THE LITERACY DEVELOPMENT
OF CHINESE AND PERSIAN ESL LEARNERS

by

Hua Qin
B.A., Shaanxi Normal University, 1995
M.A., Shaanxi Normal University, 2001

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

in
The Faculty of Graduate Studies
(Special education)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)
August 2012
© Hua Qin, 2012
Abstract

Previous cross-linguistic research has well established that transfer in the literacy development of English-as-the-second-language (ESL) students exists. Less extensive is the research on the effect of diverse first languages (L1) on the specific reading-related cognitive abilities and academic performance in the second language (L2). In the current study, Study Part One investigated English reading and spelling skills of students from different language backgrounds (English, Chinese- and Persian-speaking ESL) in Grade 6 by examining a variety of cognitive skills, and reading and spelling. The results showed similar performance on most of the cognitive tasks, however, the Chinese L1 group performed lower than the English L1 group on the oral syntactic awareness test, and the Persian L1 group performed lower than English L1 group on the written syntactic awareness task. Furthermore, the Chinese L1 group performed at a higher level than Persian L1 group on the two reading comprehension tasks, and no difference was found between English L1 and the two ESL groups. Study Part Two was a retrospective analysis of reading and syntactic skills from Grade1 through Grade 6 across the same groups. Comparable performance was found on the word reading task but not on syntactic awareness task (oral cloze). Specifically, in lower grades (i.e., Grade 1 and 2), both ESL groups performed lower than English L1 group on the syntactic awareness task, whereas heterogeneous performance was found in middle and upper grades (i.e., Grades 3, 4, 5 and 6). The Persian L1 group caught up with English L1 peers in these grades, and the
Chinese L1 group showed less efficiency than English and Persian L1 group in Grades 3 and only performed lower than Persian L1 group in Grade 5 and English L1 group in Grade 6. Taken together, these results clearly suggested (1) the weakness in both oral proficiency and syntactic awareness in ESL groups in lower grades; (2) possible L1 influence on linguistic tasks with higher demands in middle and upper grades across ESL groups.
Preface

This study used data collected for the “L1 Orthography and L2 Literacy: A Comparison of English, Persian, and Chinese L1 Speakers” research project that received approval from the University of British Columbia’s Behavioural Research Ethics Board (BREB) on February 24, 2006 under certificate H (06-80038) B04-0073. This was a longitudinal study with a number of ethics approvals. The director of the project approved Ms. Qin’s use of data for her thesis. Ms. Qin was responsible for data management and data analysis and is the sole author of this thesis.
Table of Contents

Abstract ......................................................................................................................... ii
Preface ........................................................................................................................... iv
Table of Contents ......................................................................................................... v
List of Tables ............................................................................................................... vii
List of Figures .............................................................................................................. viii
Acknowledgements ..................................................................................................... ix
Dedication ...................................................................................................................... x

Introduction .................................................................................................................. 1
  Chinese language features ......................................................................................... 3
  Persian language features ........................................................................................ 5
  The present study ....................................................................................................... 10

Method ............................................................................................................................ 13
  Participants .................................................................................................................. 13
  Design .......................................................................................................................... 14
  Procedure .................................................................................................................... 15
  Measures ...................................................................................................................... 18

Results ............................................................................................................................ 24
  Part one ....................................................................................................................... 24
  Part two ....................................................................................................................... 37

Discussion ....................................................................................................................... 43
  Conclusion and implications ....................................................................................... 49

References ..................................................................................................................... 51

Appendices ................................................................................................................... 59
  Appendix A: Phonological awareness task ............................................................... 59
  Appendix B: Syntactic awareness tasks .................................................................... 60
List of Tables

Table 1 Group Characteristics by First Language........................................14
Table 2 Word Reading and Reading Comprehension by First Language........ 25
Table 3 Spelling by First Language..................................................................26
Table 4 Spelling Error Analysis by First Language........................................27
Table 5 Correlations between Reading and Spelling by First Language........28
Table 6 Cognitive Abilities by First Language..............................................31
Table 7 Correlations and Pratt Indices between Cognitive Abilities and Spelling by First Language.................................................................34
Table 8 Reading from Grade 1 to 6 by First Language....................................38
Table 9 Syntactic Awareness from Grade 1 to 6 by First Language...............39
List of Figures

Figure 1. Reading Development from Grade 1 through 6 by First Language......41

Figure 2. Syntactic Awareness Development from Grade 1 through 6 by First Language.................................42
Acknowledgements

I offer my enduring gratitude to the faculty, staff and my fellow students at the UBC, who have inspired me to continue my work in this field. I owe particular thanks to Dr. Linda Siegel, my program supervisor, whose penetrating questions taught me to question more deeply.

I thank Dr. Nancy Perry, my program advisor and research committee member, for enlarging my vision of education and providing coherent answers to my endless questions.

I also thank Dr. Laurie Ford, my research committee member, for her encouragement and support throughout the construction of my thesis.

Special thanks are owed to my parents, who have supported me throughout my years of education, both morally and financially.
Dedication

To my parents, sister and Huanhuan
Introduction

Reading and spelling in English as a second language (ESL) are widely acknowledged, but the research so far has produced mixed results. On the other hand, increasing proportion of immigrant population in schools throughout English-speaking countries poses challenges for the school system as an increased awareness by educators is needed regarding how L1 influence the literacy acquisition in the L2. The most recent census revealed that in the Province of British Columbia in Canada alone, immigrants accounted for 26% in its total population in 2006 and 54.2% of the total immigrants were from Asia and Middle East region (Statistics Canada, 2006). Among researchers, there is little dispute about English reading that cognitive processes such as phonological awareness, working memory, syntactic awareness are correlated with reading performance of English native speakers (Siegel, 1993; Siegel & Ryan, 1988). Further research (Gottardo, 2006; Lesaux & Siegel, 2003; Plaza & Cohen, 2006; Wade-Woolley, 1997) comparing the reading performance of ESL and native English students found these underlying cognitive processes also related to the reading of ESL students. Comparatively speaking, fewer attempts have been made to explore ESL students whose L1s are of distinct orthographic features (e.g., nonalphabetic language, such as Chinese and non-Roman alphabetic language, such as Persian).

Various theories of second language acquisition have been proposed, and two of them being mostly argued about are universalist hypothesis and script-dependent
hypothesis. The universalist hypothesis, or linguistic-interdependence hypothesis (Cummins, 1979), posits that the development of reading skills in different languages are shaped by common underlying cognitive and linguistic processes. A rich literature has been accumulated to support this hypothesis (Gottardo, 2006; Lesaux & Siegel, 2003; Plaza & Cohen, 2006; Wade-Woolley, 1997).

Contrastingly, the script-dependence hypothesis proposes that each language develops from one another and that reading develops with its own orthographic features in each language. In support of script-dependence hypothesis, Akatmatsu (1999; 2003) studied alphabetic Persian, Chinese, and Japanese ESL adult learners and found the Persian readers performed better than Chinese and Japanese readers in the case altered (e.g., cAsE aLtErAtIoN) reading tasks. Georgiou, Parrila, and Papadopoulos (2008) studied Greek and English-speaking children and found that phonological and orthographic processing in both languages contributed uniquely to reading ability.

Based on the numerous studies regarding English literacy development and cross-linguistic transfer, the current study was designed to investigate whether the Chinese and Persian ESL students would demonstrate any difference in their English literacy development in relation to their distinct L1 features. The following part of literature will begin by reviewing the basic language features of Chinese and Persian respectively as well as a comparison with those in English and then present an overview of reading-related cognitive abilities that might explain ESL reading.
**Chinese language features**

Traditionally, Chinese speech is analyzed into syllables. The Chinese syllable is described in terms of an initial, a final, and a tone. The Chinese initial and final correspond to the onset and rime, but they are simpler than those in English because Chinese has no consonant clusters and has mostly open syllables that end in vowels (Taylor, 2002). The Chinese syllable is an easily accessible unit because one morpheme is represented by one character, thus Chinese is also considered as a morphosyllabic or a morphographic language in which the graphemes represent the syllables that are morphemes rather than phonemes (Wang, Cheng, & Chen, 2006). It is therefore hypothesized by some researchers that the role of morphological awareness in Chinese will be analogous to the role of phonemic awareness in reading English (Wang et al., 2006).

However, the extant literature has well established that phonological processing is used by Chinese L1 children reading Chinese in Chinese-speaking environment (Chan, & Siegel, 2001; Ho & Bryant, 1997; Knell, Siegel, Haiyan, Lin, Z., Miao, Wei, & Yanping, 2007; So & Siegel, 1997) and English-speaking context (Gottardo, Chiappe, Yan, Siegel, & Gu, 2006). Similar to English reading, morphological awareness—the ability to recognize morphemes—has also been found related to Chinese reading (Wang, et al, 2006). Wang, et al. (2006) found that English L2 compound morphological awareness made more of a contribution to reading comprehension in Chinese L1 (Wang et al., 2006). Hence, whether morphological awareness developed in the L1 has an impact on the
English reading of Chinese ESL learners has remained unclear.
**Persian language features**

Persian is written as a modified version of Arabic, with the letters written from right to left. There are 29 letters representing consonants and three letters representing long vowels (*alef, vav, ye*). The three short vowels are represented by diacritics, not letters. The diacritics appear above or below the letter associated with the short vowel sound. Persian is described as transparent in reading as it has very regular grapheme-to-phoneme correspondence rules because each grapheme has a single pronunciation (Arab-Moghaddam & Senechal, 2001; Baluch & Besner, 1991), however, similar to English, there are six phonemes in Persian (e.g., the phonemes /z/, /s/, /t/, /h/, /a/, and /gh/) that can be marked by more than one letter, therefore, the Persian orthography is described as polygraphic, namely, the same phoneme can be represented by more than one letter (Rahbari & Senechal, 2009).

Arab-Moghaddam and Senechal (2001) tested fifty-five Iranian children in grades 2 and 3 on word reading and spelling in English and Persian. They found that phonological and orthographic processing skills each predicted unique variance in word reading in English and Persian (Arab-Moghaddam & Senechal, 2001). However, spelling in English was predicted similarly by phonological and orthographic processing skills, whereas spelling in Persian was predicted by orthographic processing skills only (Arab-Moghaddam & Senechal, 2001). Another study by Akamatsu (1999) examined three groups of ESL learners from different orthographic backgrounds (Chinese, Japanese and Persian) and the results indicated the transfer of L1 orthography of Persian and
Chinese to the word recognition abilities in English as a second language.

A dearth of research on English reading has shared the conviction that reading is predicted by various cognitive processes such as phonological processing, syntactic awareness, working memory, morphological awareness, and orthographic processing (Lipka, Lesaux, & Siegel, 2006; Siegel, 1993; Siegel & Ryan, 1988; Siegel, Share, & Geva, 1995; Swanson, Zheng, & Jerman, 2009; Tong, Deacon, Kirby, Cain, & Parrila, 2011).

*Phonological awareness*

Phonological awareness refers to an individual’s conscious understanding of the individual sounds of the language. Understanding those sounds allows the learner to segment or manipulate them (Lesaux, Lipka, & Siegel, 2006). Phonological processing abilities and reading acquisition in English are crucially related (Siegel & Ryan, 1988). In addition, some research was conducted on the relationship between the phonological processing and the reading abilities of the children learning English as a second language (Gottardo, 2006; Lesaux & Siegel, 2003; Low & Siegel, 2005; Plaza & Cohen, 2006; Wade-Woolley, 1997).

Low and Siegel (2005) compared the reading performance of a group of ESL children from diverse linguistic backgrounds and that of the English L1 children in Grade 6 in Canada and found both groups performed equally well on measures of word reading, word reading fluency, phonological awareness, phonological decoding fluency and verbal working memory.
Syntactic awareness

Syntactic awareness is defined as the ability to understand the way in which linguistic elements of a specific language are put together to form grammatically correct phrases (Low & Siegel, 2005). Syntactic awareness is critical for reading comprehension as it requires making predictions about the words that should come next in sequence, namely, word order (Chik, Ho, Yeung, Chan, Chung, Luan, & Lau, 2012). In addition, more factors such as connective usage and knowledge of morphosyntactic structure are also involved in syntactic knowledge (Chik et al., 2012). The previous research on ESL children’s syntactic awareness in reading development found that ESL students experienced difficulties on the tasks of syntactic awareness (Chiappe, Siegel, & Gottardo, 2002; Chiappe, Siegel, Wade-Woolley, 2002; Lesaux & Siegel, 2003; Low & Siegel, 2005) due to ESL students’ limited exposure to English.

Working memory

Working memory is the ability in preserving information while simultaneously processing the same or other information (Swanson, 1999). Working memory is critical to the reading process since the reader must decode and/or recognize words while remembering what has already been read, and then must retrieve information such as grapheme-phoneme conversion rules (e.g., Baddeley, 1986; Daneman & Carpenter, 1980; Siegel, 1994; Siegel & Ryan, 1988). Similar memory skills between bilingual and monolingual students (Abu-Rabia & Siegel, 2002) and better memory skills of English L1 students than their ESL peers (Chiappe, Siegel, & Gottardo, 2002; Lesaux, Lipka & Siegel,
2006; Lipka and Siegel, 2011) were both found in the previous studies. Different memory skills across grades (Kindergarten and Grade 2) from the comparison of English L1 and ESL students were also found by Lesaux and Siegel (2003). It was hypothesized in the current study that ESL students in upper grade (Grade 6) would demonstrate similar working memory skills as their English native speaking peers.

*Morphological awareness*

Morphological awareness refers to individual’s “conscious awareness of the morphemic structure of words and their ability to reflect on and manipulate that structure” (Carlisle, 1995, p.194). The association between morphological awareness and reading in English was supported by the studies of Tong et al. (2011) and McBride-Chang, Wagner, Muse, Chow, & Shu (2005). Further, the role of morphological awareness in ESL reading was examined by Wang et al. (2006) (Chinese ESL, for a review, see page 8 in the above section), Foroodi-Nejad, & Paradis (2009) and Kafipour, & Khojasteh (2011) (Persian ESL). Foroodi-Nejad, & Paradis (2009) found no difference in morphological, syntactic and semantic errors among Persian ESL and English L1 speakers, however, Kafipour, & Khojasteh (2011) examined Persian bilinguals, monolinguals and English monolinguals with compound words task and the results showed crosslinguistic influence of morphological awareness in Persian on English and English on Persian.

*Orthographic awareness*

Orthographic awareness refers to a complex set of skills, including both the knowledge of the actual spelling of particular words and higher level of conceptual skills,
such as the recognition of the properties of words and sequences and typical positions of letters in English (Siegel, Share, & Geva, 1995). Akamatsu (1999, 2003) found ESL readers with a nonalphabetic L1 background (e.g., Chinese) showed less efficiency in processing the letters in an English word than those with an alphabetic L1 background (e.g., Persian).

However, another study by Akamatsu (2002) on the word-recognition skills of fluent ESL readers (Chinese, Japanese, and Iranians) yielded distinct results that L1 orthographic features did not change the procedures underlying L2 word recognition. Fluent ESL readers recognize English words. Akamatsu (2002) argued that the utilization of real words instead of nonwords might examine different cognitive activity and that high L2 proficiency of the participants may have reduced the distinctions among the ESL groups. Additionally, the information processed (Akamatsu, 1999) and the information processing (Akamatsu, 2002) in word recognition may have resulted in the inconsistency. Therefore, to explore the reading performance measured by both information processed and information processing tasks of young ESL learners from distinctive L1 backgrounds remains an unsolved issue in this area.
The present study

Despite the acknowledged relation between the cognitive abilities and reading among both ESL and English L1 students, some cognitive abilities have been argued as not a significant predictor until after certain age, such as morphological awareness (Chung and Hu, 2007; Tong and McBride-Chang, 2010). Chung and Hu (2007) examined 46 preschool Chinese children and found that morphological awareness did not significantly affect reading in the very initial stages of reading acquisition. Tong and McBride-Chang (2010) tested students of kindergarten, second grade and fifth grade and found that it was not until fifth grade that students showed a broad lexical morphological-orthographic processing construct. Since the initial aim of the present study was to understand the relationship between all the reading-related cognitive abilities and reading and spelling among ESL and English L1 students, the performance of Grade 6 students was examined in the first part of the study. The research questions for Study Part One were:

Do the students in the three language groups (i.e., English, Persian and Chinese) perform differently in reading (word reading and reading comprehension) and spelling? What are the correlations between reading and spelling performance of the three language groups in Grade 6? Are the cognitive abilities different among the students from three different language backgrounds? How do reading decoding, phonological awareness, working memory, syntactic awareness and morphological awareness contribute to the spelling of sixth-grade students from the three language backgrounds?
The hypotheses for this part were students from the three different language backgrounds might perform differently in their reading and spelling; Chinese and Persian ESL students and their English L1 peers might show difference in their cognitive abilities, particularly in phonological, syntactic and morphological awareness with the impact from their different first languages; and similarly, the difference in their L1 orthographies might lead to distinct spelling performance across the three language groups.

Meanwhile, most previous studies have investigated the reading performance and cognitive processes of ESL students in a relatively short period at various stages, such as Akamatsu (1999) (Chinese, Japanese and Persian graduate students), Arab-Moghaddam and Senechal (2001) (Iranian children learning English in Grades 2 and 3), Georgiou et al. (2008) (Greek and English-speaking children in Grades 1 and 2), and Ho and Bryant (1997) (Chinese and English-speaking children between 3 and 8). Comparison among the same three language groups (Chinese, Persian and English) through a longitudinal study across the whole elementary stage has not been conducted so far. Given the fact that the data of the current study was part of a longitudinal study throughout the elementary school period starting from kindergarten, the second part of the study further compared the students from the same group categories on reading and oral syntactic awareness (oral cloze) tasks from Grade 1 through 6. Study Part Two was to address the following questions:
How do the reading abilities develop among ESL students from different language backgrounds (Chinese and Persian in this study) and English L1 students from Grade 1 to 6? Do the reading performance and syntactic awareness of students from the three different language backgrounds differ across the grades?

The hypothesis of this part of the study was ESL students might read less proficiently than English L1 students in lower grades due to the limited exposure to English language, but might perform comparably with English L1 peers in later grades after years under English instruction.
Method

Participants

The participants were part of a longitudinal study from a school district in North Vancouver in Canada. The participants were classified as ESL students if they speak a language other than English at home to their parents, siblings and grandparents from the information obtained from school records. Most of the ESL students immigrated to Canada at an early age, although some were born in Canada and did not begin to speak English until school entry. Most of the ESL students had some experience of reading and speaking in their first languages. The participants in this study were 131 (40 Chinese ESL, 44 Persian ESL and 47 English L1) sixth-grade students from the same school district. The mean age of the children was 11.38 years (SD= .46). All of the ESL students had had at least two years of full-time English classroom instruction. The ESL students had received the same instruction as their English L1 peers. The participants of the three language groups were matched for initial status in reading, spelling, gender and classroom.
Design

The ESL participants were normally-achieving readers and spellers who scored above the 25th percentile on the spelling and reading subtests of the Wide Range Achievement Test (WRAT-3, Wilkinson, 1995). All participants scoring below the 25th percentile were excluded. The scores for the ESL participants ranged from the 30th and 99th percentile on both the reading and spelling subtests of the WRAT-3. These scores were used to select a comparably matched English L1 group. The English L1 students were randomly selected from the same classrooms as the Chinese and Persian ESL students. The English L1 students also needed to have their reading and spelling scores falling within the same range as that of the ESL groups. Table 1 shows the group characteristics of the participants by first language.

Table 1. Group Characteristics by First Language

<table>
<thead>
<tr>
<th></th>
<th>English n = 47</th>
<th>Persian n = 44</th>
<th>Chinese n = 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRAT-3 reading percentile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum value</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Maximum value</td>
<td>99</td>
<td>96</td>
<td>99</td>
</tr>
<tr>
<td>WRAT-3 spelling percentile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum value</td>
<td>30</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Maximum value</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Chronological age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>11.37</td>
<td>11.42</td>
<td>11.34</td>
</tr>
<tr>
<td>SD</td>
<td>.44</td>
<td>.46</td>
<td>.43</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Female</td>
<td>27</td>
<td>24</td>
<td>21</td>
</tr>
</tbody>
</table>

SD = Standard deviation (note: the same as in the following tables).
Procedure

Trained graduate and undergraduate students conducted the assessments in the schools. Each child was individually assessed in a quiet room for all the tasks except that the tasks of reading comprehension, morphological awareness and written syntactic awareness were administered in group settings in classrooms.

Spelling error classification

Models of spelling development have generally posited different stages of spelling (Brown, 1990; Frith, 1980, 1985; Marsh et al., 1980), however, researchers have also noted there could also be an integration of phonological and orthographic skills (Ehri, 1992). If the skills developed in the L1 transfer to L2 learning, then the strategies ESL students rely on would possibly vary. The current analysis adapted the scoring system utilized by Bruck and Waters (1988) and Lennox and Siegel (1996). In the adapted scoring system, three scores were assigned for the first ten misspellings on the WRAT-R spelling test, two of which were based on the phonological similarity of the spelling error to the target word (how well the error approximates the sound of the word) and one was based on the visual similarity (how well the error “looks like” the target word) (Lennox & Siegel, 1996).

Phonological similarity

The phonological constrained system and unconstrained system were adapted to provide two scores for each subject. The first ten misspellings were judged
phonologically accurate if they sounded like the target words by grapheme-phoneme conversion rules. Positional rules involving the specific position of the letters in the word were included in the phonologically constrained system, but not in the phonologically unconstrained system. For example, the misspellings BELEV and BELEVE would be judged as both phonologically correct by the phonologically unconstrained system but BELEV would be phonologically incorrect by the phonologically constrained system as the second E would sound differently from the target phoneme without the letter E at the end. Thus, the misspellings judged as phonologically acceptable by the constrained system were also judged as phonologically acceptable according to the unconstrained system, however, the reverse was not always true. Each misspelling was judged as phonologically accurate or not by the two systems respectively and the mean percentage of the phonologically accurate misspellings for each student was calculated by dividing the number of phonologically accurate misspellings by the total number of misspellings (10).

A measure of inter-rater agreement was calculated for the phonological similarity scores. A native English speaker of graduate educational level was hired to score the spelling errors after the scoring training. Any disagreements among the scoring of the two independent raters were resolved through discussion. Reliability was initially 90% agreement for the constrained system and 93% agreement for the unconstrained system.
Visual similarity

This scoring system reflected the amount of overlap between the letters in the misspelling and the target word (Bruck & Waters, 1988; Lennox & Siegel, 1996). The score was the average percentage of the bigrams and letters shared by each misspelling and the target word. For example, the word “decision” has 7 bigrams (d-e, e-c, c-i, i-s, s-i, i-o, o-n) and 8 letters, so the total is 15. While the misspelling DECION has 5 correct bigrams (d-e, e-c, c-i, i-o, o-n) and 6 correct letters, resulting in a total of 11. The visual accuracy score of the misspelling DECION is therefore .73 (i.e., the ratio of 11/15). In the same scoring system, the misspelling OPPURTUNITY would be scored .86 (i.e., the ratio of 18/21). The final visual similarity score for each student was calculated by dividing the sum of all the visual accuracy percentages by 10.
Measures

Phonological awareness

Pseudoword deletion: This task was administered to Grade 6 students to test their phonological processing skills. Totally 30 testing items were included in the task requiring the students to remove sounds from words that were not real. For example, the examiner said, “Say ‘mab’” and then say, “Now say ‘mab’ again, but without the /b/ sound.” The task contained both phoneme and syllable deletion and was discontinued after five consecutive errors (See Appendix A for the complete task). The maximum score on this task was 30.

Syntactic awareness

Oral cloze (Siegel and Ryan, 1989): This task contained 20 sentences with one word missing, which the administrator said “blank” and asked the student to provide the missing word orally. The word was expected to keep the sentence grammatically correct at the same time. For example, the administrator said to the student, “I might say, ‘The moon shines bright in the (blank).’ And I want you to say ‘sky’. So it would be ‘The moon shines bright in the sky.’” The three practice items were all administered to the participants from Grade 1 to 6. The administration discontinued if the child failed the practice items and the first three task items (See the Appendix B for the task).

Syntactic awareness test: The task was administered to Grade 6 students as a written group test, which contained 16 sentences. The participants were required to read the sentences and write the word that was missing. The items were designed to test the
students’ syntactic awareness involving noun plurals and prepositions, etc.. Examples are:
2. Here is a man, here are 23___. 14. The passengers arrived___ the gate at 8:00 (See Appendix B). The maximum score of this task was 16.

Working Memory

Working memory for words: This task was to test the verbal working memory of the students. The administrator presented the sentences orally with the last word in each sentence missing and the participant was asked to provide the last missing word orally. The administrator presented the practice item of one sentence first and then proceeded to another two sentences as a group item and the participant was asked to provide the last missing word of each sentence in the group. The three practice sentences were all presented to the student. Totally there were 42 sentences in four levels (level 2, 3, 4 and 5) with 3 group items (item A, B and C) in each level. The task discontinued when the child failed an entire level (i.e., all three items---A, B, C of a particular number level). This test was administered to Grade 6 students. The maximum score on this task was 12 (See Appendix C for the task).

Working memory for numbers: This task contained sets of index cards with a random array of yellow and blue dots. The child was presented with the cards and asked to count the number of yellow dots on each card and then recall the number of dots in each set in sequence. Administration was discontinued when all items on each level were failed. The maximum score on this task was 12.
**Word Reading**

The Wide Range Reading Achievement Test (WRAT-3, Wilkinson, 1995) reading subtest: The WRAT-3 reading subtest was an individually administered, standardized oral reading achievement test. This test required the children to identify 15 upper-case letters and a set of words presented in the order of increasing difficulty. This task was discontinued when a child made 10 consecutive errors. This task was administered to all the participants from Grade 1 to 6.

Word identification: This task is the Word Identification subtest of Woodcock-Johnson Psycho-Educational Battery-Revised (Form A) (WJ-R, Woodcock & Johnson, 1989). Word identification was an individually administered, standardized test for Grade-6 students. On the WJ-R Word identification test, each child was asked to read aloud a list of words of increasing difficulty. Administration was discontinued when all items on a given level were failed. The sample words were: *when, because, experiment,* and *moustache.* This task was to test the single word reading and reading decoding skills.

Word attack: This task was the Word Attack subtest of Woodcock-Johnson Psycho-Educational Battery-Revised (Form A) (Woodcock & Johnson, 1989). Word attack was also an individually administered, standardized test consisting of a list of non-real words of different numbers of syllables. The examiner asked the student to read the nonwords. The task was discontinued when the child missed 6 consecutive words that end in a section. The sample words were: *rox, dright, quantric,* and *deprotenation.* This task was to test reading decoding and phonetic coding skills of Grade-6 students.
Reading comprehension

The Stanford Diagnostic Reading Comprehension Test (SDRT, Karlsen & Gardner, 1994): The SDRT reading comprehension subtest was a standardized reading comprehension test. This subtest was administered to a group of students in Grade 6 in the classroom. Each student was given a booklet and asked to respond to multiple-choice questions about each passage within a time limit. There were totally 9 passages with 54 questions in the test.

Planet Filk and Greb: This was an experimental reading comprehension task for Grade 6. The task was composed of short stories containing novel and made-up information. For this task, each child was asked to read two short stories and respond to multiple-choice questions about the stories. The maximum score on Planet Filk was 10 and the maximum score on Greb was 4, resulting in a total of 14. The Planet Filk and Greb tasks were designed to reduce the effects of vocabulary and prior knowledge on reading comprehension. Such a task was valuable to the study of ESL reading in the assessment since most other reading comprehension tasks require some degree of vocabulary and culturally-based knowledge (See Appendix F for the story with questions).

Spelling

The spelling subtest of the Wide Range Achievement Test-3rd Edition (WRAT-3, Wilkinson, 1995): This was a standardized and group-administered test made up of a list of increasingly difficult series of words orally presented to the participants in group, who
were required to spell out the correct form of the words. The sample words were *in, enter, advice*, and *opportunity*. This test was administered to the students in Grade 6.

Spelling of sounds: This task was the spelling subtest of Woodcock Johnson-III Tests of Achievement (WJ-III, Woodcock, McGrew, & Mather, 2001). The spelling subtest was administered individually to Grade-6 students. The tester orally presented a list of pseudowords to the participants, who were required to spell out the words. This task was to test the spelling and phonetic coding skills.

*Morphological Awareness*

Morphological awareness for nonwords: The task contained 10 sentences administered to the subjects in group test in Grade 6. This task was to test the students’ understanding of how English morphemes, the smallest unit of meaning in the language, make up words. Participants were asked to choose a correct form of a word from the four nonwords with different suffixes listed to fill the blank in a given sentence. Examples were: *I just heard a ___ story.*  
A. dantment  B. dantive  C. danticism  D. dandify.  
One point was given for one right answer (See Appendix E for the task). The maximum score of this task was 10.

Morphological awareness for real words: This task was administered to Grade-6 students. It contained 10 sentences, with the only difference between this task and morphological awareness of nonwords task being that this task used real words to test English morphological awareness. The maximum score of this task was 10. Example sentence was: *A famous doctor performed___.*  
A. operation  B. operations  C.
operative  D. operationalize (See Appendix E).
Results

Part one

This part of the study examined the reading and spelling performance and the development of the cognitive abilities related to reading and spelling of Grade-6 students from diverse language backgrounds (English, Persian and Chinese in this study).

Do the students in the three language groups perform differently in their reading (word reading and reading comprehension) and spelling?

The mean scores and standard deviations of all reading measures were shown in Table 2.
Table 2. Word Reading and Reading Comprehension by First Language.

<table>
<thead>
<tr>
<th>Test</th>
<th>English</th>
<th>Persian</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Range Reading Achievement Test-3 reading</td>
<td>Mean: 109.06</td>
<td>111.11</td>
<td>112.33</td>
</tr>
<tr>
<td></td>
<td>SD: 9.71</td>
<td>8.58</td>
<td>9.24</td>
</tr>
<tr>
<td>Woodcock Johnson-III word identification</td>
<td>Mean: 116.11</td>
<td>119.45</td>
<td>115.93</td>
</tr>
<tr>
<td></td>
<td>SD: 13.77</td>
<td>13.31</td>
<td>11.69</td>
</tr>
<tr>
<td>Woodcock Johnson-III word attack</td>
<td>Mean: 120.43</td>
<td>122.07</td>
<td>122.38</td>
</tr>
<tr>
<td></td>
<td>SD: 17.18</td>
<td>11.95</td>
<td>14.34</td>
</tr>
<tr>
<td>Stanford Diagnostic Reading Comprehension Test</td>
<td>Mean: 684.15</td>
<td>664.93</td>
<td>689.80</td>
</tr>
<tr>
<td></td>
<td>SD: 35.88</td>
<td>31.77</td>
<td>35.62</td>
</tr>
<tr>
<td>Planet Filk &amp; Greb</td>
<td>Mean: 9.53</td>
<td>8.58</td>
<td>10.05</td>
</tr>
<tr>
<td></td>
<td>SD: 2.07</td>
<td>2.15</td>
<td>1.65</td>
</tr>
</tbody>
</table>

ANOVA was used to examine the difference on reading performance separately among the three L1 groups. To control for Type I error, alpha level was set .017.

Eta-squared ($\eta^2$) was used as a measure of effect size, with .009 being small size, .059 being the medium size and .138 being the large size (Cohen, 1988, p.286-287). No significant difference was found on any of the word reading tasks: WRAT-3 reading, $F(2, 128) = 1.41, ns, \eta^2 = .02$; word identification, $F(2, 128) = 1.02, ns, \eta^2 = .02$; word attack, $F(2, 128) = .23, ns, \eta^2 = .004$. However, significant differences were found on
both reading comprehension tasks, SDRT (Stanford Diagnostic Reading Test, Karlsen & Gardner, 1994), F (2, 128) = 6.14, \( \eta^2 = .09, p< .005 \); Filk and Greb, F (2, 127) = 5.92, \( \eta^2 = .09, p< .005 \). Post Hoc Tukey HSD showed Persian L1 group performed lower than Chinese L1 groups (ps< .005) on both SDRT and Filk and Greb. No significant difference was found between English L1 and two ESL groups. The performance on the two spelling measures was also investigated across the three groups. The mean scores and standard deviations were shown in Table 3.

Table 3. Spelling by First Language.

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Persian</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 47</td>
<td>N = 44</td>
<td>N = 40</td>
</tr>
<tr>
<td>Wide Range Achievement Test-3 spelling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>112.23</td>
<td>114.86</td>
<td>117.95</td>
</tr>
<tr>
<td>SD</td>
<td>10.84</td>
<td>10.86</td>
<td>9.89</td>
</tr>
<tr>
<td>Woodcock Johnson-III spelling sounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>108.81</td>
<td>108.75</td>
<td>107.38</td>
</tr>
<tr>
<td>SD</td>
<td>10.93</td>
<td>10.08</td>
<td>10.20</td>
</tr>
</tbody>
</table>

ANOVA was conducted and no significant difference was found on the task of WJ-III spelling of sounds (Woodcock et al., 2001), F (2, 128) = .25, ns, \( \eta^2 = .004 \), and WRAT-3 spelling task (Wilkinson, 1995), F (2, 128) = 3.16, \( \eta^2 = .047 \).

In order to examine the influence of L1 orthography on the spelling strategies in English as a second language, the three spelling error scores were analyzed by ANOVA. The mean scores and standard deviation were shown in Table 4. Three students with highest spelling scores provided fewer than 10 spelling errors and seven students’
spelling test papers were missing, therefore the rest 121 students were included in the
spelling error analysis (English: 45, Persian: 39, Chinese: 37).

Table 4. Spelling Error Analysis by First Language

<table>
<thead>
<tr>
<th></th>
<th>English N = 45</th>
<th>Persian N = 39</th>
<th>Chinese N = 37</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological Constrained System</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.44</td>
<td>.43</td>
<td>.41</td>
</tr>
<tr>
<td>SD</td>
<td>.19</td>
<td>.16</td>
<td>.18</td>
</tr>
<tr>
<td><strong>Phonological Unconstrained System</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.47</td>
<td>.47</td>
<td>.44</td>
</tr>
<tr>
<td>SD</td>
<td>.19</td>
<td>.17</td>
<td>.17</td>
</tr>
<tr>
<td><strong>Visual Similarity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.71</td>
<td>.68</td>
<td>.69</td>
</tr>
<tr>
<td>SD</td>
<td>.05</td>
<td>.07</td>
<td>.06</td>
</tr>
</tbody>
</table>

ANOVA showed no significant difference on all the three spelling error scores, phonological constrained, \( F (2, 118) = .32, \) ns, \( \eta^2 = .005 \); phonological unconstrained, \( F (2, 118) = .31, \) ns, \( \eta^2 = .005 \); visual similarity, \( F (2, 118) = 2.58, \) ns, \( \eta^2 = .04 \).

*What are the correlations between reading and spelling performance of the three language groups in Grade 6?*

The Pearson Product-moment correlations among the three word reading and decoding tasks, two reading comprehension tasks and two spelling tasks were shown in Table 5, with \( r = .10 \) being small effect size, \( .30 \) being medium, and \( .50 \) being large (Cohen, 1988, p. 79-80).
Table 5. Correlations between Reading and Spelling by First Language

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. WRAT-3 reading</td>
<td>.71**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. WJ-R word identification</td>
<td>.68** .77**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. WJ-R word attack</td>
<td>.66** .78** .70**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. WRAT-3 spelling</td>
<td>.34** .50** .38** .54**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. WJ-III spelling sounds</td>
<td>.43** .46** .34** .51** .24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. SDRT</td>
<td>.38** .42** .51** .42** .28 .54**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Planet Filk&amp; Greb</td>
<td>.25 .43** .21 .51** .12 .48**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Persian**      |            |            |            |            |            |            |
| 1. WRAT-3 reading| .65**      |            |            |            |            |            |
| 2. WJ-R word identification | .48** .39** |            |            |            |            |            |
| 3. WJ-R word attack | .58** .65** .42** |            |            |            |            |            |
| 4. WRAT-3 spelling | .26 .42** .10 .39** |            |            |            |            |            |
| 5. WJ-III spelling sounds | .05 .35** .12 .46** .23 |            |            |            |            |            |
| 6. SDRT          | .25 .43** .21 .51** .12 .48** |
| 7. Planet Filk& Greb | .22 -.10 -.24 -.24 .20 .55** |

** means p is significant at .01; WRAT = Wide Range Achievement Test-3; WJ-III = Woodcock Johnson-III; SDRT = Stanford Diagnostic Reading Test.

The three groups showed correlations of similar magnitude between most measures of word recognition and spelling, with rs ranging from .34 to .78 for English L1 speakers, .39 to .65 for Persian L1 speakers and .35 to .69 for Chinese L1 speakers, except Persian speakers displayed weaker correlations between nonword spelling (WJ-III
spelling sounds, Woodcock, McGrew, & Mather, 2001) and two word recognition tasks, with $r = .26$ for the WRAT-3 reading and $r = .10$ for the WJ-III word attack (Woodcock & Johnson, 1989). Chinese L1 students also displayed weaker correlations between nonword spelling and real word reading task (WRAT-3 reading, Wilkinson, 1995), with $r = .02$.

A different picture was noted in the correlations between reading comprehension and word reading, decoding and spelling across the three L1 groups. Significant correlations were found between all reading comprehension tasks and word reading, decoding and spelling tasks for English L1 group, with $r$ ranging from .30 to .59, except nonsignificant correlations between SDRT and nonword spelling, $r = .24$. However, although Persian L1 group demonstrated significant correlations between reading comprehension tasks and word identification task, $r = .35$ for SDRT and .43 for Filk and Greb, and between WRAT-3 spelling (Wilkinson, 1995) task and two reading comprehension tasks, $r = .46$ for SDRT and .51 for Filk and Greb, the correlations were not significant between WRAT-3 reading (Wilkinson, 1995) task and two reading comprehension tasks, with $r = .05$ for SDRT and .25 for Filk and Greb; and between Word attack (Woodcock & Johnson, 1989) and two reading comprehension tasks, with $r = .12$ for SDRT and .21 for Filk and Greb in this group. Interestingly, no significant correlation was found between all the reading comprehension tasks and word reading.
decoding and spelling tasks except the significant correlation between nonword spelling task and SDRT, with \( r = .41 \) among Chinese L1 students.

*Are the reading-related cognitive abilities (i.e., phonological awareness, working memory, syntactic awareness and morphological awareness) different among the students from three different language backgrounds?*

A series of ANOVA were conducted to examine the cognitive abilities across the three groups. Table 6 showed the mean scores and standard deviations of the reading-related cognitive measures across the three L1 groups in Grade 6.
Table 6. Cognitive Abilities by First Language

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Persian</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudoword Deletion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>18.68</td>
<td>19.23</td>
<td>18.20</td>
</tr>
<tr>
<td>SD</td>
<td>5.49</td>
<td>5.98</td>
<td>5.80</td>
</tr>
<tr>
<td>Working Memory for Words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5.38</td>
<td>5.23</td>
<td>4.90</td>
</tr>
<tr>
<td>SD</td>
<td>1.50</td>
<td>1.82</td>
<td>1.76</td>
</tr>
<tr>
<td>Working Memory for Numbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.00</td>
<td>7.84</td>
<td>8.70</td>
</tr>
<tr>
<td>SD</td>
<td>2.26</td>
<td>2.52</td>
<td>1.77</td>
</tr>
<tr>
<td>Morphological Awareness-Real Words</td>
<td>9.40</td>
<td>9.18</td>
<td>9.40</td>
</tr>
<tr>
<td>SD</td>
<td>.93</td>
<td>1.24</td>
<td>1.01</td>
</tr>
<tr>
<td>Morphological Awareness-Nonwords</td>
<td>7.11</td>
<td>6.72</td>
<td>7.65</td>
</tr>
<tr>
<td>SD</td>
<td>2.07</td>
<td>2.75</td>
<td>1.53</td>
</tr>
<tr>
<td>Oral Cloze</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.43</td>
<td>14.82</td>
<td>14.50</td>
</tr>
<tr>
<td>SD</td>
<td>2.08</td>
<td>2.23</td>
<td>3.74</td>
</tr>
<tr>
<td>Syntactic Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14.02</td>
<td>12.98</td>
<td>13.68</td>
</tr>
<tr>
<td>SD</td>
<td>1.28</td>
<td>2.10</td>
<td>1.39</td>
</tr>
</tbody>
</table>

No significant difference was found on measures of working memory, phonological awareness and morphological awareness tasks, working memory for words, $F(2, 127) = .90, \text{ns, } \eta^2 = .01$; working memory for numbers, $F(2, 128) = 1.76, \text{ns, } \eta^2 = .03$; pseudoword deletion, $F(2, 128) = .34, \text{ns, } \eta^2 = .01$; morphological awareness for real words, $F(2, 128) = .63, \text{ns, } \eta^2 = .01$; morphological awareness for nonwords, $F(2, 127) = 1.89, \text{ns, } \eta^2 = .03$. However, differences were found on measures of oral cloze, $F(2, 128) = 6.36, p < .005, \eta^2 = .09$; and syntactic awareness, $F(2, 128) = 4.81,$
p < .01, $\eta^2 = .07$. Post Hoc Tukey HSD showed that English L1 group had better performance on the orally presented syntactic awareness task, oral cloze, than Chinese L1 groups ($p < .005$), no difference was found between English and Persian L1 groups and the two ESL groups. Furthermore, Persian L1 group was less proficient in understanding English syntactic knowledge in printed task than English L1 group, $p < .01$, whereas the two ESL groups were comparable on syntactic awareness task, and no difference was found between Chinese L1 group and English L1 group either.

*How do reading and decoding, phonological awareness, working memory, syntactic awareness and morphological awareness contribute to the spelling of the sixth-grade students from the three language backgrounds?*

Linear multiple regression was used to determine the relative contributions of various cognitive abilities to the spelling performance of the students. Separate models were constructed for the three groups. WRAT-3 spelling was entered as the dependent variable and WRAT-3 reading, word attack, word identification, working memory tasks, pseudoword deletion, two morphological awareness tasks and two syntactic awareness tasks were entered as explanatory variable. The Pratt Index was used to examine the relative contributions of each independent variable in the model. The calculation of Pratt Index was to partition the proportion of the overall $R$ squared to each explanatory variable, namely, the resulting number of Beta weight multiplied by Pearson product
moment correlation was divided by the value of R squared for the model (Thomas, 1992).

Table 7 showed the linear regression model statistics by first language.
Table 7. Correlations and Pratt Indices between Cognitive Abilities and Spelling by First Language

<table>
<thead>
<tr>
<th>English</th>
<th>Beta weight</th>
<th>Pearson correlation with WRAT-3 spelling</th>
<th>Relative Pratt Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Range Achievement Test-3 reading</td>
<td>.14</td>
<td>.66</td>
<td>.13</td>
</tr>
<tr>
<td>Woodcock Johnson-III word attack</td>
<td>.19</td>
<td>.70</td>
<td>.19</td>
</tr>
<tr>
<td>Woodcock Johnson-III word identification</td>
<td>.35*</td>
<td>.78</td>
<td>.38</td>
</tr>
<tr>
<td>Working Memory for Words</td>
<td>.06</td>
<td>.32</td>
<td>.03</td>
</tr>
<tr>
<td>Working Memory for Numbers</td>
<td>-.11</td>
<td>.38</td>
<td>-.06</td>
</tr>
<tr>
<td>Psuedoword Deletion</td>
<td>.19</td>
<td>.57</td>
<td>.15</td>
</tr>
<tr>
<td>Morphological Awareness-Nonwords</td>
<td>.16</td>
<td>.55</td>
<td>.12</td>
</tr>
<tr>
<td>Morphological Awareness-Real Words</td>
<td>.08</td>
<td>.49</td>
<td>.06</td>
</tr>
<tr>
<td>Oral Cloze</td>
<td>-.05</td>
<td>.18</td>
<td>-.01</td>
</tr>
<tr>
<td>Syntactic Awareness</td>
<td>.04</td>
<td>.27</td>
<td>.02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Persian</th>
<th>Beta weight</th>
<th>Pearson correlation with WRAT-3 spelling</th>
<th>Relative Pratt Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Range Achievement Test-3 reading</td>
<td>.30</td>
<td>.55</td>
<td>.31</td>
</tr>
<tr>
<td>Woodcock Johnson-III word attack</td>
<td>.15</td>
<td>.47</td>
<td>.13</td>
</tr>
<tr>
<td>Woodcock Johnson-III word identification</td>
<td>.30</td>
<td>.63</td>
<td>.35</td>
</tr>
<tr>
<td>Working Memory for Words</td>
<td>.06</td>
<td>.01</td>
<td>.001</td>
</tr>
<tr>
<td>Working Memory for Numbers</td>
<td>-.10</td>
<td>-.02</td>
<td>.004</td>
</tr>
<tr>
<td>Psuedoword Deletion</td>
<td>.11</td>
<td>.11</td>
<td>.02</td>
</tr>
<tr>
<td>Morphological Awareness-nonwords</td>
<td>-.19</td>
<td>.36</td>
<td>-.13</td>
</tr>
<tr>
<td>Morphological Awareness-real words</td>
<td>.34</td>
<td>.44</td>
<td>.28</td>
</tr>
<tr>
<td>Oral Cloze</td>
<td>-.22</td>
<td>.20</td>
<td>-.08</td>
</tr>
<tr>
<td>Syntactic Awareness</td>
<td>.20</td>
<td>.37</td>
<td>.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chinese</th>
<th>Beta weight</th>
<th>Pearson correlation with WRAT-3 spelling</th>
<th>Relative Pratt Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Range Achievement Test-3 reading</td>
<td>.23</td>
<td>.57</td>
<td>.20</td>
</tr>
<tr>
<td>Woodcock Johnson-III word attack</td>
<td>.45*</td>
<td>.69</td>
<td>.47</td>
</tr>
<tr>
<td>Woodcock Johnson-III word identification</td>
<td>.07</td>
<td>.53</td>
<td>.06</td>
</tr>
<tr>
<td>Working Memory for Words</td>
<td>-.03</td>
<td>-.08</td>
<td>.004</td>
</tr>
<tr>
<td>Working Memory for Numbers</td>
<td>.17</td>
<td>.25</td>
<td>.06</td>
</tr>
<tr>
<td>Psuedoword Deletion</td>
<td>-.20</td>
<td>.14</td>
<td>-.04</td>
</tr>
<tr>
<td>Morphological Awareness-nonwords</td>
<td>.15</td>
<td>.33</td>
<td>.08</td>
</tr>
<tr>
<td>Morphological Awareness-real words</td>
<td>.22</td>
<td>.55</td>
<td>.18</td>
</tr>
<tr>
<td>Oral Cloze</td>
<td>-.05</td>
<td>.16</td>
<td>-.01</td>
</tr>
<tr>
<td>Syntactic Awareness</td>
<td>.07</td>
<td>.09</td>
<td>.01</td>
</tr>
</tbody>
</table>

* means p is significant at .05.
Different language groups were analyzed separately with linear multiple regression. The results showed that all models were statistically significant. Histogram and Normal P-P plot showed that the residuals were approximately normally distributed. The scatterplots showed that each explanatory variable was generally linearly related to WRAT-3 spelling. Scatterplots of explanatory variables against the residuals showed no major departures from homoscedasticity. A boxplot showed of the residuals showed no existence of outliers. The maximum leverage values for the resulting models were within the acceptable range according to Huber’s (1981) criterion (English= .40, Persian = .50, Chinese = .53). The values for the Variable Inflation Factor were adequate (English 1.25-3.60, Persian 1.61-3.65, Chinese 1.21 – 2.52), as were the values for tolerance (English .28-.80, Persian .27-.72, Chinese .40-.82). Cohen’s $f^2$ was used as a measure of effect size, with .02 being small, .15 being medium, and .35 being large (Cohen, 1988, pp.410-414).

As shown in Table 7, the model accounted for approximately 71% of the variance in the WRAT-spelling performance of English L1 students, $F (10, 36) = 8.83$, $p < .005$, $f^2 = 2.45$, word identification accounted for 38% of the variance accounted for by the model, followed by word attack (19%) and pseudoword deletion (15%). The model accounted for approximately 54% of the variance in WRAT-3 spelling for Persian L1 students, $F (10, 32) = 3.80$, $p < .005$, $f^2 = 1.17$, word identification accounted for 35% of the variance accounted for by the model, however, different from the English L1 group, the second largest proportion of variance accounted for by the model for the Persian L1
students was WRAT-3 reading (31), the third was morphological awareness for real words (28%). Chinese L1 group demonstrated somewhat different model from the other two groups. The model accounted for approximately 66% of the variance for the WRAT-3 spelling, \( F(10, 28) = 5.40, p < .005, f^2 = 1.94 \), the variables of relative contributions to the model were as follows: word attack (47%), WRAT-3 reading (20%), and morphological awareness for real words (18%).
Part two

Do the reading performance and syntactic awareness of students from the three different language backgrounds (i.e., Chinese, Persian and English) differ throughout the elementary stage, that is, from Grade 1 to Grade 6? How do the reading abilities and syntactic awareness develop among ESL students from different language backgrounds (Chinese and Persian in this study) and L1 English students across the grades?

The research questions in Study Part Two were addressed by a retrospective analysis of the profiles of the 131 students in Study Part One. The WRAT-3 reading (Wilkinson, 1995) and oral cloze performance of the same groups were examined from Grade 1 through 6. To conduct a more effective analysis, those students whose WRAT-3 reading and oral cloze scores missed two or more than two grades were excluded from the analysis, resulting in 85 (English 35, Persian 24, Chinese 26) students in total with scores of all the six grades or only one grade missing included in this part of study. Therefore, the sample size ranged from 73 to 85 of the two tasks across the six grades. Pairwise comparison was used to examine the group differences for each measure in each grade. Table 8 and 9 showed the means and standard deviations on the measures of WRAT-3 reading and oral cloze tasks across six grades respectively by L1 backgrounds. \( \eta^2 \) was used as the effect size, with the same criterion as the above (See page 36).
The results showed that there were no significant difference among the three L1
groups across the six grades on the measure of WRAT-3 reading, G.1, F (2, 71) = .81, ns,
\( \eta^2 = .02 \); G.2, F (2, 79) = .82, ns, \( \eta^2 = .02 \); G.3, F (2, 80) = 1.46, ns, \( \eta^2 = .04 \); G.4, F
(2, 79) = 3.80, ns, \( \eta^2 = .08 \); G.5, F (2, 73) = 2.53, ns, \( \eta^2 = .07 \); G.6, F (2, 82) = 3.02,
ns, \( \eta^2 = .07 \).
Table 9. Syntactic Awareness from Grade 1 to 6 by First Language

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Persian</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>Mean</td>
<td>9.13</td>
<td>6.65</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.03</td>
<td>3.18</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Mean</td>
<td>7.72</td>
<td>6.13</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.55</td>
<td>2.30</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Mean</td>
<td>8.14</td>
<td>7.74</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.38</td>
<td>1.74</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Mean</td>
<td>8.49</td>
<td>8.09</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.22</td>
<td>1.23</td>
</tr>
<tr>
<td>Grade 5</td>
<td>Mean</td>
<td>8.39</td>
<td>8.82</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.17</td>
<td>1.62</td>
</tr>
<tr>
<td>Grade 6</td>
<td>Mean</td>
<td>16.43</td>
<td>15.25</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.34</td>
<td>2.21</td>
</tr>
</tbody>
</table>

Differences were found on Oral Cloze in lower and middle grades, G.1, \( F(2, 70) = 7.82, p < .005, \ \eta^2 = .18; \) G.2, \( F(2, 78) = 9.11, p < .005, \ \eta^2 = .19; \) and G.3, \( F(2, 80) = 9.22, p < .005, \ \eta^2 = .19. \) However, the syntactic skills across three language groups appeared different in the upper grades with difference remaining in Grade 5, \( F(2, 73) = 6.87, p < .005, \ \eta^2 = .16, \) and Grade 6, \( F(2, 82) = 4.62, p < .017, \ \eta^2 = .08, \) but not in Grade 4, \( F(2, 79) = 2.34, \text{ns}, \ \eta^2 = .06. \) Post Hoc test showed that the two ESL groups (Persian L1 and Chinese L1) demonstrated no difference on oral cloze task in G1 and 2 and both performed lower than English L1 group (Chinese L1, \( p < .005; \) Persian L1, \( p < .017). \) In Grade 3, Persian L1 group caught up with English L1 group, but Chinese L1
group stayed at a lower level on the task than Persian (p < .017) and English (p < .005) L1 groups. In Grade 5, Chinese L1 group remained weaker performance than Persian L1 peers (p < .005) but performed similarly as English L1 group. In Grade 6, the performance of Chinese L1 group was comparable as that of Persian L1 group but lower than English L1 group. The development of word reading and oral syntactic awareness of the three L1 groups across the elementary stage was shown respectively in Figure 1. and Figure 2.
Figure 1. Reading Development from Grade 1 through 6 by First Language
Figure 2. Syntactic Awareness Development from Grade 1 through 6 by First Language

ocper = oral cloze correct percentage.
Discussion

The current study investigated whether the transfer from the first language (L1) to the second language (L2) learning is an impediment or facilitator in young learners’ literacy development. By comparing reading and spelling performance of children whose L1 is alphabetic (i.e, English and Persian) with children whose L1 is nonalphabetic (Chinese) in Grade 6 (Study Part One), this study examined how different L1s influence ESL students at applying English phonological, morphological and syntactic rules to reading and spelling. The study then presented a longitudinal examination of reading and syntactic awareness development of the children from distinct language backgrounds by following the profiles of the same three L1 groups from Grade 1 through 6 (Study Part Two).

In Study Part One, the first research question addressed whether the students achieve differently as a function of their L1 backgrounds. The results indicated that L1 backgrounds did not seem to have an impact on the performance on word reading tasks. Nevertheless, Persian L1 readers showed less proficiency in both reading comprehension tasks than Chinese L1 readers. Reading comprehension is considered a higher level process than word reading including reader level and text level (Lesaux, Lipka, & Siegel, 2006). Reader level factors, according to research, involve reading motivation, reading self-concept, reading behavior and reading comprehension (De Naeghel, Van Keer, Vansteenkiste, & Rosseel, 2012), and text level factors subsume text and question
types (Eason, Goldberg, & Cutting, 2012), discourse structure, clarity and syntactic complexity (Lesaux, Lipka, & Siegel, 2006). Since the prime focus of the current study is on the reading-related cognitive abilities rather than the other factors, the finding at least suggested that the processes of relatively complex linguistic and syntactic structures in passage reading were influenced by L1s (Chinese and Persian). This finding is consistent with the recent studies showing that the use of morphemes was a strong predictor for reading comprehension (Nunes, Bryant, & Barros, 2012) and that syntactic skills significantly predicted sentence reading comprehension (Chik, Ho, Yeung, Chan, Chung, Luan, Lo, & Lau, 2012). There might also be possible impact from the L1 learning cultures on the ESL students’ background knowledge or motivation which are beyond the limit of current study.

The examination of the spelling performance showed the three L1 groups were comparable in applying phoneme-grapheme correspondences in English and might even demonstrate equal proficiency when more spelling strategies such as memory, sight word are integrated in the tasks of real-word spelling. The examination of spelling errors did not reveal any differences across the three groups by language backgrounds. This finding has lent support to the universalist hypothesis indicating that the L1 orthography did not influence the spelling in L2 in the current sample.

The second research question addressed whether the relationship between reading and spelling was similar for English L1 and ESL students from two distinct L1 backgrounds (Chinese and Persian). Different correlations between word reading vs.
spelling and reading comprehension vs. spelling across the three L1 groups indicated an impact of L1 backgrounds on the students’ specific approaches in reading words and reading passages in Grade 6. Positive and significant correlations among all word reading and spelling measures across the groups revealed that learning to read and spell single words in English are similar processes regardless of the L1 backgrounds.

However, strategies used in reading passages with more complicated linguistic demands involving morphological and syntactic abilities seemed influenced by the L1 backgrounds. English L1 readers showed significant correlations between word reading and decoding, spelling and reading comprehension, indicating that English L1 readers in Grade 6 are consistent in applying the phoneme-grapheme correspondences (PGC) and grapheme-phoneme correspondences (GPC) in spelling and both lower level (word reading) and higher level (passage reading) reading tasks, while Persian L1 and Chinese L1 readers tended to process the reading comprehension tasks differently from word reading processes. Rahbari and Senechal (2009) found both transparent and opaque words were read faster by Persian speakers than nonwords even though the nonwords were transparent and nonpolygraphic (words that one phoneme corresponds to one grapheme). They (Rahbari and Senechal, 2009) also found Persian speakers read transparent and opaque words being affected by word frequency. The present study similarly found Persian L1 readers tended to rely on lexical access to read, indicated by the significant correlations between word identification and WRAT-3 spelling, two reading comprehension tasks; and non-lexical access to spell, indicated by the
non-significant correlations between two spelling tasks and word attack. This result is also consistent with the research of Akamatsu (2002) and Rahbari and Senechal (2009). Chinese L1 readers, however, did not demonstrate any significant correlation among the two reading comprehension tasks and word reading, decoding and spelling tasks, indicating Chinese L1 readers access higher level reading tasks with approaches (e.g., morphological awareness and syntactic awareness) somewhat different from decoding and coding strategies used for the lower level reading tasks. This finding is in line with the studies of Ho, Wong, Yeung, Chan, Chung, Lo, and Luan, (2012), McBride-Chang, Shu, Zhou, Wat, and Wagner, (2003) and Wang, et al. (2006).

The third research question concerned the issue of whether the underlying cognitive abilities deemed important for English reading vary across the L1 language groups. Cognitive abilities such as phonological awareness, working memory were found to be similar across L1 groups, which supports the universalist hypothesis.

It is interesting to find that the morphological awareness, which was expected to be different across L1 groups due to the distinct morphological features among the languages, did not show any difference across the groups. Morphological awareness is a multi-dimensional construct that includes awareness of inflections, derivations, and compounds (Ramirez, Chen, Geva, &Luo, 2011). In contrast to the two alphabetic languages---English is considered to have more words formed by derivation and inflection than compounding (Ramirez, Chen, Geva, &Luo, 2011), and Persian is also considered having an affixal morphology, while Chinese has more than 75% words
formed by compounding (Taylor & Taylor, 1995). Chen, Hao, Geva, Zhu, & Shu (2009) found that compound awareness explains unique variance in vocabulary and character reading and the contribution made by compound awareness to vocabulary is much larger than phonological awareness. Chinese ESL students’ advantage in compounding awareness rather than derivational and inflectional awareness was also found in the study of Ramirez et al. (2011). However, the morphological awareness task in this study tested the derivational more than compounding knowledge. Further, most items in the syntactic awareness task in this study mainly tested the inflectional knowledge and a few items about prepositions. Previous research was supported by current study, albeit indirectly, in that English L1 students demonstrated their advantages of more experiences in inflectional knowledge than the ESL groups. The derivational knowledge is considered to be obtained by the students in later grades than inflectional knowledge, approximately in fourth grade or later (Moats, 2000, p. 65), which explains why the sixth-grade ESL students in current sample could obtain similar abilities in this part of morphological awareness. It is equally understandable that in oral cloze task, which not only contained items about parts of speech, word order, and inflectional formation, but also involved oral language proficiency, which posed more obstacles in the performance of ESL students.

The last research question addressed whether ESL spelling could be understood by similar underlying constructs of English L1 spelling. The findings are in line with the research (Siegel, 1993; 2004) that reading decoding, phonological awareness, working memory, syntactic awareness and morphological awareness (Chen et al., 2009; Rahbari et
al., 2009; Ramirez et al., 2011) as explanatory variables together significantly predicted both English L1 and ESL spelling.

In Study Part Two, students from the same three L1 groups were examined in a longitudinal study throughout the elementary stage from Grade 1 to 6 to ascertain whether the trajectories of their reading and syntactic awareness differ across the grades. Not surprisingly, students mastered word reading skills to the similar proficiency level regardless of their different L1 backgrounds whereas the more complicated linguistic construct, syntactic awareness of the students from diverse language backgrounds remain different. ESL groups were both less proficient than English L1 peers in lower grades because of apparently weaker oral proficiency and syntactic skills, nevertheless, progress after years of English instruction was achieved in middle and upper grades in that both Persian and Chinese L1 groups became as proficient as their English L1 peers in certain grades. However, the performance across the three groups was still heterogeneous due to the impact of the distinct syntactic features in their respective first languages.
**Conclusion and implications**

The present study examined reading development of students from three different language backgrounds (alphabetic, English and Persian, and non-alphabetic, Chinese) and found support for both universalist hypothesis and script-independent hypothesis. Learning experiences in L1 were transferred to the L2 learning and influenced the L2 learning strategies in reading and process in syntactic structures, particularly in the linguistic tasks of higher level processing—reading comprehension. Persian and Chinese ESL students in Grade 6 were equally competent at applying PGC and GPC rules in word reading and spelling tasks as the English L1 students, indicating a common model of word reading and spelling for L1 and ESL students, however, they demonstrated abilities at different levels from their English L1 peers in understanding more complex linguistic tasks, syntactic structures and passage reading in English. Persian ESL readers with a non-Roman alphabetic L1 and Chinese ESL readers with a non-alphabetic L1, both of distinct morphological and syntactic structures from English, showed distinct performance on the orally presented syntactic tasks.

To summarize, cross-linguistic transfer influence the literacy of ESL students in Grade 6 more on the processing of complicated linguistic structures than lower level processes and distinct language backgrounds continued to be pertinent to the reading strategies utilized by different ESL groups despite years of exposure in English instruction.

This study provided suggestions for future research. For instance, measuring more
specific linguistic constructs such as derivational, inflectional and compounding awareness tasks that distinguish Chinese or Persian as L1 and English as L2 may produce more evidence for cross-linguistic transfer and implications for instructing ESL students from diverse language backgrounds. Also, tasks measuring metalinguistic skills in ESL students’ L1 would provide better understanding of ESL students’ capacities in L2 learning.
References


Appendices

Appendix A: Phonological awareness task

Pseudoword deletion (Grade 6)

Sample items: ma(b)____

(k)eff ____

s(k)oosh ____

(s) tet ____

te(s)p____

nuf(t)____

Items:
s(n)eck____ sis(p)____ s(k)aff____ (k)aze____

fas(k)____ s(t)oam____ yi(f)t____ (s)keak____

drun(ch)____ po(s)k____ too(f)____ (s)nize____

c(l)ets____ skep(ch)ure____ c(ant)ive____ sku(f)ly____

tro(p)ment____ bi(g)le____ stap(men)t____ ga(cio)us____

plen(ti)on____ re(ba)bly____ pre(bal)ture____ con(stup)ture

dis(prec)tive____ con(pad)ly____ mis(pre)ture____ pre(hen)ly_

des(tici)ous____ re(pre)pment____
Appendix B: Syntactic awareness tasks

Oral cloze (1-6)

1. We have done the work already. We___ it yesterday. (1, 2, 3, 4, 5, )

2. John is a good player. Bill is a better player than John. But Tom is the ___ player of them all. (1, 2, 3, 4, 5, )

3. Jane___ her sister ran up the hill. (k, 1, 2, 3, 4, 5, 6, 7, )

4. The brown dog is small; the gray dog is smaller; but the white one is the ___. (1, 2, 3, 4, 5, )

5. Betty ____ a hole with her shovel. (k, 1, 2, 3, 4, 5, 6, 7, )

6. Yesterday, Tina and Marie___ walking down the street. (1, 2, 3, 4, 5, )

7. The girl ___is tall plays basketball well. (2, 3, 4, 5, 6, 7, )

8. The hungry dogs have ___ all the food. (1, 2, 3, 4, 5, )

9. Dad ___Bobby a letter several weeks ago. (k, 1, 2, 3, 4, 5, 6, 7, )

10. Yesterday, Joe ____ the ball. (1, 2, 3, 4, 5, )

11. The ___ little pigs ate corn. (k, 6, 7, )

12. Fred put the big turkey ___ the oven. (k, 6, )

13. The ___ put his dairy cows in the barn. (k, 6, )

14. It was a sunny day with a pretty ___ sky. (k, 1, 6, 7, )

15. Jim set the lamp on the desk so he could ___. (k, 6, )

16. With a piece ___ chalk, he sketched her face. (6, 7, )

17. The boy had big brown eyes and a pleasant ___. (k, 6, 7, )
18. Because of the rain yesterday, the children ___ inside the house. (6, 7, )

19. Nancy knocked ___ before entering the house. (6, 7, )

20. The children put on their boots ___ it snows. (k, 6, 7, )

21. I want to play with a toy ___ is fun. (6, 7, )

22. ___ is Susan going to the doctor today? (6, 7, )

23. Jeffrey wanted to go ___ the roller coaster. (k, 1, 2, 3, 4, 5, 6, 7, )

24. When we go ___ the building, we must be quiet. (k, 6, 7, )

25. After her broken leg had healed, Laura found it hard to walk ___. (6, 7, )

26. Paul’s mother picked up the toys ___ books. (6, 7, )

27. He has ___ the correct path. (7, )

28. I want to see a movie ___ is good. (7, )

29. We should have ___ that yesterday. (7, )

30. Sally has a party dress and a school dress. She has two ___. (1, )

31. Bob is a child. Mary is a child. They are two ___. (1, )

32. I have one mouse here and one mouse there. I have two ___. (1, )

Syntactic awareness (Grade 6)

On this task, you need to read sentences and complete the word that is missing. Please choose the word that will fit the best in the sentence.

1. Here is a box, here are 11 ____.

2. Here is a man, here are 23 ____.
3. I told the dentist that 4 of my ____ are sensitive to cold drinks.

4. We saw one brown cow and three white and black ____.

5. I did not do well in my math test. In fact, this test was ____ than the last one.

6. My favorite food is potato. I ate 3 ____ at lunch.

7. My mother gave each of us a toy. We spend all afternoon playing with our ____.

8. We ran around the field for the first time in gym class. First my left foot started to hurt and now both my ____ hurt.

9. My cat looked nervous and then I saw two ____ running across the room.

10. Only one gentleman and a few ____ entered the shopping mall yesterday.

11. Alex dreams ____ playing hockey with the NHL.

12. I am disappointed ____ Steve. He told my secret.

13. They always argue ____ which television show to watch.

14. The passengers arrived ____ the gate at 8:00.

15. Why is that man staring ____ you?

16. Do not be scared ____ ask for help. You are among friends.
Appendix C: Memory task

Working memory for words (Grade 6)

2A  1) In a baseball game, the pitcher throws the ___.
    2) On my two hands, I have ten___.

      Child’s responses: _____ (ball, fingers)

2B  1) In the fall, we need to rake ____.
    2) When we are sick, we often go to the _____.

      Child’s responses ______ (leaves, doctor)

2C   1) An elephant is big, a mouse is _____.
     2) A saw is used to cut ______.

      Child’s responses: __________ (small, wood)

3A  1) Running is fast, walking is ______.
     2) At the library people read _____.
     3) An apple is red, a banana is _____.

      Child’s responses: _______ (slow, books, yellow)

3B  1) The sun shines during the day, the moon at ____.
     2) In the spring, the farmer plows the _____.
     3) The young child had black hair and brown ______.

      Child’s responses: _______ (night, field, eyes)

3C  1) In the summer it is very ______.
     2) People go to see monkeys in a _____.


3) With dinner, we sometimes drink_____.

Child’s responses: _____ (hot, zoo, milk)

4A 1) Please pass the salt and _____.

2) When our hands are cold we wear _____.

3) On the way to school I mailed a _____.

Childs’ responses: _____ (pepper, gloves, letter, wet)

4B 1) Snow is white, grass is ______.

2) After school, the children walked ______.

3) A bird flies, a fish_____.

4) In the barn, the farmer milked the _____.

Child’s responses: _____ (green, home, swims, cow)

4C 1) In the autumn, the leaves fall off the ______.

2) We eat soup with a _____.

3) I go to the pool to ______.

4) We brush and comb our _____.

Child’s responses: _____ (trees, spoon, swim, hair)

5A 1) For the party, the girl wore a pretty pink _____.

2) Cotton is soft, and rocks are _____.

3) Once a week, we wash the _____.

4) In the spring it is very _____.

5) I throw the ball up and then it comes ______.
Child’s responses: _____ (dress, hard, car, rainy, down)

5B
1) The snail is slow, the rabbit is _____.

2) At a birthday party, we usually eat ice cream and _____.

3) Sandpaper is rough but glass is ____.

4) In a garden, we pick ____.

5) Over the field, the girl rode the galloping ____.

Child’s responses: ______ (fast, cake, smooth, flowers, horse)

5C
1) To cut meat we use a sharp ____.

2) In the daytime it is light, and at night it is ____.

3) Dogs have four ____.

4) At the grocery store, we but ____.

5) A man is big, a baby is ____.

Child’s responses: ____. (knife, dark, legs, food, small)
Appendix D: Morphological awareness task

Real Words

You will see sentences that have a blank space. Above and below the blank there are four possible words that could be used to fill the blank. Only one of the words makes a good sentence.

Example: She hoped to make a good ___.

A. impressive  B. impressionable  C. impression  D. impressively

Items:

1. A famous doctor performed___.
   A. operation  B. operations  C. operative  D. operationalize

2. He likes to ____ his desires.
   A. gratuity  B. grateful  C. gratify  D. gratification

3. Watch carefully, I will ___.
   A. demonstration  B. demonstrative  C. demonstrable  D. demonstrate

4. Age improved her ___.
   A. personify  B. personalize  C. personality  D. personal

5. He’s too old to be ___.
   A. productivity  B. productive  C. production  D. produce

6. Farmers___ their fields.
   A. fertilize  B. fertilization  C. fertility  D. fertilizer

7. She works hard. She is very____.
A. industrialization  B. industry  C. industrious  D. industrialize

8. Those two dogs are almost____.
   A. identical  B. identify  C. identification  D. identify

9. He’s always going to meetings. He is an ___.
   A. activist  B. active  C. activate  D. activism

10. He was blinded by the ____.
    A. bright  B. brighten  C. brightly  D. brightness

*Nonwords*

1. I could feel the ____.
   A. froodly  B. froodful  C. frooden  D. froodness

2. What a completely ____ idea.
   A. tribacious  B. tribicism  C. tribacize  D. tribation

3. I admire her ____.
   A. sufilive  B. sufilify  C. suflation  D. sufilize

4. Where do they ____ the money?
   A. curfamic  B. curfamity  C. curfamate  D. curfamation

5. Please____.
   A. scriptial  B. scriptize  C. scriptist  D. scriptious

6. The meeting was very ____.
   A. lorialize  B. lorial  C. lorialism  D. lorify
7. I just heard a ___ story.
   A. dantment   B. dantine   C. danticism   D. dandify

8. Dr. Smith is a famous ____.
   A. ciciaris   B. cicarize   C. cicarify   D. ciciarial

9. Can you ___ both sides?
   A. romify   B. romity   C. romious   D. romative

10. he has too much____.
   A. brinable   B. brinicity   C. brinify   D. brinicious
Appendix E: Planet Filk and Greb

A Visit to the Planet Filk

The silver spaceship, Starview, glided to a gentle stop on the planet Filk. Just as the landing wheels touched down, Pat and Kim, the passengers, both age 12, felt the spaceship bump. They peered out the window. Pat screamed, “Look at the lake, look at the lake! It’s purple!”

Kim said, “That is because it is made out of grape juice.”

“You’re kidding me. Lakes are not made out of grape juice.”

“Yes, they are. They are on Filk.”

“Really? Are you fooling me?”

“They are made out of grape juice. Let’s go taste what is in the lake. Then you’ll believe me.”

While strolling along the path to the lake, they heard a rustling in the bushes. “What’s that. Pat?” Pat looked scared, “I don’t know.” All of a sudden a big bear with blue fur appeared in front of a bush just a short distance away. The bear stared at them. What should they do? They tried to remember what to do when you meet a bear. Run? Climb a tree? Make noise?

“What should we do?” asked Kim.

Just then the bear started to come toward them. They were scared. Suddenly, the bear turned and ran away into the bushes.

“Wow, that was close. I hope we don’t meet any more bears.”
They dashed to the lake and scooped up the purple liquid with their hands. “Yum! This tastes good, Pat. I wish the lakes on Earth were made of grape juice.”

In the distance they spotted a large tree with different coloured flowers on it: red, green, yellow, white, orange, brown. The flowers were round and very smooth. What strange looking flowers, they thought. When they reached the tree they saw they were not flowers; they were Smarties. Pat reached up and grabbed one. So did Kim. The Smarties tasted good.

In the distance they saw a person. It must be someone who lives on Filk. People who live on Filk are called Filkians. Pat whispered, “Look! The Filkian has three heads! Wow, they must be very smart.”

“Having three big brains does not always mean that you are smart. Elephants have big brains and they’re not very smart”, said Kim.

“The Filkian has no ears!” Kim exclaimed. Pat pointed to the large antenna on each of the Filkians’ three heads. “Maybe that’s what they use to hear.”

“I bet that you’re right.”

The Filkian had only one mouth in the middle of his head.

“Ellohay, Earth eoplepay.” A Filkian walked slowly toward them.

“What did the Filkian say?” asked Pat.

“I don’t understand.” Kim replied. “It sounds like Martin. I guess he’s speaking Filkian.

Pat and Kim spoke to the Filkian, “We don’t understand. We speak English. Do
you speak English?”

“Onay. I ouldway iketay ota earnlay. Lllway ouya eachtay emay?”

“Okay. When we meet people we say ‘hello.’”

Pat and Kim both said “hello.”

“Hello.” The Filkian whispered.

Pointing and smiling, Pat said, “My name is Pat.” Pointing to Kim, Pat said, “My friend’s name is Kim.” Pat pointed to the Filkian. “What is your name?”

“89213.”

“Do you have numbers instead of names?”

“Esyay.”

The Filkian waved and said “Oodgay ayday.”

Pat and Kim said “Goodbye.”

They looked ahead of them.

Large and beautiful mountains rose majestically in the distance. They were brown with white tops.

“Let’s go visit the mountains.”

“How will we get there?”

Pat looked ahead and saw a sign ‘TRAIN TO THE MOUNTAINS. 200 KM FROM HERE TO THE MOUNTAINS. NEXT TRAIN 12 NOON. TRAIN ARRIVES 1400 (2 PM). RETURN TRAIN AT 1600 (4 PM). FARE: FREE ONLY FOR EARTH PEOPLE. FARE FOR FILKIANS: 27 PABBERS.”
“Let’s go!”

“Do we have time?”

“Yes. The spaceship leaves at 1900 (7 pm). We can catch the train at 1600 and be at the spaceship in plenty of time.

Pat and Kim took the train to the mountains. They threw snowballs at each other on the top of the mountain. They had a good time and returned to the spaceship.

1. If Kim and Pat saw a Filkian wearing a fur coat made of bear skin, the coat would be
   a. brown   b. blue   c. white   d. black

2. Which of the following could be a word in the Filkian language?
   a. latcay   b. otnak   c. onpat   d. ogday

3. Majestic means
   a. very big and beautiful   b. very little and beautiful   c. average size and beautiful   d. no way to know

4. How fast does the train to the mountains travel?
   a. 200 kilometres per hour   b. 100 kilometres per hour   c. 50 kilometres per hour   d. 150 kilometres per hour

5. Will Pat and Kim return to the spaceship on time?
   a. Yes   b. Maybe   c. No   d. If they hurry

6. If Pat and Kim were thirsty and decided to drink from the lake, what would they drink?
   a. water   b. grape juice   c. milk   d. hot chocolate

7. Who said, “Yes, they are on Filk.”
a. Kim   b. Pat   c. Neither Kim or Pat   d. Both Kim and Pat

8. Were Pat and Kim boys or girls?
   a. They were both boys.   b. Pat was a girl and Kim was a boy
   c. Kim was a girl and Pat was a boy   d. The story does not tell us.

9. What time will the train return from the mountains?
   a. 1600   b. 1800   c. 1900   d. 1400

10. The Filkian money is called

11. Would you like to visit Filk?
    a. No   b. Yes   c. Maybe   d. I don’t know

A Visit to the Planet Greb

The spaceship, Starview, drifted silently down from the clouds to the planet Greb.

The passengers, Leslie and Cory, age 11 years old, peered out the large round window and saw a grassy meadow.

“Look at the turquoise coloured leaves on the trees!” shouted Leslie.

“All the trees have turquoise leaves, Leslie,” Cory said.

They started off down the path. A large creature stepped in front of them.

“Greb to Welcome! Stay your enjoy your hope I.” The creature grinned at them with a mouthful of teeth.

“What did the creature say?”

“I don’t know; it must speak the Grebian language.”
The creature yelled at them: “Me understand you don’t?”

“No, I’m sorry; we only speak English.”

“You understand don’t I.” the creature said and waved goodbye.

“Look at its hand! It has 12 fingers on it, neatly arranged in 3 rows of 4 fingers!
The other hand has 12 also, in 3 rows.

“Don’t stare. He probably thinks that we are funny looking.”

Leslie and Cory ran off to the spaceship.

1. Leslie kicked a pile of leaves. What colour were the leaves?
   a. Green   b. Red   c. Yellow   d. Turquoise

2. Which one of these sentences would be correct in the Grebian language?
   a. Strange and scary very is large planet this.
   b. Strange and scary very is planet large this.
   c. Strange and scary planet is very large.
   d. Strange and scary larger very this planet.

3. What is one advantage of having 24 fingers, 12 on each hand, arranged in 3 rows?
   a. You could play the piano very easily.
   b. You could type on a computer keyboard very easily.
   c. You could knit more easily than someone with only 5 fingers on each hand.
   d. You could pick your nose more easily than someone with 5 fingers on each hand.

4. Which is correct?
   a. Cory and Leslie are both boys.
b. Cory is a boy and Leslie is a girl.

c. Cory and Leslie are both girls.

d. There is not enough information to judge from the story.