inferred that compared with participants with learning difficulties, group two participants have the advantage of remembering and understanding words.

TABLE 1

Descriptive Statistics of Phonological Awareness Test Scores by *t*-test

	Groups	*n*	*M*	*SD*	Std. Error Mean
Phonological Awareness	1	36	40.583	8.1919	1.3653
	2	43	49.256	6.4072	.9771

TABLE 2

Descriptive Statistics for Phonological Awareness and Vocabulary Size Tasks

Task	Group one (*n* = 36)			Group two (*n* = 43)		
	M	*SD*	Range	*M*	*SD*	Range
Phonological Awareness						
Syllable Awareness	9.833	2.2615	7-14	11.302	2.5684	4-16
Rhyme Awareness	12.628	2.0424	10-16	12.667	2.0933	7-17
Phoneme Awareness	19.167	7.0731	5-27	25.256	3.9886	5-30
Vocabulary	18.667	4.1884	13-26	20.000	4.6445	14-29

Besides phonological awareness and vocabulary size tests, participants in group one also took part in word reading tasks. Word reading tasks include high frequency word reading, low frequency word reading and nonword reading. Among the three testing items, there were 20 real words and 20 nonwords respectively. Test results are in Table 3 as follows.

From Table 3, it can be found that participants did better in real word reading tasks than

in nonword reading tasks. This is in accordance with the Psycholinguistic Grain Size Theory (Ziegler & Goswami, 2005) which emphasizes on role of grapheme-phoneme rules. Unlike real words, which are usually acquired by learners' word knowledge and experiences, nonwords are often recognized by applying grapheme-phoneme rules to specific letters and pairs. In this process, learners use letter-sound mappings that are accumulated in real word learning to infer how to read nonwords. Table 3 also shows that participants did worse in low frequency word reading than in high frequency word reading. Though participants were informed that low frequency words are selected from real words, they still had difficulty in reading them. In this regard, low frequency words share something with nonwords. For participants with learning difficulties, a low frequency word is almost an unknown word. When reading low frequency words, they may choose the same strategy as they read nonwords and this may be the reason that they lose points in low frequency word reading tasks. Furthermore, Table 3 reveals that participants had different performances in nonword reading tasks. Nonwords used in this study were made up of one-syllable nonwords, two-syllable nonwords, three-syllable nonwords and four-syllable nonwords. In Table 3, it can be seen that participants did the best in one-syllable nonword reading tasks and they did the worst in four-syllable nonword reading tasks. This finding is also consistent with the Psycholinguistic Grain Size Theory (Ziegler & Goswami, 2005) in that units with smaller grain sizes are more difficult than units with bigger grain sizes. Compared with one-syllable and two-syllable words that can be taken as big grain sizes (words and syllables), recognition of three and four-syllable words requires participants to distinguish small grain sizes (phonemes) and thus are harder for participants with learning difficulties.

TABLE 3
Descriptive Statistics for Word Reading Tasks of Group One

Tasks	*M*	*SD*	Max	Min
Real Word Reading				
High-frequency Word Reading	8.500	.7746	10.0	7.0
Low-frequency Word Reading	4.000	1.5492	7.0	2.0
Nonword Reading				
One-syllable Nonwords	4.750	5.3526	5.0	2.0
Two-syllable Nonwords	2.917	1.3390	5.0	.0
Three-syllable Nonwords	2.750	.9373	4.0	1.0
Four-syllable Nonwords	1.167	1.1588	4.0	.0

2. Correlations Among Composite Variables

Table 4 below shows correlations among components of phonological awareness, word

reading and vocabulary size. The results of Pearson Correlation analysis shows that phonological awareness shares the closest relationship with phoneme awareness, the second closest relationship with rime awareness and the least closest relationship with syllable awareness. This finding is in accordance with the Psycholinguistic Grain Size Theory in which the development of phonological awareness usually starts from the easiest element, syllables (Ziegler & Goswami, 2005). On the other hand, phoneme awareness is considered to be developed the latest because it requires learners to acquire basic reading abilities and skills.

What is more, the Pearson Correlation analysis reveals that there is an interrelationship between vocabulary size and phonological awareness. In accordance with Table 4, vocabulary size correlates with phonological awareness significantly at the 0.05 level (-.346), which suggests that the perception of phonological awareness and the acquisition of vocabulary influence each other to some degree. The vocabulary size also correlates with syllable awareness and rime awareness at the 0.01 level but has no correlation with phoneme awareness. Table 4 also reveals the correlations among phonological awareness, real word reading, nonword reading and word reading and shows that word reading abilities share the closest relation with nonword reading. This implies that acquisition of grapheme-phoneme rules is important for the development of word reading abilities.

TABLE 4
Correlations Among Phonological Awareness, Word Reading and Vocabulary Size Composite Variables

	1	2	3	4	5	6	7
1. Syllable Awareness	-						
2. Rhyme Awareness	.118	-					
3. Phoneme Awareness	-.202	.396*	-				
4. Phonological Awareness	.010	.601**	.914**	-			
5. Real Word Reading	.485**	.000	.194	.165	-		
6. Nonword Reading	-.032	.544**	.697**	.734**	-.117	-	
7. Word Reading	.248	.485**	.731**	.748**	.466**	.824**	-
8. Vocabulary Size	-.522**	-.344*	-.253	-.346*	-.327	-.377*	-.523**

*p < .05, **p < .01

3. Prediction of English Phonological Awareness From Word Reading and Vocabulary Size in Students With Learning Difficulties

To further investigate how word reading and vocabulary size will predict students'

phonological awareness, a multiple regression analysis was conducted to access the contribution of word reading and vocabulary size to phonological awareness. The results were summarized in Tables 5 and 6 as follows.

TABLE 5
Predicting Phonological Awareness From Word Reading and Vocabulary Size

Model Summary[b]				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	.750[a]	.563	.536	5.5793

a. Predictors: (Constant), Vocabulary, Word reading
b. Dependent Variable: Phonological awareness

Before the multiple regression analysis was conducted, Kolmogorov-Smirnov Normality test was completed first to confirm that the dependent variable does obey the normal distribution and the regression analysis can be performed (p = .001). The model given in Table 5 reveals that there is only one possible model in which the dependent variable is phonological awareness and the predictor is word reading. Detailed illustrations can be found in Table 6 below.

TABLE 6
Coefficients in Multiple Regression Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	*t*	*p*
		B	Std. Error	Beta		
1	(Constant)	-2.950	10.632		-.278	.783
	Word Reading	1.943	.336	.780	5.779	.000
	Vocabulary Size	.120	.264	.061	.454	.652

a. Dependent Variable: Phonological awareness
*F = 21.226, p < .001

The coefficient of multiple regression in Table 6 (R = 0.750, p < .001) reveals that only word reading shares a significant linear relationship with the dependent variable while there is no specific linear relationship between phonological awareness and vocabulary size. In accordance with the relationship between predictor variables and criterion variables predicted by Beta, the change in one standard deviation (*SD*) unit in word reading will contribute to 0.78 *SD* unit changes in the phonological awareness of high school learners with learning difficulties. The finding that vocabulary size is not a coefficient is the same with the study of Yoshikawa and Yamashita (2014). Based on Yoshikawa and Yamashita's

research on adult Japanese learners, vocabulary did not show any correlation with phonological awareness. However, this finding is different from Metsala and Walley (1998) who emphasized the role of vocabulary in enhancing phonemic awareness developments. The reason may lie in that even for high school students with learning difficulties, word meanings have already been an inseparable part in their English learning. When sound-letter mappings are taken into consideration only, it is hard to say how vocabulary size plays its role.

V. CONCLUSION AND SUMMARY

This study focuses on Chinese high school students with learning difficulties in English and examines their phonological awareness, word reading abilities and vocabulary size to investigate whether there are correlations among them and how reading abilities and vocabulary size affect phonological awareness. Test results show that for Chinese high school students, especially those with learning difficulties, their word reading abilities have significant correlations with their phonological awareness, which suggests that the development of word reading skills may be helpful to strengthen their phonological awareness. But vocabulary size does not have a significantly meaningful relationship with their phonological awareness. The interrelationship between phonological awareness and word reading found in this study is mostly in congruence with previous studies on Japanese and Korean learners (K. Nam, 2006; Yoshikawa & Yamashita, 2014). For Japanese adult learners, word reading plays an important role in phonological awareness while vocabulary size does not have any correlation with phonological awareness. As for Korean adult learners, modified phonics instruction as one kind of reading intervention improves their phonemic awareness both in perception and production. Thus we assume that this correlation between phonological awareness and reading not only exists among children but also works for adolescents and adult beginners. Furthermore, in accordance with Ziegler et al. (2014), phonological decoding can be used as the self-teaching mechanism to acquire novel words and it is also proved to be able to implicate dyslexia. This suggests that reading is a potent element in predicting phonological awareness and that a decoding-based model will be effective in preventing lack of phonological awareness.

The findings of this study also enlighten us about the possibility of utilizing the interrelationship between phonological awareness and reading to promote English teaching and learning.

First, making full use of multiple testing items can be helpful for teaching. Detailed analyses of each testing item show that participants have difficulties in syllable segmentation tasks, low frequency word reading tasks and nonword reading tasks. All the

tasks used in this study are seldom found in traditional English education in high school where students are required to focus on grammar learning and remember words through reading and dictation over and over again. If tasks like word segmentation, rime detection and phoneme addition can be added into English classes, it is highly likely that students can have more approaches to word learning.

Second, since improving phonological awareness and word reading is supplementary to each other, early identification and intervention of phonological awareness is necessary. The Psycholinguistic Grain Size Theory illustrates that phonological awareness is usually present by about age 3 to 4 (Ziegler & Goswami, 2005). Therefore, if lack of phonological awareness can be diagnosed at the very beginning, teachers can help students restart their English learning from simple word reading and improve their phonological awareness. Students with learning difficulties can also benefit a lot from effective intervention like phonics.

Finally, if students who are identified to have low phonological awareness receive phonic trainings in school, teachers can retest them to see whether phonological awareness training can improve their reading abilities and understand how phonological awareness and reading work together in English acquisition.

However, there are also some limitations that must be taken into account. In accordance with the Psycholinguistic Grain Size Theory (Ziegler & Goswami, 2005), mother language's orthography also plays an important role in L2 learners' study. Also, the study of E. Bae and U. Maeng (2012) suggests that L1 reading affects L2 reading strongly. For Chinese EFL learners, the inconsistency between the pronunciation system and the writing system in Chinese can be highly likely to affect their English acquisition. In this study, factors like Chinese phonological awareness and Pinyin (Chinese Alphabetic system) are not considered because we assume that high school students usually do not have problems in recognizing Pinyin characters. But this assumption may have some side effects to our test results and it is better to perform Chinese phonological awareness tests next time. Second, research on the validity and reliability of phonemic awareness tests (Yopp, 1988) revealed that phoneme segmentation, phoneme blending and phoneme deletion tasks got the highest rankings among all seven phoneme awareness tests. But in our study, taking time and course arrangements into consideration, only two tests were used in the phoneme awareness tasks. For further study, to do research on target participants' phonological awareness, a more diversified test design is needed. Last, but not least, although our test results are almost consistent with previous studies, it is still of great necessity to investigate whether these correlations exist after one or two years of English learning and whether there is any other elements that may influence high school EFL's phonological awareness development. An experimental study on this topic is expected in the future.

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APPENDIX 1

Phonological Awareness Tests

1. Syllable awareness tasks [Words selected from Senior One English textbooks]

Count the number of syllables in the given word and segment the word into syllabic units.

E.G. female 2 fe male

Test words: assume, disagree, statement, cattle, requirement, rough, tourism, existence, brilliant, supply

2. Rime recognition task [Revised from Stadler et al. (2007, p. 205)]

Judge whether the given words have the same rime.

(1) apply - supply
(2) mild - mind
(3) face - north
(4) case - base
(5) father - mother
(6) though - cough
(7) rare - fare
(8) bomb - tomb
(9) die - high
(10) above - stove

3. Rime generation task [Revised from Stadler et al. (2007, p. 205)]

Write down one word that rhymes with the given word.

Test words: cage, breathe, devotion, candy, sail, park, wide, moon, feed, pain

4. Phoneme blending task [Revised from Roswell-Chall Auditory Blending Test (1963)]

Combine given sounds into words.

E.G. /k/ - /a/ - /t/ cat

(1) /ə/ - /w/ -/ɔ:/ -/d/
(2) /b/ - /ju:/ - /t/ - /i/

(3) /k/ - /l/ - /əʊ/ - /ð/ - /ɪ/ - /ŋ/
(4) /e/ - /n/ - /tr/ - /ən/ - /s/
(5) /n/ - /eɪ/ - /t/ - /ɪ/ - /v/
(6) /p/ - /ʌ/ - /b/ - /l/ - /ɪ/ - /ʃ/
(7) /s/ - /aɪ/ - /ən/ - /t/ - /ɪ/ - /f/ - /ɪ/ - /k/
(8) /v/ - /æ/ - /l/ - /i/
(9) /w/ - /aɪ/ - /l/ - /d/ - /l/ - /aɪ/ - /f/
(10) /d/ - /ɪ/ - /s/ - /k/ - /aʊ/ - /n/ - /t/

5. Phoneme addition Task [Revised from Bruce (1964, p. 170)]
Move the given phoneme to the given place to make a new word and read it out.
(1) fly (final /t/)
(2) am (first /j/)
(3) fair (last /y/)
(4) had (middle /n/)
(5) star (last /t/)
(6) met (middle /s/)
(7) rock (first /f/)
(8) ten (last /t/)
(9) lot (middle /s/)
(10) ice (first /n/)
(11) top (first /s/)
(12) far (last /m/)
(13) money (middle /k/)
(14) pin (first /s/)
(15) for (last /k/)
(16) old (first /c/)
(17) part (last /i/)
(18) wet (middle /n/)
(19) fog (middle /r/)
(20) ear (first /n/)

APPENDIX 2

Word Reading Tasks

Real word reading [Words selected from Senior One English textbooks]

change, bring, provide, significant, wildlife, whose, done, steak, though, paid, spank, saint, thrill, plump, creak, caste, gross, sew, chute, plaid;

Nonword reading [Revised from Bruck (1990, p. 454); Gathercole et al. (1994, p. 103)]

plit, culk, bipe, pake, deet, cullshew, pringe, raliss, plamid, barptiss, contramponist, empliforvent, fenneriser, pennerriful, comisitate, altupatory, detratapillic, pristoractional, voltularity, versatrationist;

Examples in: English

Applicable Languages: English

Applicable Levels: Tertiary

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