THE INFLUENCE OF L1 PHONOLOGICAL AND ORTHOGRAPHIC SYSTEM IN

L2 SPELLING: A COMPARISON OF KOREAN LEARNERS OF ENGLISH AND

NATIVE SPEAKING CHILDREN

A DISSERTATION

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

DOCTOR OF PHILOSOPHY

BY

CHAEHEE PARK

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BALL STATE UNIVERSITY
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ABSTRACT

Literacy development, particularly spelling development is an important topic in SLA because spelling ability is the foundation of literacy skills (Venezky, 1989). However, little is known about the development of spelling in ESL. Research on the development of spelling skills has focused on native English language. This study investigated English L2 spellings among Korean L1 learners of English on the basis of linguistic differences in their L1 and L2 phonology and orthography.

Two groups of 3rd graders, Korean L1 English learners (N=36) and native English speakers (N=30), performed a pseudoword spelling task, in which they listened to an audio recording of a total of 34 pseudowords and dictated what they heard.

The task material targeting phonological difference consists of two types of pseudowords: the consonants that exist in both English and in Korean (congruent type) and the consonants that do not exist in Korean but exist English (incongruent type). The task material targeting orthographic difference consists of two types of pseudowords: more consistent vowels and less consistent vowels.

Data were tested with an experiment with a 2 x 2 factorial design with "group" and "word type" as independent variables. The groups included two groups who are from contrasting L1 backgrounds: English and Korean. For phonological difference, word type included two contrasting types: congruent and incongruent. For orthographic difference, word type included two contrasting types: more consistent and less consistent.

The results support the prediction that Korean L1 learners of English would have difficulty in spelling pseudowords containing phonemes which do not exist in Korean but

are present in English phonology and that learners whose L1 is relatively transparent had difficulty in spelling L2 words whose grapheme phoneme correspondence is less transparent. Further analysis on error types and pedagogical implications regarding English L2 spellings are addressed.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Second language acquisition (SLA) has been an important topic in Applied Linguistics, given the increasing number of learners of a second language (L2). For example, regarding English as a second language, Graddol (1997) reported that the population of English speakers has grown tremendously. He suggests that English is considered to be official or special status in at least 75 countries in the world, and over two billion people speak English in those countries. English is also used as a foreign language (EFL) by approximately 750 million people, indicating that one out of four people in the world speaks English to some level of competence. In the U.S., there is also a steady increase in non-English-speaking populations. For instance, according to the American community survey report (U.S. Census Bureau, 2007), more than 42 million speakers speak English as a second language (ESL). Among them, more than one million people (approximately 1,062,337 as of 2007) speak Korean as their first language (L1), indicating a 299 percent increase in the last three decades, during which the U.S. population grew only 34 percent.

Given such demographic trends, there has also been a pressing need for research in various aspects of SLA. In particular, spelling development is an important topic in SLA because spelling ability is the foundation of literacy skills. In 1773, Noah Webster suggested that "spelling is the foundation of reading and the greatest ornament of writing" (cited in Venezky, 1989, p. 12). For the past two decades, researchers studying the relationship between spelling and reading have found that spelling ability predicts the later reading success of students from early grades through late elementary school (Ehri, 1989, 1991; Mann, 1993; Treiman, 1998). Because spelling skills are related to reading ability and reading ability has a strong impact on academic success, the importance of spelling skills in early literacy development cannot be emphasized too much.

However, despite the acknowledged importance of spelling ability, the current spelling research has so far focused primarily on native speakers of English, and little is known about the development of spelling in a second language (Figueredo, 2006). This gap in the research and instructional needs has been evidenced in South Korea as well. ESL spelling instruction in South Korea has not received much attention compared to other literacy skills in English L2. The Korean government introduced English as a compulsory subject from the third grade under the Seventh Curriculum Reform in 1997, believing that students' communicative competence in English is the most essential skill needed for an individual to become a member in the global society (Korean Ministry of Education, 1997). Since then, the English education curriculum has been reformed several times (Ministry of Education and Science and Technology, 2008). During these reforms, speaking and listening have been emphasized in order to improve students' communicative competence, while literacy, including spelling, has been largely ignored.

This educational policy seems to be directly related to the fact that only a limited amount of research is available on L2 spelling acquisition, whereas a greater amount of research is available on L2 speaking and listening. Given the lack of research on L2 spelling, the overall goal of this dissertation was to extend the documentation of L2 spelling research by providing data on English L2 spelling among Korean L1 learners.

Thus, the pedagogical significance of this dissertation addresses the improvement of L2 spelling and literacy instruction, particularly among Korean L1 learners of English, based on the psycholinguistics theories of reading and spelling. Currently, because little is known about how Korean L1 learners of English progress in the development of their spelling knowledge, it is hoped that the examination of English L2 spelling errors caused by phonological and orthographic differences between English and Korean will help establish explicit and systematic instruction in English L2 spelling, which will also lead to improvement of literacy skills in English L2.

The theoretical significance of this dissertation includes the integration of theories from different areas of study: linguistics, SLA, and psychology. Integrating theories from these areas provide a thorough understanding of the L2 spelling process from a multifaceted new perspective. Psycholinguistic theories suggest that written language (spelling) involves mapping spoken language onto its written form (encoding). To encode spoken language, children rely on knowledge of the phonological, morphological, and orthographic structure of the language (Perfetti, 1997). L2 spelling also involves cross-linguistic transfer (L1 transfer), which implies that linguistic differences between L1 and L2 affect spelling acquisition (e.g., Sun-Alperin, 2008; Wang & Geva, 2003a). Integrating the theories in psychology, linguistics, and L2 spelling acquisition, this study

investigated the following two specific issues in the learner population, Korean L1 learners of English. First, this dissertation examined the influence of phonological differences between English and Korean on English L2 spelling acquisition. Second, this dissertation examined the influence of orthographic differences between English and Korean on English L2 spelling. The next chapter reviews related areas of research in order to establish the theoretical background of the study.

CHAPTER 2

LITERATURE REVIEW

The purpose of this chapter is to provide more extensive research of two languages in terms of their writing system, phonology, and orthography based on which this dissertation develops an argument on English L2 spelling among young Korean L1 learners of English. This section first reviews writing systems of language. It describes different types of writing systems (e.g., logographic writing system, syllabic writing system, and alphabetic writing system) with examples in order to provide fundamental grounds for understanding what is involved in the spelling of words in each writing system. Next it reviews orthographic and phonological differences of Korean and English in order to understand how Korean L1 learners' spelling acquisition can be explained and predicted by the linguistic differences of the two languages. The section then reviews L1 transfer research on English L2 spelling acquisition to illustrate how cross-linguistic differences affect English L2 spelling acquisition, based on which the main theoretical framework for this dissertation is established.

2.1. Writing System and Language

To distinguish spoken language from written language, DeFrancis (1989) defines written language within the framework of human communication. According to him, human communication can be distinguished into two groups based on the degree of how much of human thought can be represented: partial and full. Figure 1 illustrates that all full systems of communication are based on spoken language, which can be represented by written language, sign language, and touch language. That is, full spoken language is the defining characteristic of the human species and can be encoded into three types of languages. Among these, written language includes graphic symbols to encode spoken language (thought). The two main schools of thought define writing differently in relation to its graphic symbols and delivery of thought (message):

Inclusivists: Writing includes any system of graphic symbols that is used

to convey *some amount of thought*.

Exclusivists: Writing includes only those systems of graphic symbols that can be

used to convey *any and all thought*.

(p. 4)

The inclusivists' definition of writing includes such limited systems as mathematical notation, musical notation, and chemical formulas. It also includes international symbols such as those for "No Pets" and "No Smoking." However, the exclusivists' definition of writing does not include these symbols because they are far too limited and cannot be expanded into complete systems that would enable us to express

complex ideas such as writing a poem, a philosophical treatise, or a manual on how to operate a car (DeFrancis, 1989). As such, it seems that writing can be "partial" or "full" depending on how much it represents human thought. DeFrancies defines full writing system as "a system of graphic symbols that can be used to convey any and all thought" (p. 5). In this paper, "writing" refers to the definition of the exclusivists and to full writing system encoding spoken language as one of the ways of communication.

COMMUNICATION

Partial   Full

                                              Spoken language

                                        Written Lg.   Sign Lg   Touch Lg

vocal: tactile: gestural: material: graphic
interjections   cresses   pointing   wampum
grunts   blows   miming   quipu
screams   etc.   etc.   etc.
etc.
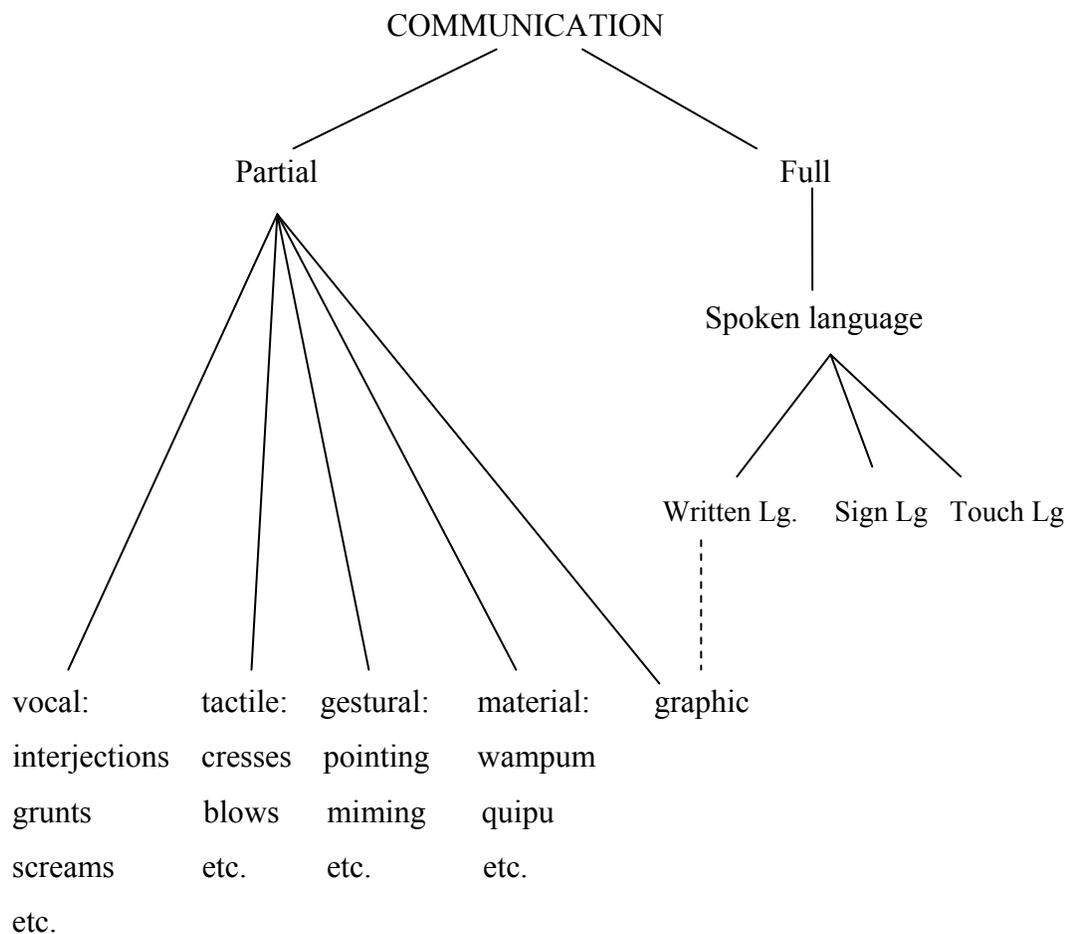
Figure 1. *Communication Classification Scheme* (DeFrancis, 1989)

Knowing that spoken language is encoded into written language, a discussion of writing systems is necessary to understand how spoken language is represented in written language. It is generally recognized that writing systems fall into logographic systems, syllabic systems, and alphabetic systems. Each writing system has a type of symbolic system used to encode linguistic information in each language, and different writing systems select different units of spoken language for mapping (DeFrancis, 1989). For instance, a logographic writing system selects morphemes or words, a syllabic writing system selects syllables, and an alphabetic writing system selects phonemes to represent spoken language.

One of the representative languages that employ logographic writing system is Chinese. In principle, Chinese characters represent the meanings of morphemes and are classified into several groups. Table 1 shows some examples of Chinese characters in each category. The first category of characters consists of pictographs, drawings of objects. Many of the earlier letters are clearly pictographic in nature. For instance, 日 (sun) is a pictograph depicting the sun. Its earliest form was a circle with a dot in the center. The second category of characters is called the "simple indicative principle" (DeFrancis, 1989, p. 96). These characters represent words in some other representational manner, not exactly pictorially. For instance, the words for *above* and *below* are represented by a horizontal line with a short bar placed above or below it (e.g., 上, 下). The third category is meaning composite (compound indicative principle) where indicators or pictographs combine to form a meaning composite. For instance, the two pictographs 日(sun) and 月(moon) join in the character for 明 (bright). In the next category, phonetic loans are characters which shared the same sound in archaic Chinese.

For instance, in ancient, the character for the word 萬(ten thousand) and the word *scorpion* were homonyms (wan). So, the character 萬 originally meant *scorpion* but was borrowed for 10,000 because it would have been inconvenient to write the number 10,000 in the same way used to write numbers *one* (一), *two* (二), *three* (三). The final category is a semantic–phonetic composite (phonetic compound), which is composed of a sound-cuing phonetic component and a meaning-convey semantic component together to represent one meaning. For instance, the Chinese character 媽 (mā-mother) is formed by combing the character 女(nǔ-female) with another character 馬 (mǎ-horse). This character involves joining a semantic element (女 nǔ-female) and a phonetic element (馬 mǎ-horse). Given that the letter-sound mapping in Chinese reflects a unit of pronunciation (the syllable) as well as a unit of meaning (the morpheme), Chinese can be categorized as a morpho-syllabic writing system (DeFrancis, 1989; Mattingly, 1992; Perfetti & Zhang, 1995).

Table 1

The Six Categories of Chinese Characters (Taylor & Taylor, 1995)

Category	Modern	Sound	Meaning
Pictograph	日	rì	sun
	月	yuè	moon
Indicator	上	shàng	above
	下	xià	below
Meaning composite	日　月	rì, yuè	sun, moon
	明	míng	bright
Phonetic loan	—	wan	scorpion
	萬	wàn	the thousand
Semantic-phonetic	女 馬	nǚ　mǎ	woman, horse
	媽	mā	mother

In a syllabic writing system, a letter represents a syllable. For instance, Japanese Kana is a syllabic writing system in which each grapheme represents a syllable; the word やま (mountain) consists of two syllables and each grapheme や(ya) and ま(ma) represents each syllable.

In an alphabetic writing system, such as English and Korean, the representation of spoken language is somewhat different in that the meaning is conveyed by symbols used for their phonetic value. For instance, the word *cat* is composed of three letters <c>, <a>, <t> and these letters initiate phonology which corresponds to phonemes /k/, /æ/, /t/ representing consonant-vowel-consonant sequence. Like English, the Korean language also employs an alphabetic writing system even though it uses non-Roman alphabets, called, *Hangul*. For example, the word 산 (san-mountain) consists of three letters <ㅅ(s)>, <ㅏ(a)>, <ㄴ(n)>, and each letter also initiates the phonology corresponds to the phonemes ㅅ (/s/), ㅏ(/a/), ㄴ(/n/) representing consonant-vowel-consonant in Korean as well (Kim, 2007).

a) 山   b) やま   c) 산

Figure 2. *Three Scripts Representing Three Different Writing Systems* (Perfetti, 2003)

To summarize, Figure 2 represents three different writing systems: logographic, syllabic, and alphabetic writing system. Each graph corresponds to a single syllable. The logographic Chinese character (2a) represents a word, monosyllabic morpheme, which happens also to be a syllable. In a syllabic writing system (2b), the elementary units directly represent a spoken syllable of Japanese. *Hangul* (2c) is written in syllable blocks

rather than a horizontal representation of letters found in the Roman alphabetic writing system.

2.2. Orthography and Language

Knowing that writing systems reflect the spoken forms of their respective languages, understanding the spelling rules in a specific writing system, particularly in an alphabetic writing system is necessary, because this dissertation discusses spellings in the alphabetic writing system (English and Korean). Orthography is defined as the conventional spellings including spelling rules and spelling patterns of the language (Varnhager, Boechler, & Steffler, 1999). The knowledge of orthography, which is defined as children's understanding of the conventions used in the writing system of their language (Treiman & Cassar, 1997), has been shown to facilitate children's spelling and reading acquisition. Thus, in an alphabetic writing system, writing involves the process of mapping grapheme to phoneme, and knowledge of the mapping is a critical factor for successful spelling.

One major theory for discussing processing differences in orthographies among alphabetic language systems is the Orthographic Depth Hypothesis (ODH) (Katz & Frost, 1992). According to ODH, in transparent orthographies such as Serbo-Croatian, Spanish, and Italian, there is a relatively simple and consistent one to one correspondence between grapheme and phoneme. For instance, Serbo-Croatian is a major language in the Balkan Peninsula, and its present alphabet was introduced based on the principle "Spell a word

like it sounds and speak it the way it is spelled." In other words, each grapheme presents only one phoneme in the spoken word and each phoneme is represented by only one letter. The relation between graphemes and phonemes is also isomorphic and exhaustive, and the spelling system follows the phonemic structure of spoken words. Morphemic variations based on inflection and derivation in Serbo-Croatian do not affect the phonemic structure of the word (Katz & Frost, 1992).

However, in opaque orthographies such as English, there is a more complex and less consistent relation between graphemes and phonemes. For instance, grapheme <a> can be pronounced differently in the words *cat*, *about*, *all*, and *lady* in English. In addition to the differences in grapheme-phoneme correspondence at the phonemic level, English morphophonemic spelling makes use of the principle even more extensively and in even more diverse ways. For instance, a morpheme can be represented by different sounds, but these are written in the same way; the plural morpheme in English is represented by three different sounds as in *cars* [-z], *cats* [-s], *cases* [-ɪz], but they can be written with the same letter <s>. Orthographic awareness refers to "a visually mediated ability to analyze and recognize letter and letter strings" (Katzir et al., 2006, p. 846) and is very important in spelling words correctly in a relatively opaque orthography due to this inconsistent correspondence between grapheme and phoneme. It has been found that children need to learn the spelling rules explicitly in an opaque orthography such as English (Bryant, 2002; Kessler & Treiman, 2003). They must learn the alternative spelling rules for the same sound as well as how to utilize these alternative rules to spell words correctly. Researchers also suggest that phonological and orthographic knowledge mutually facilitate each other and that grapheme-phoneme knowledge provides young

learners with a powerful tool to bind the spelling patterns of individual and multiple letters with their pronunciation in words (Ehri, 1991, 1998).

The link between phonology and orthography is central to the Psycholinguistic Grain Size Theory (PGST) (Ziegler & Goswami, 2005). PGST fundamentally relates to reading development. Because spelling involves phonological and orthographic process as the reading process does, introducing PGST helps to understand spelling process. The PGST assumes that grain size along with orthographic consistency plays an important role in learning to read. Figure 3 illustrates a different grain size of the word *grasp.*
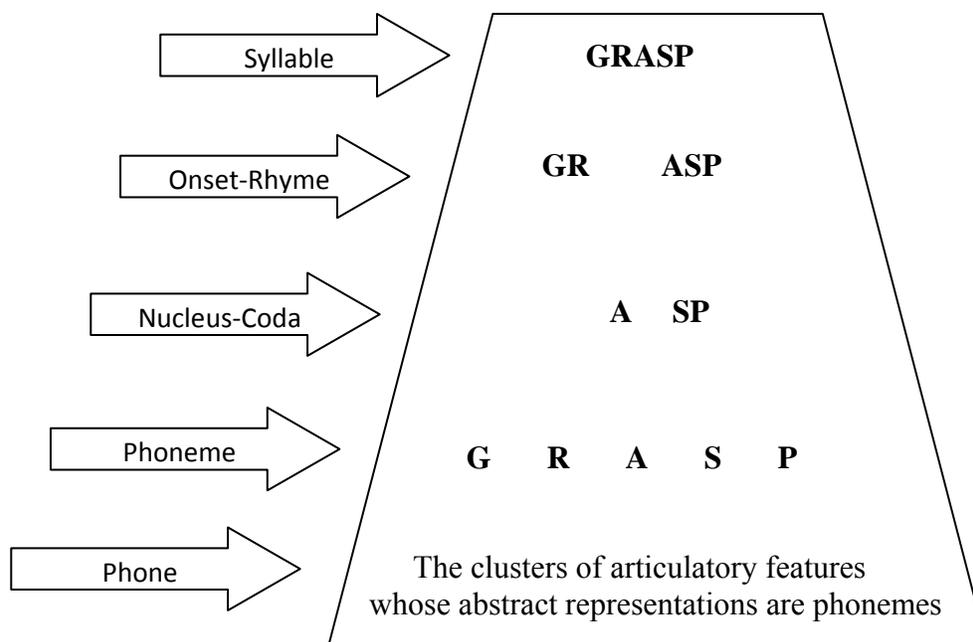
Figure 3. *A Schematic Depiction of Different Psycholinguistic Grain Size (Ziegler & Goswami, 2005)*

For phonological reading to be successful, children need to find shared grain sizes in the orthography and phonology of their language that allow a straightforward and unambiguous mapping between the two domains. According to Ziegler and Goswami (2005), when children are exposed to spoken language at the early stages of reading acquisition, the phonological contribution seems to be made at larger grain size units (e.g., the whole syllable *grasp* or onset-rhyme *gr-asp*). When children begin learning to read and spell in later stages, smaller grain size units such as onset-nucleus-coda (*gr-a-sp*) plays a more significant role (see Figure 3). For instance, the substructure of the one syllable word *cat* consists of /k/ (onset), /æ/ (nucleus), /t/ (coda). Initially, they seem to recognize the sound of the word *cat* as a whole and begin segmenting the sound to a rather larger grain size; onset-rhymes (/k/ - /æt/). However, when children start learning to read and spell, they seem to recognize smaller grain size units of the word such as /k/, /æ/, /t/.

The smaller grain size units (letters or phonemes) are most important in transparent language systems such as Greek, German, and Spanish because the phonemes, the smaller unit, are consistent and reliable to correspond to the grapheme. However, in an opaque orthography language system, larger grain size units are considered more important in reading. For example, phonemes (the smaller unit) are more inconsistent and unreliable than larger units (syllables and rhymes) in English: inconsistent grapheme phoneme correspondence. According to this hypothesis, in less transparent orthography, the larger grain size units (e.g., syllable, rhyme) are easier to recognize than the smaller grain size units (e.g., phonemes).

2.3. Linguistic Description of English and Korean

In this section, the discussion will be focused on the description of phonology, orthography, and the grapheme-phoneme mapping in English and Korean. As mentioned, English and Korean employ the same alphabetic writing system implying that written letters represent phonemes in principle. First, I will describe the consonants of both languages. There are 29 basic *Hangul* symbols consisting of 19 consonants and 10 vowels (Sohn, 1999). The 19 consonants include four tensed stops (/ k', p', t', c'/ ㄲ,ㅃ ㄸ,ㅉ in Korean) and one tensed fricative (/s'/, ㅆ) (see Table 2 for details). Some dialectal zones lack a few of the consonants and/or vowels that appear in the overall inventory. There are three nasals in Korean; bilabial /m/, alveo-dental /n/, and velar /ŋ/. Each nasal can be placed either syllable initial or final in accordance with the rule in *Hangul*.

Table 2

Consonants of Korean (Sohn, 1999, p. 153)

	Bilabial	Alveo-dental	Palatal	Velar	Glottal
stop	/p/ <ㅂ>	/t/ <ㄷ>	/c/ <ㅈ>	/k/ <ㄱ>	
	/pʰ/ <ㅍ>	/tʰ/ <ㅌ>	/cʰ/ <ㅊ>	/kʰ/ <ㅋ>	
	/p'/ <ㅃ>	/t'/ <ㄸ>	/c'/ <ㅉ>	/k'/ <ㄲ>	
fricative		/s/ <ㅅ>			/h/ <ㅎ>
		/s'/ <ㅆ>			
nasal	/m/ <ㅁ>	/n/ <ㄴ>		/ŋ/ <ㅇ>	
liquid		/l/ <ㄹ>			

Note. Corresponding graphemes in Korean are represented in < >

Sohn (1999) points out that there are several salient articulatory features in Korean. First, alveo-dental consonants are produced with the top (not the tip) of the tongue touching or approaching the back of the upper teeth and gum ridge area and the tongue tip touching the back of the lower teeth. Second, the palatal series and alveo-dental fricatives are produced with the lips flattened, unless they are followed by a round vowel. Third, Korean palatals are monotonous stops without the fricative quality such as /ʃ/ and /ʒ/. Fourth, no Korean consonant is released in the syllable final (coda) position. For instance, in producing the word /apʰ/, meaning *front*, the lips are closed for /pʰ/ and the resultant sound is [ap] despite the fact that its morphophonemic form is /*apʰ*/. The aspirated stops /pʰ/, /tʰ/, /cʰ/, and /kʰ/ are never voiced and are produced with a strong puff of air.

Table 3

*Consonants of English (*Yavaş, 2006, p. 9)

	Bilabial	Labio-dental	Inter-dental	Alveolar	Retro-flex	Palato-alveolar	Velar	*Glottal*
Stops	/p/ <p, pp> /b/ <b, bb>			/t/ <t, tt, th, ed> /d/ <d, dd, ed>			/k/ <c, cc, ck,ch, cq, k, qu> /g/ <g, gg, gh,gu>	
Affricates						/tʃ/ <ch, tch, t, ti> /dʒ/ <j, d, dg, g, gg>		
Fricatives		/f/ <f, ff, gh, ph> /v/ <v, vv, f, ph>	/θ/ <th> /ð/ <th>	/s/ <s, ss, sc, c> /z/ <z, zz, s, ss, x>		/ʃ/ <sh, ce, ch, ci, s, sci,sch, se, si, ss, ti> /ʒ/ <g, s, si, z>		/h/ <h, wh>
Nasal	/m/ <m, mm>			/n/ <n, nn>			/ŋ/ <ng, n>	
Liquid				/l/ <l, ll>	ɻ <r, rr, rh>			
Glide	/w/ <w,u>					/j/ <y,j>	/w/ <w, u>	

Note. Corresponding graphemes are represented in < >

There are 24 consonants in English including two semivowels (e.g., *w* and *j*) in which some places of articulations (e.g, labio-dental and inter-dental) are present but absent in the Korean consonant chart (see Table 2 and Table 3 for comparison). The ways in which some sounds are produced in Korean versus English are different. For instance, in Korean, there are three different ways to produce stops. The different ways of producing these sounds have to do with how much air is released and how much tension is in the mouth and tongue when producing the sounds. Considering the letter <p> in Korean to demonstrate the difference, the letter <p> is produced similar to English words such as *pit, pig, or put*. If one puts a finger up to the mouth while saying the word *pit*, a puff of air is felt. But, when one says the word *spit*, the puff of air released is not as strong as *pit*. In English, distinct letters or characters are not used to represent these voiceless stops whereas in Korean there are three different letters for each voiceless stop (see Table 2).

English consonants have multiple grapheme phoneme correspondence whereas Korean consonants have more consistent correspondence. For instance, phoneme /t/ can be mapped onto <t>,< tt>, <th>, or <ed> in English (four graphemes) whereas it maps onto <ㄷ> in Korean (one grapheme). The major phonological difference between Korean and English is that Korean does not have phonemes such as labio-dental (/f/ and /v/), inter-dental (/θ/ and /ð/), and retroflex (/ɹ/). Therefore, English words containing those phonemes will be challenging to Korean L1 learners of English because they need to create new linguistic representations for the absent phonemes.

Table 4

Vowels of Korean (Sohn, 1999, p. 156)

Place	Front		Back	
	Unround	Round	Unround	Round
High	/i/ < ㅣ >	/y/ <ㅟ>	ɨ <ㅡ>	/u/ <ㅜ>
Mid	/e/ <ㅔ **>**	/ø/ <ㅚ>	/ə/ <ㅓ>	/o/ <ㅗ>
Low	/ɛ/ < ㅐ **>**		/a/ < ㅏ >	

Note. Corresponding graphemes in Korean are represented in < >

Next, the description of the vowels in each language follows. The 10 Korean vowels can be arranged in terms of the place of articulation, the shape of the lips, and the height of the tongue as shown in Table 4. In general, all of the vowels are orthographically distinguished in Korea. However, certain vowels are not distinct in certain dialects. For example, vowel /e/ <ㅔ> and /ɛ/ <ㅐ> are not distinguished in the southern area and the two vowels /y/ <ㅟ> and /ø/ <ㅚ> are pronounced as on-glide diphthongs /wi/ and /we/, respectively in the central area and some other dialects.

	Front		Back	
High	/i/ <e,ea,ee,y,ie,ei,i,eo,ey,oe>			/u/ <ui,oo,ou,o,oe,eu,au,ew>
		/ɪ/ <i,y,u,e,o,ee,ui>	/ʊ/ <oo,u,ou,o>	
Mid	/e/ <ay,ai,a,ei,ea,ey,au>			/o/ <ew,o,oa,ou,eau,ow,eo>
		/ɛ/ <e,ea,a,ai,ie,ue,ae,eo>	/ʌ/ / /ə/ <u,o,ou,oo,oe,a,ai,ia>	
Low		/æ/ <a,au>		/ɔ/ <a,o,aw,au,oa,ou> /ɑ/ <ea,o,a,ow,e>

Figure 4. *Vowels of English* (Hammond, 1999)

Note. Corresponding graphemes are represented in < >

English vowels were described in Figure 4 in terms of three basic descriptors of vowels: height, backness, and tenseness or vowel length as follows. Tense vowels appear in the periphery of the diagram and lax vowels in the central regions. As seen in Figure 4, each phoneme can correspond to more than two graphemes. Particularly, the phoneme /i/ can be mapped to 10 types of grapheme as in the words, *be*, *meat*, *free*, *silly*, *niece*, *deceive*, *machine*, *people*, *key,* and *amoeba*. However, in Korean *Hangul,* grapheme phoneme correspondence of vowels is relatively more transparent than that of English in which one grapheme represents one phoneme in principle.

	Pattern1	Pattern2	Pattern 3
Non-terminal	C_1 ㅇ V ㅏ	C_1 ㅇ / V ㅜ	C_1 ㅇ / V ㅡ V ㅣ

	Pattern 4	Pattern 5	Pattern 6
Terminal	C_1 ㅇ V ㅏ / C_2 ㄴ	C_1 ㅇ / V ㅜ / C_2 ㄹ	C_1 ㅇ / V ㅜ V ㅣ / C_2 ㄴ
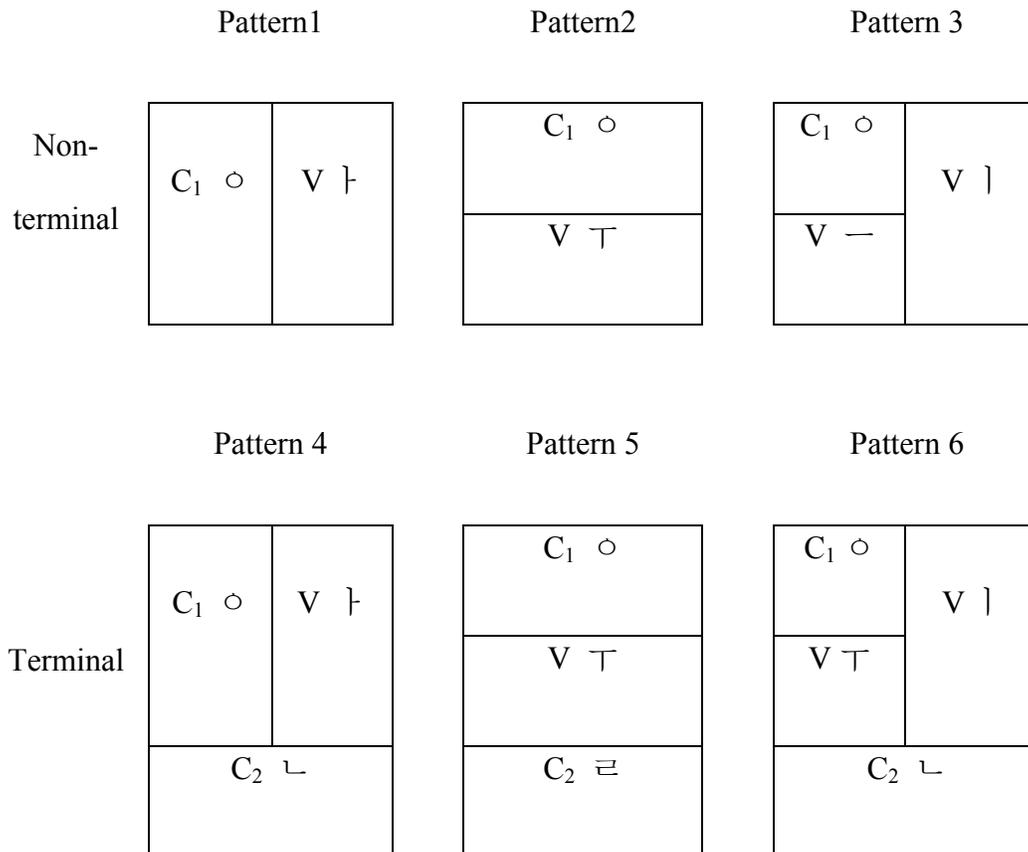
Figure 5. *The Six Patterns of Hangul in Syllable* (Yoon et al., 2002)

Next, the description of the sub-syllabic unit in each language follows. *Hangul* is written in a block, each block representing a syllable, rather than being written as a string of letters in a linear format as in English. Each square pattern contains up to four letters and corresponds to a single syllable. As seen in Figure 5, phonemes are arranged from left-to-right or from top-to-bottom in which the body unit (C_1V) is also visually prominent in its orthographic representation because consonant letters for codas (C_2) are added to the bottom of the arrangement of body (C_1V). For instance, the vowel /a/ <ㅏ> is placed on the right side of a preceding consonant (e.g., /k/ <ㄱ>), forming a horizontal representation of the C_1V (e.g., /ka/ <가>), and coda /n/ <ㄴ> can be added to the bottom of the body (C_1V), composing /kan/ <간> (Yoon & Derwing, 2001)[1]. Second, the body unit (C_1V) is also a minimal syllable in writing so that when a syllable consists of only a vowel (e.g., /a / <ㅏ>), a salient consonant letter ㅇ is used as filler in the onset position. There are limited letter position constraints for *Hangul* graphemes (Simpson & Kang, 2004). Horizontal vowels such as /u/ <ㅜ> and /o/ <ㅗ> are always placed under an initial consonant (e.g., /so/ <소>, meaning *cow*) whereas vertical vowels such as /a/ <ㅏ>, /e/ <ㅔ>, /ɛ/ <ㅐ>, /ə/ <ㅓ>, and /i/ <ㅣ> are always placed to the immediate right of the initial consonant (e.g., /na/ <나>, meaning *I*). There are also constraints on final consonant clusters. For instance, certain combinations of two consonants lead to illegal final clusters (e.g., /kh/ <ㄱㅎ> and /nk/ <ㄴㄱ>). Its overall shape looks more similar to Chinese than its fellow alphabetic orthographies such as English and Spanish.

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[1] A detailed literature review on body-coda vs. onset-rhyme awareness in Korean and English will be provided in following section.

English is written as a string of letters in a linear format for which syllabication of a word is relatively difficult compared to that of Korean. Figure 6 represents the general formula of English syllable structure where V (vowel or diphthong), the nucleus, is the only obligatory element in an English syllable (e.g., 'a'[e]). Table 5 presents each type of syllable with examples.

(C)	(C)	(C)	V	(C)	(C)	(C)

Figure 6. *General Formula of English Syllable Structure* (Yavaş, 2006)

Table 5

English Syllable Structures with Examples (Yavaş, 2006)

Syllable	Word	Syllable	Word
CV	say[se]	CVCC	binge [bɪndʒ]
CCV	pray [pɹe]	CVCCC	text [tɛkst]
CCCV	spray [spɹe]	CCVCC	print [pɹɪnt]
VC	at [æt]	CCVCCC	sphinx [sfɪnks]
VCC	act[ækt]	CCCVCC	sprint [spɹɪnt]
VCCC	busts[bʌsts]	CCCVCCC	sprints[spɹɪnts]
CVC	beat[bit]	CVCCC	worlds [wɝldz]
CCVC	break [bɹek]	CCVCCC	twelfths [twɛlfθs]
CCCVC	strike[stɹaɪk]		

In regard to the internal structure, a syllable consists of onset-nucleus-coda, which can be divided into onset-rhyme (nucleus+coda). For example, English monosyllabic words such as cat [kæt] have onset /k/ and rhyme /æt/ in which each letter represents one segment. However, there are some other possibilities in English; the onset cluster of /bl/ in Figure 7b and coda cluster of /nd/ in 7d and 7e[2].

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[2] More detailed discussion regarding onset-rhyme awareness in English will be provided in section 2.4.

(a) Cat
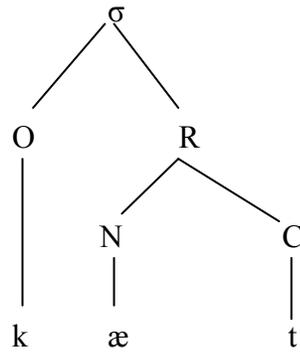
σ = syllable

O = onset

R = rhyme

N = nucleus

C = coda

(b) Blue
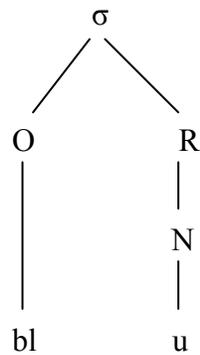
(c) Side
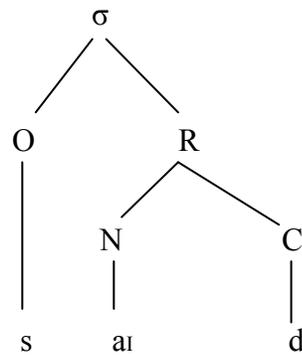
(d) Wind
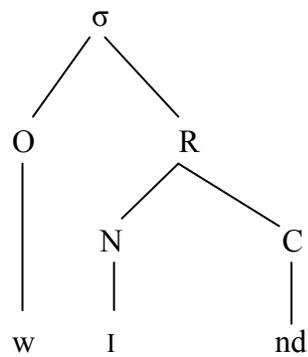
(e) Ground
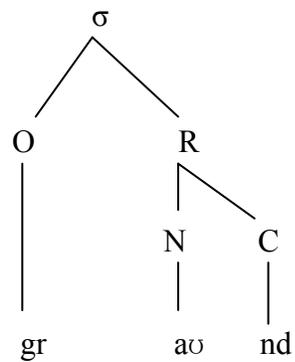
Figure 7. *Syllable Structure of English* (Yavaş, 2006)

To summarize, English and Korean employ the same alphabetic writing system implying that written letters represent phonemes in principle. However, orthographic depth is different between the two languages. English grapheme-phoneme correspondence is nontransparent compared to that of Korean. That is, phonological information is less ambiguous in Korean and more readily spelled because of the systematic mapping between grapheme and phoneme. Therefore, acquiring reading and spelling in Korean is relatively easy once children master the grapheme-phoneme correspondence. There are also some phonemes present in English but absent in Korean. Korean letters are written in block, each block representing a syllable. However, English is written as a string of letters in a linear format for which syllabication is rather difficult compared to that of Korean.

2.4. Component Skills of Spelling Acquisition

Research on the development of spelling skills in English has documented various aspects of the skill including the main developmental phases (e.g., Bear & Templeton, 1998; Ehri, 1997; Gentry, 1984) and a detailed inventory of the various types of difficulties posed by the English spelling system (e.g., Treiman, 1993; Treiman, Zukowski, & Richmond-Welty, 1995). What clearly emerges from these and other studies is that learning to spell in English is a complex, long-term process that is founded on three basic skills: (1) knowledge of the letters of the alphabet, (2) phoneme awareness, the ability to consciously analyze and manipulate speech at the level of phonemes, and

(3) the ability to learn the correspondences between phonemes and graphemes or phoneme-grapheme encoding skills (Caravolas et al., 2001).

Phonological knowledge is a crucial underlying component in reading and spelling development (Goswami & Bryant, 1990; Lundberg, Olofsson, & Wall, 1980; Mann & Liberman, 1984). Phonological awareness refers to the ability to distinguish and manipulate the sounds in spoken words. Studies have reported that individual difference in phonological awareness is one of the predictors of early word reading skills in English (Goswami & Bryant, 1990; Snow, Burns, & Griffin, 1988). To explain the importance of phonology in spelling, Goswami and Bryant (1990) categorized the words into four groups on the basis of whether children read and spell them.

1. If the list is not too difficult there would, no doubt, be some words which she managed to read and also to spell correctly (*R and S words*).

2. The list could, and probably would, contain some words which she could neither read nor spell (*neither R nor S words*).

3. It is also possible that there would be words which she could read, and yet did not manage to spell (*R not S words*)

4. In principle, it is possible that the child would be able to spell some of the words correctly without being able to read these particular words (*S not R words*).

(p. 58)

Categories 1 through 3 are normal occurrences which are common with views of children's reading and writing. Children may be able to read some familiar words and to

spell them as well (*R and S words*) even at the earliest stage of learning, or may not be able to read and spell (*neither R nor S words*) some words which are more difficult and less familiar. They also might be able to read some words which they were not able to spell (*R not S words*). Bradley and Bryant (1979) and Bryant and Bradley (1980), gave six and seven year old children lists of words to read and write and found empirical evidence for all four categories. They concluded that there was a clear and consistent difference in the types of words which children read but did not spell (*R not S words*) and those which they spelled but did not read (*S not R words*). The most common *R not S words* were *light*, *school*, *train*, and *egg* because "these do not lend themselves well to a grapheme phoneme correspondence strategy" (p. 59). In contrast, they found the most frequent *S not R words* require a phonological code such as *bun*, *mat*, *leg* and *pat*. This result suggests that children depend on the strategy for letter sound relations and phonological code, in order to spell but not in order to read (Bryant & Bradley, 1980).

The speech sounds usually include phonological units such as onset-nucleus-coda and syllable levels. Children's awareness of the three phonological units has been found to develop sequentially in English (Stahl & Murray, 1998; Treiman, 1985; 1992; Treiman & Zukowski, 1991). For instance, Stahl and Murray (1998) categorized children's phonological processing skills into five levels of difficulty. First, children acquire the ability to recognize rhymes (e.g., f-ame and s-ame). Second, they recognize alliteration (e.g., b-ig, b-us, b-ut), focusing on smaller parts, specifically the onset of the words. Third, a familiarity with blending and splitting syllables emerges (e.g., pl-ain, fl-ight). Fourth, children learn to segment syllables into phoneme (e.g.,p-at, c-at). The fifth and most difficult stage is to manipulate individual phonemes (e.g.,p-a-t, c-a-t)

Internal structure of syllable (sub-syllabic unit) also relates to the development of phonological awareness. One of the important views on this syllable internal structure is that a syllable does not consist of only linear strings of segments (Fowler, Treiman, & Gross, 1993). Rather, two-phoneme sequences are intrinsically more closely associated with each other than the other two-phoneme sequences in the syllable. The syllable internal structure of language is represented with tree diagrams to account for the subsyllabic structure difference in Korean and English.

(a) CV- Cluster Hypothesis   (b) VC-Cluster Hypothesis

Syllable   Syllable

α   β   α   β

C   V   C   C   V   C
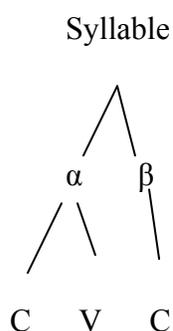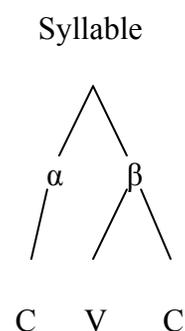
Figure 8. *Structural Representation of the Syllable* (Yoon & Derwing, 2001)

It is well supported that the boundary between onset and rhyme is salient in English (Figure 8b, VC cluster hypothesis). In other words, English speakers parse CVC monosyllabic words into a C/VC partition (Treiman, Salasoo, Slowiaczek, & Pisoni, 1982; Treiman, 1983; Fowler, Treiman, & Gross, 1993) in which the major boundary lies between the onset and the nucleus of the syllable. This finding is also supported by the prominence of the rhyme unit in reading English (Treiman, Mullenniz, Bijeljac-Babic, & Richmond-Welty, 1995; Kessler & Treiman, 1997; Goswami, 1988,1993,1998). More

specifically, these researchers also suggested that the phonological structure of the language plays an important role in forming grapheme phoneme correspondence in orthography and in learning to read. For instance, Goswami (1988) studied what analogies children use to read. In his analogy experiment, children learned the clue words such as *beak* and were then asked to read new words such as *peak* and *bean*. The results show that the words such as *peak* were easier to read by analogy to the rhyme part of the clue word (*-eak*) than were words such as *bean*. Children's reading analogies have also been studied using consonant clusters (Goswami, 1991). He used the clue words *trip* as a basis for decoding new words such as *trim* (shares initial consonant cluster), and clue words such as *desk,* as a basis for decoding new words, such as *risk* (shares final consonant cluster). He found that analogies were restricted to the shared consonants cluster that corresponded to onsets. The children made a significant number of analogies between the clue word such as *trim* and the pseudoword such as *trot*. They did not use analogies between the clue words like *desk* and the test word *risk*, even though this word also shared consonant clusters in the coda position with the clue words. This result suggests that children are sensitive to onset-rhyme units over body-coda units in English.

However, as for the Korean sub-syllabic structure, Yoon and Derwing (2001) found that Korean children have a preference for syllable-initial CV (body) units over syllable-final VC (rhyme) sequences (Figure 8a, CV cluster hypothesis). In their study, they conducted different types of experiments to clarify the status of rhyme vs. body constituents in the Korean language. One of the experiments was a sound similarity judgment (SSJ) task focused on monosyllabic CVC-CVC pairs. In this task, students listened to pairs of words and rated on a scale of how similar each pair is in overall

sound. For instance, in CVC pairs composed of body sharing parts (e.g., pan-pat) and rhyme-sharing parts (e.g., pan-tan), if the body (onset-nucleus) were a more salient part of the Korean syllable than the rhyme (nucleus-coda), the body sharing pairs should be judged more similar than the rhyme sharing pairs and the body variable should account for more variance than the rhyme variable. They found that pairs sharing the body unit were judged significantly more similar than pairs sharing the rhyme.

Furthermore, Kim (2007) used blending and segmenting tasks to examine four different phonological units: syllable, onset-rhyme, body-coda, and phoneme. In these tasks, Korean L1 children listened to audiocassette-recorded sounds and were asked to either combine or segment sounds. For instance, in the onset-rhyme task of the segmenting task, the children listened to [koŋ] and were asked to segment it into the onset-rhyme unit /k/ and /oŋ/. The results indicated that the syllable tasks were easiest for the children, followed by the body-coda tasks. The body-coda tasks were easier than the phoneme tasks and the onset-rhyme unit tasks were the most difficult indicating that body –coda boundary (e.g., ca-t) is more salient than onset-rhyme boundary (e.g., c-at) for Korean children. This finding suggests that Korean children's knowledge in the similarity of the spelling sequence in the body facilitates word reading and spelling development in Korean. These results confirm that the onset-rhyme boundary prominent in English is not universally accessible across languages (Share & Blum, 2005; Ziegler & Goswami, 2005).

Next, research on morphology in spelling is reviewed. Although the role of morphology in spelling is not a focus of this study, the relationship between morphological awareness and spelling is briefly discussed in order to provide more detailed information on spelling acquisition in general. Morphological awareness refers

to "one's conscious awareness of morphemic structure of words and their ability to reflect on and manipulate that structure" (Carlisle, 1995, p. 194). Research on morphological awareness in spelling is limited to English L1 children (Carlisle, 1995, 2003; Nunes, Bryant, & Bindman, 1997; Wolter, Wood, & D'zatko, 2009).

According to Carlisle (2003), the first signs of explicit morphological awareness appear in the elementary years, as judged by children's responses when they are asked to analyze or manipulate the morphological structure of words. For instance, children were asked to produce the correct derived form of given word in sentence (e.g., "*Produce: The play was a grand _____*" and the expected response is *production)*. Carlisle found that typically developing children, kindergarteners and first graders are in the process of mastering inflections such as tense markers and the plural –s (Carlisle, 1995).

Nunes, Bryant, and Bindman (1997) carried out a longitudinal study examining spelling acquisition. They found that children use morphological strategies in their spelling. For instance, to spell the past tense –ed correctly, in the initial stage, children spell –*ed* non-systematically, followed by frequent phonetic spellings (e.g., *kist* for *kissed*). Then, they start applying regular –*ed* endings indiscriminately to irregular verbs (e.g., *sleped* for *slept*) and non-verbs (e.g., *softed* for *soft*). Next, -*ed* endings are confined to verbs with generalization to irregular verbs (e.g., *kissed*, *sleped*). Finally children learn that there are exceptions to this rule and apply the –*ed* ending to regular past tense only (e.g., *kissed*, *slept*).

Studies also suggest that morphological awareness has been identified as a significant predictor of spelling ability (Muter & Snowling, 1997; Wolter, Wood, & D'zatko, 2009). Wolter and his colleagues examined morphological awareness' influence

on spelling ability. They conducted a single-word morphological spelling task in which they include words containing flaps and consonant clusters because spelling those words requires children's morphological awareness (Treiman et al, 1994). For instance, if children use their morphological knowledge, they might be more accurate when spelling morphologically complex words because they could use their knowledge of a root word (e.g., *dirt*) to spell a flap correctly (e.g., *t* in *dirty*). Word types include both one morpheme (e.g., *city*) and two morphemes (e.g., *dirty*). They found that children accurately spelled *t*-flap words with a *t* significantly more often when the words were morphologically complex rather than when they consisted of a single morpheme.

The importance of morphological awareness in spelling skills was also found in Korean. Kim (2010) investigated the relations between morphological awareness and spelling in Korean. She used two tasks: *comes from task* and *compound construction task* to assess children's morphological awareness. In the *comes from task*, children were asked to decide if the second word was derived from (comes from) the first word. For instance, 책상 [tʃɛk.saŋ], a *desk*, came from 책[tʃɛk], a *book*, thus the correct response was

yes and, 책상 [tʃɛk.saŋ], is composed of two morphemes, *book* and *table*. In the

compound construction task, nine scenarios were orally presented in two-or three-sentence stories. For instance, "*when a refrigerator keeps kimchi (a Korean dish) in it, then we call it kimchi refrigerator. If a refrigerator keeps a flower in it, what would we call it?*" The correct answer is *flower refrigerator*. The spelling task consisted of phonologically transparent and opaque words. Phonologically transparent words included single-morpheme words (e.g. 건물, [kʌn. mul], building) and two-morpheme words (e.g.,

눈물, [nun.mul] eye+water, tears). Phonologically opaque words consisted of two-morpheme words, because phonological opacity is created by word formation and phonologically opaque morpheme words are highly unusual in Korean. She found that morphological awareness was positively related to spelling skills in Korean.

Morphological awareness helps children with conventional spelling because employing a phonetic strategy only may not be sufficient for spelling morphologically complex words that include morphemes. For instance, appreciating that English words in irregular past tense are typically spelled –*ed* despite different grapheme-phoneme correspondence pronunciations (e.g., /d/ as in turned, /t/ as in worked, /ɪd/ as in added) helps learner spell words correctly. It seems that in order to master the orthographic rules that accompany spell skills, children need to appreciate the morphological constraints of the language.

2.5. Developmental Stages of English Spelling

Current theories of spelling development are mostly based on the research with native speaking children. According to Ehri (1989), children utilize three sources of information: knowledge of letters, knowledge of the spelling system, and lexical knowledge to spell the word. Knowledge of the system involves children's knowing about grapheme-phoneme relations and how to segment pronunciation into phonemes. Lexical knowledge includes knowing the sequence of letters in specific words, and knowing how these letters symbolize phonemes in the word. It takes some time for children to develop spelling proficiency. They must not only learn how the conventional

spelling system works in order to generate phonemically plausible spellings, but also

store lexical knowledge in order to recall the words correctly. For instance, Ehri (1989)

provided the course of spelling development through examples of spellings in each stage

(Table 6). It illustrates the spellings produced by a boy of average reading and spelling

ability during the first and second grade. Correct spellings are underlined, and the

increase of correctly spelled words is noticeable from the first to the fifth test, slowly at

first and then dramatically at the end.

Table 6

Spelling Test of 20 Words Dictated to One Student Five Times Over a Two Year Period in First and Second Grades (Correct Spellings Are Underlined) (Ehri, 1989)

Words	Test1 Grade 1.3	Test2 Grade 1.6	Test3 Grade 1.9	Test4 Grade 2.3	Test 5 Grade 2.8
rag	1	RG	<u>rag</u>	<u>rag</u>	<u>rag</u>
buzz	BP	BZ	boz	uz	<u>Buzz</u>
lid	E	LD	lad	<u>lid</u>	<u>Lid</u>
six	6	SS	sis	siks	<u>Six</u>
game		GEM	gam	gars	<u>game</u>
nice	SAT	Nis	nis	nis	<u>nice</u>
doctor	DA	DOD	did	doktdr	<u>doctor</u>
view	Y	vyou	vo	vu	<u>view</u>
yellow		yellw	yao	<u>yellow</u>	<u>yellow</u>
kiss	C	kits	kis	<u>kiss</u>	kis
camp	MP	CAP	cap	kap	<u>camp</u>
zero	O	ZW	zio	ziro	<u>zero</u>
hill		<u>Hill</u>	ole	hil	<u>hill</u>
tack	P	TAK	tac	tac	<u>tack</u>
five	5	FAV	fi	<u>five</u>	<u>five</u>
pickle	PO	PL	pal	pikl	pickel
muffin	KO	MN	mufn	mufin	muffen
wife	1	yuf	wif	wif	<u>wife</u>
job		JB	iig	<u>job</u>	<u>job</u>
quick	Ka	KWK	cwy	kwic	quice

Research on children's invented spellings has complied developmental stages of children's spellings. In general, research suggests that children move from pre-literate scribbles, to the use of phonetic strategies, through a transitional stage where visual and structural aspects become more dominant before standard spelling is firmly established. Particularly, some researchers investigated spelling developmental stages (Gentry, 1982; Bear & Templeton, 1998; Ehri, 1989): four stages in Ehri's research, five stages in Gentry's and six stages in Bear and Templeton's. Bear and Templeton (1998) provided detailed information on English spelling development. The description of spelling development of English in this section is based on the stages of Bear and Templeton (1998) and Ehri (1989).

Ehri (1989) divided spelling development into four stages: precommunicative, semiphonetic, phonetic, and morphemic or transitional stage. The course of spelling development can be illustrated with the spellings in Table 6. First, in the precommunicative stage, children may produce scribbles, or strings of randomly selected letters or numbers to represent words or sentence. A few precommunicative spellings are shown at test one in Table 6 : P (*tack*) and KO (*muffin*). Second, the semiphonetic stage begins when they learn the names or sounds of letters and use this knowledge to spell. At test one, 50% of the misspellings were semiphonetic and most included only one letter corresponding to a sound. At tests two and four, 63-79% were semiphonetic and most included two letters symbolizing sounds. Examples of this stage are BP (*buzz*) and PL (*pickle*). In this stage, children may know very few correct spellings of words. Next in the phonetic stage, children become able to produce spellings that contain letters for all of the sounds in words. In Table 6, some phonetic misspellings are evident at test two and test

three (21% to 37%). One of the most important acquisitions distinguishing the phonetic

stage from the semiphonetic stage is learning to spell vowels. Then, children move to the

morphemic or transitional stage, but Ehri does not include detailed description on

transitional stages.

Bear and Templeton (1998) divided spelling developmental stages into six and

provide more detailed information on each of the spelling stages, particularly on

transitional stages. First, in the *prephonemic spelling stage*, children's writing is usually

not linked to sound. Children may imitate writing styles they have seen in others. As seen

in Figure 9, spelling in this stage is a blend of pictures, squiggles, and known letters, and

those are not connected to the pronunciation of words and sounds within words (Bear &

Templeton, 1998). Children may produce numbers to represent words or sentences.
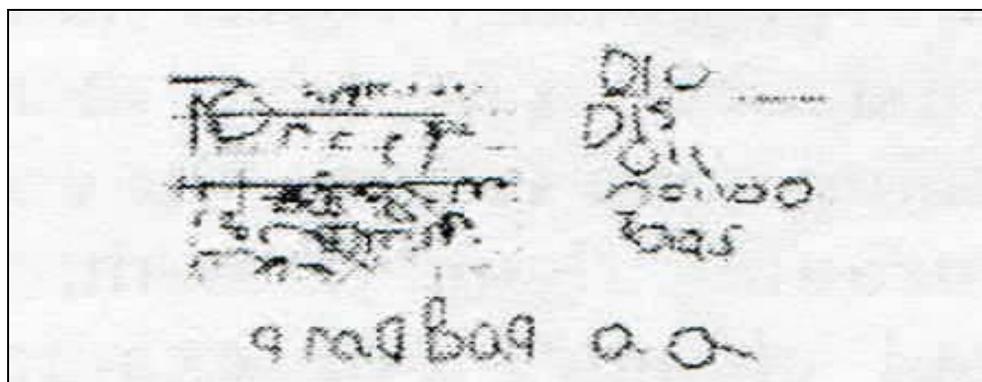
Figure 9. *Invented Spelling-Prephonemic Stage* (Bear &Templeton, 1998)

Next, in the *semiphonemic* or *early letter name spelling stage*, children use a

name of a letter to represent a beginning sound and ending sounds. Usually their writing

includes the initial consonant and final consonants. For instance, a student may spell the

word *book* with a B or BK because the name of letter B is pronounced with a /b/ sound at the beginning and K is pronounced with a /k/ sound at the end. The writing of this early stage is brief and often difficult to read because of the sounds that are not represented in their writing. Children in this semiphonemic stage concentrate on spelling consonants and vowels are usually omitted.

Third, in the *letter name spelling stage*, children extend and elaborate on the alphabetic principle and the use of sound and articulation to spell by adding short vowels to their spelling. For example, at first, children may spell N or NT and then NAT for *net*. In this stage, children understand that a basic syllabic structure is the consonant-vowel-consonant pattern (CVC). However, children still make mistakes in long vowels. Usually long vowels are represented with one letter whose name is the same as the vowel sound. For example, *float* may be spelled FOT or *rain* as RAN. Although children's letter choices may violate spelling conventions, they are nevertheless logical and indicate that the children are attempting to use what they know about letters to figure out how the spelling system works. Children in this stage build a sight vocabulary of known words that include single syllable short vowel patterns and include more consonant blends and diagraphs in their spelling. Sight words are words that readers have read accurately a few times; therefore, all words become sight words once they have been read several times (Ehri, 1995).

Fourth, in the *within-word pattern spelling stage*, children have moved away from a strict one letter-one sound expectation, and start manipulating more complex letter patterns. Children try to spell long vowel patterns. For instance, SEET for *seat*, ROAP for

rope, and CRIE for *cry* reveal that children experiment with long vowel patterns. They also learn to spell most consonant blends and diagraphs conventionally.

Fifth, in the *syllable juncture spelling stage*, children explores polysyllabic words by examining what happens when simple inflectional endings such as –ed and –ing are added to single syllable words as in hop + -ing (hopping) vs. hope + -ing (hoping). When students understand when to double a consonant, when to drop an *e*, and when to leave matters alone, they have the potential to apply this knowledge to a wide range of polysyllable words. Children's spelling patterns of two syllable words are such as the following:

- they are not doubling when they need to (e.g., ATEND for *attend*), or they are doubling when they don't need to (e.g., CONFUSSION for *confusion*)
- they are misspelling syllables that receive less accent or stress (e.g., Y for -*ey* as in HOCKY for *hockey*)
- they are spelling certain sounds at the juncture of syllables as the sounds would be spelled in single-syllable words (e.g., CHUR for -*ture* as in CAPCHUR for *capture*)

(Bear & Templeton, 1998, p. 228)

In the final stage, the *derivational constancy spelling stage*, students' spelling reflects "the fact that words that are derived from a common base word or word root usually keep the spelling of the base or root constant" (Bear & Templeton, 1998, p. 228). At the derivational constancy stage, students spell most words correctly and fully

appreciate how the spelling-meaning connection operates in the language. Hallmarks of student's misspellings include the following (Bear & Templeton, 1998, p. 228):

- unaccented or "schwa" sounds are misspelled (e.g., OPPISITION for *opposition* and BEFAFIT for *benefit*)
- some consonants are omitted (e.g., SOLEM for *solemn*)
- some suffixes are misspelled (e.g., APPEARENCE for *appearance*)

2.6. L1 Transfer in L2 Spelling

Children learning English as L2 need to acquire phonological knowledge of the target language, which in turn helps build accurate and specific phonological representations. Studies on children's spelling on English L2 languages concern the influence of the ESL learner's first language on the English L2 spelling development because linguistic differences of two languages negatively affect SLA. This section reviews how L1 phonological, orthographic, and phonology-orthography mapping structures transfer to L2 spelling acquisition.

Most L2 researchers agree that language learners' native language influences some aspects of second language acquisition, a process known as L1 transfer (Gass & Selinker, 1994; Odlin, 1989; Schwartz, 1998). The interference of the L1 system with the L2 system is the principal barrier to second language acquisition. This view of SLA argues that second language learning basically involves the overcoming of the differences between the two linguistic systems, and a scientific and structural analysis of differences

of the two languages would enable the linguist to predict the difficulty a learner would encounter while learning a second language. Lado (1964) proposed contrastive analysis hypothesis (CAH) that language learners' learning problems can be predicted by comparing the linguistic structures of their L1and target language. For instance, in English, there are two distinctive phonemes such as /d/ and /ð/ as in *do* and *then*, which are phonetically similar. However in Spanish, these two sounds are not separate phonemes but are variants of only one phoneme. The phoneme /d/ has a stop variant initially before vowels and a fricative variant, resembling the English /ð/ between vowels. Because of this difference, Spanish learners of English tend to have difficulty distinguishing two sounds. Regarding grammar, Corder (1971) points out that learner's L2 production involving grammatical errors represents linguistic differences between L1 and L2. For instance, a learner's sentence, *I am told, there is bus stops,* shows how the learner's use of articles differs from that of English, leading to the assumption that the learner's L1 grammar lacks articles. Korean learners of English might make more mistakes in subject-verb agreement which does not exist in Korean. For instance, a learner's sentence, *many dogs is barking,* shows that Korean grammar lacks subject-verb agreement.

According to CAH, the differences between L1 and L2 linguistic structures interfere with L2 acquisition: cross-linguistic influence (CLI). CLI also recognizes the fact that interference does exist and the influence of the native language as prior experience must not be overlooked. CAH also stressed the interferring effects of the first language on second language learning which is commonly referred to as interlanguage - the influence of the first language on the development of ESL (e.g., Genesee, Paradis, &

Crago, 2004; Major, 2001). L1 transfer has also been defined as the effect of knowledge that was learned during the development of first language skills on learning or performance in a second language (Figueredo, 2006). L1 transfer is further characterized in two situations: positive L1 transfer and negative L1 transfer. For instance, instances where commonalities exist between L1 and L2, transfer of L1 knowledge may facilitate developing proficiency in second language skills (positive L1 transfer), whereas instance where English-specific knowledge is required and has yet to be learned, negative L1 transfer could be evidenced by L1 knowledge being inappropriately applied to the second language (Figueredo, 2006).

Given that language and literacy skills can be transferred from one language to another, L1 transfer has been observed in areas of L2 spelling acquisition. In the following detailed review, the development of ESL spelling skills is focused on the difference of the surface structure of languages. English L2 spelling research has been done in a few languages focusing on the difference of L1 and English. Particularly, a number of studies on Spanish ESL learners have been conducted (Bebout, 1985; Cronnell, 1985; Fashola et al., 1996; Francisco, Carlo, August, & Snow, 2006; Sun-Alperin & Wang, 2008), and some other languages such as Arabic L1 learners of English (Ibrahim, 1978) and Chinese ESL learners (Wang & Geva, 2003a, 2003b) were also studied.

In general, spelling errors seem to occur when there are incongruent phonemes between L1 and English L2. When English L2 learners replace the English phoneme that does not exist in L1 with the other phonemes that exist in their L1, the error occurred (Ibrahim, 1978; Bebout, 1985; Cook, 1997; Fashola et al., 1996; Wang & Geva, 2003a). Ibrahim (1978) collected undergraduate student's written works (examinations,

homework assignments, papers, reports), and found that the difference between two sound systems (English vs. Arabic) affected Arabic students' English L2 spelling. For instance, students replaced the phoneme /p/ with the phoneme /b/ because Arabic does not have /p/. Spelling errors such as the following are fairly frequent in Arabic; *bicture* (picture), *compination* (combination), *distripution* (distribution), *clup* (club), *hapit* (habit), and *pit* (bit). Arabic students also made errors in consonant clusters because many Arabic dialects do not permit final consonant clusters in the coda position. They also tend to insert a vowel before the last consonant (e.g., *communisem* for communism).

Similar results were also found in the Chinese learners of English. Wang and Geva's (2003a) study is of particular interest. Involving English learning Cantonese-speaking children (L2) and English speaking (L1) children, they conducted a two-year longitudinal study comparing the spelling development of two English phonemes (/ʃ/ and /θ/). In the developmental spelling test, children listened to each word by itself first, then the target word was repeated again in a sentence, and then it was repeated again by itself. The test consisted of 16 simple and highly frequent words. The word list was constructed on the basis of phonological, orthographic, and morphological considerations such as the making of plural forms (e.g., cats), tense forms (e.g., wanted), and certain phonological patterns such as long vowels (e.g., please) and two contrastive phonological elements /ʃ/ and /θ/ in the digraph <sh> and <th> (e.g., *ship*, *teeth* and *thick*). They found that the pattern of spelling development was similar between Cantonese-speaking ESL and English monolingual groups. That is, Cantonese-speaking children's English spelling development generally followed the same trajectory as that of English monolingual children over a two-year period. Towards the end of grade two, both groups were spelling

most words at the same developmental level; for example, all phonemes were presented.

However, in the initial stage, spelling errors of the Chinese ESL children reflected

difficulty in representing phonemes that do not exist in Cantonese phonology (e.g., /ʃ/

and /θ/) suggesting that L1 phonological transfer interferes with L2 spelling acquisition.

Error analysis indicates that the Chinese ESL children had more phonologically

imprecise representations in spelling these two phonemes than their L1 counterparts, and

the dominant error for this phoneme was the use of <s> for <sh> and <s> or <z> for

<th>.

Bebout (1985) presented a fill-in-the-blank task to both English speaking children

and Spanish speaking adults studying English. The task was to supply words for blanks in

sentences so that the sentence made sense. For instance, some of the sentences strongly

suggested particular responses (e.g., *batteries*, in "Your flashlight won't work if you

forget to put_____ in it"). She classified about 700 errors, collected from both English

speaking children and Spanish-speaking adults, into eight categories as follows:

Category 1: Consonant doubling error; the two major logical types of consonant-

doubling errors: failure to double (*batery* for battery) and unnecessary

doubling (*dinning* for dining)

Category 2: Other consonant errors; all consonant errors except for doubling:

single letter replacement (*insident* for incident), part of cluster

retained (*decend* for descend), letter added to a correct consonant

(*breack* for break), silent letter omitted (*hansome* for handsome),

other letter omitted (*audiece* for audience), and letter added from

elsewhere in same word (*corlered* for colored).

Category 3: Errors involving schwa; the misspelling of the unstressed mid-central

vowel (the <a> in terrace) and schwa preceding /r/ (the <o> in visitor)

Category4: Errors involving "silent <e>; the omission involving an affix (*turnd*

for turned) and not involving one (*plat* for plate)

Category5: Other vowel errors; all vowel errors not covered by the category 3 and

category 4.

Category6: Letter misordering; most of the items could be classified as involving

an <l> and <r> or another consonant plus a vowel.

Category7: Unclassifiable items; more than four different errors (*guarnabe* for

grenade) and errors which did not fit into any of other categories. This

category also include syllables added or omitted from some words

(*tirered* for tired and *fatting* for fattening)

Category8: Homophones; mostly the whole-word homophones (*brake* for break

and *where* for wear) and a few morphemic homophones (*loansome* for

lonesome) were included

(Bebout, 1985, p. 576-578)

She found that both groups were similar in that they both made proportionally more

vowel errors than consonant errors. This result is not surprising because grapheme

phoneme correspondence patterns of the English language are less consistent in vowels

than consonants. In addition to vowel errors, Bebout also found that Spanish-speaking

adults made more errors involving consonant doubling. It seems in Spanish, the three doubled consonant patterns (<rr>, <ll>, and <cc>) are very distinct from their single-consonant counterparts, and because consonant doubling is rare in the Spanish language, they pay less attention to the presence or absence of doubled consonants when writing.

Fashola and his colleagues (1996) investigated the English spelling errors of Spanish speaking children on the basis of phoneme difference between two languages. In this study, 38 students who speak Spanish at home and 34 students who speak English at home listened to a list of 40 common English words and wrote down each word one at a time. Children's predicted and nonpredicted errors were analyzed in both English-speaking children and Spanish-speaking children. Predicted errors were errors that were caused by applying Spanish phonological and orthographical rules to English words. For example, a Spanish-speaking child might spell the English word *soccer* as *soker* in which <cc> can be replaced with <k> in Spanish phonology. They found that Spanish children committed more predicted errors than the English speaking children, which represents Spanish children applying their L1 spelling rules to the English words. However, it was hard to assume that the errors were made due to an influence of Spanish orthography since they did not provide information on the Spanish-speaking children's prior literacy experience in Spanish. To compensate for this issue, Sun-Alperin and Wang (2008) conducted a study after carefully recruiting children who attended school in a Spanish-speaking country prior to their arrival in the United States in which they also reiterate Spanish L1 influence on English L2 spelling.

Sun-Alperin and Wang (2008) recruited 26 native Spanish-speaking and 53 native English-speaking children in grades two and three and examined their spelling

errors. They conducted a real-word spelling task and pseudoword spelling task. In the real-word task, a native English female read the target word, used it in a sentence, and read the word again. For example, "meet… I'll meet you on the play ground…meet." In the pseudoword task, a native female also read the target word twice and children had approximately ten seconds to write the word. In this experiment, they found that, in pseudoword spelling task, native Spanish-speaking children committed significantly more vowel spelling errors that were consistent with Spanish orthography. That is, error types were more phonologically legitimate in Spanish (e.g., *mit* for meat and *mun* for moon), which suggests that orthographic properties of Spanish L1 influence children learning to spell in English L2. This result also supports the idea that different levels of orthographic transparency influence spelling development in English L2. Learners of transparent Spanish orthography rules had difficulty spelling English vowel sounds which have indirect phoneme-to-grapheme correspondence.

2.7. Theoretical Framework and Research Questions

The insights gained from the above literature review can be summarized as follows:

(1) Written scripts represent spoken language, and different languages employ different systems to encode spoken language (phonology) onto written scripts (orthography).

(2) Spelling acquisition requires awareness of and knowledge in orthography, phonology, and orthography-phonology (letter-sound) mapping (i.e., orthographic depth).

(3) Languages vary in terms of their orthography, phonology, and orthography-phonology (letter-sound) mapping.

(4) Experience in processing L1 orthography, phonology, and orthography-phonology (letter-sound) mapping transfers to L2 processing, which in turn influences L2 spelling acquisition.

Despite growing interest in L2 spelling acquisition, the importance of spelling skill has not received much attention from SLA researchers. There are enough findings in L1 spelling acquisition that help us develop theories and identify development of spelling skills (Bear, 1998; Ehri, 2000; Treiman, 1995; Kessler and Treiman,1997), yet a lack of L2 findings makes it difficult for theory building; thus very little direct impact has been made on L2 spelling instruction. Current L2 spelling research has investigated Spanish learners of English (Bebout, 1985; Cronnell, 1985; Fashola et al., 1996; Rolla San Francisco et al., 2006; Sun-Alperin & Wang, 2008), Arabic learners of English (Ibrahim, 1978), and Chinese ESL learners (Wang & Geva, 2003a; 2003b). The overall goal of this dissertation was to extend the documentation of L2 spelling research by investigating performance of Korean L1 learners of English, the L1 group who has never been investigated in this area of research. The following research questions were posed:

(1) Are Korean L1 learners of English able to accurately spell English words that include phonemes that do not exist in Korean? Does their spelling accuracy differ depending on the position (word-final or word-initial) of the phonemes in the words? If they make errors in spelling the words, what types of errors do they tend to make?

(2) Are Korean L1 learners of English able to accurately spell English words that include phonemes that have multiple correspondences with different letters? If they make errors in spelling the words, what type of errors do they tend to make?

Given that Korean phonemes are different from English phonemes, for the first research question, it was predicated that Korean L1 children would have difficulty in spelling English sounds that correspond with phonemes that are absent in Korean. When spelling, sound information (phoneme) is encoded onto written scripts (orthography). Due to L1 transfer, a lack of strong and accurate phonological representations of unfamiliar English phonemes makes it more difficult for Korean L1 English learners to spell English words which include phonemes that are absent in Korean. English L2 spelling research has reported that there is a negative transfer in which ESL children used the closest phoneme from their L1 to spell the letters whose corresponding phonemes do not exist in their L1. For instance, Chinese ESL children had difficulty spelling a digraph <th>, which corresponds to /θ/, because spelling the letter sequence requires them to form a new phonological representation of sound /θ/ (Wang & Giva, 2003a). It is hypothesized that Korean L1 learners of English also have difficulty in spelling English letters that correspond with phonemes that are absent in Korean. For example, there are voiceless

stops (e.g., /p/, /t/, /k/) in both English and Korean, whereas Korean does not have a labio-dental fricative (/f/ and /v/), which can cause difficulty for Korean L1 learners of English in spelling the words containing those phonemes. The first research question investigated whether Korean L1 learners of English were able to accurately spell English words that include phonemes that do not exist in Korean.

Knowing that Korean has more transparent grapheme-phoneme (orthography-phonology) correspondences than English, for the second research question, it was predicted that Korean L1 learners of English would have difficulty in spelling English words that contain phonemes that correspond to multiple letters. Research suggests that different degree of correspondence between letters and sounds influence L2 spelling acquisition (Sun-Alperin & Wang, 2008). For instance, Spanish L1 learners had difficulty in spelling English vowel sounds (e.g., *mit* for meat and *mun* for moon). Spanish has more transparent grapheme-phoneme correspondences than English, which is presumably the reason for the difficulty in spelling English vowel sounds that have less transparent grapheme-phoneme correspondences. Therefore, learners whose L1 is more transparent in grapheme-phoneme transfer their L1 orthographic processing skills to L2 spelling.

Similarly, Korean also has more transparent or consistent grapheme-phoneme correspondences than English. Particularly, in English, mapping of vowel sounds to letters is more inconsistent than that of consonant sounds to letters (Kessler & Treiman, 2001). There is also research suggesting that English speaking children make more mistakes in spelling vowels compared to consonants (Treiman, 1993; Varnhagen, Boechler, & Steffler, 1999). For example, the vowel sound /i/ is represented with letters such as <e> (be), <ea> (meat), <ee> (free), <y> (silly), <ie> (niece), <ei> (deceive), <i>

(machine), <eo> (people), <ey> (key), and <oe> (amoeba) (Yavas, 2011). However, in Korean, the vowel sound /i/ is represented with < i> (ㅣ) only. Based on this difference, it is hypothesized that Korean L1 learners' experience processing more transparent orthography transfers to English L2 spelling, which leads to increased difficulty in spelling English words that include phonemes that have multiple correspondences with different letters.

The research questions were tested in a study with a 2 x 2 factorial design with "group" and "word type" as independent variables. Group was a between-participant factor and word type was a within-participant factor. The groups consisted of two L1 groups: Korean and English. The English group served as a control group. For research question one, word type included two contrasting types: congruent and incongruent. The congruent type included words whose phonological property and corresponding orthography exist in both languages, and the incongruent type included words whose phonological property and corresponding orthography exist in English but not in Korean. For research question two, word type included two contrasting types: more consistent and less consistent. The more consistent type includes words whose grapheme-phoneme correspondence is more consistent, and the less consistent type includes words whose grapheme-phoneme correspondence is less consistent. The following section details the method of the experiment.

CHAPTER 3

METHODS

3.1. Participants

Thirty native English speaking children and 36 native Korean speaking children who are learning English as a foreign language participated in this experiment. The English group was recruited from three private schools located in Muncie, IN (14, 10, and 12 students from each school). The Korean group was recruited from a public elementary school in the urban area of Metropolitan Gwangju, South Korea. The researcher contacted the principals of each school in Muncie, IN and the research assistant contacted the principal at the school in Korea. The principals of each school gave permission to collect data from their students.

Several points were considered in participant selection. All participants had received formal education in their L1 through third grade which ensured that they were phonologically developed in their L1. The teacher reported that all participants in each group can read and write in their L1. The children in this study came predominantly from middle class families and the children's parents had received university level education and regarded education as important to their children's scholastic development.

One of the considerations concerning the Korean group is to ensure that their awareness of English L2 phonology is developing because Korean L1 participants at least need to know how to write the English alphabet to map English letters to sound. To ensure this literacy skills in English L2, an English vocabulary test was administered in addition to teacher's rating on students four basic language skills (reading, writing, listening, and speaking) in English (see Appendix G). Vocabulary list consisted of words from the *Woodcock Reading Mastery Tests-Revised* (WRMT-R) (Woodcock, 1987). The selection criterion for the stimulus was the appropriateness for the current participants' literacy proficiency. The 17 real words were selected from the items suggested for grades two through three. A native speaker of English pronounced the words, and the pronunciations were recorded by a digital voice recorder. The test was administered to both groups. For the Korean group, children listened to an audio recorded pronunciation of each word and wrote down the meaning of the word as well. The mean scores of the vocabulary test of the English group was shown 16 ($SD = 1.23$) (max. 17). The mean scores of the vocabulary test of the Korean group was shown 8.7 ($SD = 2.52$).

Table 7

Korean group's Demographic Information and English Learning

Gender		Age Started Learning English				Studying English after School		Time of Studying English (Minutes/Day)
Boy	Girl	Pre-kinder	Grade1	Grade2	Grade3	Private institute	Private tutor	
19	17	5	15	3	13	31	5	53.3M
(53%)	(47%)	(13.9%)	(41.7%)	(8.3%)	(36.1%)	(86.1%)	(13.9%)	(SD=25.96)

Parents of Korean children were asked to fill out a short questionnaire concerning the importance of English learning as a second language in Korea and how their children learn English outside of the class. Table 7 summarizes the results. Compulsory English education in Korea starts at the third grade, but as seen, many participants started learning English before third grade: 13.9% in preschool or kindergarten, 41% in grade one and 8.3% in grade two. All participants were also learning English at private institutes (*hagwon*) after school, and the average study time of English after school was 53.5 minutes a day.

In Korea, English education is usually perceived as the most important factor to succeed in a future career. The Korean government believes that communicative competence in English education needs to be emphasized in order for an individual to become a member in the global society. With this goal in mind, the Korean government introduced English education to elementary school students from the third grade to the sixth grade as a compulsory subject under the Seventh Curriculum Reform in 1997 (Korean Ministry of Education, 1997). Since then, in addition to receiving English education in the public school system, Korean parents spend a large portion of their income on their children's extracurricular lessons, such as private school tuition (*hagwon*), private tutoring (*kwaoe*), English camps (*yeongeocamp*), and even language training abroad (*haewoeyonsu*). The cost of English education has increased tremendously since 2000 ($10 billion in 2000 and $15 billion in 2005) (Cho, 2006).

3.2. Materials and Task

Following a task used in previous L2 spelling research (Wang & Geva, 2003a, Sun-Alperin &Wang, 2008), a pseudoword spelling task was used in this study. In pseudoword spelling task, participants listen to the pseudowords and write them down on the sheet. Pseudowords are pronounceable combinations of letters that do not include semantic meaning but which can be decoded and pronounced via phonological processing and alphabetic (letter-sound) knowledge (Frederickson, Frith, & Reason, 1997). One set of material was created for each research question, and for each research question, a list of pseudowords (nonwords) was created. The reason for using pseudowords was to avoid the effect of lexical knowledge on spelling performance. For instance, students can spell familiar real words by sight word memory without converting phonemes to letters.

For the first research question, twenty-four monosyllabic pseudowords were created. Each pseudoword item includes target phonemes which do not exist in Korean (/f/ and /v/ for the incongruent consonants) and phonemes which exist in both languages (/m/ and /n/ as the congruent consonants). Twelve items for the incongruent consonants (/f/ and /v/) and twelve for the congruent consonants (/m/ and /n/) were created. Phonemes present in both English and Korean (/m/, /n/, /p/, /s/, /i/ /u/ /ɛ/) except for the target consonants of /f/ and /v/, were used to create pseudowords. Each target consonant was placed into either syllable initial only (e.g., [fɛp] and [mup]) or syllable final only (e.g., [sif] and [sɛm]), but not placed in syllable initial and syllable final simultaneously (e.g., [fiv], [fif], [fim], and [mɛf]). Each pseudoword was created by changing only one

phoneme of a real word. For instance, the pseudoword *feace* [*fis*]*,* targeting consonant /f/, is based on the real word *peace* [*pis*] (see Appendix A).

For the second research question, ten monosyllabic pseudowords were created: five for the less transparent vowel /i/ and five for the more transparent vowel /ɑ/. The vowel sound /i/ is considered less transparent because it can be mapped onto ten types of graphemes such as <e> (be), <ea> (meat), <ee> (free), <y> (silly), <ie> (niece), <ei> (deceive), <i> (machine), <eo> (people), <ey> (key), or <oe> (amoeba). In contrast, the vowel sound /ɑ/ is considered more transparent because it can be mapped onto five types of grapheme such as <ea> (heart), <o> (hot), <a> (father), <ow> (knowledge), or <e> (sergent) (Yavas, 2011). As in the research question 1 pseudowords, pseudowords were created by changing only one phoneme of real words. For instance, pseudoword *keam* [*kim*], targeting the phoneme /i/, is based on the real word *beam* [*bim*]. Except for the target vowels, phonemes present in both English and Korean (/n/, /m/, /p/, /t/, /k/, /w/) were also used to create pseudowords (see Appendix C). When the two sets of materials were finalized, a native speaker of English who had a Master's degree in Linguistics and TESOL pronounced the pseudowords spelled in phonetic symbols, and they were recorded by a digital voice recorder.

3.3. Procedure

The pseudoword spelling task was administered to the Korean group by a research assistant in February 2010. The research assistant was a teacher at the school. Before administering the task, the researcher provided training to the assistant. The researcher first explained the purpose of the study and the task procedure to the assistant. After that,

the researcher gave a sample session to the research assistant to ensure the research

assistant was aware of the task procedure. The task for the English group was

administered by the researcher in February 2010. The task was administered during class

time but it was not a part of the regular lesson. Before the task, the classroom teacher

explained the purpose of the task, and the primary researcher administered the task.

     For both lists of pseudowords (research question one and research question two),

the groups listened to the recorded pronunciation of each pseudoword twice with ten

second intervals between each word, and they wrote down the pseudowords on the sheet.

It took about ten minutes for the children to complete each list. A sheet and pencil were

provided for each child, and the children were not allowed to put anything but the sheet

and pencil on the desk to avoid distraction. The children were encouraged to write down

as many pseudowords as they could.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1. Data Analysis Procedure

Multiple letter-sound correspondences can be possible in English spelling because English orthography is relatively opaque. Thus, in order to assess the accuracy of spelling in a more appropriate manner, five native speakers of English studying Linguistics and TESOL listened to the same list of pseudowords, and their answers were used to determine whether the participants' responses were correct. For instance, the phoneme /f/ can be written with <f>, <ff>, <gh>, and <ph> (Yavas, 2008), but the native speakers' answers for each item targeting /f/ do not include <ff> and <gh>. In this case, those were not counted as the correct answer.

In the material for research question one (test on consonant spelling), participants' spellings of the target consonants that are absent in Korean (/f/ and /v/) were the main concern. The target phoneme /f/ was spelled with <f> or <ph>, and the target phoneme /v/ was spelled with <v> or <ve>. The possible answers for each pseudoword are shown in Table 8.

Table 8

Pseudowords and Possible Answers for the Test on Consonant Spelling

	(RW) /PW/ - Possible Answers		(RW) /PW/ - Possible Answers
1	[fis]- fiece, feese, fees	13	[suf]- soof, sooph, souf, souph
2	[pɛv] - pev	14	[suv] - soov, soove, souve
3	[fɛp] - fep	15	[sif] - seef, sif, ceef
4	[mis] - mees, meece, meese	16	[vis] - veece, vis, veese, vease
5	[nip] - neep, kneep	17	[mup] - moop, mupe, moup
6	[siv] - sieve, seev, seeve, sive	18	[pɛf] - pef
7	[pim] - peem, peeme	19	[sɛm] - sem, sim
8	[vup] - voop, voup, vupe	20	[vɛp] - vep
9	[pun] - poon, pune, poune	21	[sɛn] - sen
10	[sum] - soom	22	[fup] - foop, fupe, phoop
11	[nɛp] - nep, knep, nepp	23	[nus]- noose, nuse, nous
12	[sin] - sceene, scean, sein	24	[mɛp] - mep

*RW-read word   *PW-pseudoword

In the material for research question two (test on vowel spelling), several answers were also possible. For instance, the phoneme /i/ could be written with the letters <e>, <ea>, <ee>, <y>, <ie>, <ei>, <i>, <eo>, <ey>, or <oe> and the phoneme /ɑ/ with <ea>, <o>, <a>, <ow>, or <e>. However, the possible answers obtained from the native speakers' were limited to two for each target phoneme: *-ea-* and *-ee-* for /i/, and *-o-* and *-a-* for /ɑ/. The possible correct answers for each pseudoword are shown in Table 9.

Table 9

Pseudowords and Possible Answers for the Test on Vowel Spelling

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(RW) /PW/ - Possible Answers (Vowels Only)

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1   [nɑp]: -o-

2   [tik]: -ea-, - ee-

3   [mɑt]: -o-

4   [kim]: -ea-, -ee-

5   [nik]: -ea-, -ee-

6   [tɑk]: -o-, -a-

7   [wit]: -ee-, -ea-

8   [kɑm]: -o-, -a-

9   [mip]: -ee-, -ea-

10   [wɑk]: -o-, -a-

---

*RW-read word   *PW-pseudoword

A coding scheme was adapted for scoring the task to reflect word spelling performance more precisely. Following the procedure used in Treiman, Berch, and Weatherston (1993), the spelling the children produced were scored as either correct or incorrect according to the native speakers' answers. A second coder, a graduate student majoring in applied linguistics, analyzed 20 % of the data, and the interrater reliability was above 90 %. Therefore, the first coder analyzed the rest of the data.

The task material on the consonant spelling consists of two types of pseudowords: the consonants that exist in both English and Korean (congruent type) and the consonants that do not exist in Korean but exist English (incongruent type). To address students' spelling accuracy in the word initial and word final positions, the target phonemes were placed in either syllable initial or syllable final, and only consonants (syllable initial and syllable final) were considered to score points. For the initial consonant, when participants spell only one letter (consonant as in *p _ _* for [*pim*]), or consonant and vowel (e.g., *s i _* for [*siv*]) in order, it was considered as the initial consonant. For the final consonant, when the participants spelled vowel and following consonant (e.g., *_ i s* for [*vis*]), it was counted as the final consonant. When the participants spell two consonants without a vowel between them (e.g.,*m_p* for [*mɛp*]), the first was counted as initial <m> and the second as final <p>. Participants received two points for items answered correctly, one point for items misspelled by one letter, and zero points for items misspelled by both consonants.

In the material on the vowel spelling, only vowels were scored. Participants received one point for items answered correctly (*not* for [nɑp]) and zero points for items either misspelled (e.g., *mut* for [mɑt]) or skipped ([t_ _] for [tik]). In general, the

phoneme /ɑ/ can be mapped onto either grapheme <a> or <o> in monosyllabic words, but the phoneme /ɑ/ in item 1 and item 3 in the test can be mapped onto grapheme <o> only, not onto grapheme <a> (see Table 9). Thus, the spelled letter <a> for item 1 and item 3 was considered an error. The correctness of consonants of syllable initial and syllable final was not considered because consonants were not a main concern in the vowel spelling test.

4.2. Results

4.2.1. Research Question One

For the first research question, a consonant spelling test was conducted in order to investigate whether the Korean group was able to spell incongruent types of pseudowords. The incongruent types included pseudowords whose phonological property and corresponding orthography exist in English but not in Korean. Word types also included congruent pseudowords whose phonological property and corresponding orthography exist in both English and Korean for comparison purposes. Figure 10 summaries the mean scores of each group. The mean scores of the Korean group was 10.75 (*SD* = 4.47) for the incongruent pseudowords (spelling /f/ and /v/) and 15.13 (*SD* = 4.01) for the congruent pseudowords (spelling /m/ and /n/). The mean scores of the English group was 18.46 (max score 24) (*SD* = 2.92) for the incongruent pseudowords (spelling /f/ and /v/) and 20.16 (*SD* = 2.30) for the congruent pseudowords (spelling /m/ and /n/).
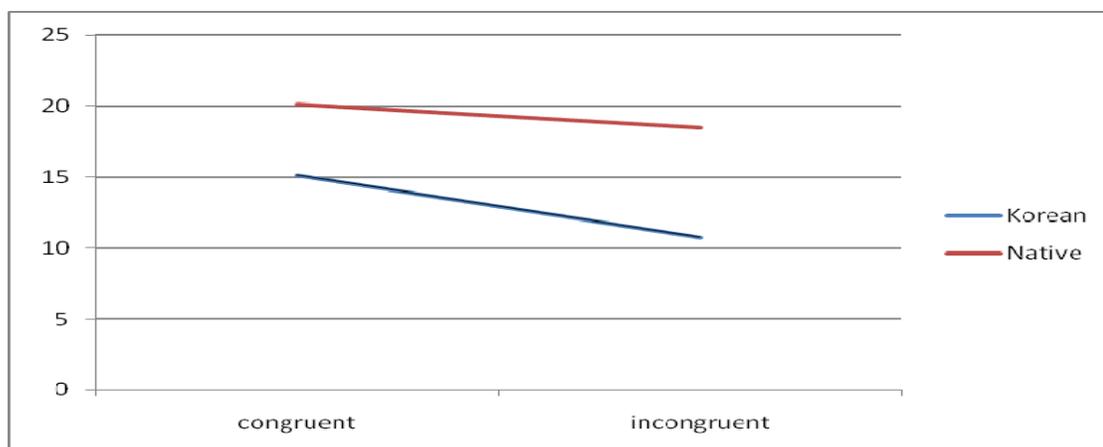
Figure 10. *The Comparison of Mean Scores of the English Group and the Korean*

Group

A two-way analysis of variance (ANOVA) was performed with language

background (English vs. Korean) as the between-participant factor, and word type

(incongruent vs. congruent) as the within-participant factor. The main effect for language

background was significant, F (1, 64) = 58.685, MSE = 1,328.898, $p < .0001$, η_p^2 = .478,

indicating that the Korean group made more errors than the English group. The main

effect for word type was also significant F (1, 64) = 89.288, MSE = 303.337, $p < .0001$,

η_p^2 = .582, indicating that the participants made more errors in the incongruent

pseudowords than the congruent pseudowords. The interaction between L1 groups and

word types was also significant F (1, 64) = 17.412, MSE = 59.156, $p < .0001$, η_p^2 = .214,

indicating that the Korean group made more errors in the incongruent pseudowords than

the English group.

Figure 11 illustrates summaries of mean scores and standard deviation of syllable

initial (SI) consonant and syllable final (SF) consonant for each language group (max

score 12). The mean scores of the English group was 8.9 (SD = 2.0) for the syllable initial

consonant, and 8.8 (*SD* = 1.6) for the syllable final consonant. The mean scores of the

Korean group was 4.9 (*SD* = 2.7) for the syllable initial consonant, and 6.0 (*SD* = 2.1) for

the syllable final consonant.
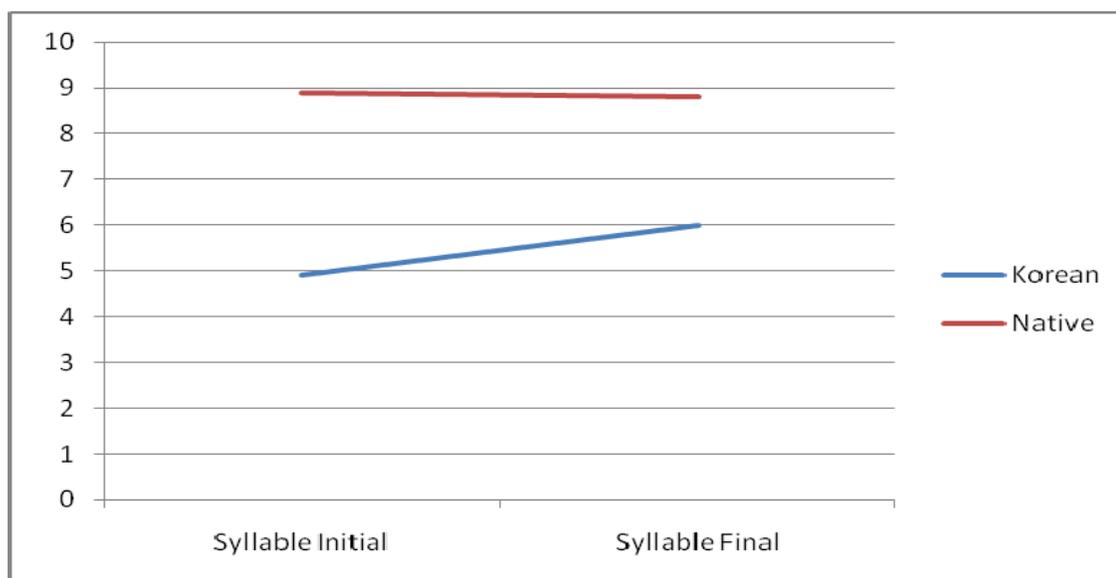
Figure 11. *The Comparison of Mean Scores: Syllable Initial and Syllable Final*

A two-way analysis of variance (ANOVA) was performed with language

background (English vs. Korean) as the between-participants factor, and syllable position

(syllable initial vs. syllable final) as the within-participant factor. The main effect for

language background was significant, F (1, 64) = 58.054, *MSE* = 389.536, $p < .0001$, η_p^2

= .476, indicating that the Korean group score is lower than the English group. The main

effect for syllable position was not significant F (1, 64) = 2.057, *MSE* = 5.989, $p > .05$,

indicating that there is no difference in mean scores in syllable initial and syllable final.

However, the interaction between L1 groups and syllable positions was significant F (1,

64) = 4.430, *MSE* = 12.898, *p* < .05, η_p^2 = .065, indicating that the difference of mean scores between the syllable initial and the syllable final in the Korean group is much larger than that of the English group.

Descriptive analysis of error types of the Korean group was also a major focus of the first research question. The Korean group's errors were categorized into letters they misspelled. Figure 12 illustrates the percentage of misspelling for the target phoneme /f/: letter <p> was 36.1%, letter <s> was 25.9%, and letter <t> was 9.3%. The data shows that Korean L1 group misspelled the target phoneme /f/ with either <p>, <s>, or <t> (more than 70%). Figure 13 also shows the percentage of misspelling for the target phoneme /v/: letter <b> was 34.5%, letter <d> was 11.1%, and letter <t> was 5.8%. The data indicates that Korean L1 group misspelled the target phoneme /v/ with either <b>, <d>, or <t> (more than 50%).

Figure 12. *Korean Participants' Misspelling of the Phoneme /f/*   *om:omission

Figure 13. *Korean Participants' Misspelling of the Phoneme /v/*   *om:omission

4.2.2. Research Question Two

For the second research question, a vowel spelling test was conducted in order to

investigate whether Korean L1 learners of English were able to spell pseudowords that

include multiple grapheme-phoneme correspondence. The pseudowords included two

types: more consistent grapheme-phoneme correspondence (/ɑ/) and less consistent

grapheme-phoneme correspondence (/i/). Figure 14 summarizes both group's mean

accuracy for each pseudoword type (max score 5). The mean scores of the English group

was 4.03 (*SD* = 1.49) for the less consistent type includes the phoneme /i/ and 4.16 (*SD* =

0.74) for the more consistent type includes the phoneme /ɑ/. The mean scores of the

Korean group was 1.30 (*SD* = 1.48) for the less consistent type and 2.50 (*SD* = 1.25) for

the more consistent type.
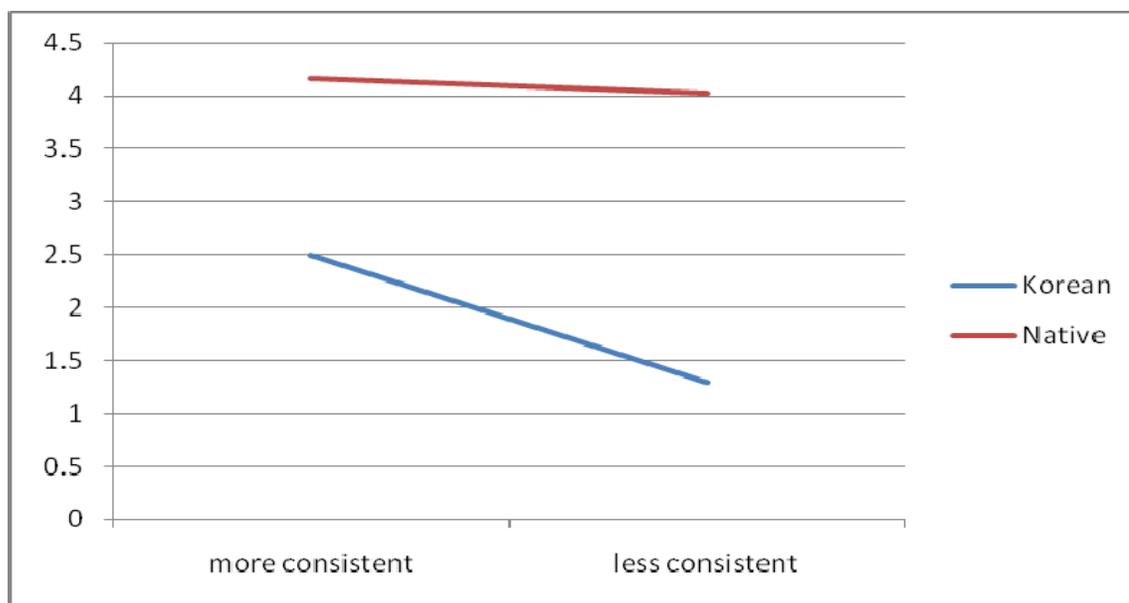
Figure 14. *The Comparison of Mean Scores of Native Group and Korean Group*

A two-way analysis of variance (ANOVA) was performed with language background (English vs. Korean) as the between-participant factor and word type (less consistent vs. more consistent) as the within-participant factor. The main effect for language background was significant, F (1, 64) = 84.819, MSE = 158.000, $p < .0001$, η_p^2 = .570, indicating that the Korean group made more errors than the English group. The main effect for word type was also significant F (1, 64) = 9.764, MSE = 14.424, $p < .003$, η_p^2 = .132, indicating that the participants made more errors in the less consistent pseudowords than the more consistent pseudowords. The interaction between L1 groups and word types was also significant F (1, 64) = 6.236, MSE = 9.212, $p < .01$, η_p^2 = .089, indicating that the Korean group made more errors in the less consistent pseudowords than in the more consistent pseudowords.

Descriptive analysis of error types was also another focus of the second research question. Figure 15 illustrates the percentage of misspelling for the target vowel /ɑ/: letter <a> was 52.9%, letter <u> was 21.4%, and letter <e> was 7.2%. The data indicates that the Korean group tended to misspell the target phoneme /ɑ/ with either <a>, <u>, or ,<e> (more than 80%). Figure 16 illustrates the percentage of misspelling for the target vowel /i/: letter <i> was 70.5%, letter <e> was 18%, and letter <a> was 3%. The data shows that the Korean group misspelled the target phoneme /i/ with either <i> or <e> (more than 85%).
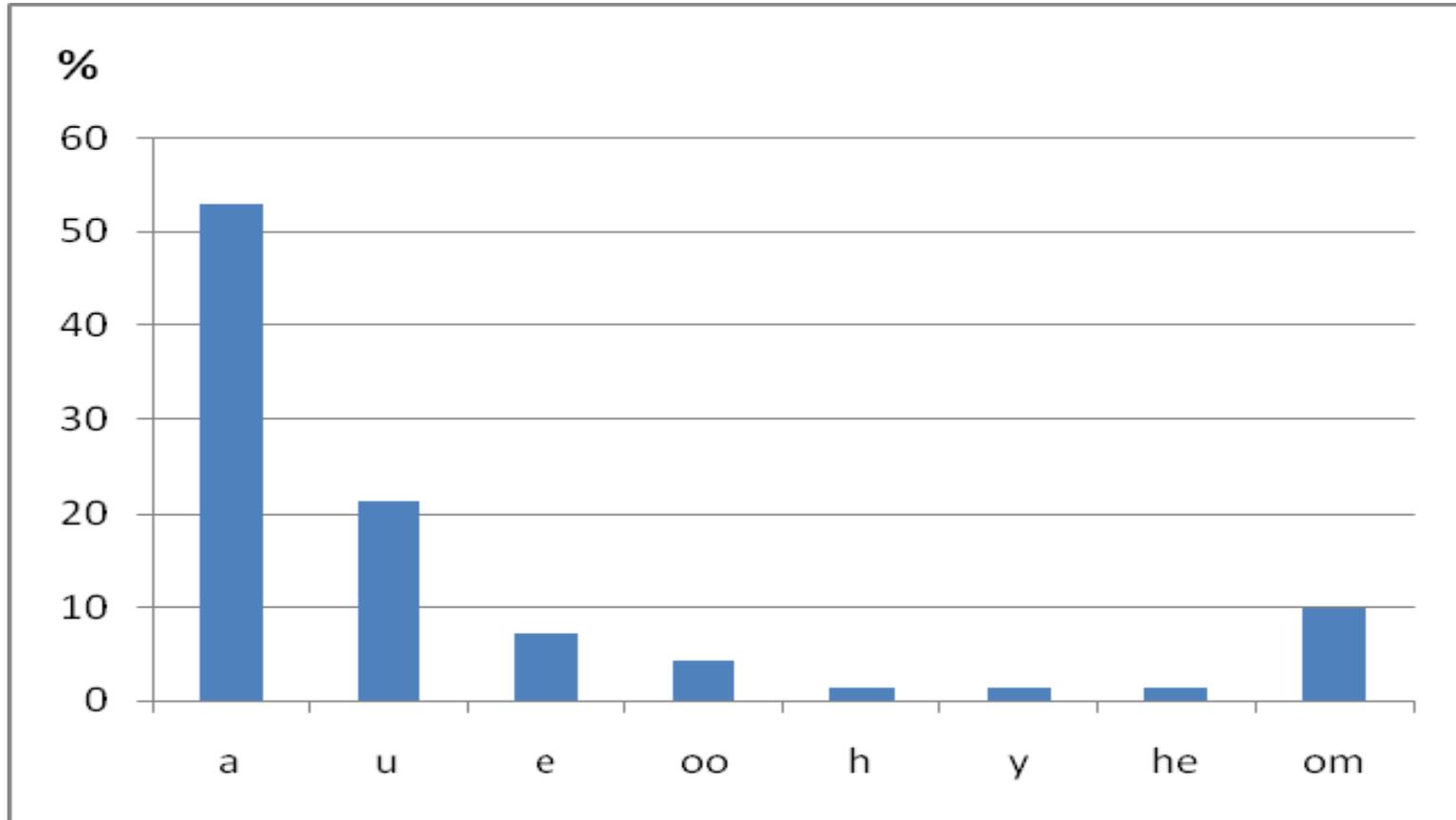
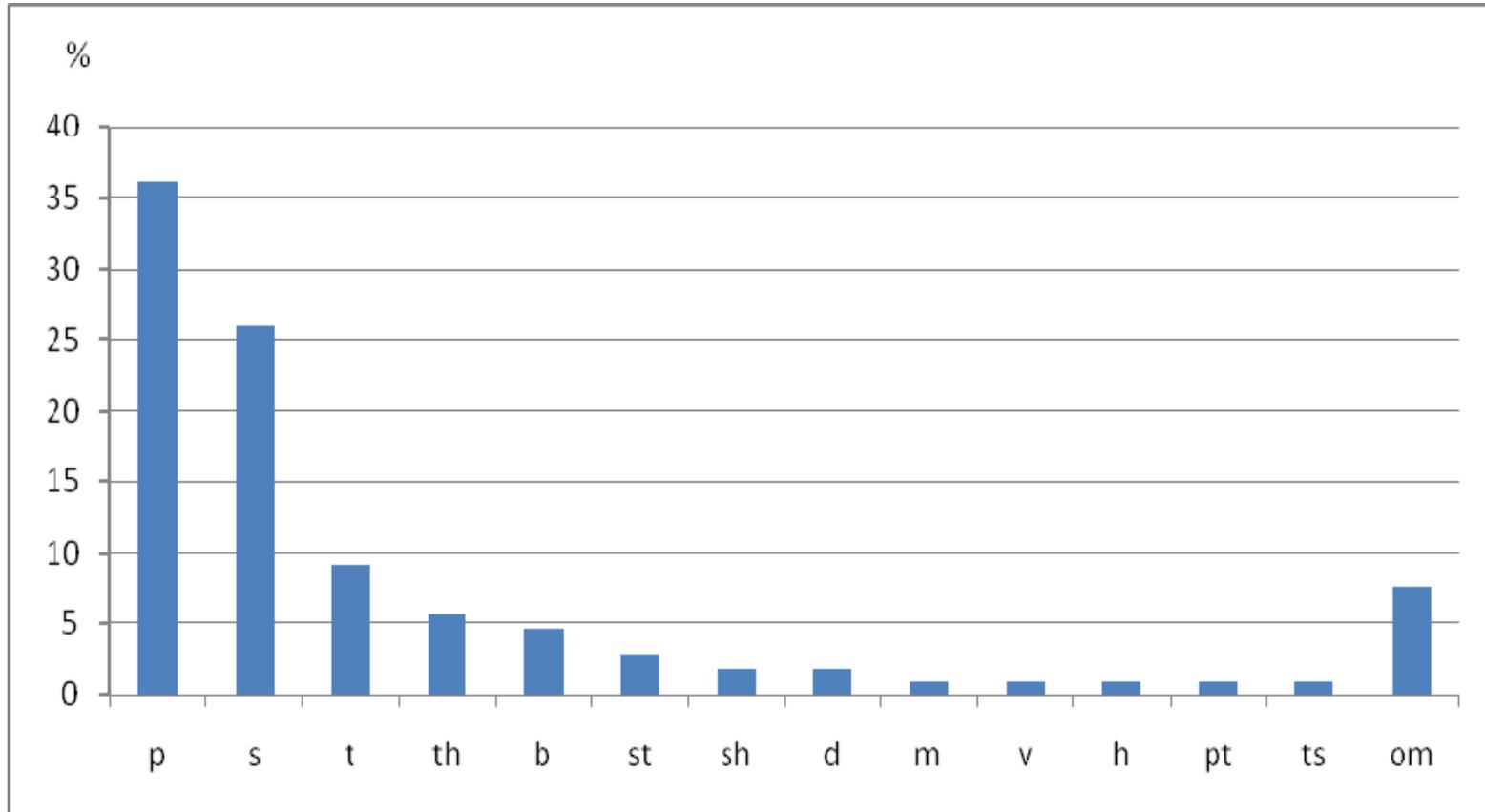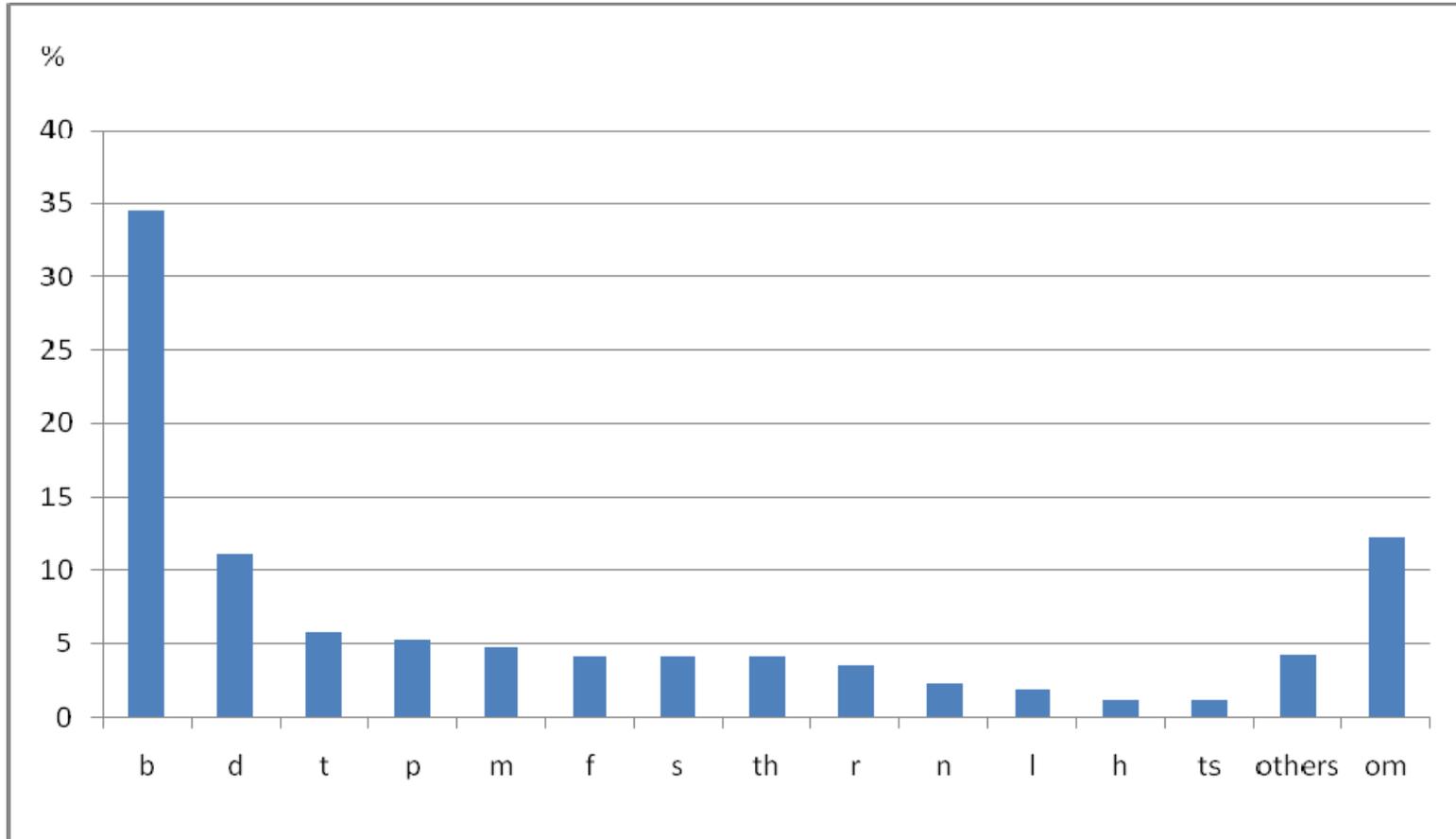Figure 15. *Korean Participants' Misspelling of the Phoneme /a/*   *om:omission
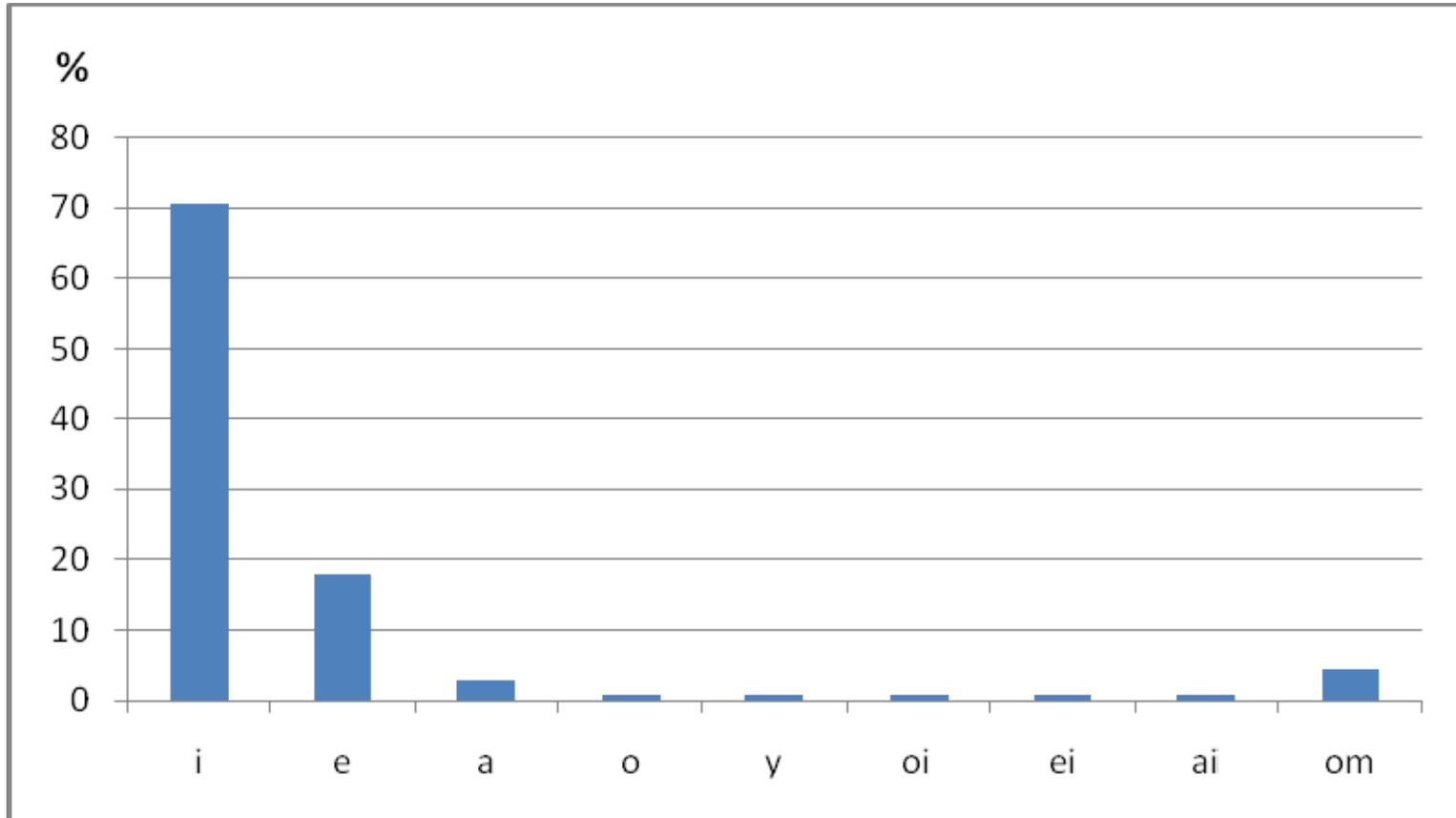
Figure 16. *Korean Participants' Misspelling of the Phoneme /i/*   *om:omission

CHAPTER 5

DISCUSSION

5.1. Research Question One

The first research question posed was whether the Korean group was able to accurately spell English words that include phonemes that do not exist in Korean. A two-way analysis of variance (ANOVA) indicated that the Korean group made more errors than the English group. Both groups also made more errors in the incongruent pseudowords than the congruent pseudowords, and the Korean group made more errors in the incongruent pseudowords than the English group. These results seem to support the prediction that Korean L1 learners of English would have difficulty in spelling pseudowords containing phonemes which do not exist in Korean but are present in English. This finding is consistent with findings from Arabic English learners (Ibrahim, 1978) and Chinese English learners (Wang & Geva, 2003a).

Error types of the Korean group's English spelling were also a main concern in the consonant spelling test. In regard to the error types, the Korean group tends to spell

<p> (36.1%), <s> (25.9%) and <t> (9.2%) for the target phoneme /f/, and <b> (34.5%), <d> (11.1%), and <t> (5.8%) for the target phoneme /v/. These findings confirmed that there is cross-linguistic transfer in English L2 spelling among Korean learners of English as in other L1 (Ibrahim, 1978; Wang & Geva, 2003a; Sun-Aplerin & Geva, 2008). These error types are also consistent with findings from Arabic English learners (Ibrahim, 1978) and Chinese English learners (Wang & Geva, 2003a). For instance, whereas English has two distinct bilabial plosives /p/ and /b/, Arabic has only voiced /b/. Ibrahim found that Arabic English learners substituted /b/ for /p/ in English words which have /p/ as in *bicture*, *blaying,* and *jaban*. Another point is that many Arabic dialects do not permit final consonant clusters. When speakers of these dialects pronounce an English word that has a final consonant cluster, they tend to insert a vowel between two consonants, and this vowel is inserted in writing as well, as in the error *communisem*. Wang and Geva (2003a) also reports that the Chinese English learners made the dominant errors of <s> for /ʃ/ and <s> or <z> for /θ/. These error types indicate that Chinese English learners distinguish the manner of articulation of the sound but cannot distinguish the place of articulation exactly because errors <s> and <z> are pronounced with the same manner of the target phoneme /θ/ (fricative) but different place of articulation (alveolar and inter-dental). The errors made by the Korean group suggest that they often replace the target phonemes with the phonemes that are articulated at a similar position. For instance, target phoneme /f/ (labio-dental) which does not exist in Korean, was more likely to be replaced by the articulatory adjacent sounds such as bilabial /p/, forward position from the target, and alveo-dental /t/ and /s/, backward position from the target. A similar result was also found in the target phoneme /v/. The target phoneme /v/ (labio-dental), which does not

exist in Korean, was also more likely to be replaced by the articulatory adjacent sounds such as bilabial /b/ (34.5%), forward position from the target, and alveo-dental /d/ (11.1%), backward position from the target.

Furthermore, the results showed two interesting points concerning spelling of Korean L1 learners of English. First, the inter-dental <th> (/θ/) sound was not used to replace /f/ (voiceless) even though this sound is articulated in a closer position to the target than /t/ and /s/, and inter-dental <th> (/ð/) sound was not used to replace /v/ (voiced) either, even though this sound is articulated in closer position to the target than /d/. Another interesting point is that Korean children were able to distinguish whether the target phonemes are voiced or not, even if they failed to correctly spell the phonemes. For instance, in the case of the target phoneme voiced labio-dental /v/, the rate of children's errors such as /b/ and /d/ accumulated to 45.6% and 11.1% for voiceless /p/ and /t/. This tendency becomes larger when it comes to voiceless labio-dental /f/. The rate of children's errors of voiceless such as /p/, /s/, and /t/ accumulated to 71.2%.

A part of the first research question is to examine children's spelling accuracy in word initial and word final position. As discussed in the literature review, phonological awareness is also an important factor in children's spelling development (Goswami & Bryant, 1990; Lundberg, Olofsson & Wall, 1980; Mann & Liberman, 1984). The results indicated that there is a difference in the sensitivity to the sub-syllabic structure difference between the English group and the Korean group. Thus far, there is limited research on Korean L1 learners of English L2 spelling, but the results of this study partially suggest that Korean L1 learners of English are sensitive to syllable coda rather than syllable onset in their English L2 spellings. As seen in Figure 11, the Korean group

tends to correctly spell the syllable final (6.0) which is coda compared to syllable initial (4.9) which is onset, whereas the English group does not show much difference between the syllable initial (8.9) and syllable final (8.8).

Research on the sub-syllabic structure sensitivity in both English L1 and Korean L1 has supported the idea that the boundary between onset and rhyme is salient in English. English speakers parse CVC monosyllabic words into C/VC partitions (Treiman et al., 1982; Treiman, 1983; Foweler et al., 1993) in which the major boundary lies between the onset and the vowel of the syllable. However, in the study on the Korean sub-syllabic structure sensitivity, it has been found that Korean children have a preference for syllable-initial CV (body) units over syllable-final VC (rhyme) sequences (Yoon & Derwing, 2001; Kim, 2005, 2007). Although further research focusing learner's sub-syllabic structure sensitivity is necessary, the results of this study suggest that Korean L1 learners of English show coda preference in their English L2 spelling as in Korean L1.

5.2. Research Question Two

The second research question posed was whether Korean L1 learners of English were able to accurately spell English words that include phonemes that have multiple correspondences with different letters. The mean scores of the Korean group was 1.30 ($SD = 1.48$) for the less consistent type and 2.50 ($SD = 1.25$) for the more consistent type. A two-way analysis of variance (ANOVA) showed that the Korean group made more errors than the English group, that the participants made more errors in the less consistent pseudowords than the more consistent pseudowords, and that the Korean group made more errors in the less consistent pseudowords than the English group.

These results support the prediction that learners' L1orthographic transparency influences L2 spelling accuracy. That is, vowels in Korean have direct one-to-one grapheme-phoneme correspondence whereas vowels in English usually have multiple spellings. For Korean L1 learners of English, the transition from a relatively transparent orthography to a less transparent orthography could potentially cause difficulties. For instance, Sun-Alperin and Wang (2008) argues that native Spanish L1 English learners who learn transparent orthography as their L1 had difficulty in spelling English words which have an indirect grapheme-phoneme correspondence. Furthermore, they found that native Spanish L1 learners of English made significantly more vowel spelling errors that were consistent with Spanish orthography. For instance, error types were more phonologically legitimate in Spanish (e.g., *mit* for meat and *mun* for moon), which suggests that the orthographic experience of Spanish L1 influenced children's learning to spell in English L2. The result from this study extends the findings of L2 spelling to a non-Roman alphabetic writing system. Korean letters are written in blocks rather than being written as a string of letters in a linear format such as the Roman alphabet writing (e.g., Spanish). However, English L2 learners who learn more transparent orthography as their L1 had difficulty in spelling words in English which has a less transparent orthography, regardless of the writing systems, which are distinct from the visual appearance of the script (Roman alphabetic vs. non-Roman alphabetic).

Descriptive analysis of spelling errors was also another focus in this study. The Korean group seemed to have followed the Korean orthographic convention when spelling the vowels /i/ and /ɑ/ in English (70.5% of grapheme <i> and 52.9% of grapheme <a> respectively) (see Figure 15 and Figure 16). For the vowel /i/, the Korean

group in this study tended to spell *tik* for *teek* [tik] and *wit* for *weat* [wit]. For the vowel

/ɑ/, the Korean group tended to spell *mat* for *mot* [mɑt] and *nap* for *nop* [nɑp].

Cross-linguistic L1 orthographic transfer to L2 spelling has been identified from

the previous research (Bebout, 1985; Cronnell, 1985; Sun-Alperin and Wang, 2008). For

instance, positive transfer may occur when the L1 graphemic representation for the

phoneme is consistent with English L2 (Bebout, 1985; Cronnell, 1985; Durgunoglu et al.,

2002). However, a negative transfer may occur if the L1 grapheme is different from the

L2 English grapheme (Bebout, 1985; Berkel, 1987; Cronnell, 1985; Durgunoglu et al.,

2002; Fashola et al., 2002; Morris, 2001). In this case, L2 learners use L1 orthographic

knowledge to spell L2 words. For instance, the phoneme /i/ is spelled <ea> or <ee> in

English but <i> in Spanish and Korean. Thus, Spanish L1 learners used the grapheme <i>

to represent the phoneme /i/ as in *clin* for *clean*, and Korean L1 learners spelled *mip* for

/*mip*/ in this study. A negative cross-linguistic transfer also occurs in consonants. For

instance, in English, the phoneme /k/ is spelled <ck> or <cc> in medial orthographic

spelling forms, whereas in Spanish the corresponding orthographic forms are <c>,<k>,

and <qu>. Because of this different grapheme representing the same phoneme, /k/, in

Spanish L1 and English L2, Spanish L1 learners may also spell *socer*, *soke*r, or *soquer*

for *soccer* (Fashola et al., 2002). The finding on the error types of this study adds a piece

of evidence to the existing literature concerning the effect of L1 orthographic transfer to

L2 spelling.

CHAPTER 6

CONCLUSION

6.1. Summary

The overall goal of this dissertation was to provide further findings on L2 spelling acquisition, which can serve as a theoretical basis for implementing L2 spelling instruction. To this end, this study focused on a specific learner population, Korean L1 learner of English, and examined the influence of phonological and orthographic differences between English and Korean on English L2 spelling. Writing systems of language and orthographic and phonological differences of Korean and English were discussed. Research on the component skills of spelling acquisition has been reviewed. Particularly, review of the research on L1 transfer in L2 spelling provided evidence for how cross-linguistic differences affect English L2 spelling acquisition, based on which the main theoretical framework for this dissertation was established.

In this study, the pseudoword spelling task was administered to native English speaking children and Korean speaking children learning English as a foreign language to examine the influence of phonological and orthographic differences between English and Korean on English L2 spelling. To investigate the influence of phonological difference

between English and Korean, the consonant spelling test was administered. The pseudowords used in this task included two types: incongruent type, in which the pseudowords included the consonants (/f/ and /v/) which exist in English but are absent in Korean and congruent type, in which the pseudowords included only the phonemes which exist in both English and Korean. The findings suggest that impact of spelling accuracy of the word type was larger in the Korean group, indicating that the Korean group's spelling accuracy decreased significantly more in the incongruent type. This finding was consistent with findings from Arabic English learners (Ibrahim, 1978) and Chinese English learners (Wang & Geva, 2003a), which demonstrate that English L2 learners had difficulty in spelling phonemes absent in their L1 regardless of their writing system difference: Chinese logographic, Arabic alphabetic, and Korean alphabetic. Furthermore, the errors made by the Korean L1 learners suggest that they often replace the target phonemes with the phonemes in the closest place of articulation and their spelling accuracy differed between the syllable and word final and syllable and word initial, whereas the English L1 participants did not show such a difference.

To investigate the influence of orthographic difference between English and Korean, the vowel spelling test was administered to the same participants. The pseudowords included two types: more consistent grapheme-phoneme correspondence and the less consistent grapheme-phoneme correspondence. The findings suggest that the impact of word type on spelling accuracy was larger in the Korean group, indicating that the Korean group's spelling accuracy decreased significantly more in the less consistent type. This finding was consistent with findings from Spanish English learners (Sun-Alperin &Wang, 2008), which implies that learners' L1orthographic transparency

influences L2 spelling accuracy. That is, English L2 learners who learn more transparent orthography for their L1 had difficulty in spelling words in English which has a less transparent orthography. Error types were also a main concern in the vowel spelling test. The errors made by the Korean group tended to follow Korean orthography to spell English vowels. For instance, Korean participants spelled <i> for the vowel /i/ and spelled <a> for the vowel /ɑ/: the vowel /i/ maps into Korean grapheme <i> (ㅣ) and the vowel /ɑ/ maps into Korean grapheme <a> (ㅏ). That is, the transfer of L1 orthographic knowledge has occurred to English L2 spellings among the Korean L1 learners of English. In cross-linguistic analysis it has been also found that the degree of orthographic depth between English and Korean was a critical factor affecting English L2 spelling among Korean L1 learners of English.

These results added valuable pieces of findings to existing research in L2 spelling acquisition. First, as discussed, phonological awareness, which is the ability to distinguish and manipulate the sounds in spoken words, is one of the important skills for spelling development (Goswami & Bryant, 1990; Lundberg, Olofsson & Wall, 1980; Mann & Liberman, 1984). The findings of this study suggest that L2 learners need to know sounds absent from their L1 in order to acquire phonological awareness in L2. For instance, the phonemes which do not exist in their L1 but present in L2 need to receive special attention for learners to be able to manipulate the phonemes. Second, orthographic awareness, the awareness of correspondences between grapheme and phoneme, plays an important role in L2 spelling acquisition. The ODH (Frost, 1994; Katz & Frost, 1992) suggests that the correspondences vary across languages. As introduced

earlier, Korean orthography has relatively consistent grapheme-phoneme correspondences. This study further indicated learners' experience of processing L1 words leads to increased difficulty in spelling English words, which has a less transparent orthography writing system. This finding also relates to PGST (Ziegler & Goswami, 2005). According to PGST, children who acquire a more consistent or transparent orthography rely on a smaller grain size, such as phonemes, in reading, because they provide reliable information to be used for mapping graphemes onto phonemes. However, children who acquire less transparent orthography, such as English, rely on a larger grain size units, such as syllable, rhyme, because a smaller size, such as phonemes, is not reliable for them to retrieve information to be used for grapheme phoneme mapping. The finding of this study suggests that learners' dependence on the smaller grain size units acquired from their L1 needs to change to the larger grain size units to spell words whose orthography is less transparent.

6.2. Pedagogical Implications

In South Korea, English education starts from the third grade as a compulsory subject under the Seventh Curriculum Reform in 1997 (Korean Ministry of Education, 1997). It includes four skills of the language arts in English (reading, writing, listening, and speaking). Even though writing is included in elementary English education, the importance of spelling did not receive much attention from educators from the beginning in South Korea. Since then, English education curriculum has been reformed several times (Ministry of Education and Science and Technology, 2008). During these reforms,

even if English education in general has received tremendous attention from educators and parents in South Korea, spelling instruction has been ignored. However, the results of this study showed that Korean L1 learners had difficulty in spelling English words which include phonemes that do not exist in Korean. Korean L1 learners also showed difficulty in spelling English words whose grapheme phoneme correspondence is less consistent. Thus, this study suggests that English L2 spelling instruction should be emphasized, particularly focusing on the linguistic differences between English and Korean. Furthermore, a number of researchers have found that early spelling competence correlates to later literacy development (Ehri, 1989, 1991; Mann, 1993; Treiman, 1998). Because spelling ability in early English literacy development correlates to English literacy proficiency, spelling instruction in class is worthy to receive attention from educators. Spelling instruction should be incorporated into English education curriculum in order for an individual to achieve communicative competence in English which is the goal of English education in South Korea (Korean Ministry of Education, 1997).

Some specific instructional suggestions regarding L2 spelling are discussed. Because phonological awareness or creation of a new phonological representation is important not only for listening or speaking, but also for spelling, instruction that focuses developing phonological skills needs to be emphasized. It is recommended that L2 instructors should be knowledgeable of phonological and orthographic differences between L1 and L2 in order to provide more effective instruction. For example, such knowledge helps the instructors to understand the reason or cause of some of the misspellings in L2. The instruction that explains the differences between L1 and L2 will be necessary for L2 learners to overcome the predicted difficulty in L2 spelling.

6.3. Suggestions for Future Research

Although the results of this study provide some valuable insight into English L2 spelling, this study still has several limitations that need to be addressed. This study only includes a pseudoword spelling task, but it needs to include real word task to understand more variations of students' spelling errors. In creating the material for vowel spelling test, pseudowords could have been created more carefully. Some phonological combinations were also found in real words (teak for [tik], wheat for [wit], and wok for [wɑk]). The present study also studied English pseudowords containing the limited L2-specific phonemes. The phonemes /θ/ and /ð/ which do not exist in Korean were not considered. Therefore it was limited in the range of information that could be obtained. Data targeting more L2-specific phonemes need to be collected in order to ensure the results of this study. Particularly, research on the sub-syllabic structure sensitivity in English L2 among Korean L1 learners should be further addressed based on the more structured design of the study. Further research should address those limitations to have better understanding about English L2 spelling among Korean L1 learners of English. It is also worthy to investigate English L2 spelling development based on data collected from learners whose English learning stages are different. Research addressing student's awareness of morphological structure of English L2 is also necessary to understand spelling skills.

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APPENDIX A

A List of Pseudowords (Consonant)

Congruent consonants	Incongruent consonants
(meace) [mis]	(feace) [fis]
(moop) [mup]	(foop) [fup]
(mep) [mɛp]	(fep) [fɛp]
(peam) [pim]	(soof) [suf]
(sem) [sɛm]	(seef) [sif]
(soom) [sum]	(peaf) [pɛf]
(neep) [nip]	(voop) [vup]
(nep) [nɛp]	(vep) [vɛp]
(noose) [nus]	(veace) [vis]
(sean) [sin]	(peve) [pɛv]
(pune) [pun]	(sove) [suv]
(sen) [sɛn]	(seeve) [siv]

APPENDIX B

Test One: Consonant Test

I am going to ask you to spell some nonsense words. Try to spell them the best you can. Some of the words will be easy to spell; some will be more difficult. When you do not know how to spell a word, spell it the best you can. You will hear each word two times with 5 second intervals.

1	[fis]	13	[suf]
2	[pɛv]	14	[suv]
3	[fɛp]	15	[sif]
4	[mis]	16	[vis]
5	[nip]	17	[mup]
6	[siv]	18	[pɛf]
7	[pim]	19	[sɛm]
8	[vup]	20	[vɛp]
9	[pun]	21	[sɛn]
10	[sum]	22	[fup]
11	[nɛp]	23	[nus]
12	[sin]	24	[mɛp]

APPENDIX C

A List of Pseudowords (Vowel)

More consistent	Less consistent
(nop) [nɑp]	(teek) [tik]
(mot) [mɑt]	(keam) [kim]
(tock) [tɑk]	(neak) [nik]
(kom) [kɑm]	(weet) [wit]
(wock) [wɑk]	(meep) [mip]

APPENDIX D

Test Two: Vowel Test

I am going to ask you to spell some nonsense words. Try to spell them the best you can. Some of the words will be easy to spell; some will be more difficult. When you do not know how to spell a word, spell it the best you can. You will hear each word two times with 5 second intervals.

1	[nɑp]
2	[tik]
3	[mɑt]
4	[kim]
5	[nik]
6	[tɑk]
7	[wit]
8	[kɑm]
9	[mip]
10	[wɑk]

APPENDIX E

Demographic Information Survey (For Native English Speakers)

Questions about Participants

1. Child's name:_____

2. Is your child a boy or girl?   boy   girl

3. What is your child's date of birth?   Month:_____   Day:_____
   Year:_____

Questions about Participants' Parents

4. How old are you? Father_____ Mother_____

5. What is your occupation? Father_____ Mother_____

6. Please indicate the highest education level the parents completed by;

   Father: Doctorate, Master's Undergraduate, High school, Middle school

   Mother: Doctorate, Master's Undergraduate,   High school,   Middle school

7. Do you think English education is important for your child? Please mark one below

   Strongly agree   (   )

   Agree   (   )

   Neutral   (   )

   Disagree   (   )

   Strongly disagree   (   )

APPENDIX F

Demographic Information Survey (for Korean Students)
자녀에 관한 질문

1. 자녀이름:_____

2. 자녀의 성별은 무엇입니까?   <u>남자</u>   <u>여자</u>

3. 자녀의 생년월일은?   년:_____   월:_____   일:_____

4. 당신 자녀는 몇학년때 (몇살)부터 영어를 배우기 시작했습니까? _____

5. 당신 자녀는 영어를 배우기 위해 영어권 나라에 간 적이 있습니까?   <u>네</u>   <u>아니오</u>

6. 만약 영어권 나라에서 공부를 했다면, 어느 나라에서 공부했습니까?   -
   _____

7. 얼마나 오랫동안 그 나라에서 공부했습니까?   _____ 개월.

8. 현재 당신의 자녀는 방과후에 영어공부(학원,과외)를 하고 있습니까?   <u>네</u>   <u>아니오</u>

9. 만약 방과후 영어 공부를 한다면 어디에서 공부를 합니까? (e.g., 과외, 학원)
   _____

10. 얼마나 오랫동안 방과후 영어 공부를 하고 있습니까? (예, 1 년, 3 개월, 또는 6 개월)?
    _____

11. 일중일에 몇시간정도 방과후에 영어 공부를 합니까? (예, 2 시간, 3 시간)? _____

부모님에 관한 질문

12. 지금 당신의 나이는 어떻게 됩니까?   아버지_____   어머니_____

13. 당신의 직업은 무엇입니까?   아버지_____   어머니_____

14. 어느정도의 고등교육을 받았는지 아래에 동그라미 해주세요;

    아버지: 박사학위,   석사학위   대학교 졸업,   고등학교 졸업,   중학교 졸업

    어머니: 박사학위,   석사학위   대학교 졸업,   고등학교 졸업,   중학교 졸업

15. 당신은 영어교육이 당신자녀에게 중요하다고 생각하십니까?

    매우 그렇다.   (   )

    그렇다   (   )

    중립   (   )

    그렇지 않다.   (   )

    매우 그렇지 않다   (   )

APPENDIX G

Student English Proficiency Rating (for Korean Students Only)

Please rate the student's English proficiency based on four basic language skills.

Listening Skill
1. Excellent
2. Good
3. Fair
4. Poor

Speaking Skill
1. Excellent
2. Good
3. Fair
4. Poor

Reading Skill
1. Excellent
2. Good
3. Fair
4. Poor

Writing Skill
1. Excellent
2. Good
3. Fair
4. Poor

APPENDIX H

Vocabulary Test

I am going to ask you to spell some English words. Try to spell them the best you can. Some of the words will be easy to spell; some will be more difficult. When you do not know how to spell a word, spell it the best you can. You will hear each word two times with 5 second intervals.

1. People

2. sheep

3. everyone

4. date

5. warm

6. low

7. family

8. river

9. great

10. wonderful

11. money

12. lemon

13. without

14. exit

15. chew

16. question

17. piece