METALINGUISTIC AWARENESS CONTRIBUTIONS:

EVIDENCE FROM SPELLING IN KOREAN AND ENGLISH

A Dissertation

by

SOOKKYUNG YEON

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Approved by:

Chair of Committee,	R. Malatesha Joshi
Committee Members,	Victor Willson
	Janet Hammer
	Erin McTigue
Head of Department,	Yeping Li

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ABSTRACT

Metalinguistic awareness skills (i.e., phonological awareness, orthographic awareness, morphological awareness) contribute to children's spelling as well as reading. Although the multi-dimensional nature of these metalinguistic awareness skills has been acknowledged, little research has been conducted on the simultaneous investigation of these three metalinguistic skills, and it is especially true for Korean Hangul. The purpose of this study was to simultaneously examine these three inter-related constructs and the unique and shared contributions of each construct to English spelling as well as Korean spelling of typically developing fourth, fifth and sixth grade Korean-speaking students (n= 287).

Korean metalinguistic awareness skills represented by three-first order factors (i.e., phonological, orthographic, morphological awareness) predicted 83% of the total variance in Korean spelling, and 52% of the total variance in English Word Spelling. It was particularly noteworthy that Korean metalinguistic awareness skills determined 12% of the variance in English Word Spelling, even after controlling for English vocabulary, demonstrating that there was a transfer effect between the two different orthographies. Findings from the present study provide strong support for the relationships between first language and second language literacy skills in terms of spelling and the concrete relationship between morphological awareness and spelling.

DEDICATION

To my beloved parents,

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TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

During the past decades, more studies concerning cross-language effects on second/foreign language learning have begun to increase in the field of second language learning (Koda, 2005). A considerable amount of research indicates that second/foreign language learners bring their prior language learning experiences in the learning of second/foreign language and incorporate knowledge and experiences gained from their first language (see Koda, 2005, 2008 for review).

One of the studies that have greatly influenced the research of second/foreign language acquisition has been Cummins' interdependence hypothesis (1979, 1991). Cummins (1979) has proposed that first language (hereafter "L1") and second/foreign language (hereafter "L2") are closely related to common linguistic abilities and L2 competence of bilingual children is largely determined by their L1 abilities. Once language learners develop literacy knowledge and skills in their L1, they are able to transfer those knowledge and skills to L2 development. Thus, L1 ability plays a significant role in L2 reading success. A good number of studies have provided empirical support for the Interdependence Hypothesis (e.g., Cummins, 1991; Geva & Siegel, 2000; Verhoeven, 1994). Recent research synthesis has also shown that oral proficiency and literacy skills in L1 can be used in promoting literacy development in L2 (August & Shanahan, 2006).

Based on theoretical foundation (i.e., interdependence hypothesis), there have been a number of research studies on the cross-language transfer, many of which have shown that there is a close relationship between L1 and L2 skills (Akamatsu, 2003; Durgunoglu, Nagy, Hancin-Bhatt, 1993; Geva & Wang, 2001; Kahn-Horwitz, Shimron, & Sparks, 2005; Koda, 2005, 2008; Sparks, Patton, Ganschow, Humbach, & Javorsky, 2008; Wang, Perfetti, & Liu, 2005). However, most of the studies about the relationship between L1 and L2 have focused on phonological awareness and reading-related tasks. Compared to the body of research on reading, few studies have attempted to explore the topic of spelling and in particular, little is known about cross-language transfer in terms of L2 spelling development (Joshi, Hoien, Feng, Chengappa, & Boulware-Gooden, 2006).

Spelling has been regarded as an important literacy skill in children's L1 literacy development. More specifically, spelling is closely related to vocabulary; spelling helps reading as well as writing; spelling promotes reading comprehension as well (Deacon & Bryant, 2006; Ehri, 2000; Joshi, Treiman, Carreker, & Moats, 2008; Perfetti, 1997; Treiman, 1993, 2006). Findings from a number of studies have suggested that spelling involves a number of underlying component skills, such as phonological, orthographic, and morphological processing skills (Bourassa & Treiman, 2007; Caravolas, 2006; Moats, 2000; Treiman, 2006; Treiman & Bourassa, 2000). Spelling requires not only phonological knowledge of the words, but also additional processing of retrieving and representing knowledge of the words (Ehri, 2000; Perfetti, 1997). In other words, children's spelling conveys their awareness of sounds, orthographic patterns, and

meaningful units. Thus, an analysis of children's spellings can reveal a wealth of information about their understanding of phonological, orthographic, and morphological knowledge (Treiman, 1993). In addition, an investigation of L2 spellings can provide a closer picture of how L2 learners incorporate their L1 knowledge with L2 literacy acquisition.

Then, we might wonder how L2 spelling development is similar to or different from L1 spelling development. As a similar psycho-linguistic based process, L2 spelling may show similar patterns to the one of L1 learners to a certain degree. However, L2 spelling development may not be an identical process of L1 spelling development since L2 learners who already have their L1 literacy skills are likely to apply their L1 literacy knowledge into L2 spelling. Thus, we might expect that their already developed skills of L1 could be transferred to L2 spelling development and L2 learners' spelling skills could reflect their L1 knowledge. If that is the case, one important question on L2 spelling development might be which component skills of L1 impact spelling and to what degree they could be transferred to L2 spelling development.

The present study aims to understand the nature of these three metalinguistic awareness skills in Korean, which is not fully explored area, and their relationships with English spelling as well as Korean spelling. Although there have been a few studies that simultaneously examined the contribution of these three metalinguistic awareness skills to reading and spelling in L1 (Apel, Wilson-Fowler, Brimo, & Perrin, 2012; Kim, 2010, 2011; Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003; Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009; Walker & Hauerwas, 2006), few studies have

examined whether these three metalinguistic awareness skills in L1 are related to L2 spelling skills. In particular, the simultaneous examination of the role of the L1 metalinguistic awareness skills on L2 spelling development is extremely rare. Therefore, an investigation of L2 spelling performance by way of L1 metalinguistic awareness skills, could offer interesting insight of cross-language transfer between the two different orthographies (i.e., Korean and English). Korean is an alpha-syllabic language, with a shallow orthography (i.e., regular and consistent phoneme-grapheme correspondences with relatively easy spelling acquisition). English is an alphabetic language, with a relatively deep orthography (i.e., irregular and complex phoneme-grapheme correspondences with relatively difficult spelling acquisition). Both Korean and English share the basic alphabetic principle. However, they differ in visual forms (i.e., liner vs. square block) as well as orthographic depth (i.e., deep vs. shallow) (Wang, Park, & Lee, 2006).

In the present study, I examined Korean and English spelling performance of Korean-speaking children to determine whether Korean (L1) phonological awareness, orthographic awareness, and morphological awareness skills were predictive of Korean (L1) spelling performance; whether these underlying Korean (L1) phonological, orthographic and morphological awareness skills contributed to English (L2) spelling, after taking into account English (L2) vocabulary ability; and whether these three metalinguistic skills differed across Grades 4, 5 and 6, showing developmental patterns. Thus, this study could provide further knowledge of how phonological, orthographic, and morphological awareness skills in L1 facilitated L2 spelling as well as L1 spelling

and useful information to L1 and L2 researchers and practitioners who are interested in issues of L1 and L2 spelling skills. In this study, I used the terms phonological, orthographic and morphological awareness in an inclusive manner, including the general processing skills and knowledge of each term.

CHAPTER II

LITERATURE REVIEW

When learning to read, children are first faced with mapping sounds in the oral language and graphic symbols in the written language (Goswami, 2006; Perfetti & Dunlap, 2008). Children need to acquire how sound units match with graphic symbols in order to be able to read the written language. However, the sound units with which graphic symbols map vary depending on writing systems.

It has been generally considered that there are three major writing systems: alphabetic, syllabic and morphosyllabic depending on how the graphic symbol matches with each sound unit (e.g., phoneme, syllable, morpheme) (Perfetti & Dunlap, 2008), although there is never a clear-cut distinction. In literature, this categorization has been termed as orthographic distance. In an alphabetic system, letters represent phonemes, which are the smallest sound units (e.g., English, Finnish, and Spanish). In a syllabic system, such as Japanese kana, graphic symbols reflect the spoken syllables in the languages. For example, there are different graphic symbols for ba, be, bi, bo, bu in kana and they cannot be further decomposed into smaller units (Grabe, 2009). In a morphosyllabic system, such as Chinese and Japanese Kanji, each graphic symbol (i.e., character) maps onto a morpheme (i.e., words or concepts) (Wang & Yang, 2008). Thus, syllabic and morphosyllabic writing systems require larger spoken units for graphic mappings than alphabetic writing system (Ziegler & Goswami, 2005).

All orthographies can be further categorized by their orthographic depth (i.e., shallow vs. deep), which refers to the degree of correspondence between spoken unit and written unit (Katz & Frost, 1992; Perfetti & Dunlap, 2008). Orthographies, particularly alphabetic orthographies, have varying degrees of correspondence between graphemes and phonemes. An orthography that closely represents the relationship between sounds (phoneme) and letters (grapheme) in a consistent one-to-one manner is called a shallow (or transparent) orthography (e.g., Finnish and Spanish). For example, in Finnish, each letter corresponds to one phoneme. On the other hand, orthography with an inconsistent phoneme and grapheme correspondence is called a deep (or opaque) orthography (e.g., Chinese). English falls somewhere in between these two continuums. Some English letters can be pronounced in more than one way and some sounds can be written in more than one form. In particular, English tends to preserve morphological information over phonological transparency. For example, the past tense morpheme –ed could be pronounced in three different ways, as in called, walked, and shouted, but is written in one form (-ed). Therefore, preserving the grapheme –ed to show its morphological information causes a problem in terms of one-to-one phoneme-grapheme correspondences (Hamada & Koda, 2008; Koda, 2005).

Then, what does orthographic distance and depth have to do with reading and spelling? To explain how orthographic depth affects learning to read and spell across different writing systems, Katz and Frost (1992) proposed the orthographic depth hypothesis. According to the orthographic depth hypothesis, the orthographic transparency affects the strategies that readers use when they try to read unfamiliar

words (Katz & frost, 1992). For example, in shallow or transparent orthographies, which have more reliable correspondence between graphemes and phonemes, readers are more likely to rely on letter-to-sound correspondences and use a decoding strategy. On the other hand, in deeper or opaque transparent orthographies, readers tend to use a lexical strategy, such as whole word reading or real word substitution, without grapheme-phoneme mapping strategy (Perfetti & Dunlap, 2008).

For instance, ESL learners whose L1 is a morphosyllabic orthography tend to utilize visual-orthographic processing in reading L2, whereas ESL learners whose L1 is alphabetic use more phonological decoding skills in reading L2 (Akamatsu, 2003; Wang, Koda, & Perfetti, 2003c). Akamatsu (2003) examined the effects of L1 orthographies on L2 reading. In the study, three groups of ESL readers (i.e., Chinese, Japanese, and Iranian ESL readers) were given with English passages; half of the passages was printed in a normal case and the other half was in alternated case (e,g., aLtErNaTeD). They were asked to read each passage and answer the reading comprehension questions. Results showed that English reading speed for the Chinese and Japanese ESL readers (i.e., non-alphabetic L1 groups) was relatively slower for the English passage with case alternation, whereas there was no group difference of English reading speed in normal passage reading. Akamatsu (2003) concluded that the Chinese and Japanese groups were negatively affected by visually alternated passage reading, whereas the Iranian ESL group, whose L1 shares alphabetic features with English was not affected.

In another study, Wang et al. (2003c) compared English word identification tasks between native Korean and native Chinese college students who were matched on

English proficiency. The authors hypothesized that Korean readers may use the same sublexical (letter-phoneme) strategy that works in reading Korean when reading English. On the other hand, Chinese readers may try to transfer their lexical strategy they use to read Chinese to read English. Wang et al. (2003c) tested their Korean-English and Chinese-English bilingual groups to determine to what extent each group relied on phonological and orthographic processing skills in English word identification task. The results suggested that the Chinese-English groups relied more on orthographic information and less on phonological information when identifying English words than did their Korean counterparts. Further, in a phoneme deletion task, Korean-English bilinguals performed better than their Chinese counterparts who made more errors that were phonologically incorrect but orthographically acceptable. The authors suggested that the differences in the L1 orthography and transfer of L1 reading strategy might be the possible reasons for these differences in performance for the two bilingual groups.

There also appeared to be a strong effect of orthographic depth on decoding development (Landerl, 2006; Seymour, Aro, & Erskine, 2003). Seymour, Aro, and Erskine (2003) showed that decoding develops more slowly in a deep orthography than in a shallow orthography, possibly because of the inconsistent correspondences between phonemes and graphemes. The authors measured letter knowledge, word reading, and nonword reading in English and in 12 different European orthographies and found that orthographically deeper languages, such as Danish and English showed poorer decoding and less accurate performance than the performance of orthographically shallow languages, such as Spanish and Finnish. In particular, English-speaking children

showed the poorest performance in nonword reading. In addition, Seymour et al. (2003) estimated the approximate length of time to master basic decoding skills and found that English-speaking children needed more than twice as much time as most other European languages in learning the basic decoding skills. The authors explained the possible reasons for these results that the deeper orthographies may require two (i.e., logographic and alphabetic) foundational skills, whereas the shallow orthographies need only one alphabetic principle in decoding the words. Seymour et al. (2003) concluded that there are wide differences in the speed of acquiring the basic decoding skills, even among the alphabetic orthographies.

Spelling Development in L1 and L2

There have been a number of cross-language studies focusing on effects of L1 on L2 reading acquisition. Koda (2007) identified transfer as "the ability to learn new skills by drawing on previously acquired resources" (p.17) and emphasized that previous literacy experiences need to be understood as a "reservoir of knowledge, skills, and abilities" (p.17) that L2 learners can utilize when learning a new language. Then, the question remains as to what are actually transferred, and how transferred L1 skills facilitate L2 literacy acquisition and development?

Figueredo (2006) reviewed the studies of cross-language transfer on spelling abilities and found that L1 had an influence on L2 spelling in both positive and negative ways. The similarities between two orthographies (i.e., L1 and L2) tended to be transferred positively (Figueredo, 2006); for example, after an alphabetic language has

been acquired, the alphabetic principle does not need to be learned again when L2 learners learn to read in another alphabetic language since L2 learners already have the alphabetic principle in their knowledge (Koda, 2007). On the other hand, different language specific aspects might be negatively transferred from L1 to L2 acquisition since L2 learners have not yet acquired L2 specific knowledge and thus transferred inappropriate L1 knowledge as a strategy (Figueredo, 2006). For instance, Chinese children tend to make spelling more errors on the phonemes that do not exist in Chinese phonology, such as /ʃ/ and /θ/ (Wang & Geva, 2003a).

However, there has been a study which confirms the cross-language transfer despite the differences between the languages. For example, common underlying abilities affecting L1 reading, such as orthographies and morphological structure, affect L2 reading acquisition as well. In a study involving Hebrew L1 and English L2, Kahn-Horwitz, Shimron and Sparks (2005) examined whether L1 reading related variables influenced L2 reading acquisition. They administered both Hebrew (L1) and English (L2) variables to 145 fourth grade children to determine whether Hebrew L1 predictor variables (e.g., phonological, orthographic, and morphological awareness skills, and word reading) predict English reading related variables (e.g., letter sounds and letter names, word attack and reading comprehension). Using a Linear Structural Equation Analysis (LISREL), they confirmed that the core linguistic abilities that affected L1 also affected English L2 reading acquisition.

Then, are there any cross-language studies examining L1 effects on L2 spelling? Aforementioned in the introduction, spelling provides a better understanding of

children's knowledge of the alphabetic principle and the level of orthographic and morphological knowledge. Thus, investigating the effects of L1 by way of L2 spelling might provide L2 researchers and practitioners a closer understanding of how L2 children are developing their L2 literacy skills. As previously mentioned, Figueredo (2006) reviewed 27 qualified studies concerning L1 influence on English spelling skills and found that there was strong evidence of the relationship between the ESL learner's L1 and English spelling skill. He found that both positive and negative transfer of L1 knowledge to L2 learners' English spelling and discussed the findings in light of ESL learners' L1 proficiency level, orthographic distance between L1 and L2, age of learning, and English learning environmental background. In the next section, studies on cross-language transfer in terms of spelling development are reviewed in more detail.

Orthographic Depth and Spelling

L2 spelling can be explained by the orthographic depth and distance between L1 and L2. Several ESL spelling researches indicate that ESL spelling skills are influenced by the orthography of learners' L1 (Aaron & Joshi, 2006; Joshi et al., 2006; Leong, Tan, Cheng, & Hau, 2005; Wang & Geva, 2003a; 2003b). For example, in a comparison study between Chinese ESL children in Toronto and English monolingual children, Wang and Geva (2003b) found that Chinese-speaking ESL children performed as well or better than native English-speaking children in spelling English real words, but they were worse than native English-speaking children in spelling pseudowords, which requires more phoneme-grapheme correspondence skills. Specifically, Chinese ESL

children tended to rely more on whole lexical or visual-orthographic forms of English words and relied less on phonological processing (phoneme-grapheme correspondence) in spelling. Their results revealed that even Chinese children who had developed limited L1 literacy skills showed the effects of learning to read in L1 on L2 spelling.

This finding was also confirmed by the study in which Chinese ESL students in Hong Kong were tested by reading and spelling regular and irregular English words (Leong et al., 2005). Leong et al. (2005) found that orthographic and lexical knowledge made greater contributions to learning to read and spell English words for these Chinese ESL children as compared to native English-speaking children. In addition, the difference between pseudoword and real word spelling performance was much greater for the Chinese children. However, as the authors noted, the Chinese children had only limited exposure to English at the time of assessment, and this also may have had an effect on their performance.

Joshi et al. (2006) also demonstrated similar results in that ESL learners' L1 orthographies affected their English spelling performance. Joshi et al. (2006) compared the spelling performance of American third graders, Norwegian fifth graders, Chinese fifth graders and Indian seventh graders. They found that American third graders performed better than the other three groups on real word spelling. There was no difference on real word spelling among Norwegian, Indian, and Chinese groups who had received formal English instruction for three years. However, in the examination of children's fourth year of English instruction, Norwegian and Indian groups showed better performance than Chinese groups did on real word spelling. With regard to

phonologically plausible spelling, the Chinese group did the poor performance than the Norwegian and Indian groups did. The Chinese group relied more on visual processing rather than phonological processing in spelling English words. For instance, when the Chinese group children did not know the correct spelling of the words, they had a tendency to skip the entire word or to substitute the target word as a real word that they already knew, whereas Norwegian and Indian students, whose L1s are alphabetic orthography, tended to come up with a phonologically plausible word for the target word.

In a similar vein, Dixon, Zhao, and Joshi (2010) also investigated the L1 influence on L2 spelling performance of bilingual children, whose L1 is Malay (alphabetic), Tamil (alpha-syllabic), and Chinese (morpho-syllabic), respectively. The results demonstrated that there was a statistically significant L1 effect on conventional spelling after controlling for reading proficiency. More specifically, Chinese L1 groups performed better than Malay and Tamil L1 groups. In addition, as shown in the study of Joshi et al. (2006), the Chinese group made more real word substitution errors. However, when phonologically plausible spellings were considered as correct, there was no statistically significant difference of performance among these three L1 groups. Malay L1 and Tamil L1 groups showed much improvement of spelling performance, whereas Chinese groups did not show any improvement for the phonologically correct spellings. This result was interpreted for ESL learners, whose L1 is a shallow orthography tend to better utilize phonological processing skills and spell phonologically plausible words more accurately than ESL learners whose L1 is a deep orthography. Given the

aforementioned studies, in line with Orthographic Depth Hypothesis (Katz & Frost, 1992), we can assume that ESL learners whose L1 is alphabetic orthography (esp. a shallow orthography) tend to rely on the use of phonological processing skills on unfamiliar words, whereas ESL learners whose L1 is morphosyllabic (a very deep orthography) tend to rely on the use of visual processing skills when they try to spell unfamiliar words.

L1 Spelling and L2 Spelling

Few studies have examined the relationship between L1 spelling and L2 spelling performance. Among the few studies on this topic, Sparks, Patton, Ganschow, Humbach, & Javorsky (2008) investigated whether early L1 reading and spelling skills could predict later L2 reading and spelling skills. Sparks et al. (2008) first measured students' English L1 skills (i.e., phonological awareness, word decoding, spelling, listening comprehension, receptive vocabulary, reading comprehension) at the beginning of the first grade and the end of first, second, third, and fifth grades. Then, they followed the same students and measured their L2 reading (i.e., word decoding and comprehension) and spelling skills around the time the students finished two years' L2 (i.e., French, German, Spanish) instruction in high school years (i.e., 10th Grade). Sparks et al. (2008) found that L2 decoding skill was best predicted by L1 decoding skill; L2 spelling was best predicted by L1 spelling and L1 phonological awareness; L2 comprehension was predicted by L1 comprehension. Their findings demonstrated that

students' early L1 reading and spelling skills still had an influence on later L2 reading and spelling skills.

Metalinguistic Awareness Skills in Literacy Development

Metalinguistic awareness skills refer to the "ability to identify, analyze, and manipulate language forms" (Koda, 2007, p2) and have been regarded as the underlying and fundamental process that contributes to spelling as well as reading development. Previous studies on literacy acquisition and development have identified three metalinguistic awareness skills: phonological awareness, orthographic awareness, and morphological awareness (Bourassa & Treiman, 2007; Figueredo, 2006; Kim, 2010; Kuo & Anderson, 2008; Landerl & Wimmer, 2008; Moasts, 2000; Seymour, 2006; Treiman, 1993; Treiman & Bourassa, 2000). According to Treiman (1993) and Treiman and Bourassa (2000), children's early spellings are largely dependent on their understanding of phoneme-grapheme correspondences, and closely related with phonological awareness. As children learn to read and gradually make progress in spelling, they begin to understand certain morphological information (e.g., Children know heal and health share the same meaning unit) as well as orthographic patterns of English (e.g., Children know about acceptable and unacceptable letter strings). In other words, beginning with predominantly sound-based spellings, children come to acquire a more sophisticated knowledge of orthography and morphology in the spelling development (Treiman, 1993; Treiman & Cassar, 1997).

Although phonological knowledge plays an important role in early spelling development, children in earlier grades also were shown to apply the orthographic and morphological knowledge in their spellings (Kim, 2010; Treiman & Bourassa, 2000; Treiman & Cassar, 1997; Ouellette and Senechal, 2008; Walker & Hauerwas, 2006). For example, Walker and Hauerwas (2006), in a study with children in Grades 1, 2, and 3, examined the influence of phonological, orthographic, and morphological awareness skills on spelling of inflected verbs and found that orthographic awareness best explained first and second graders' inflectional spelling performance and morphological awareness made the most contribution to third graders' inflectional spelling abilities. Also, in a recent study of 5-year-old children's early (invented) spelling, Ouellette and Senechal (2008) examined the relationship between invented spelling and cognitive and linguistic underlying component skills. The authors found that phoneme awareness was an important predictor of invented spelling. In addition, invented spelling of these children was related with orthographic and morphological processing skills.

A recent study by Kim (2010) has also demonstrated that 5-year-old Korean-speaking children primarily used a phonological strategy in spelling in Korean even though there were no explicit instructions of phonological awareness and alphabetic knowledge in teaching Korean Hangul. In addition, it was found that early spelling development was closely related with multiple skills, such as letter knowledge, orthographic awareness, and morphological awareness, after controlling for phonological awareness and vocabulary. Given the critical role that three metalinguistic awareness skills play in spelling development, it is important to examine how each

component skill contributes to spelling development. In the next section, each skill was discussed in terms of spelling development in L1 and L2.

Phonological Awareness

Phonological awareness is considered as the ability to identify and manipulate speech sounds (e.g., phonemes, onset, rime, and syllable) in oral languages. There has been a considerable amount of research that indicates phonological awareness is one of the best predictors of reading acquisition and development (Adams, 1990; Cunningham & Stanovich, 1997; Goswami & Bryant, 1990). This critical role of phonological awareness in reading is not limited to the alphabetic orthographies, such as English, but extends across various languages.

Several researchers have investigated the role of phonological awareness abilities in literacy skills across languages and found that phonological awareness played a significant role in reading across various languages (Ho & Bryant, 1997; McBride-Change, Cho, Liu, Wagner, Shu, Zhou, Cheuk, & Muse, 2005). For example, in Chinese, a morphosyllabic orthography, which is considered to be at the deep end in orthography continuum, phonological awareness has been shown to be an important predictor of reading (Ho & Bryant, 1997). Ho and Bryant (1997) investigated the contribution of phonological awareness of Hong Kong Chinese children to their reading achievement. The authors found that phonological awareness skills at the age of 2 significantly predicted children's reading 2 and 3 years later, even after controlling for age, IQ, and mother's education. In a cross-cultural study involving 100-second graders

in Beijing, Hong Kong, Korea, and the United States, McBride-Chang et al. (2005) examined the contributions of phonological awareness to the literacy-related tasks across languages (e.g., Chinese, English, Korean). Their results showed that phonological awareness measures were significantly related with word reading, vocabulary and morphological awareness across all cultures, although there were relative differences across languages (i.e., phonological awareness was shown to be more related with reading in English and Korean; morphological awareness was closer to reading in Chinese and Korean).

Phonological awareness tends to be highly correlated with spelling, as well (Landerl & Wimmer, 2008; Treiman, 1993, 2000; Wade-Woolley & Siegel, 1997). Wade-Woolley and Siegel (1997) found that phonological processing skills predicted L1 and L2 children's English spelling and pointed out that both L1 and L2 (ESL) speakers showed similar phonological processing patterns on spelling. Treiman (1993, 2000) also showed ample evidence that children's early spellings are dependent on their understanding of phoneme-grapheme correspondences, and closely related with phonological awareness. Similarly, Landerl and Wimmer (2008) demonstrated in their longitudinal study of German-speaking children that phonological awareness was the strongest predictor of spelling performance. They also found that children in Grade 1 with phonological spelling problems still showed conventional spelling difficulties in Grade 8, demonstrating the strong relationship between early problems in phonological spelling and later conventional spelling skills.

Very few studies have examined the relationship between phonological awareness and spelling in Korean; most of the studies on Korean orthography have been conducted with relationship between phonological awareness and word reading and/or reading comprehension. In a study of good and poor readers of Korean Hangul, Kim and Davis (2004; 2006) demonstrated that poor readers of Korean Hangul showed poor performance on Korean phonological processing measures compared to good readers. In another study of Korean kindergarteners and second graders, Cho and McBride-Chang (2005) examined Korean Hangul acquisition and found that both phoneme and syllable awareness uniquely predicted Hangul word recognition. In another study of 4 and 5 years old Korean kindergarteners, Cho, McBride-Chang, and Park (2008) found that all three levels of phonological awareness (i.e., onset, coda, and syllable) were uniquely related to regular word recognition. In particular, these studies found that syllables as well as phonemes are important phonological units in reading Korean Hangul (Cho & McBride-Chang, 2005; Cho et. al., 2008) because of its alpha-syllabic characteristics (i.e., clear-cut syllable boundaries due to a syllable block representation over a linear representation of letters).

In relation to cross language transfer of phonological awareness, numerous studies have shown that phonological processing skills in L1 and L2 are highly correlated and transfer across languages (Cho & McBride-Chang, 2005; Durgunoglu, Nagy, & Hancin-Ghatt, 1993: Geva & Wang, 2001; Rickard Liow & Lau, 2006; Wang, Perfetti, & Liu, 2005). For instance, Rickard Liow and Lau (2006) examined English spelling of 80 children with three different language backgrounds in Singapore: English

L1 and Mandarin L2; Mandarin L1 and English L2; Malay L1 and English L2. They found that all three groups used some phonological processing skills for spelling in English, although Malay L1 children of a shallow orthography were more dependent on phonological processing and Chinese L1 children with a morphosyllabic orthography relied more on visual-orthographic processing skills than either phonological or morphological skills. In addition, in a study involving Chinese L1, a morphosyllabic orthography and English L2 reading skills Chinese phonological processing (i.e., Chinese tone processing skills) was found to explain a modest but significant amount of unique variance in English pseudoword reading, even after English phonemic awareness skill was controlled (Wang, Perfetti, & Liu, 2005).

In a recent study of 89 Spanish-English bilingual children in grades 2 and 3, Sun-Alperin and Wang (2011) investigated cross-language transfer of phonological and orthographic processing skills. The authors administered phonological and orthographic related measures comparable in both Spanish and English and found that Spanish phonological awareness predicted English real word and pseudo word reading. Spanish orthographic awareness also predicted English word reading, but did not predict English spelling. Their study showed that there was a strong link between L1 Spanish and L2 English reading, supporting previous findings on the role of L1 phonological awareness in learning to read in L2.

Few studies have examined the L2 English phonological skills of Korean L1 readers. Since Korean and English share similarities in phonological processing of an alphabetic principle, phonological skills developed in L1 might influence phonological

processing skills in L2 (Koda, 2007; Park, 2008) Wang, Park, and Lee (2006b), in a study of 45 Korean-English bilingual children, tested Korean L1 and English L2 literacy-related skills in order to investigate cross-language phonological and orthographic transfer. The authors found that phonological awareness skills in L1 and L2 were strongly related with each other and more importantly, phonological awareness skills in Korean explained unique variance in English pseudoword reading (but, not real word reading) after controlling for English phonological and orthographic awareness skills. Their results suggest that L1 phonological awareness skills facilitate L2 pseudoword reading, which requires stronger letter-sound correspondence skills. The authors discussed their findings in terms of universal phonological processing in learning to read.

Orthographic Awareness

Orthographic awareness is usually referred to as the general understanding of the written conventions (writing system) of a particular language. It can be defined as the ability to recognize acceptable and unacceptable letter patterns and sequences in written words (Treiman & Cassar, 1997). This knowledge of orthographic patterns is shown to develop early. According to Treiman (1993) and Cassar & Treiman (1997), native English-speaking children began to distinguish *nuck* (orthographically plausible nonword) from *ckun* (orthographically non-plausible nonword) by the end of kindergarten or the end of first grade. Although their phonological awareness was not fully developed, children in Kindergarten or first grade were shown to be sensitive to the

orthographic patterns in the spelling of words, such as no consonant doubling at the beginning of the nonwords.

A positive relationship between orthographic awareness and word reading and spelling has been found across multiple L1 researches. For example, Cunningham, Perry, & Stanovich (2001) administered six different measures of orthographic processing skills to 39 primary school children and found that a composite measure of orthographic processing skills explained a substantial amount of unique variance (16.3%) in word recognition after the variance of the phonological processing skills was controlled. Wang et al. (2006b) also found a similar result involving Korean-English bilingual children that orthographic awareness skills were positively related to word reading within Korean. Orthographic knowledge was found to influence spelling performance as well. For example, Sun-Alperin and Wang (2011) found that orthographic awareness skills were predictive of real word spelling after taking into account age, receptive vocabulary and phonological awareness within English and within Spanish, although they did not find the transfer effect of Spanish orthographic awareness skills to English spelling. In another study of Hebrew-speaking 5 years old children, the children were asked to choose which one looked more like a real word after illegal letter sequences or characters were presented to them (Aram & Levin, 2002, as cited in Ouellette & Senechal, 2008, p.199). The authors found that there was a strong correlation *(r* = .62) between orthographic awareness and young children's invented spelling, along with word recognition. Walker and Hauerwas (2006), in a study with first, second, and third grade students, examined the simultaneous contributions of three

metalinguistic awareness skills to children's inflected spelling. They found that orthographic awareness best explained first and second graders' inflectional spelling performance.

Similar result also has been found in the study with Korean-speaking children. In a study of 4 and 5 years old Korean L1 children, Kim (2011) investigated the unique predictive power of phonological, orthographic, semantic (vocabulary and morphological awareness), and other print-related variables on word reading and spelling. She found that all the language and literacy skills she examined were positively related to word reading and spelling, but the unique predictive power on word reading and spelling, was only partially confirmed. More specifically, orthographic awareness was uniquely related to word reading and spelling, contributing the largest amount of unique variance to both word reading and spelling, though more unique variance in word reading than in spelling; phonological awareness was uniquely related to spelling; and morphological awareness was not related either word reading or spelling, after controlling for other language and literacy skills. In addition, Kim (2011) pointed out that various language and literacy skills were involved with spelling together. There was no surpassing predictor that contributed to early spelling in Korean Hangul for these Korean-speaking children.

In relation to cross language transfer of orthographic awareness, several studies have investigated whether orthographic processing skills in L1 facilitate literacy skills in L2. However, cross language transfer effects of orthographic awareness seem less visible compared to the ones of phonological awareness skills. For example, Wang,

Perfetti, and Liu (2005) examined Chinese L1 and English L2 reading skills of 46 Mandarin-speaking children to investigate the role of phonological and orthographic skills in word reading. Unlike phonological processing skills, they did not find the unique contribution of orthographic skills to word reading. Their results were also consistent with the findings of Wang et al. (2006b). Similarly, in a study of Korean-English biliteracy acquisition, Wang et al. (2006b) found no orthographic knowledge transfer between the English and Korean Hangul orthographies, although as mentioned earlier, orthographic knowledge predicted both real and non-words within the same language. Korean orthographic skill did not predict English word reading after controlling for English phonological and orthographic skills. The authors explained the possible reasons for non-statistically significant orthographic transfer in terms of different visual forms (i.e., English is written in a linear fashion, whereas Korean is written in a square block form) and orthographic transparency (i.e., English is a deep orthography, whereas Korean is a shallow orthography) between the two writing systems.

However, in contrast to the results from the studies above, in a study with Hebrew-speaking fourth graders, Kahn-Horwitz et al. (2005) found that orthographic abilities, measured in L1 Hebrew spelling ability, predicted L2 (EFL) reading comprehension. In addition, in a recent study with English L1 children in French program, Deacon, Wade-Woolley, and Kirby (2009) examined cross-language transfer of orthographic processing skills to word reading and found that English orthographic processing skills made a significant contribution to French word reading, and vice versa, after literacy-related variables were controlled. Deacon et al. (2009) suggested that

orthographic processing may not be language specific skills, but the languages have to share some features (i.e., Roman alphabets) if orthographic processing skills are to be transferrable. In a similar vein, Sun-Alperin and Wang (2011) found the cross-language transfer of orthographic processing skills as well as phonological processing skills in the study of Spanish-English bilingual children. The authors found that orthographic processing skills in Spanish predicted word reading in English, although they did not find the predictive power of Spanish orthographic processing skills to English spelling. The possible explanations for finding the orthographic transfer to word reading from Spanish-English bilingual study, but not from Korean-English bilingual study, were suggested as followings: Spanish is more similar to English than to Korean in that Spanish and English both share the alphabetic writing system and fundamental alphabetic principle, and are presented in a linear fashion. In addition, they share some common grapheme-phoneme correspondences. However, even in this study, after controlling for English phonological and orthographic processing skills and Spanish phonological processing skills, Spanish orthographic processing was found to be limited and non-significant in orthographic transfer.

Morphological Awareness

Morphological awareness refers to the ability to manipulate morphemes (smallest units of meanings) and apply morphemic knowledge to create a new word form (Kuo & Anderson, 2006). More than half of the English words are considered morphologically complex (Nagy & Anderson, 1984) and many of the spelling rules in English are based

on morphemes. These morphemic features are found not only in English spelling but also in other orthographies as well (e.g., Korean, Greek). Thus, knowledge of morphology is important for understanding the writing system and for accurate spelling (Bear, Helman, Templeton, Invernizzi, & Johnston, 2007).

The growing number of studies has shown that morphological awareness predicts word reading, vocabulary knowledge, spelling, and reading comprehension across various languages. (Deacon, Kirby, Casselman-Bell, 2009; McBride-Chang et al., 2005; Nagy, Berninger, & Abbott, 2006; Ouellette & Senechal, 2008; Siegel, 2008). For example, Nagy, et al. (2006) evaluated about 600 English L1 children (4th graders through 9th graders) in order to examine the role of phonological and morphological awareness skills in reading performance. Nagy et al. (2006) found that morphological awareness made a unique contribution to vocabulary, spelling, and reading comprehension for all three groups and even made a significant contribution to reading comprehension after controlling for vocabulary for all three groups. In another study of 1,238 6th graders, Siegel (2008) examined the predictive power of morphological awareness to reading and spelling skills of three groups of children: children with dyslexia, children with typical reading progress, and children who are English language learners (ELLs). Morphological awareness was significantly related to reading comprehension and spelling, even after taking into consideration phonological awareness and oral language skills. They found no differences between the ELLs and the English L1 children in any measures. However, children with dyslexia performed

significantly poorly than children without dyslexia on the morphological awareness tasks.

More recently, Deacon et al. (2009) examined the role of morphological awareness in spelling ability and found that morphological awareness measured in Grade 2 explained approximately 8% of the variance in spelling in Grade 4 two year later, even after taking into account phonological awareness, verbal and nonverbal intelligence, verbal short term memory and RAN. The authors emphasized that morphological awareness had a robust contribution to spelling even at lower grade levels. In a similar vein, Walker and Hauerwas (2006) also found that morphological awareness skills made the most contribution to inflectional spelling of third graders, though orthographic awareness best predicted first and second graders' inflectional spelling performance. Taken together, their results indicated that there was a robust contribution of morphological awareness to spelling ability, even in the lower grades.

In a study involving Korean kindergarteners, Cho et al. (2008) demonstrated that morphological awareness consistently explained word recognition of phonologically irregular words in Korean, whereas phonological awareness was uniquely related to phonologically regular word recognition. In the aforementioned study comparing the literacy development of second-graders from multiple countries, McBride-Chang et al. (2005) measured morphological awareness related tasks as well and found that morphological awareness was significantly contributing to word reading for Chinese L1 and Korean L1 children.

There have been a number of cross-language transfer studies on morphological awareness. Hancin-Bhatt and Nagy (1994) investigated the cross-language transfer of morphological awareness of Spanish-English bilingual students in Grades 4, 6, and 8 and found the cross-language transfer of morphological knowledge of derivational suffixes. More recently, Wang, Cheng, and Chen (2006a) assessed Chinese L1 and English L2 literacy-related comparable tasks to examine morphological awareness transfer and other literacy-related knowledge of Chinese-English bilingual children. Wang et al. (2006a) found that English morphological awareness of compound structure tasks predicted a unique variance in both character reading and reading comprehension in Chinese, even after taking into account Chinese-related predictors and showed that there was a cross-language morphological transfer between the two different writing systems.

In a study similar to the Chinese-English bilingual study, Wang, Ko, and Choi (2009) examined a comparable set of Korean and English tasks on phonemic awareness, morphological awareness, oral vocabulary, real word reading, and passage reading comprehension and found that morphological awareness was an important contributor to word reading and reading comprehension within both Korean Hangul and English. In addition, they found cross-language transfer of morphological awareness in word reading. The authors emphasized that this cross language transfer occurred across orthographies with different orthography depths (i.e., shallow vs. deep).

Studies on these three underlying metalinguistic awareness skills (i.e., phonological, orthographic, and morphological awareness) have been reviewed so far, in relation with literacy outcomes (i.e., reading, spelling). However, little research has

been conducted on the simultaneous investigation of these three metalinguistic skills (e.g., Apel et al., 2012), and it is especially true for Korean Hangul. In addition, there has been little research on cross-language transfer of these metalinguistic skills in spelling development.

In this regard, the present study examined how each component skill in Korean makes a contribution to English spelling as well as Korean spelling and whether these essential componential skills measured in Korean are transferred to English spelling performance. In order to provide a better understanding of the orthographic effects of Korean (L1) and English (L2), similarities and differences between Korean and English orthographies are described in the next section in further detail.

Korean Hangul and English: Similarities and Differences

Korean Hangul is an alpha-syllabic language, which has the characteristics of both alphabetic and syllabic writing systems (Lee & Ramsey, 2000; Taylor & Taylor, 1995; Wang et al., 2006). First of all, Korean Hangul shares the general alphabetic (grapheme to phoneme) mapping principles with alphabetic languages, although it is a non-Roman alphabetic script. Korean Hangul shows a very consistent and reliable grapheme–phoneme correspondence, unlike English that is a relatively inconsistent orthography in terms of orthography depth.

At the same time, Korean Hangul shares the syllabic characteristics. In contrast to the linear horizontal sequences used in most alphabetic writing systems, such as English, Korean Hangul is non-linear and composed of square blocks, in which letters

are not presented in a line, but are grouped together into syllable blocks. These syllable blocks are called 글자 *gulja* and considered to be the basic unit for reading and spelling of Korean Hangul words. For example, the five phonemes of a word, sky 하늘 /ha-nul/, are represented in two syllable blocks,하 and 늘, rather than a linear string of five letters, ㅎ ㅏ ㄴ ㅡ ㄹ. In this example, first syllable 하 is composed of two graphemes (ㅎ & ㅏ) which correspond to two phonemes; the second syllable 늘 is composed of three graphemes (ㄴ & ㅡ & ㄹ) which correspond to three phonemes. This syllable block representation is visually salient and presents a much more compact form than a linear string (Kim, 2011).

Due to these characteristics of syllable blocks, Korean Hangul is considered an alpha-syllabic orthography (Taylor & Taylor, 1995; Wang et al., 2006), rather than just an alphabetic. However, it is not a true syllabic (i.e., Japanese kana) in that each syllable block can be decomposed into its vowels and consonants (Chiappe.Glaeser, & Ferko, 2007). Korean Hangul syllable blocks are comprised of initial, medial, and final positions, arranged top to bottom, left to right. There are three primary syllable structures: CV (e.g., 차 /cha/), CVC (e.g., 산 /san/) and CVCC (e.g., 닭 /dak/). Many syllable blocks represent a CVC syllable, with the initial consonant and vowel on the top and the final consonant at the bottom (Park, 2008; Perfetti & Dunlap, 2008; Taylor & Taylor, 1995).

There are 24 basic Hangul graphemes, including 14 consonants (representing 19 phonemes) and 10 vowels (Taylor & Taylor, 1995). Korean does not have some of the

phonemes (e.g., /z/ and /ʃ/) and phoneme pairs (e.g., /f/ and /v/) in English. In addition, there are 5 twin consonants, 12 consonant clusters and 11 diphthongs in Korean Hangul (Chiappe et al., 2007).

Early 15th century Hangul orthography had been based on a purely phonemic principle, with each letter representing one phoneme; however, since the reformation of Hangul Orthography in 1933, modern Korean orthography has followed a morphophonemic principle (Perfetti & Dunlap, 2008; Sohn, 1999). Thus, morphological information is preserved over the change of the pronunciation and the syllable block is an essential basic unit that carries morphological information. For example, the word 깊은 /kiph-un/ is spelled with two syllable blocks, 깊 /kiph/ (representing the morpheme "deep") and 은 /un/ (representing the morpheme "to be"), even though the word is pronounced as 기픈 /ki-phən/ (Shon, 1999). The morphophonemic feature can be also found in the English writing system, which has a tendency to preserve morphological information over phonological correspondences (Bourassa & Treiman, 2007; Bryant, Deacon, & Nunes, 2006; Koda, 2005; Nagy, Berninger, & Abbott, 2006). For example, the same spellings (i.e., morpheme stem) are kept in both hear-heard and sign-signature, even though the vowel pronunciations are changed.

These morphophonemic features in both languages sometimes make children hard to learn to spell words, especially for those who are just beginning to learn to spell. Korean children typically acquire basic spelling skills in a short period of time, most likely due to the highly transparent sound-symbol correspondences in Korean orthography and the relatively simple syllable formation rules (Park, 2008). However,

the morphophonemic feature in Korean Hangul requires children to understand that Korean spelling follows the morphological rule of words, rather than the pure phonetic rule.

Reading instruction method is also regarded as an important factor influencing literacy experience. According to Aro (2006), the effect of orthography in cross-language studies may be varied depending on reading instruction methods. In shallow or transparent orthographies, reading instruction is typically based on phonics. In deep or opaque orthographies, such as English, early reading instruction is usually a mixture of phonics and whole-word methods. However, in Korea, the predominant approach to early literacy instruction since late 90's has been whole language instruction. A whole word is presented to children as a unit, without any explicit or systematic alphabetic principle (Kim, 2007), even though Korean is a shallow orthography, which features consistent phoneme and grapheme correspondence.

Given the previous studies reviewed so far, it seems clear that each metalinguistic component skill of phonological, orthographic, and morphological awareness is related to spelling performance to a great extent. However, the unique and shared contributions of each component skill to L2 spelling development have not been fully explored yet in terms of cross-language transfer. In the present study, three metalinguistic skills in Korean were examined as predictors of spelling in English as well as spelling in Korean to compare the unique and combined contributions of each of them. Furthermore, the relationship between Korean L1 spelling and English L2

spelling was examined. More specifically, following research questions were attempted to answer.

1. Are Korean phonological, orthographic, and morphological awareness skills important components of Korean spelling (dictation)?
2. Do Korean phonological, orthographic, and morphological awareness skills make the unique and shared contribution to English spelling, especially after taking into account pre-existing differences (e.g., English vocabulary)?
3. Is there any difference across different grades in terms of metalinguistic awareness skills?

CHAPTER III

METHODS

Participants

Two hundred eight-seven Korean-speaking children who were learning English as a foreign language were recruited to participate in the study. They were tested at the end of the school year in Korea (i.e., December, January and February). The participants were upper elementary school children, including Grades 4, 5 and 6. The mean age for the total group of children was 10.81 (SD = 0.83) years old. All participants were recruited from one public elementary school in the suburbs of a large metropolitan city in Korea. The participants are one of convenience sample, rather than being a nationally representative random sample. However, the participants came from a fairly similar socio-economic background and have received Korean and English instructions using the same government-issued Korean Hangul and English textbooks since the beginning of their school education.

Children's parents were asked to fill out a short questionnaire with basic demographic information, language background and their children's English education experience. All children were native speakers of Korean and no children have lived in English-speaking countries. There were no participants who spoke languages other than Korean as their first language at home. No participants were reported to have received special education services.

Literacy Instruction in Korean and English

Korean children start learning English as a required school subject in the third grade. However, the main focus of English education during the first year (i.e., third grade) lies in developing listening and speaking skills of English language, focusing on the basic communication skills. Writing is not part of English instruction during the first year. However, the English spelling measure used in the study required children to be able to spell English words to some degree. Therefore, children in Grade 3 were excluded from the study, and only children from Grades 4, 5, and 6 were recruited to participate in the study. Recruiting varied grade levels in the study makes it accessible to examine the possible influence of different levels of Korean and English knowledge on spelling performance and provides the relationship between Korean and English in a more expanded picture.

Children in grade 4 have been exposed to formal English instruction for about two years and received their English writing instruction for about a year at the time of testing. Children in grade 5 have been exposed to about three years of English instruction and children in grade 6 have been exposed to about four years of English instruction. However, over 80 percent of the children have reported that they have been receiving English instruction through private education system (i.e., tutoring or private cram schools) outside school English instruction. The majority of children in Korea receive Korean Hangul literacy education at preschool or kindergarten prior to their formal public education and by the time they begin first grade, children have already acquired the considerable literacy skills in Korean Hangul (Kim, 2008; 2009).

Data Collection

All potential participants were informed that they would be involved in a study to investigate the relationship between first language (Korean) and second/foreign language (English). To that end, in each classroom, information and questions related to the study were given. All potential participants were informed verbally and in a written form that they could withdraw from the study at any time, even though they initially agreed to participate in the study. In addition, children were informed that these tests would not affect their school grade and the results would be kept confidential. Once the parental consent forms were collected, children who agreed to participate in the study were tested in three sessions. One session was devoted to English spelling and Korean spelling test; the other session was spent on the rest of the Korean metalinguistic awareness measures (i.e., phonological, orthographic, and morphological awareness tasks). Each session lasted about 25 - 40 minutes. English vocabulary test was individually administered in a different session. The researcher and research assistants administered the testing procedures with the help of a classroom teacher. In the beginning of each task, specific instruction on how to complete the task was given and practice items for each task were presented. Every task was group administered with the exception of the English vocabulary test and ensured that participants did not copy from each other.

Measures

The following variables were measured: English spelling (real words and pseudowords), English vocabulary, Korean spelling (dictation task), Korean phonological awareness-, Korean orthographic awareness-, and Korean morphological awareness- measures. Each L1 measure was chosen to examine whether the three metalinguistic awareness skills in L1 would be predictive of L2 spelling as well as L1 spelling. Reliability was estimated by internal consistency, using Cronbach's alpha.

English Measures

English Word Spelling (EWS): Real word spelling

To measure English real word spelling ability, the researcher constructed a spelling list from the grade-level curriculum materials used in Korea elementary schools. The spelling words were selected based on the frequency and the level of difficulty, and reviewed by classroom teachers. The test consisted of 30 words that ranged from one-syllable words to multi-syllable words and Cronbach's alpha internal consistency was .96.

Native English speakers recorded the test items and the digital file was played in a classroom. Children were told that they would hear the target English word first and then the target word would be presented in a sentence. This was followed by one more repetition of the target word. Children were instructed to write the target word on a given paper and encouraged to spell the words as best as they could; they were

encouraged to spell small parts of the word when they were not sure of the complete spelling of the word.

English Sound Spelling (ESS): Pseudoword spelling

Pseudoword spelling has been considered to be an effective measure of children's phoneme-grapheme mapping skills by minimizing the possible influence of vocabulary (lexical) knowledge (Treiman, 1993). Children were administered the Spelling of Sounds Subtest of the Woodcock-Johnson Spelling of Sounds (Woodcock, McGrew, & Mather, 2001). Native English speakers recorded the test items; the digital audio files were played during the testing session. Children were instructed that the words that they were about to hear were not real words, but nonwords (pseudowords) and asked to spell the nonwords based on the phonics rules they had learned.

This task was group administered although the Spelling of Sounds Subtest of the Woodcock-Johnson Spelling of Sounds was intended to be administered individually. In order to obtain an accuracy for pseudoword spelling and ensure that children heard what they were supposed to hear, a couple of children, in each classroom, were asked to repeat each word aloud as they heard it and made sure that they heard what they were supposed to hear on every item. Only the responses listed in the testing manuals were scored as correct answers. The first five items were scored with 1 point each, if correct. The next seven items were scored ranging 0 to 3 points, according to the scoring guidelines in the testing manuals. This task had a Cronbach's alpha of .81.

English Vocabulary (EV)

Peabody Picture Vocabulary Test IV (Dunn & Dunn., 2007), a measure of receptive vocabulary, was individually administered to the children. Each child was shown a page containing four pictures and asked to point out the picture that corresponded to the word that he/she just heard. The researcher and three research assistants administered the test over five weeks. Children's performance on this measure was used to control for English word knowledge presented in English spelling performance. This task had a Cronbach's alpha reliability coefficient of .92.

Korean Measures

Korean Dictation (KD): Korean dictation test

In this spelling (dictation) task, Korean developmental spelling inventory developed by Yang (2005) was used to assess children's Korean spelling abilities (Bear, Helman, Templeton, Invernizzi, & Johnston, 2007). According to Yang (2005), words in the list were selected using two sources of Korean vocabulary lists: *Grade Level Vocabulary* (E. Lee, 1987) and *Educational Vocabulary by Level* (K. Kim, 2003). Words that appeared in both vocabulary lists were selected for the spelling lists based on the difficulty level and tested with 409 randomly selected Korean elementary children to ensure that the list is appropriate for measuring the orthographic development for the Korean elementary children (Yang, 2005).

The spelling test consisted of 30 words that ranged from two-syllable to multi-syllable words, and was designed to administer to children in grades 1 through 6. The

researcher read aloud the target Korean word first and then the target word in a sentence. This was followed by one more repetition of the target word. Children were instructed to write the target word on a given paper and encouraged to spell the words as best as they could, even if they felt unsure. The responses were scored as correct or incorrect (i.e., 1 or 0) and the raw scores of the test were used in the analyses. The Cronbach's alpha was .85.

Phonological Awareness Tasks

A phoneme detection task (phoneme oddity task) was used to measure phonological awareness in Korean; only phoneme detection was used, neither syllable nor onset-rhyme detection was used due to possible ceiling effects. This task was adopted from the study by Wang and her colleagues (2006b) and modified by the researcher to accommodate the difficulty level for the children in the present study. The participants in Wang et al.'s study were not only in lower grade levels (i.e., Grades 1, 2, and 3) but also their level of Korean literacy was much lower compared to the participants in the present study.

The phoneme detection task is designed to detect children's ability to differentiate the phonemes in a spoken word and has been widely used to measure phonological awareness in previous studies involving various languages, such as English, Spanish (Gottardo, 2002; Stanovich, Cunningham, & Cramer, 1984).

Initial phoneme detection task (KPB)

The researcher read aloud three choices of one-syllable nonwords twice. Children were asked to closely pay attention to the beginning sound and then choose the one that began with a different initial sound from the other two nonwords. (e.g., 강/kaŋ/, 감/kam/, 들/tul/). This task had two practice items and 20 test items.

Final phoneme detection task (KPE)

The procedure and instructions for this task were the same as in the previous initial phoneme detection task. The researcher read aloud three choices of one-syllable nonwords twice. Children were asked to pay close attention to the ending sound and then choose the one that ended with a different final sound from the other two nonwords (e.g., 실 /sil/,감/gam/,삼 /sam/). This task had two practice items and 20 test items.

Each task was presented orally in the form of multiple choices. The Cronbach's alpha reliability estimates were .86 for the beginning phoneme awareness task and .70 for the ending phoneme awareness task.

Orthographic Awareness Tasks

Orthographic choice task (OAA)

This orthographic choice task was designed to detect children's ability to identify the correct spellings among phonologically similar words and has been used in the previous studies involving orthographic awareness in English (Cunningham, Perry, & Stanovich, 2001; Olson, Frosberg, Wise, & Rack, 1994). The items that were used in

this task were adopted from the study by Han (2009) and modified by the researcher based on the English version of Orthographic Choice task (e.g., snow-snoe; goat-gote; rain-rane). In this task, children were given four choices of words that sounded alike (e.g., 난말, 낱말, 낫말, and 낯말) and asked to choose which one was spelled correctly.

There were 20 items in total and in each item, only one word was spelled correctly and the other three words were phonologically similar, but conventionally incorrect according to the Korean orthographic rule. Thus (since the stimuli sounded similar), the children need to use their orthographic knowledge to make a correct response. This task was group administered and each item was scored dichotomously. The Cronbach's alpha for this task was .70.

Homophone choice task (OAB)

The Homophone Choice task asks children to choose which of the two words is spelled correctly within a sentence. For example, a researcher reads a sentence, (e.g., "which is a part of the body?") and children are asked to choose the correct answer to the question from a pair of phonologically similar words (e.g., feet or feat) (Cunningham, Perry, & Stanovich, 2001). The items used in this task were developed by the researcher based on the English version of Homophone Choice task (e.g., "which one is the name of a flower?" rose-rows). In this task, two real words that were phonologically similar were given and children were asked to circle the word that fit the meaning of the sentence. This task was group administered and there were 10 items in total; each item was scored dichotomously to provide a total maximum score of 10. The Cronbach's

alpha for this task was .63. Because Cronbach's alpha is influenced by the number of test items, this measure might have showed relatively lower internal consistency, compared to other measures.

Morphological Awareness Tasks

Morphological relatedness task (KMM)

This task was based on the study with English-speaking children (Nagy, Berninger, & Abbott, 2006) and it requires children to make judgments about the morphological relatedness of word parts in Korean. Similar task with younger Korean-speaking children was also used in the study of Kim (2010, 2011). Children were provided with pairs of words and asked to decide whether the underlined parts of word pairs shared the similar meanings. Underlined parts of word pairs were pronounced the same in Korean, but not necessarily had the similar meaning. For example, if children are asked if 책 in the word 책상 (a desk) shared the same meaning with 책 in the word 책가방 (a bookbag), the correct response is yes. A desk 책상 is composed of two morphemes (book and table: 책 & 상) and a bookbag 책가방 is composed of two morphemes (book and bag: 책 & 가방). However, if children are asked if 차 in the word 보리차 (baily tea) are semantically related with 차 in the word 자동차 (automatic car), the response would be no, although they are phonologically same, but did not necessarily have the same meaning. Test items were presented in a paper and pencil test format and group administered. There are 20 test items in total and each item was scored

dichotomously, making a total maximum score of 20. The Cronbach's alpha for this task was .73.

Morphological derivational/decomposition task (KMF)

This task was adopted from the study of Wang et al. (2009) and modified with additional items in order to accommodate the difficulty level for the participants in the current study. The task accesses children's knowledge of the derivational structure of Korean words. Children were asked to complete a sentence using a given clue word. The items were divided into two parts. In the first part, children were given the root (base) words as clue words and asked to transform the base words into derived words to fit a grammatical context. For example, children were asked to complete the following sentence, "하루는 나중에 커서_____가(이) 되고 싶다." (답: 과학자). (Haru wants to be a _____ [answer: scientist], by using the base word, "science" (과학). In the second part, children were given a derived word, and asked to decompose the derived word into a base word to fit in a sentence context. For example, for the clue word "거짓말쟁이"(*liar*), the sentence would be completed as following, "_____ 을(를) 하면 나빠요." *It is wrong to tell a _____ [lie]).* There were 20 items in total; 10 for each part and two practice items were given. The Cronbach's alpha for this task was .76.

Literacy Background Questionnaire

Parents of children were asked to fill out a short questionnaire with basic demographic information (e.g., name, gender, date of birth, etc.) and English language and overall literacy experiences (e.g., language used at home, length of extra English activity other than formal English instruction at school, age of first English instruction, experience of reading/learning difficulties, experience of living in a native English-speaking country, etc.). Children's age and the length of English instruction obtained from this questionnaire would be used as control variables in the analyses.

CHAPTER IV

RESULTS

This chapter presents the results of the statistical analyses of the data and is divided into four parts. The first part of the chapter discusses descriptive statistics and zero-order correlations of the measured variables. The second part addresses the results of the Confirmatory Factor Analysis (CFA). Based on the configured CFA model, structural equation models (SEM) for both Korean and English spelling outcomes are presented in the next part. Then, more specific processes of development in higher-order structural equation model are described. Lastly, Multiple Indicators Multiple Causes (MIMIC) model and English spelling models are discussed in more detail.

Descriptive Statistics

Descriptive statistics provide a summary of the data. Table 1 presents the means, standard deviations, skewness, and kurtosis of the measured variables for each of the three grades. As expected, the means of all measured variables increase as the grade level goes up. ANOVA of three-group mean difference test showed that all nine measures were statistically significant at the level of $p < .001$, with the exception of English Vocabulary measure (EV).

Table1

Means, standard deviations, skewness, and kurtosis for all measures

	All (N=287)		Grade 4 (N=88)		Grade 5 (N=97)		Grade 6 (N=102)		Skewness		Kurtosis	
Measure	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Statistic	SE	Statistic	SE
KWS (30)	16.02	6.03	12.48	5.45	16.89	5.75	18.18	5.44	-0.002	0.145	-0.872	0.288
EWS (30)	19.92	8.16	16.31	8.79	20.29	8.04	22.51	6.59	-0.762	0.146	-0.483	0.291
ESS (25)	11.82	5.23	9.52	4.80	12.28	5.41	13.26	4.80	-0.240	0.146	-0.545	0.291
EV (60)	39.22	9.73	37.49	9.14	39.85	9.92	40.12	9.94	-0.485	0.144	-0.359	0.287
KPB (20)	18.26	2.60	17.28	3.67	18.52	1.35	18.86	2.13	-3.522	0.144	14.824	0.287
KPE (20)	16.75	2.67	15.91	2.82	16.84	2.64	17.38	2.37	-1.136	0.144	1.346	0.287
KOA (20)	16.06	2.35	15.08	2.71	16.11	2.21	16.83	1.80	-1.409	0.144	4.136	0.288
KOB (10)	7.89	1.72	7.36	1.93	7.89	1.75	8.34	1.36	-1.125	0.145	1.714	0.288
KMM (20)	16.61	2.65	15.40	3.12	16.81	2.18	17.46	2.24	-1.064	0.144	1.513	0.288
KMF (20)	16.56	2.65	15.73	2.69	16.38	2.87	17.46	2.08	-0.240	0.144	5.326	0.287

Note. Inside the parenthesis indicates the maximum scores.

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

Correlations

Table 2 shows zero-order correlation coefficients among all measured variables. All correlation coefficients among measured variables were significant at the level of $p <$ .001. According to Cohen (1988), Pearson zero-order correlation values of .10 to ± .29 are considered low, .30 to ± .49 are considered moderate, and .50 to ± 1.0 are considered high.

As seen in the table 2, the highest correlations were between English Word Spelling and English Vocabulary (r = .78) and the next strong positive correlations (r = .60) were found between Korean Word Spelling (KWS) and English Word Spelling (EWS). As expected, all six tasks in Korean, which were used to measure the Korean phonological, orthographic, and morphological awareness, were more highly correlated with the Korean Word Spelling (KWS) than with the English Word Spelling (EWS). More specifically, the correlation coefficients ranged from moderate to high ($.37 \leq r \leq .63$) between the Korean Word Spelling and the six Korean tasks (i.e., KPB, KPE, KOA, KOB, KMM, KMF), whereas the coefficients were moderate ($.31 \leq r \leq .45$) between the English Word Spelling (EWS) and the six Korean tasks (i.e., KPB, KPE, KOA, KOB, KMM, KMF). All the variables among the English tasks (i.e., EWS, ESS, and EV) were highly correlated ($.61 \leq r \leq .78$).

Table 2
Zero-order correlations among measured variables

	Measure	1	2	3	4	5	6	7	8	9	10
1	KWS	-									
2	EWS	.61	-								
3	ESS	.47	.67	-							
4	EV	.59	.78	.61	-						
5	KPB	.40	.37	.33	.32	-					
6	KPE	.46	.31	.40	.36	.38	-				
7	KOA	.63	.45	.42	.48	.33	.36	-			
8	KOB	.52	.32	.25	.37	.26	.26	.54	-		
9	KMM	.58	.44	.37	.41	.23	.32	.42	.36	-	
10	KMF	.63	.45	.40	.45	.31	.36	.55	.45	.47	-

Note. All coefficients are significant at the .001 level.

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

As previous research (Apel & Lawrence, 2011; Apel, Wilson-Fowler, Brimo, & Perrin, 2012; Nagy et al., 2003; Deacon & Bryant, 2005, 2006; Ehri & Rosenthal, 2007; Kirby, & Bell-Casselman, 2009; Nagy et al., 2006; Perfetti, 1985; Rosenthal & Ehri, 2008) suggested that the morphological awareness (MA) was an important indicator of spelling, MA measures were found to significantly correlate with spellings in both Korean and English. Korean Word Spelling (KWS) was highly correlated with both

orthographic awareness (OA: a latent factor with two indicators: KOA, r = .63 and KOB, r = .53) and morphological awareness (MA: a latent factor with two indicators: KMM, r = .55 and KMF, r = .62) measures, whereas English Word Spelling (EWS) was a little bit more closely correlated with MA measures (KMM, r = .44 and KMF, r = .45) than with OA measures (KOA, r = .45 and KOB, r = .32).

Structural Equation Modeling

Structural equation model was used to evaluate the contribution of Korean phonological, orthographic, and morphological awareness - each measured by two indicators - to both Korean and English spelling outcomes, respectively, for the Korean elementary school children. All structural equation modeling analyses were performed using M-plus (Muthén,& Muthén,2007) and various fit indices were used to evaluate the overall model fit. Several researchers (Byrne, 2005; Hu & Bentler, 1999; Kline, 2011) recommended reporting the multiple fit indices for model fit evaluation, such as, χ^2 with degrees of freedom and p value, Root Mean Square Error of Approximation (RMSEA) along with its 90% of confidence interval, Standardized Root Mean Square Residual (SRMR) and Comparative Fit Index (CFI). All these fit indices were reported in this study and the cutoff scores that recommended by Hu and Bentler (1999) and Byrne (2010) were used.

The χ^2 statistic tests the null hypothesis that the covariance matrix implied by the hypothesized model provides a good fit to the observed covariance matrix. If χ^2 statistic is not statistically significant, it generally means that the model fits to the data well; but

it does not necessarily mean whether the model is correct (Kline, 2011). In addition, the χ^2 statistic is extremely sensitive to the sample size. Even small deviation from the population covariance structure may produce rejection in large samples. Therefore, sole use of this statistic is inconclusive proof of model fit, and several other fit indices need to be considered.

As a goodness-of-fit index, the Root Mean Square Error of Approximation (RMSEA) measures the error of approximation to the population covariance matrix (error of the hypothesized model from the actual data) and the smaller value indicates the better fit. Values of RMSEA that are less than .05 are considered as good fit and less than .08 are as fair fit (Kline, 2011).

The Standard Root Mean Square Residual (SRMR) provides the average difference between the hypothesized model and the actual model driven by the data, by comparing the two models' correlation matrices (Kline, 2011). Values of less than .05 are considered as good fit and less than .08 are as fair or acceptable fit.

The Comparative Fit Index (CFI) is an incremental fit index that measures the relative improvement in the hypothesized model fits compared to a baseline model (Kline, 2011). A baseline model assumes no relations exist between variables and thus, it represents the most restricted/worst possible fit of the data. The CFI generally ranges between 0 and 1, with values approaching 1 indicating better fit. If CFI values are greater than .95, it is considered evidence of as good fit (Hu & Bentler, 1999; Kline, 2011).

Confirmatory Factor Analysis Model

Prior to testing the contributions of the Korean phonological, orthographic, and morphological measures to the spelling outcomes with the structural equation models, confirmatory factor analysis (CFA) was performed to establish the measurement model. The CFA model evaluates how well the measured variables represent their corresponding latent variables. In CFA model, regression paths represent factor loadings, which measure "the strength of the regression paths from the factors to the observed variables" (Byrne, 2010, p.6). In other words, factor loadings indicate how the latent variables are measured in terms of the observed variables.

The hypothesized CFA model was proposed in Figure 1 and the standardized estimates of the CFA model were presented in Figure 2. The several fit indices indicated an excellent model fit: a non-significant, χ^2 (6) = 3.350, p = .764, indicating there is little difference between the hypothesized model and the observed model that is derived from the data. In addition, fit indexes, such as, CFI = 1.000, RMSEA = .000 with 90% confidence interval ranging from.000 to .053 and SRMR = .014, further support a good data-model fit.

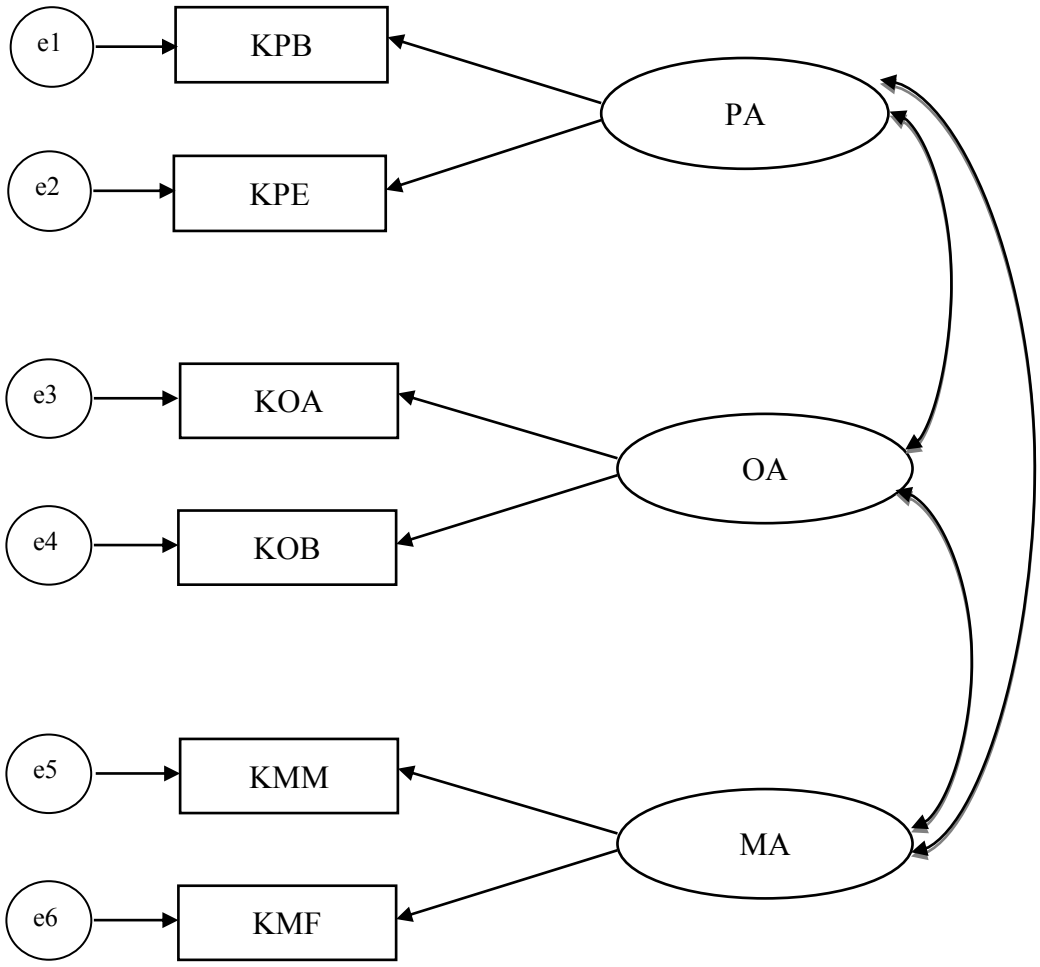

Figure 1
Hypothesized three-factor, first-order CFA model

Note. KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

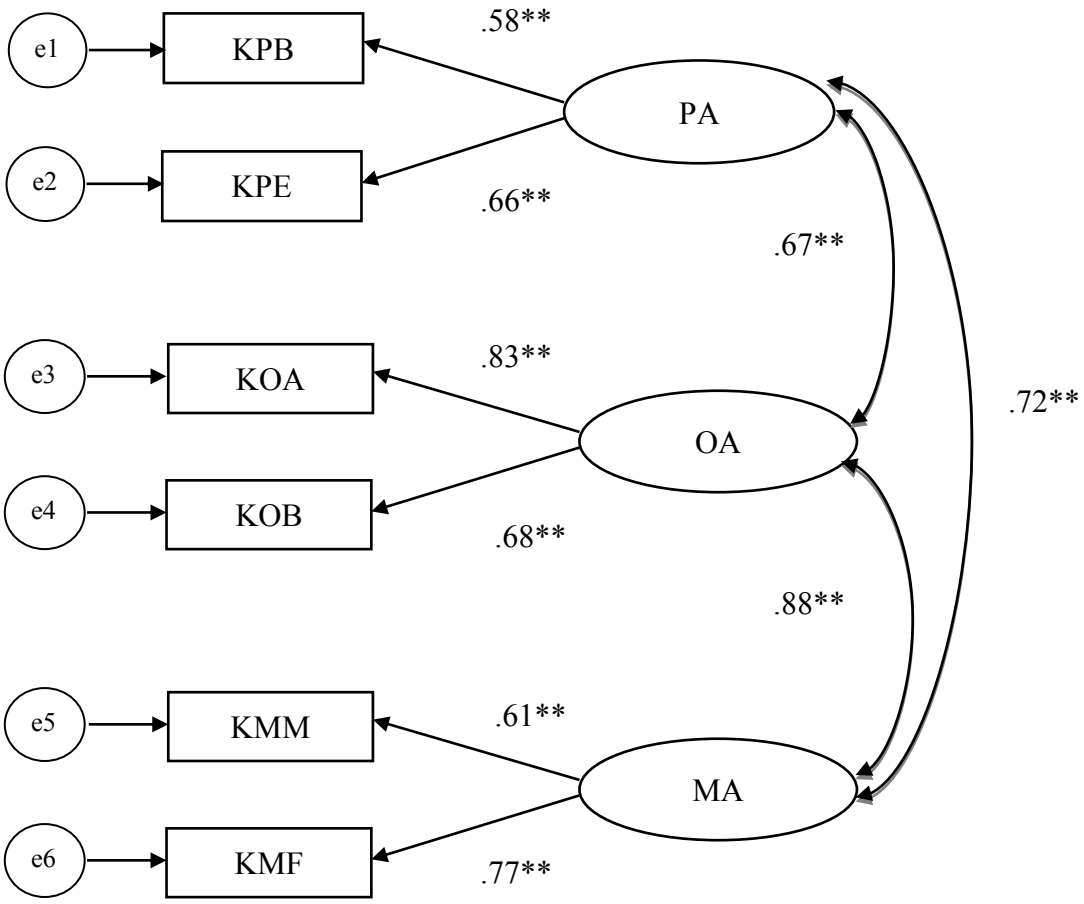

Figure 2
Standardized estimates of three-factor, first-order CFA model

Note. χ^2 (6) = 3.350, p = .764, CFI = 1.000, RMSEA = .000 with 90% confidence interval of (.000, .053), SRMR = 0.014. ** P < .001

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

All parameter estimates for this CFA model showed significantly high loadings to their corresponding/related latent variables, ranging from .58 to .83 and all coefficients were found to be statistically significant at the .001 level. This indicates that each measured variable made a significant contribution to their corresponding latent variables and reliably represent their proposed latent variables (i.e., PA, OA, and MA). The standardized factor loading of KOA on OA was the highest ($\gamma = .83$) and of KPB on PA was the lowest ($\gamma = .58$). The correlation coefficients among the three latent variables were also relatively high: $r = .67$ (PA with OA), .72 (PA with MA) and .88 (OA with MA). The high correlations among the three factors may suggest that there is a possible higher-order factor, which governs all three factors. All standardized parameter estimates are presented in Table 3, along with R-square statistics.

Table 3
Standardized parameter estimates of the CFA model (Measurement model)

Parameter		Standardized Estimate	SE
Factor Loading	PA BY		
	KPB	0.58	0.06
	KPE	0.66	0.06
	OA BY		
	KOA	0.83	0.04
	KOB	0.68	0.04
	MA BY		
	KMM	0.61	0.05
	KMF	0.77	0.04
Correlation	PA WITH OA	0.67	0.07
	PA WITH MA	0.72	0.08
	OA WITH MA	0.88	0.06
R-Square	KPB	0.34	0.07
	KPE	0.43	0.08
	KOA	0.68	0.06
	KOB	0.48	0.06
	KMM	0.37	0.06
	KMF	0.60	0.07

Note. All coefficients are significant at the .001 level.

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

Structural Equation Model

On the basis of the results for the CFA model, a structural equation model was constructed to examine the contributions of each latent variable (i.e., PA, OA, and MA) to the spelling outcomes in both Korean and English (see Figure 3): whether there was any unique/shared contribution of each factor to the prediction of the Korean and English Word Spelling (KWS/EWS) outcomes was examined.

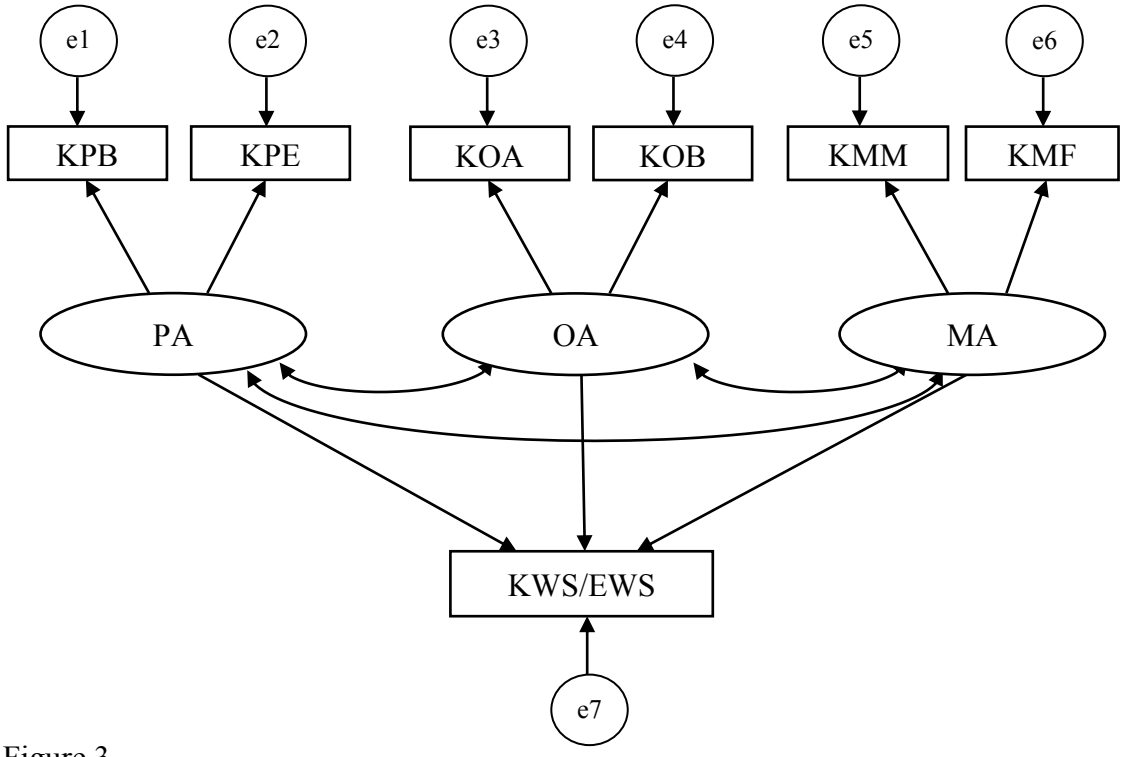

Figure 3
Hypothesized SEM model for Korean/English spellings

Note. KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

The overall fit of the structural models for both Korean Spelling and English Spelling, respectively, indicates very good model fit (See Table 4). Followings are the fit indices (1) for the Korean Word Spelling (KWS) outcome, χ^2 (9) = 5.588, p = .780, CFI = 1.000, RMSEA = 0.000 with 90% confidence interval ranging from .000 to .051 and SRMR = .015; (2) for the English Word Spelling (EWS) outcome, χ^2 (9) = 8.549, p = .480, CFI = 1.000, RMSEA = .000 with 90% confidence interval ranging from .000 to .064 and SRMR =.018.

Table 4
Fit indices of the measurement model and the structural model

Model		χ^2 (df)	p-value	CFI	RMSEA	SRMR
Measurement Model (CFA)		3.350 (6)	.764	1.000	0.000 (.000-.053)	0.014
Structural Model	Korean Spelling	6.412 (9)	.698	1.000	0.000 (.000-.051)	0.016
	English Spelling	8.546 (9)	.480	1.000	0.000 (.000-.064)	0.018

When it comes to the path coefficients, we find that not all direct paths, which measure the strength of the paths from the factors to the outcome variables, are statistically significant. In both Korean Spelling and English Spelling (KWS/EWS) outcomes, only the MA factor was statistically significant onto the KWS/EWS at the

level of p <.05. The path coefficients from the PA and the OA factors to the spelling outcomes were not statistically significant, as shown in Figure 4 and Figure 5.

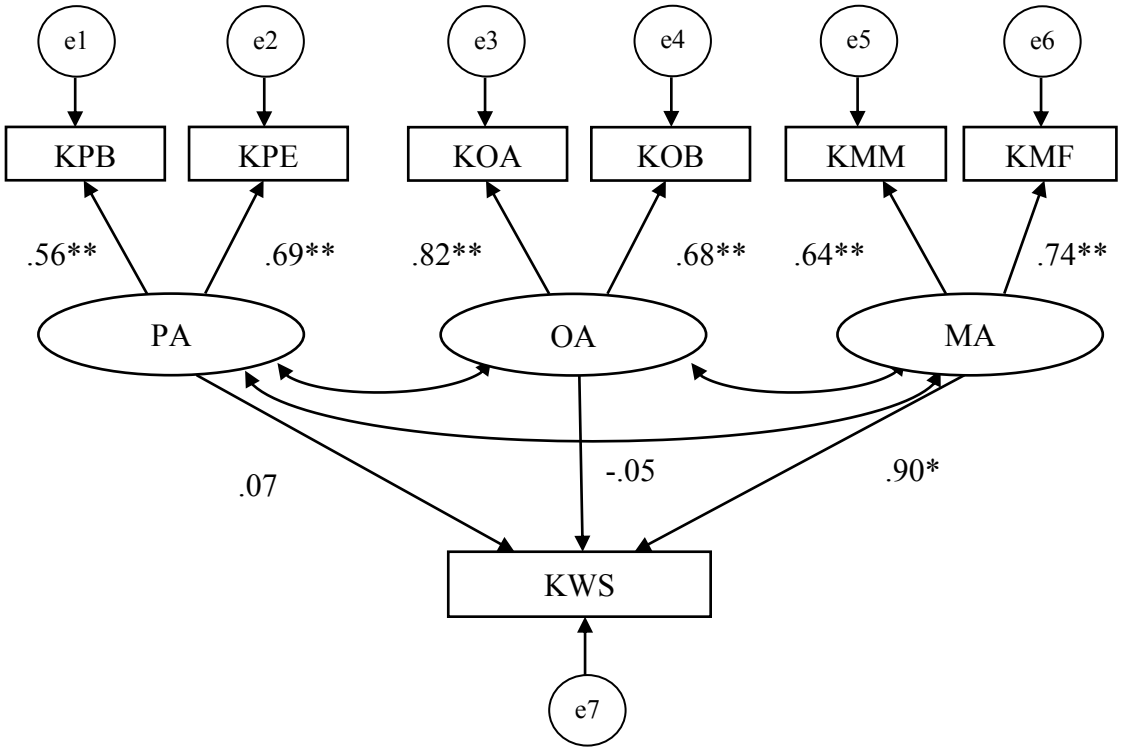

Figure 4
Standardized estimates of the SEM model for Korean spelling

Note. * p <.05, ** p < .001

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

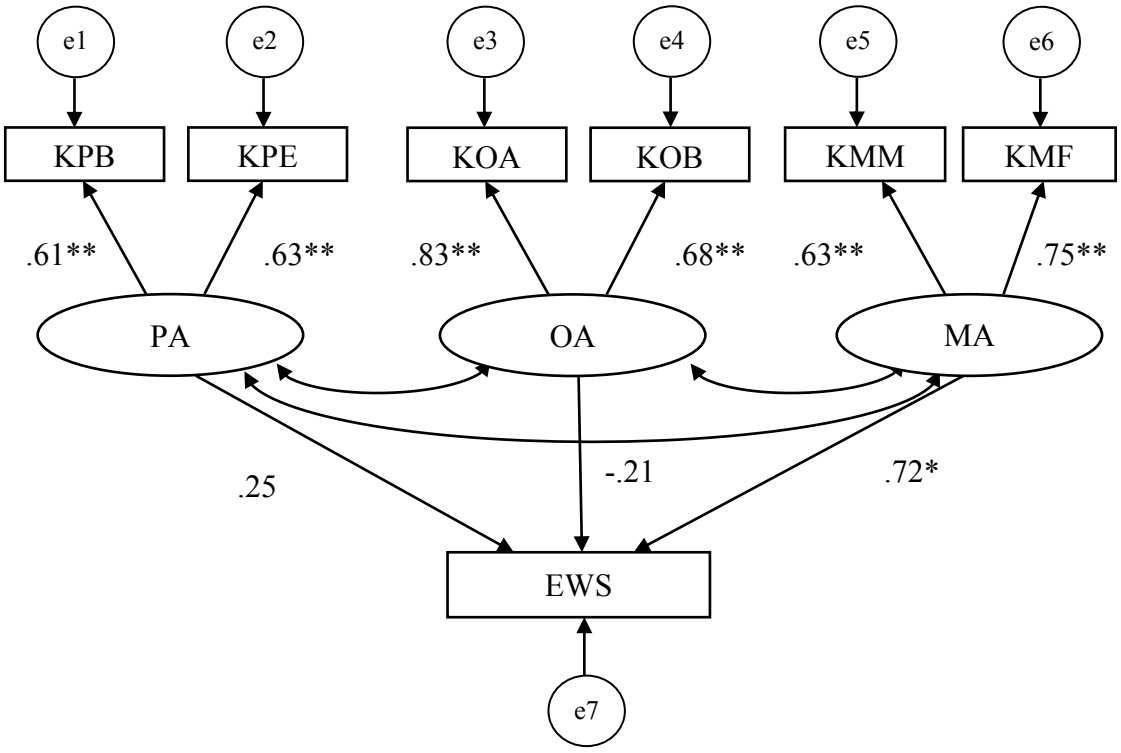

Figure 5
Standardized estimates of the SEM model for English spelling

Note. * P <.05, ** p < .001

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

Given the results that the direct path coefficients of the two factors (i.e., PA & OA) to the spelling outcome variables were not statistically significant, we might suggest that there is an underlying higher order factor that is reflected by the first-order factors. In addition, as previously noted, high correlations among these three first-order factors (i.e., PA, OA, and MA) might further support that the structural equation model might be better represented by a second-order factor model.

A Second-Order Factor Structural Model

After analyzing three-factor first- order model, the idea that a second-order factor model might be better fit to the data was suggested and a second-order factor model was developed. First, a second-order confirmatory factor analysis was hypothesized as seen in Figure 6. According to Kline (2011), there must be at least three first-order factors to identify a second-order/hierarchical CFA model and each first-order factor should have at least two indicators. The hypothesized second-order factor model in Figure 6 meets these conditions. In this model, there are no double arrows which indicate correlations among the first-order factors because the second-order factor represents what the first-order factors have in common. Therefore, correlations among these three first-order factors are now explained by the second-order factor, META (Byrne, 2005). The second order factor, META (i.e., Metalinguistic Awareness) here is defined as an overarching construct which represents the three metalinguistic awareness skills (i.e., PA, OA, and MA). The second-order CFA model produced an excellent fit to the data, χ^2 (6) = 3.350, p = .7639, CFI = 1.000, RMSEA = .000 with 90% confidence interval ranging from .000

to .053 and SRMR = .014. There was basically no difference in model fits between the first-order and second-order CFA models.

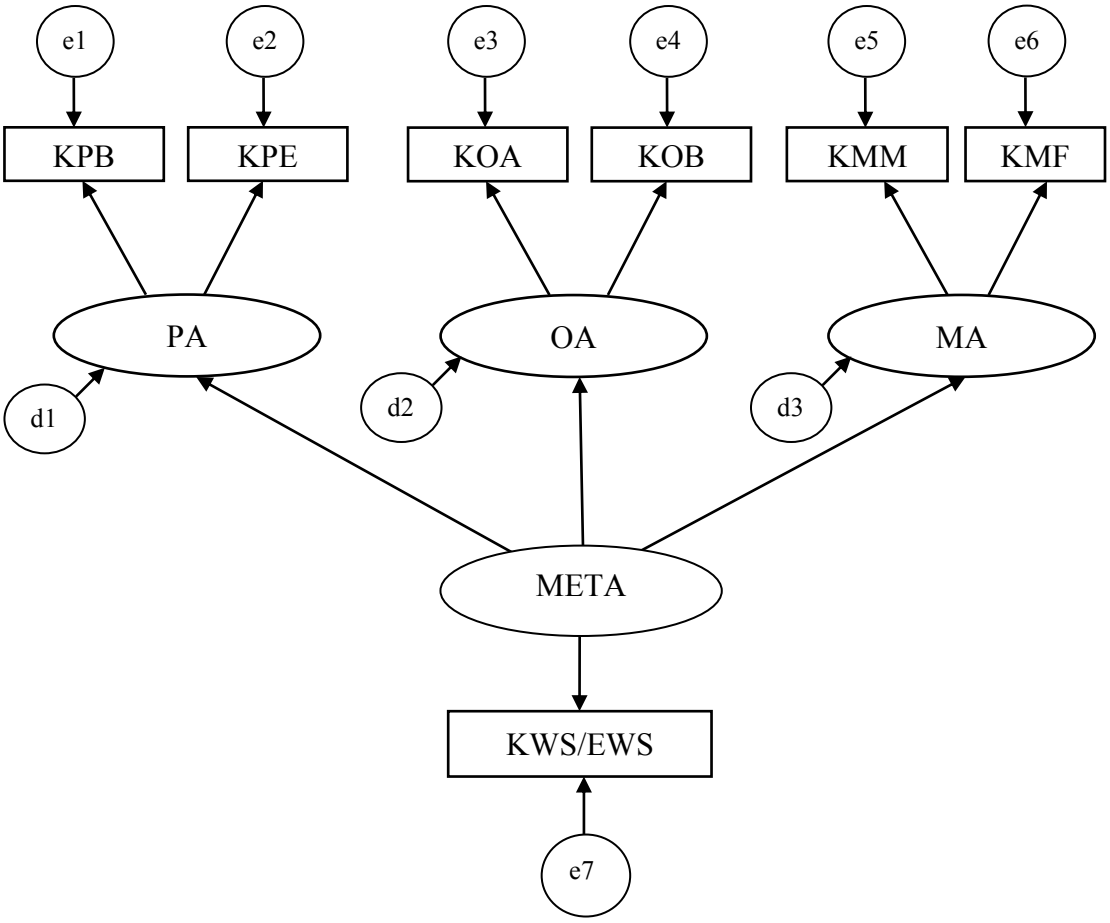

Figure 6
Hypothesized four-factor, second-order SEM model

Note.
KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

Now that we have evaluated a second-order CFA model, the next step is to construct a second-order structural model by adding the outcome spelling variable. Followings are the overall fit indices for the second-order structural model. In the case of Korean Word Spelling (KWS), the second-order factor model produces an excellent fit to the data, χ^2 (11) = 6.126, p = .864, CFI = 1.000, RMSEA = .000 with 90% confidence interval ranging from .000 to .033 and SRMR = .015. There is basically no difference of model fits between the first-order and second-order models in terms of KWS. In the case of English Word Spelling (EWS), the second-order factor model also yields a very good model fit to the data; χ^2 (11) = 12.608, p = .320, CFI = .997, RMSEA = .023 with 90% confidence interval ranging from .000 to .068 and SRMR = .022. Although fit indices of this second-order model for EWS are not as same as the ones of the first-order model for EWS - the difference in model fits between the two models is very minimal, they still present an excellent fit, indicating that this second-order model is very well fitting to the data. This second-order, four-factor structural models with the Korean and English spelling outcomes are shown in Figure 7 and 8, respectively.

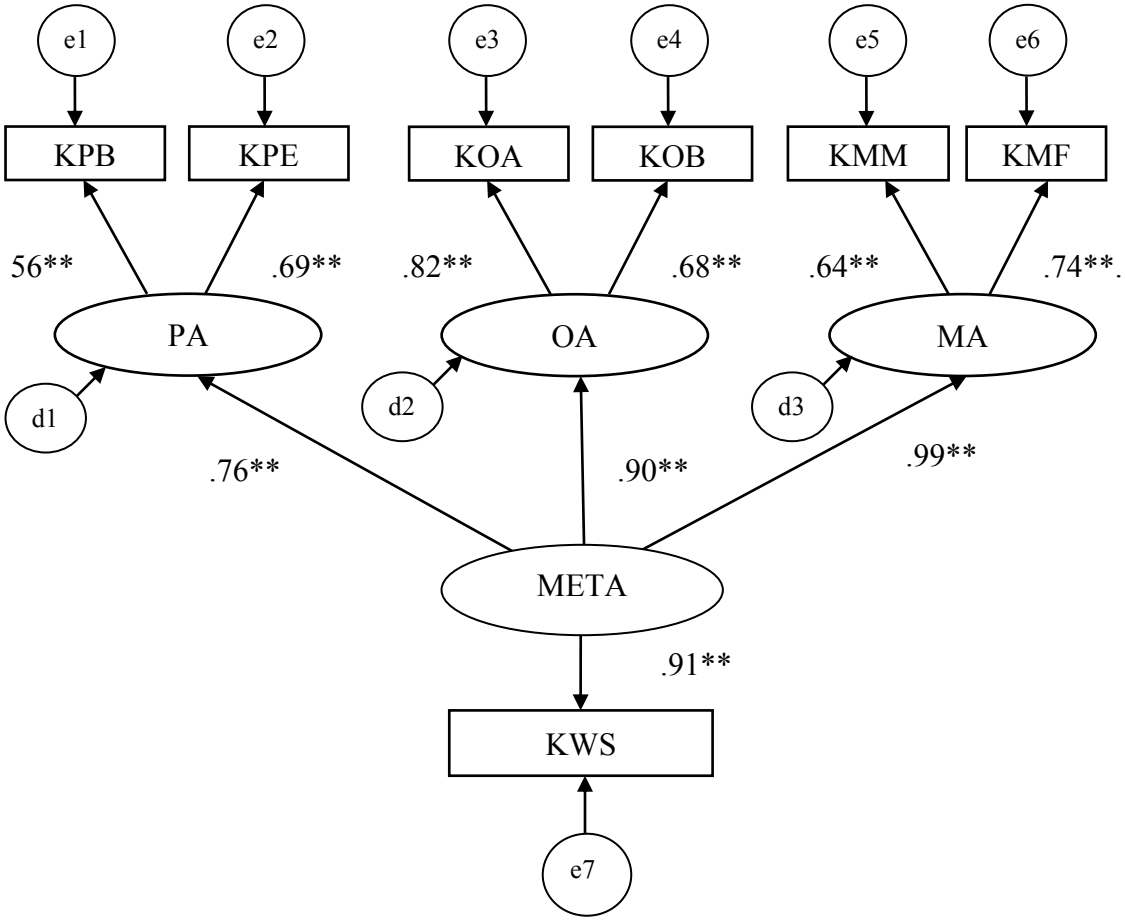

Figure 7
Standardized parameter estimates of the second-order SEM for Korean spelling

Note. ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

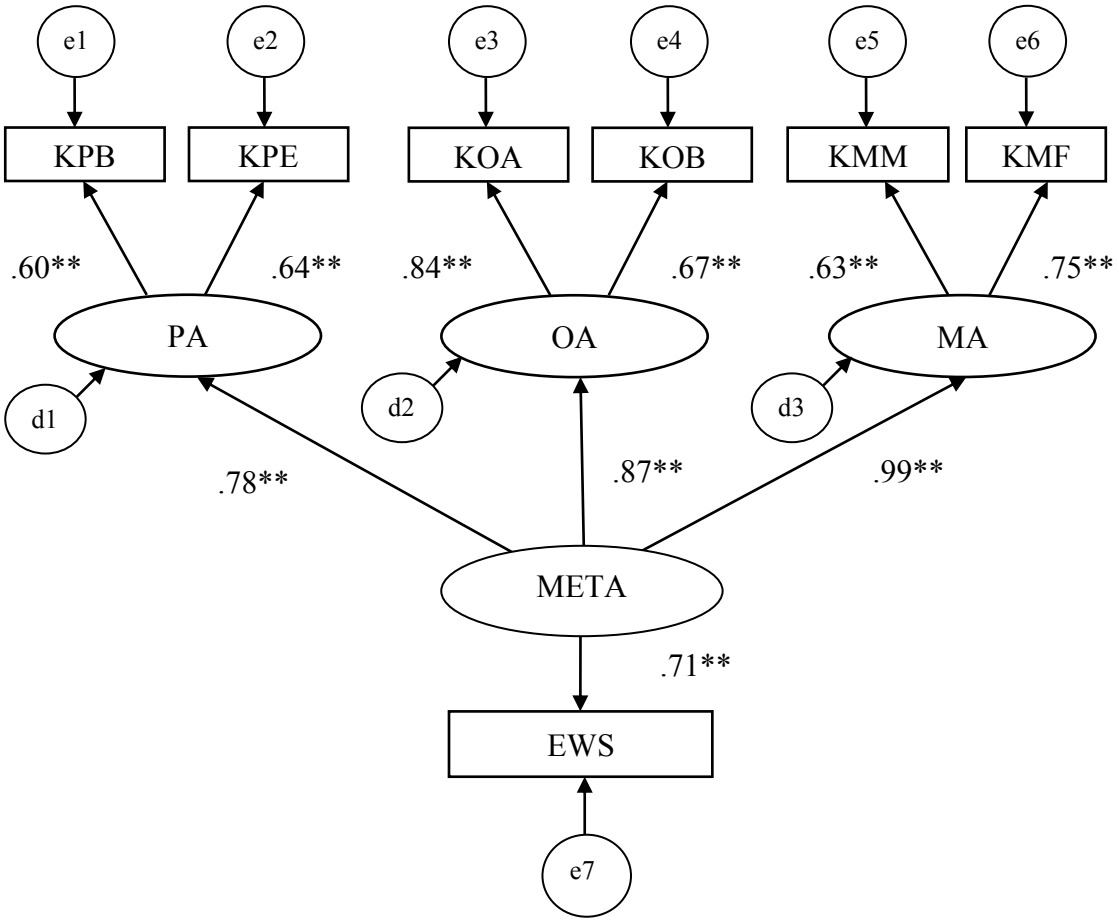

Figure 8
Standardized parameter estimates of the second-order SEM for English spelling

Note. ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

All standardized parameter estimates were statistically significant at the level of .001 in both Korean and English spelling models. For the Korean Word Spelling (KWS) model, the factor loadings of the three first-order factors (PA, OA, MA) from the second-order factor (META) were .75, .89, and .99, respectively. The standardized path coefficient (regression weight) from META to the Korean spelling outcome, KWS was .91. In other words, one standard deviation increase in META increases a .91 standard deviation in KWS. For the English Word Spelling (EWS) model, the second-order (META) factor loadings to the three first-order factors (PA, OA, MA) were .78, .87, and .99, respectively. The standardized path coefficient (regression weight) from META to the English spelling outcome, EWS was .71. That is, one standard deviation increase in META increases a .71 standard deviation in EWS.

Further examination of individual parameters suggested that, in both models, the MA factor yielded the highest factor loadings on the second-order factor, META (i.e., .99 & .99) followed by the OA factor (i.e., .89 & .87) and the PA factor (i.e., .75 & .78) in the order. Additionally, the parameter estimate of the MA factor for Korean model was as same as the one of English model. The OA factor yielded slightly higher factor loadings in the Korean spelling model than in the English spelling model and the PA factor showed slightly higher factor loadings in the English spelling model. A summary of standardized factor loadings and R-square statistic for the second-order structural factor model were shown in Table 5.

Table 5
Standardized parameter estimates of the second-order SEM model

Parameter			Korean Spelling		English Spelling	
			Standardized Estimate	SE	Standardized Estimate	SE
Factor Loading	META BY	PA	0.75	0.062	0.78	0.065
		OA	0.87	0.037	0.87	0.043
		MA	0.99	0.029	0.99	0.047
	PA BY	KPB	0.56	0.057	0.59	0.058
		KPE	0.69	0.058	0.64	0.058
	OA BY	KOA	0.82	0.035	0.84	0.038
		KOB	0.68	0.041	0.68	0.043
	MA BY	KMM	0.64	0.043	0.63	0.045
		KMF	0.74	0.039	0.75	0.041
Path Coefficient	KWS/EWS ON	META	0.91	0.022	0.71	0.042
R-Square	Latent Variable	PA	0.57	0.093	0.60	0.102
		OA	0.79	0.066	0.75	0.075
		MA	0.99	0.079	0.93	0.093
	Observed Variable	KPB	0.31	0.064	0.35	0.069
		KPE	0.47	0.080	0.42	0.075
		KOA	0.68	0.057	0.70	0.063
		KOB	0.46	0.055	0.46	0.058
		KMM	0.41	0.055	0.39	0.056
		KMF	0.55	0.058	0.56	0.062
		KWS/EWS	0.83	0.040	0.51	0.060

Note. All coefficients are significant at the .001 level.

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

The question, then, arises as to which model, first-order or second-order, better represents the data of the study. Byrne (2005) discussed some requirements in making choice of a second-order model. First, correlations among the first-order factors must be significantly high. Second, there must be a theoretical/reasonable explanation for second-order factor governing over first order factors. Third, the second-order model needs to represent a good model fit. If these conditions are met, there are some advantages of choosing a higher order CFA model (Rindkopf & Rose, 1988, as cited in Byrne, 2005, p.27). One notable advantage of choosing a higher-order model is that a second-order model is more parsimonious than its first-order model because correlations among the first-order factors do not need to be specified in the second-order factor model, as previously noted.

In regard to the conditions suggested by Byrne (2005), the data of this study seem qualified to be a second-order model. As mentioned earlier, the correlations among the first-order factors are quite substantial; three first-order factors (i.e., PA, OA, and MA) can be explained by a bigger term, metalinguistic awareness and share a common construct (i.e., META); there is almost no difference in the model fits between the first- and the second-order factor models, both indicating a very well-fitting data. Additionally, statistically significant path coefficients to the outcome variables from the second-order factor further suggest that the data of this study could be represented most appropriately as a higher order model. Now that second-order factor model was chosen as a final structural equation model for the data, in the next section, I shall examine whether there was any difference among the three grades.

Multiple Indicators and Multiple Causes (MIMIC) model

Multiple Indicators and Multiple Causes (MIMIC) model is used to examine the effects of the covariates, such as background information, on latent variables to understand measurement invariance or group differences (Kline, 2011). In this section, MIMIC model was used to examine the effects of the group memberships as covariates on the latent factor, META. In other words, MIMIC model was created to investigate the factor mean difference across three grades by using grouping variables as covariates. A hypothesized MIMIC model is shown in Figure 9, in which an arrow from Grades points to the latent factor (META).

In order to create MIMIC model, first, a dummy-coded dichotomous grouping variable was created as either focal group (coded as "1") or reference group (coded as "0"). For example, the first dummy variable (i.e., G4 vs. G5) was coded with G4 as 1 and G5 as 0; the second dummy variable (i.e., G4 vs. G6) was coded with G4 0 and G6 as 1; and the last variable (i.e., G5 vs. G6) was coded with G5 as 1 and G6 as 0. Next, three separate analyses (i.e., G4 vs. G5, G4 vs. G6, and G5 vs. G6) were run and the results showed that the standardized path coefficients from Grade to META (factor) were in the following order: - .379 ($p < .000$); .349 ($p < .000$); .013 ($p > .50$). This means that the latent factor mean of the focal group, Grade 4 (coded as 1) is .379 units lower than that of the reference group, Grade 5 (coded as 0). Also, the latent factor mean of the Grade 4 (coded as 1) is .349 unit lower than that of the Grade 6 (coded as 0) and there is no significant difference between Grades 5 and 6.

In addition to the analyses on factor mean difference across grades, separate analyses were carried out across three grades in order to examine grade-level differences in structural path coefficients. Standardized factor loadings and R-square statistics for Grade 4, 5 and 6 models are shown in Table 6 and 7.

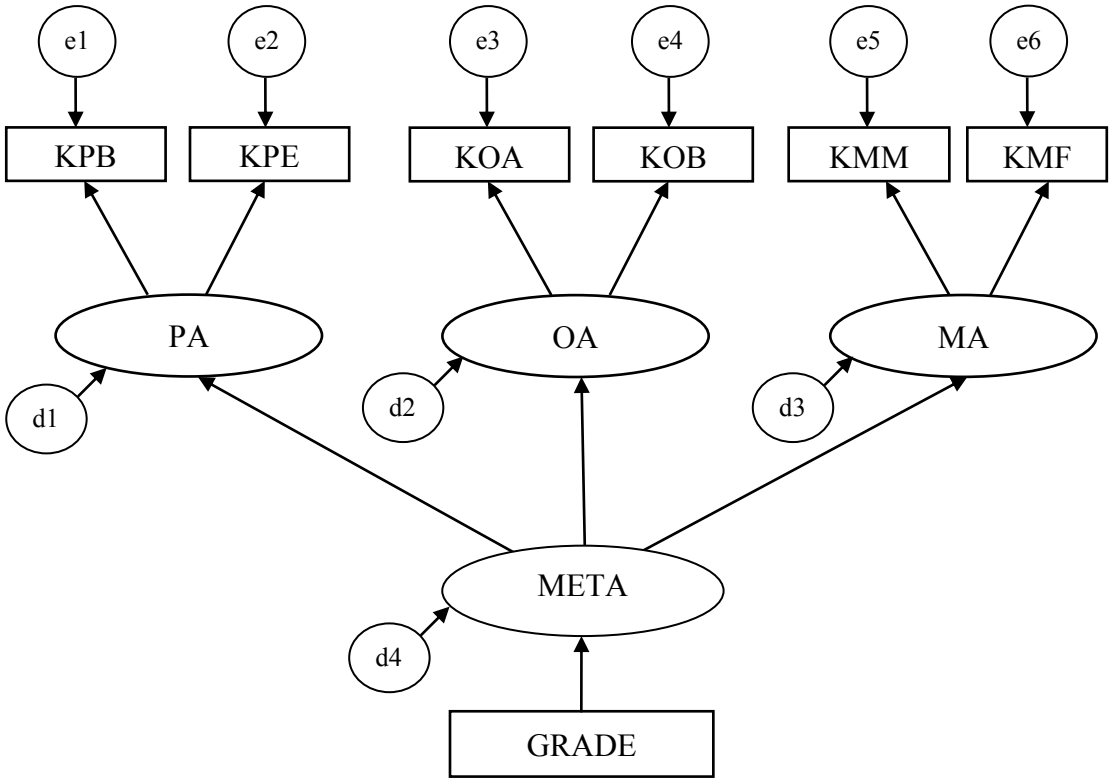

Figure 9
Hypothesized multiple indicators multiple causes (MIMIC) model with a covariate

Note.
KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

Table 6
Standardized parameter estimates of the second-order SEM model (Korean word spelling) by grade

Parameter			All		Grade 4		Grade 5		Grade 6	
			Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Factor Loading	PA BY	KPB	.56	0.057	.54	0.105	.37	0.116	.69	0.117
		KPE	.69	0.058	.77	0.111	.60	0.140	.55	0.109
	OA BY	KOA	.82	0.035	.79	0.063	.84	0.058	.75	0.099
		KOB	.68	0.041	.79	0.064	.62	0.073	.49	0.095
	MA BY	KMM	.64	0.043	.65	0.078	.44	0.088	.73	0.069
		KMF	.74	0.039	.70	0.076	.82	0.047	.69	0.071
	META BY	PA	.75	0.062	.68	0.111	.83	0.176	.64	0.120
		OA	.89	0.037	.84	0.070	.92	0.062	.82	0.107
		MA	.99	0.029	.98	0.077	.98	0.010	.94	0.080
Direct Path	KWS ON	META	.91	0.022	.924	0.042	.926	0.034	.86	0.059
R-Square	Latent Variable	PA	.57	0.093	.46	0.151	.69[b]	0.292	.40	0.153
		OA	.79	0.066	.71	0.118	.84	0.113	.67	0.175
		MA	.99	0.079	.97	0.151	.96	0.020	.88	0.150
	Observed Variable	KPB	.31	0.064	.29	0.114	.14	0.085	.47	0.161
		KPE	.47	0.080	.59	0.171	.36	0.167	.31[a]	0.120
		KOA	.68	0.057	.63	0.100	.70	0.098	.56	0.148
		KOB	.46	0.055	.62	0.100	.39	0.090	.24	0.094
		KMM	.41	0.055	.43	0.102	.19	0.077	.53	0.101
		KMF	.55	0.058	.49	0.106	.67	0.076	.48	0.098
		KWS	.83	0.040	.85	0.078	.86	0.064	.75	0.101

Note. All coefficients are significant at the .001 level, with an exception of .31[a] ($p \leq .01$). .69[a] ($p = .113$).

Table 7
Standardized parameter estimates of the second-order SEM model (English word spelling) by grade

Parameter			All		Grade 4		Grade 5		Grade 6	
			Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Factor Loading	PA BY	KPB	.59	0.058	.61	0.106	.38	0.121	.77	0.117
		KPE	.64	0.058	.69	0.108	.58	0.147	.49	0.103
	OA BY	KOA	.83	0.038	.86	0.073	.81	0.065	.70	0.111
		KOB	.68	0.043	.74	0.077	.64	0.074	.53	0.103
	MA BY	KMM	.63	0.045	.61	0.090	.50	0.088	.68	0.073
		KMF	.75	0.041	.75	0.088	.80	0.056	.74	0.071
	META BY	PA	.78	0.065	.76	0.124	.79	0.184	.71	0.122
		OA	.87	0.043	.86	0.094	.93	0.071	.77	0.117
		MA	.99	0.047	.88	0.114	.98	0.007	.97	0.090
Direct Path	EWS ON	META	.71	0.042	.55	0.114	.74	0.066	.76	0.087
R-Square	Latent Variable	PA	.60	0.102	.58	0.189	.62	0.289	.50	0.172
		OA	.75	0.075	.73	0.160	.87	0.131	.59	0.179
		MA	.99	0.093	.78	0.201	.97	0.014	.94	0.174
	Observed Variable	KPB	.35	0.069	.37	0.129	.14	0.092[a]	.59	0.180
		KPE	.42	0.075	.47	0.148	.34	0.171	.24	0.101
		KOA	.70	0.063	.74	0.125	.66	0.105	.49	0.155
		KOB	.46	0.058	.55	0.113	.41	0.095	.28	0.109
		KMM	.39	0.056	.38	0.111	.25	0.088	.46	0.099
		KMF	.56	0.062	.57	0.133	.64	0.090	.55	0.105
		EWS	.51	0.060	.30	0.124	.55	0.098	.57	0.132

Note. All coefficients are significant at the .001 level, with an exception of .092[a] (p = .119)

English Spelling Model

So far, several SEMs have been developed and compared with Korean word and English word spelling outcomes, side by side. In this section, I will focus more on English spelling model to shed light on the transfer effects from Korean to English spelling outcome. Three more analyses will be shown in the following section in regards to English Spelling Model.

First, English Spelling model with a covariate will be analyzed in order to examine the transfer effects more clearly. The results of the second-order SEM model have shown that the direct paths from the second-order factor to both Korean and English spellings are highly significant. In addition, the second-order factor of the Korean metalinguistic abilities (i.e., PA, OA and MA) explained 83% of the total variance in the Korean spelling outcome and more importantly, 51% of the total variance in the English spelling outcome. It was truly noticeable that Korean metalinguistic abilities made a significant contribution to the English spelling outcome, which was statistically significant at the level of .001.

Then, a question arises whether the results would be different if we add a covariate in the model. A substantial body of studies has shown that spelling and vocabulary abilities are very closely related (Apel & Lawrence, 2011; Nagy et al., 2003; Deacon & Bryant, 2005, 2006; Ehri & Rosenthal, 2007; Kirby, & Bell-Casselman, 2009; Nagy et al., 2006; Perfetti, 1985; Rosenthal & Ehri, 2008). If we add English vocabulary as a covariate to the model in order to control the students' English abilities in the English spelling outcome, would the direct path from the second-order factor

measured in Korean to the English spelling outcome be still statistically significant? If so, it clearly indicates that transfer from Korean to English spelling outcome exists, even after controlling for the English vocabulary in the English spelling outcome.

In order to control students' English abilities (i.e., English vocabulary ability), English vocabulary variable was entered as a covariate into the model. The overall fit of the English Vocabulary covariate structural model indicates a very good model fit. Followings are the fit indices: χ^2 (16) = 17.387, p =.3610, CFI = .998, RMSEA = .017 with 90% confidence interval ranging from .000 to .059 and SRMR = .021. The result shows that even after adding the covariate to the model, the path from the Korean second-order factor to English spelling outcome is statistically significant at the level of .001 (Figure 10). Although the path coefficient has decreased from .71 to .34, with the inclusion of English vocabulary as a covariate, it is noticeable that the path is still statistically significant at the level of .001, indicating the transfer from Korean abilities to English spelling outcome.

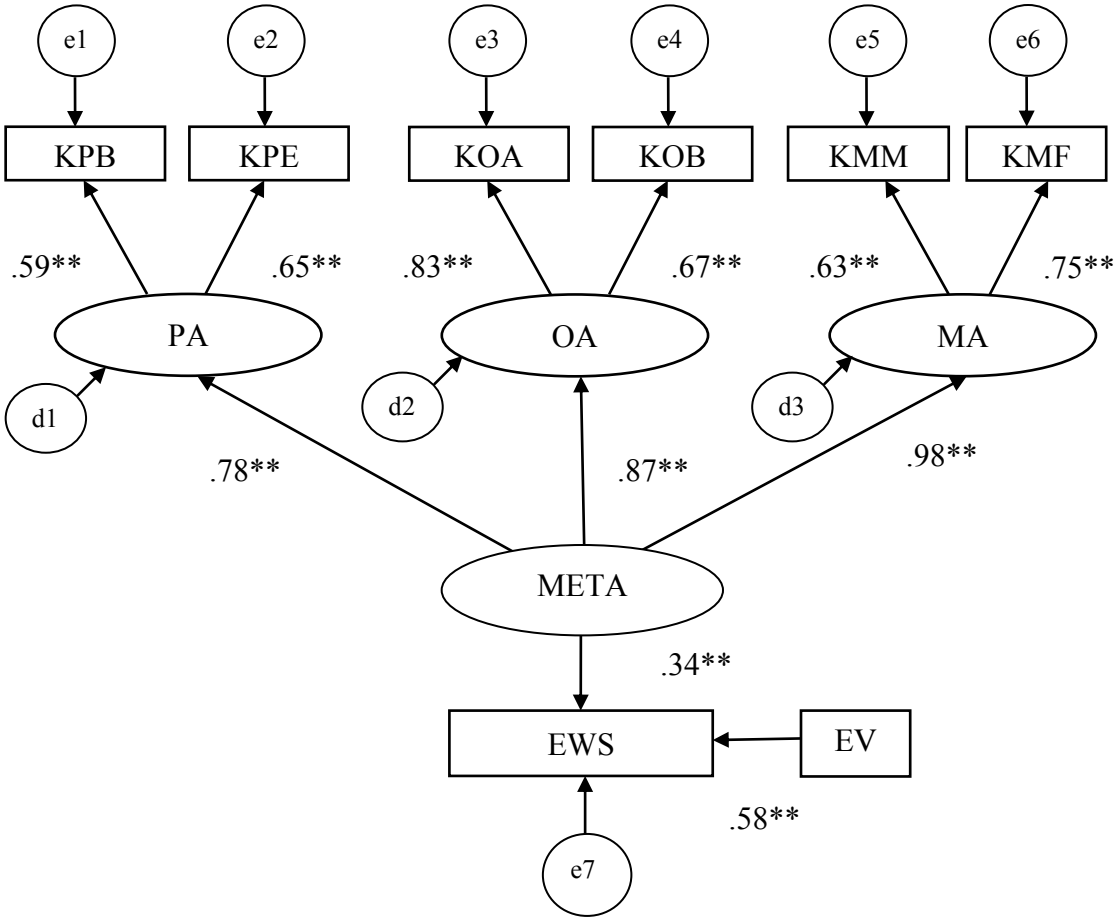

Figure 10
Standardized parameter estimates of the second-order model with a covariate of English vocabulary for English word spelling

Note. ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

In the second analysis of English Spelling model, additional outcome variable will be entered to the model and any changes will be examined in the standardized path coefficients. As mentioned in the chapter III methods section, two types of English Spelling task were administered to the students: English Word Spelling (EWS) and English Sound Spelling (ESS). In all the analyses that have been done so far, only the EWS was used so that English spelling outcome could be compared with Korean spelling outcome, in which only one type of spelling task (i.e., Korean Word Spelling) was administered. As mentioned in the previous chapter, Korean is a shallow orthography, in which the relationship between sound and spelling is more consistent compared to English orthography. There is no need to administer Korean Sound Spelling task since you spell what you hear in Korean Sound Spelling task. On the contrary, English Sound Spelling task is a common practice in assessing students' knowledge of the alphabetic principle.

In order to fully explore the influence of the Korean metalinguistic awareness, META onto English spelling abilities, English Sound Spelling (ESS) was added to the model as an outcome, in addition to the English Word Spelling (EWS). Together, they created a latent factor, English Spelling (ES) and a structural equation model of English Spelling was constructed to examine whether there was any unique contribution of each latent variable (i.e., PA, OA, and MA) to the prediction of the English Spelling outcome by adding one more indicator to the outcome (see Figure 11). The overall fit of the English Spelling structural model indicates very good model fit. Following is the fit

indices: χ^2 (14) = 15.694, p = .332, CFI = .998, RMSEA = .021 with 90% confidence interval ranging from .000 to .062 and SRMR = .019.

In the previous analysis of the first-order model, in which there was only one outcome variable of English Word Spelling (EWS), only the Korean MA factor was statistically significant onto the outcome variable at the level of p <.05, whereas the Korean PA and OA factors were not significant (See Figure 5). However, interestingly enough, in the current analysis where there was a latent variable outcome with two indicators of English Word Spelling and English Sound Spelling, the direct paths from PA as well as MA became statistically significant at the level of p <.05. Given the result that the direct path coefficient of the factor, PA to the outcome became statistically significant by adding the English Sound Spelling (ESS) variable, we might suggest that the Korean Phonological Awareness has a statistically significant contribution to the English Sound Spelling.

Going one more step further from the current analysis, when we add English vocabulary as a covariate in this model in order to control the English abilities, the direct path coefficients from PA and MA decrease, but they are still marginally significant, indicating the unique contribution to the English Spelling outcome. The standardized coefficients of each path are followings: PA .21 (p = .07); MA .51 (p = .06) (Figure 12).

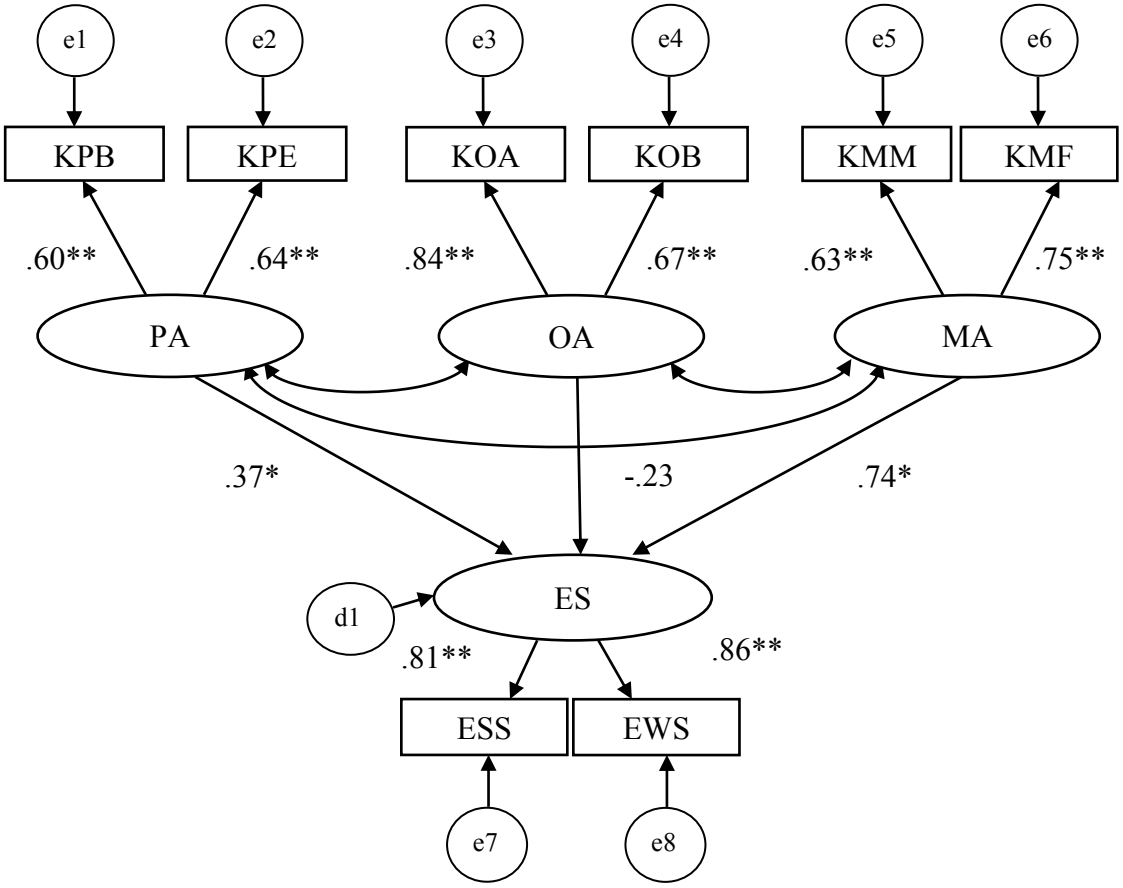

Figure 11
Standardized parameter estimates of the English spelling model with two outcome indicators

Note. *$p < .05$, ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

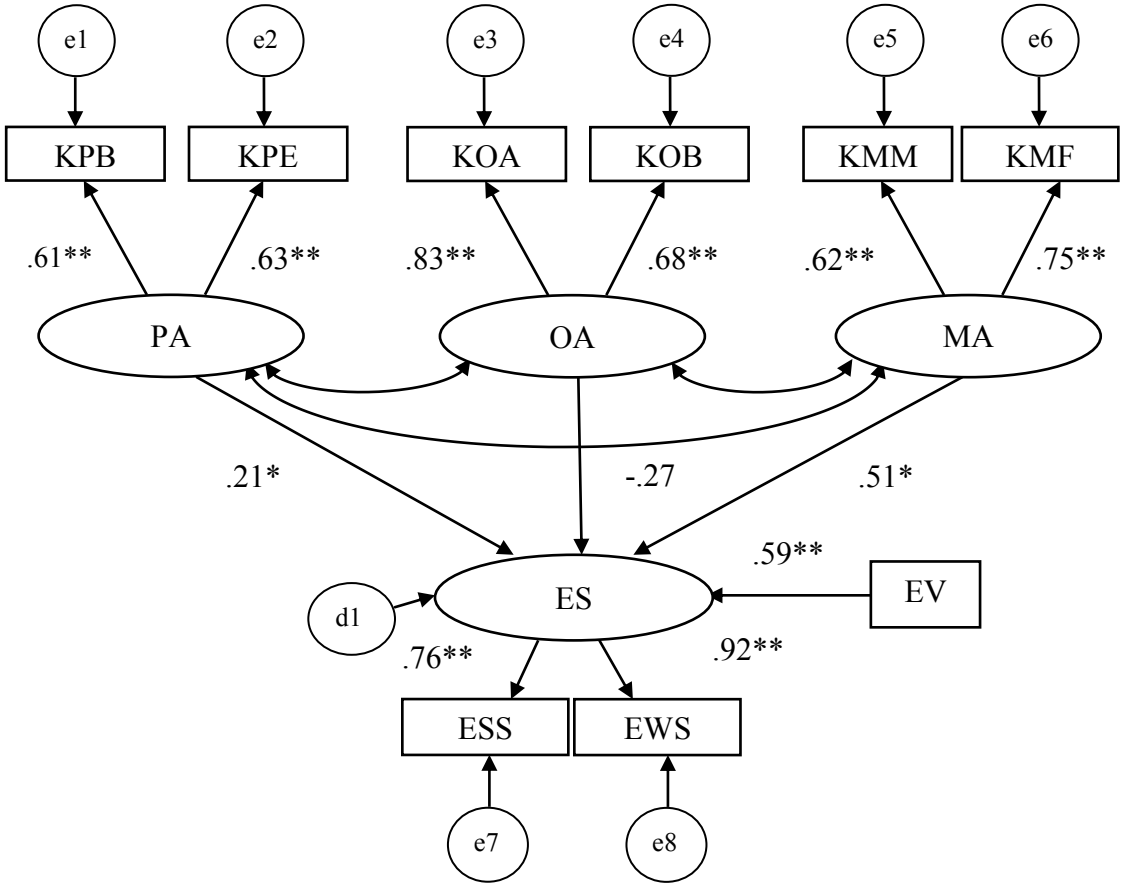

Figure 12
Standardized parameter estimates of the English spelling model with a covariate of English vocabulary

Note. *$p < .10$, ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form

Lastly, in the third analyses, second-order SEM models were analyzed with two outcome indicators and covariates of vocabulary and age. The standardized path coefficients of the analyses were shown in Figure 13 and Figure 14. There were almost no changes in path coefficients, other than the increase in the direct path from the latent factor, META to English Spelling outcome (i.e., .71 to .83). This was because one more indicator (i.e., ESS) was added to the outcome variable, which led META to be able to explain more variance in the English Spelling outcome (ES).

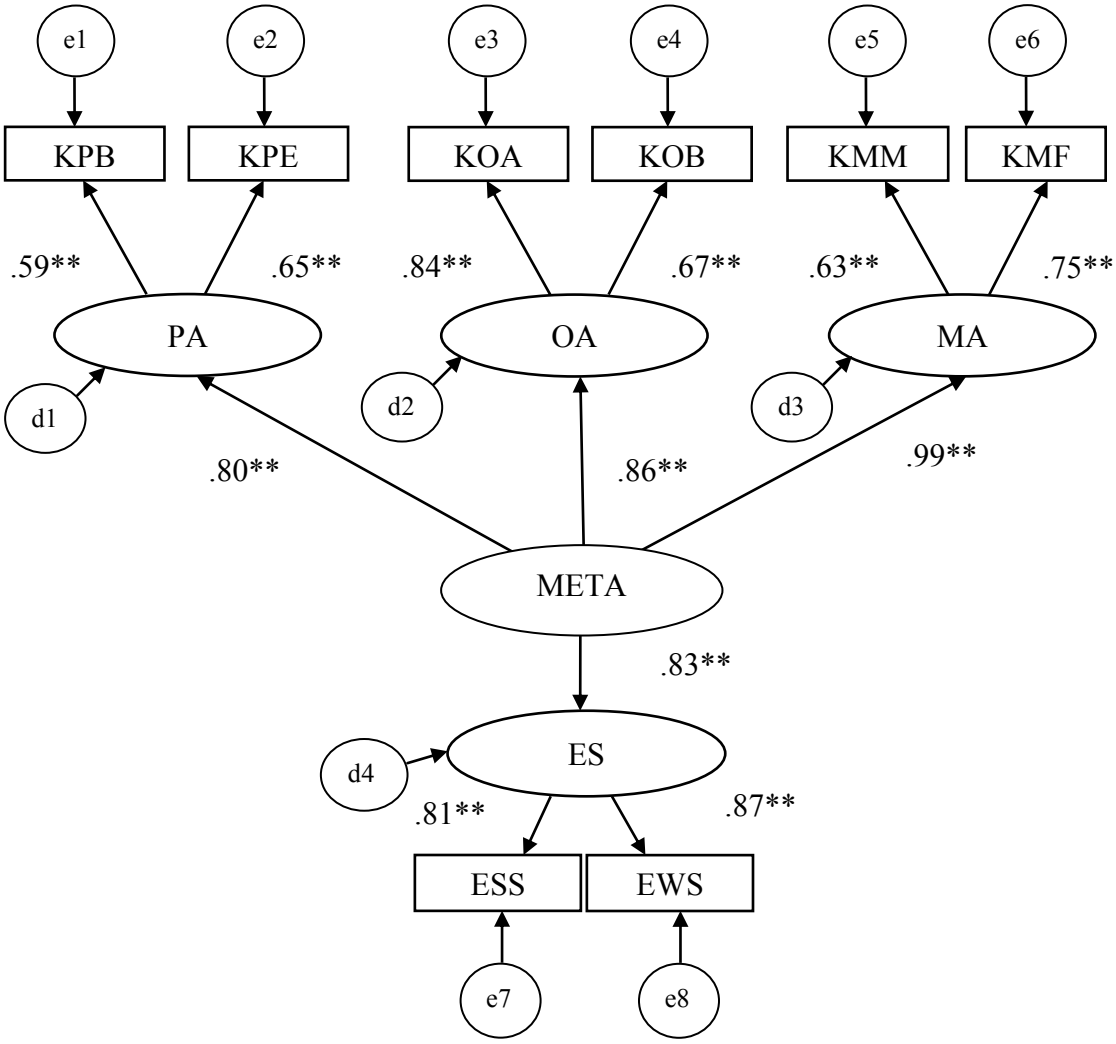

Figure 13
Standardized parameter estimates of the second-order English spelling model

Note. ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

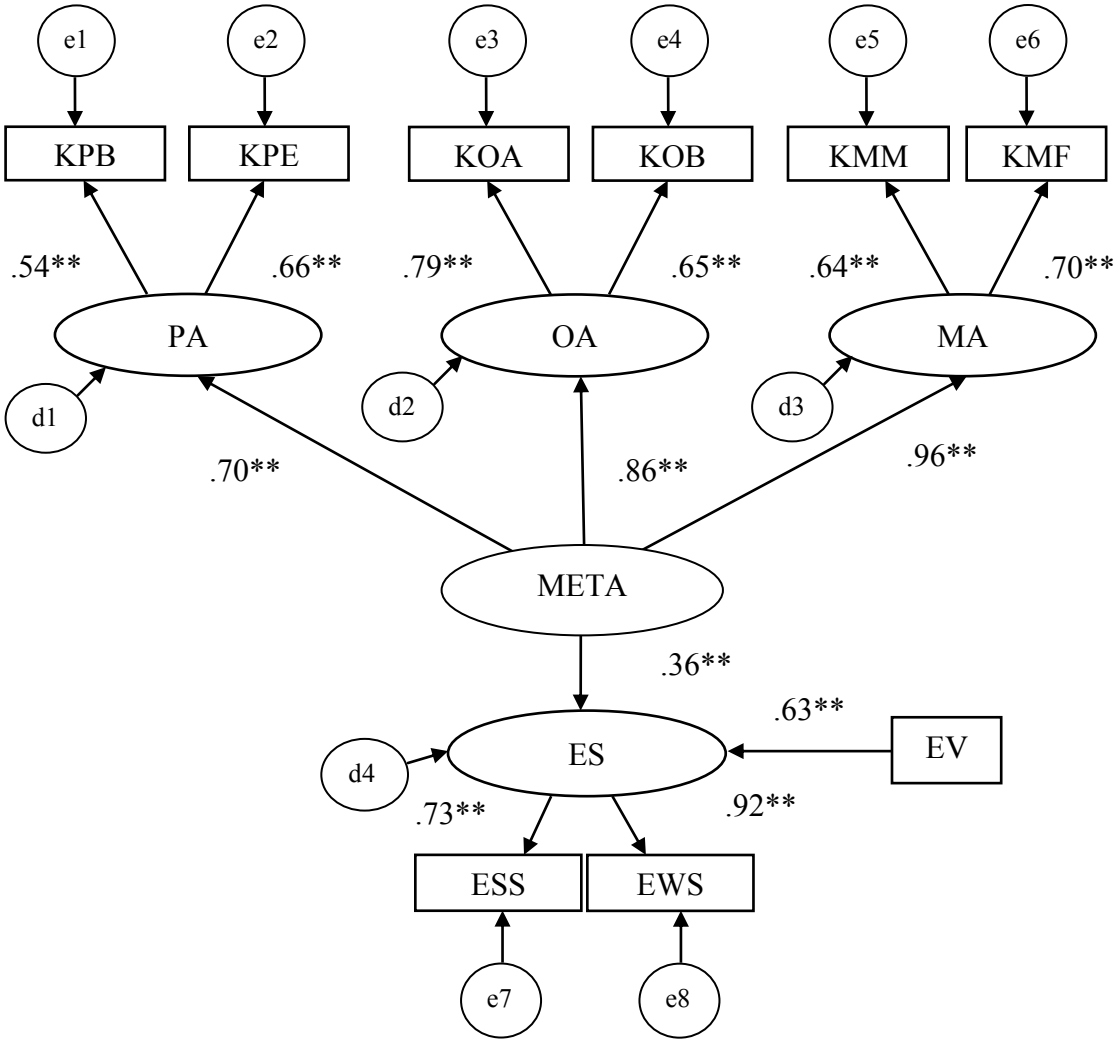

Figure 14
Standardized parameter estimates of the second-order English spelling model with a covariate of English vocabulary

Note. ** $p < .001$

KWS = Korean Word Spelling, EWS = English Word Spelling, ESS = English Sound Spelling, EV = English Vocabulary, KPB = Korean Phonological Awareness-Beginning phoneme (onset) oddity task, KPE = Korean Phonological Awareness-Ending phoneme oddity task, KOA = Korean Orthographic Choice task-A, KOB = Korean Orthographic task-B, KMM = Korean Morphological Awareness – Meaning, KMF = Korean Morphological Awareness – Form, META = Metalinguistic Awareness

CHAPTER V

DISCUSSIONS AND CONCLUSIONS

Discussions

Metalinguistic awareness skills (i.e., phonological awareness, orthographic awareness, morphological awareness) contribute to children's spelling as well as reading (Bear & Templeton, 1998; Moats, 2000; Treiman, 1993; Treiman & Bourassa, 2000). Although the multi-dimensional nature of these metalinguistic awareness skills has been acknowledged, little research has been conducted in the simultaneous investigation of these three metalinguistic skills (e.g., Apel et al., 2012), and it is especially true for Korean Hangul. The purpose of this study was to simultaneously examine these three inter-related constructs and the unique and shared contributions of each construct to English spelling as well as Korean spelling of typically developing fourth, fifth and sixth grade Korean students.

The first-order factor hypothesized measurement model was tested with CFA, using M-Plus and the fit was excellent. Then, Korean and English spelling outcomes were regressed on the three first-order factors (i.e., phonological, orthographic, and morphological awareness), respectively. The results indicated that morphological awareness alone made a unique contribution to both Korean and English Spelling. Orthographic awareness as well as phonological awareness did not make statistically significant unique contribution to both Korean and English Spelling.

Next, based on the results of the first-order model, the second-order hypothesized model was tested and demonstrated excellent fit. The second-order factor, META was a multi-dimensional metalinguistic construct defined by these three first-order factors. The factor loadings for META were significant in both Korean and English models. Implications of results for Korean metalinguistic awareness models in relation with spellings in Korean and English are discussed below, corresponding to three research questions.

Korean Spelling

RQ1. Are phonological, orthographic, and morphological awareness important components of Korean spelling?

To summarize the findings, Korean morphological awareness skills made the strongest unique contribution among Korean-speaking children in Grades 4, 5, and 6, explaining 83% of unique variance in Korean spelling. On the other hand, orthographic awareness as well as phonological awareness skills did not explain unique variance in Korean spelling. The significant role of morphological awareness alone, but not phonological and orthographic awareness on spelling performance was rather unexpected. However, these findings confirmed that children's morphological awareness skills were strongly connected with spelling abilities in Korean and were also in line with many investigations in which morphological awareness was the strongest predictor to spelling across various age and language groups (Apel & Lawrence, 2011; Apel, Elizabeth, Wilson-Fowler, 2012; Casalis, Deacon, & Pacton, 2011; Deacon &

Bryant, 2005, 2006; Ehri & Rosenthal, 2007; Deacon, Kirby, & Casselman-Bell, 2009; Nagy et al., 2003, 2006; Perfetti, 1985; Rosenthal & Ehri, 2008; Walker & Hauerwas; 2006).

Most of the studies mentioned investigated English-speaking children, with some involved with Chinese, Spanish, French, etc. However, their findings were consistent with the ones of the current study. For example, very recent study involving English-speaking children, Apel and his colleagues (2012) investigated the simultaneous influence of three metalinguistic awareness skills, linguistic skills (i.e., receptive vocabulary), and processing skills (i.e., rapid naming abilities) on reading and spelling in Grades 2 and 3. Apel et al.(2012) found that morphological awareness alone made a unique contribution to spelling; orthographic awareness contributed unique variance to word recognition, but none of phonemic awareness, rapid naming abilities and receptive vocabulary abilities made unique contributions to any of the three outcome variables (i.e., word recognition, spelling and reading comprehension).

Very few investigations have been involved with Korean metalinguistic awareness skills and in fact, as far as I know, only one study examined the predictions of all three metalinguistic awareness skills to Korean spelling performance. Among the studies involving Korean metalinguistic awareness skills, as previously reviewed, Wang et al. (2006b) examined phonological and orthographic awareness skills to predict Korean word reading and found that both of them were predictive of Korean word reading. In another study, Wang et al. (2009) examined the predictive power of morphological awareness skills to word reading and reading comprehension and found

that morphological awareness skills were an important contributor to both outcomes. Recent study with 5-year-old Korean children examined early spelling development (Kim, 2010) . Kim (2010) found that both phonological and orthographic awareness skills as well as morphological awareness skills were important component skills in Korean spelling, even after controlling for other linguistic factors. Her findings are meaningful in that these phonological, orthographic, and morphological awareness skills are closely related to Korean spelling, even in the early stage of spelling development in Korean. In a similar vein, McBride-Change et al. (2005) examined Korean phonological and morphological awareness skills to word reading and found that both were important predictors to word reading among Korean second graders.

Most of the studies above involving Korean-speaking children found that phonological, orthographic, and morphological awareness skills were significant predictors to their outcome within Korean. However, it is not possible to directly compare the results of those studies with the ones of the current study. For example, in the study of Wang et al. (2006, 2009), their participants were Korean-English bilinguals in Grades 1 to 3 whose Korean literacy skills were not as good as native speakers of Korean counterparts, aside from the age difference. In addition, their study did not examine the concurrent contribution of three metalinguistic awareness skills and the target outcome was word reading rather than spelling. In a similar manner, the direct comparison with the studies of Kim (2010) and McBride-Change et al.(2005) is not possible with the current study (e.g., their participants were younger children).

Then, what might be the possible explanations for not finding statistically significant results of phonological and orthographic awareness skills on Korean spelling in the current study? As an alpha-syllabic language, Korean Hangul requires and benefits from alphabetic principle (e.g., phoneme-grapheme correspondence) when learning to read and spell, and as shown in the study of 5-year-old Korean children's spelling development (Kim, 2010), both phonological and orthographic awareness skills as well as morphological awareness skills were important component skills in early Korean spelling. One plausible reason for these findings might be related with participants' grade level (age). The participants of the current study were fourth, fifth and sixth graders, and their developmental level of primary linguistic abilities in Korean have been established to a great degree, especially for those skills, such as phonological and orthographic awareness skills, which tend to develop at earlier grades. As previously mentioned, younger children rely more on their phonological awareness skills and orthographic awareness skills to some degree, and morphological awareness skills are more fully developed later (Berninger, Abbott, Nagy, Carlisle, 2010; Treiman, 1993; Treiman & Bourassa, 2000). For example, Berninger and her colleagues (2010), in their longitudinal growth study, investigated the growth patterns in phonological, orthographic, and morphological awareness skills of Grades 1 to 6 for 4 years. Berninger et al. (2010) found that phonological awareness showed the most growth before third grade and orthographic awareness showed a faster rate during the early elementary grades (i.e., Grades 1 to 3) and a slower rate during the later elementary grades (i.e., Grade 4-6), although both skills indicated continuing growth. For

morphological awareness, some morphological tasks showed substantial growth in the first three to four grades, but one task showed more growth in fourth grade and beyond. Although these studies were involved with English-speaking children, their results of growth pattern seem to fit to Korean-speaking children also.

Therefore, if younger children in the early stage of learning to read were included in the current study, the unique contribution of phonological and orthographic awareness skills to Korean spelling might be noticeably detected. In fact, previous studies that found the unique contribution of phonological and orthographic awareness skills to literacy development, although little research has been conducted on this topic yet, focused on the children who were 4- or 5-years old or who were second-graders at the highest grade level, or who were Korean-English bilinguals, living in an English-speaking country (Cho & McBride-Change, 2005; Cho et al., 2008; McBride-Change et al., 2005; Kim, 2010, 2011; Wang et al., 2006, 2009). Those children's Korean literacy abilities were still in the early stage of learning to read, and thus, the researchers might have been able to detect more variability of their participants' performance on Korean phonological and orthographic awareness skills. In this regard, participants' developmental literacy level/grade level (age) might be responsible for not finding statistically significant results of phonological and orthographic awareness skills on Korean spelling in the current study. This might be the case of English spelling, as well, as discussed in the next section.

In fact, there was a dilemma when it comes to selecting participants for the study. In order to maximize the possibility of detecting the contribution of Korean phonological

and orthographic awareness, lower graders might be preferred. However, as previously mentioned, English is introduced as a school subject at third grade in Korea and writing instruction in English is not begun until at the middle/end of fourth grade. In order to investigate transfer effects from Korean metalinguistic awareness skills to English spelling, participants had to be able to spell English words to some degree, which meant they should be fourth grade and beyond.

So far, the unique contribution of metalinguistic awareness skills to Korean spelling has been explored and discussed in detail. Then, what is the shared contribution of metalinguistic awareness skills to Korean spelling? Among the studies in which the concurrent contribution of three metalinguistic skills to either reading or/and spelling were investigated, none of them explored the second-order SEM model (e.g., Apel, Elizabeth, Wilson-Fowler, 2012; Nagy et al., 2003, 2006; Walker & Hauerwas; 2006). In the second-order SEM model, the second-order factor (i.e., META) represents what the three first-order factors have in common, as previously discussed. In the current study, a second-order factor, META explained 83% of the total variance in Korean spelling, which meant the common construct of all three metalinguistic awareness skills explained 83% of the total variance in Korean Spelling.

English Spelling

RQ2. Korean phonological, orthographic, and morphological awareness make unique and shared contribution to English spelling performance, especially after taking into account pre-existing differences (e.g., English vocabulary)?

To address the second research question, English spelling model was tested and found the results similar to those of Korean spelling model. First, Korean morphological awareness skills made the strongest contribution to English spelling for Korean-speaking children in Grades 4, 5, and 6, explaining 52% of unique variance in English Word Spelling. This finding was also supported by the highest correlation between English Word Spelling and English Vocabulary (r = .78) in the study. Aforementioned in the Korean spelling section, ample evidence supported the strong relationship between morphological awareness and spelling in L1. One step further, in the current study, Korean morphological awareness skills were found to explain English (L2) Word Spelling in addition to Korean (L1) spelling, providing the transfer evidence between L1 and L2. On the other hand, as in the case of Korean spelling model, orthographic awareness as well as phonological awareness skills did not explain unique variance in English Word Spelling, either. Neither of the two first-order factors (i.e., phonological awareness and orthographic awareness) was found to uniquely contribute to English Word Spelling.

Spelling can be assessed both for real words and for pseudowords. The former requires conventional spelling abilities and the latter requires phoneme-grapheme correspondence abilities, which is closely associated with phonological awareness skills.

In the current study, both types of English Spelling task were administered to the children: English Word Spelling (EWS: real word) and English Sound Spelling (ESS: pseudoword). So far, only the English Word Spelling (EWS) was used as an outcome so that English spelling outcome could be compared with Korean spelling outcome, in which only one type of spelling task (i.e., Korean real word spelling) was administered. However, most noticeably, when English Spelling outcome was constructed with two indicators of English Word Spelling (e.g., real words) and English Sound Spelling (e.g., pseudowords), Korean phonological awareness skills turned out to predict English Spelling. This finding is interesting, but not surprising, considering the close relationship between English Sound Spelling and phonological awareness skills. In this English Spelling model, both phonological awareness as well as morphological awareness skills made unique contributions to English Spelling (ES), explaining 14% and 55% of the total variance in English Spelling. It is worth noting that cross-language transfer between Korean L1 phonological awareness and English L2 spelling, especially English sound spelling, has been confirmed. Furthermore, even after controlling for English vocabulary, Korean phonological and morphological awareness skills were still marginally significant to English Spelling, indicating each contributing unique variance to English Spelling (i.e., PA .21 (p = .07); MA .51 (p = .06). Given the well-established finding that vocabulary and spelling is closely related, it was noticeable that unique powers of L1 phonological and morphological awareness skills to predict L2 English Spelling were still found, even after taking into consideration L2 English vocabulary.

A number of cross-language transfer studies demonstrated that L1 orthographies influenced L2 spelling performance of ESL learners (Dixon et al., 2010; Joshi et al, 2006; Leong et al., 2005). Figueredo (2006) also reviewed studies of cross-language transfer on spelling skills and found that similarities between two orthographies tended to be transferred positively. This might be the case of the positive transfer between Korean L1 phonological and morphological awareness and English L2 spelling in the current study. As previously reviewed, both Korean and English feature the morphophonemic characteristics, which carry both phonological and morphological levels of characteristics. For example, in English, h*ea*lth is spelled with an "ea" instead of an "e" so that its root word (i.e., morphological information) "heal" is preserved over phoneme-grapheme correspondence; in Korean, 먹는 (eating) is spelled with "먹" 는 even though it is pronounced as "멍"는 because of its root word, 먹다 (eat). This is one of the critical aspects in spelling in Korean as well in English. Thus, their shared morphophonemic characteristics, in addition to the characteristics of alphabetic orthography, might have positively affected the transfer between Korean phonological and morphological awareness skills and English spelling.

Few studies focused on cross-language transfer between Korean and English, one of which was bilingual literacy studies conducted by Wang et al. (2006b, 2009). Wang et al.(2006b), in a study with bilingual children in U.S., found that Korean phonological skills explained unique variance in English non-word reading, even after controlling for English phonological and orthographic skills; however, they did not make unique contribution to English real word reading. In addition, Korean orthographic awareness

skills did not predict English word reading after controlling for English phonological and orthographic skills. Although research outcomes (i.e., word reading vs., spelling) and several other conditions (e.g., participants' age, literacy levels, etc.) are different and thus the direct comparison between Wang et al. (2006b, 2009) and the current study is not possible, their findings are similar to those of the current study, to some degree. Both studies found unique power of L1 morphological awareness to predict L2 outcome (i.e., word reading, spelling). Both studies found no unique power of L1 orthographic skills to predict L2 outcome (i.e., real word/pseudoword reading, real word/pseudoword spelling) and no unique power of L1 phonological skills to predict L2 outcome (i.e., real word reading, real word spelling), though both studies found predictive power of L1 phonological awareness skills to L2 pseudoword reading and pseudoword spelling, respectively.

Then, what might be the possible explanations for not finding statistically significant results of phonological and orthographic awareness skills on English Word Spelling in the current study? One possible explanation for no-significance might be participants' developmental level of linguistic abilities in Korean, as discussed above in more detail. Participants' developmental level of Korean phonological and orthographic awareness skills have been established to a great degree and thus, low variability on those skills might not have made unique contribution to spelling performance.

Another plausible reason, especially in case of orthographic awareness, might be the types of tasks that were used to measure orthographic awareness skills in the study. According to Apel (2011) and Apel et al. (2012), tasks used to measure orthographic

awareness skills can be broadly categorized into two types. One is more involved with "stored mental representations of specific written words or word parts", in other words, "memories of specific words" and the other is more associated with knowledge of the "general patterns or rules of the writing system" (p.595). Together, they help children to spell correctly (Apel, 2011). For example, a measure of Letter String Choice task assesses children's knowledge of orthographic conventions (e.g., which pseudoword looks more like a real word, beff-ffeb; dake-dayk). Next, Orthographic Choice task asks students to choose which one is spelled correctly among the pairs of letter strings that are phonologically similar (e.g., rain-rane; goat-gote). Third, Homophone Choice task asks children to choose which of the two words is spelled correctly within a sentence. For example, a researcher reads a sentence, (e.g., "which is a part of the body?") and children are asked to choose the correct answer to the question from a pair of phonologically similar words (e.g., feet or feat). (see further details in Cunningham, Perry, & Stanovich, 2001). As Apel et al. (2012) pointed out, first task measure children's knowledge of general orthographic patterns and the latter two tasks are more likely to measure children's knowledge of specific word forms rather than their knowledge of general orthographic rules or patterns. The orthographic measures used in the current study are close to the latter two which measure word specific knowledge in Korean. Thus, not having significant results between Korean orthographic awareness and English spellings might be attributed to the orthographic measures that were used in the study. However, things still remain to be undecided as to whether orthographic awareness skills are language specific, as Wang et al (2006b) suggested, and thus not

transferable to different writing systems. Future research needs to be done with more various orthographic tasks in Korean in order to make sure this was the case.

So far, the unique contribution of metalinguistic awareness skills to English spelling has been explored and discussed in detail. Not only morphological but also phonological awareness skills made unique contribution to English Spelling. Then, what is the shared contribution of Korean L1 metalinguistic awareness skills to English L2 spelling? 51 % of the total variance in English L2 Word Spelling (EWS) and 69% of the total variance in English L2 Spelling (i.e., English Sound Spelling was included to the outcome) was explained by META, a multi-dimensional metalinguistic common factor defined by three first-order factors, (i.e., phonological, orthographic, and morphological awareness), and 12% of the total variance, even after controlling for English vocabulary. On the basis of the results, along with the findings on Korean spelling above, it can be concluded that metalinguistic awareness skills make a significant contribution to not only L1 spelling but also L2 spelling as well.

Grade Difference in Metalinguistic Awareness Skills

RQ3. Is there any difference across different grade levels in terms of metalinguistic awareness skills?

Metalinguistic awareness skills (i.e., phonological awareness, orthographic awareness, morphological awareness) have been regarded as critical components in children's spelling as well as reading (Bear & Templeton, 1998; Moats, 2000; Treiman, 1993; Treiman & Bourassa, 2000). However, not only simultaneous investigation of

these three metalinguistic awareness skills, but also a shared/common construct of these three metalinguistic awareness skills has been less explored. In this section, a common construct of these three metalinguistic awareness skills will be discussed across different grade levels.

As we have seen in the previous chapter, these three metalinguistic awareness skills were closely interrelated with each other (e.g., *rs* = .67 (PA with OA), .72 (PA with MA) and .88 (OA with MA)), and these three correlated metalinguistic awareness skills created a higher-order factor as a common/shared construct, which governs all three metalinguistic awareness skills. This higher-order factor, META was examined across three grades using MIMIC model. The results showed that there was no mean difference in a higher-order factor between Grades 5 and 6; only Grade 4 showed lower factor mean than the other two grade levels. To my knowledge, there is no research which has investigated a higher-order factor mean difference regarding metalinguistic awareness skills. Thus, it is not plausible to find any reference point to the findings in the current study. However, these results imply that all three metalinguistic awareness skills adequately converged into one higher-order factor, demonstrating adequate convergent and discriminant validity. In addition, no noticeable patterns of individual metalinguistic awareness skills were found across three grades. Overall, morphological awareness was the highest, followed by orthographic awareness and then, phonological awareness skill across all three grades.

Lastly, one noticeable finding from the current study was the strong positive relationship between Korean L1 spelling and English L2 spelling (r = .60). These strong

correlations were consistent with previous study where Sparks et al. (2008) investigated early L1 spelling and later L2 spelling performance. The authors found that children's L1 spelling skills in elementary school accounted for 47% of the variance in L2 spelling in the 10th grade, suggesting that L1 spelling skills made a significant contribution to learning to spell in L2 even after many years later (r = .69). The plausible reason for stronger correlation between L1 and L2 spelling skills even after many years later in their study, compared to the present study, could be explained by the orthographic depth and distance between L1 and L2. In their study, L1 was English, and L2 were Spanish, French, and German, all of which were alphabetic orthographies and used Roman alphabetic scripts; on the other hand, in this study, Korean L1 is alpha-syllabic orthography that features both alphabetic and syllabic characteristics and uses a non-Roman alphabetic script, which is represented in syllable block, rather than a lineal string as in English (see further discussions in chapter II).

Limitations and Implications

First of all, we cannot draw conclusions on the causal relationships since this was a non-experimental study. In this sense, the results from the current study need to be read with caution. Second, Korean measures used to assess children's phonological and orthographic awareness skills had some limitations in measuring various aspects of each metalinguistic skill. For example, phonological measures used in this study were phoneme detection task, which required children to distinguish and detect different phonemes. However, children's ability to manipulate phonemes, such as deleting or

blending phonemes, was not tested in the current study, mostly because phonological awareness measures were group-administered. In addition, as discussed earlier, measures of orthographic awareness used in the study tended to focus more on specific word knowledge over general orthographic patterns. We might have a broader picture of children's phonological and orthographic awareness skills, if more varieties of phonological and orthographic tasks were included.

Lastly, the current study focused on Grades 4, 5, and 6 because participants had to be able to spell English words to some degree. However, as mentioned earlier, it was a challenging work to measure the phonological and orthographic awareness skills of the upper grade children, particularly in the case of Korean. Even in a study with 5-year-old Korean-speaking children, Kim (2010) pointed out that there was a possible ceiling effect in one of her phonological awareness task (e.g., syllable awareness task). Although the task in her study was not used in the current study, it has potential ceiling effects for assessing Korean phonological or orthographic awareness skills with upper elementary grade children and beyond.

Despite all these limitations, the results of the current study provide meaningful findings (1) by simultaneously investigating Korean metalinguistic awareness skills and their relationship with Korean spelling performance using structural equation modeling; (2) by simultaneously investigating metalinguistic awareness skills and their cross-language transfer effects onto English spelling performance ; (3) by investigating a common construct of Korean metalinguistic awareness skills.

More specifically, in the current study, Korean morphological awareness skills made a strong positive contribution to spelling in both Korean and English. Although the unique contributions of the other two metalinguistic awareness skills (i.e., phonological and orthographic awareness) remain to be determined with younger participants or with different types of measures, the robust connection between morphological awareness and spelling, along with previous investigations on the critical role of phonological and orthographic awareness skills, suggests that explicit instruction on these three metalinguistic awareness skills promotes literacy development, especially spelling. In addition, Korean L1 phonological awareness skills made a significant contribution to English L2 Sound Spelling. This implies that not only emphasizing L2 phonological awareness skills when children learning L2, but also providing explicit instruction on L1 phonological awareness from early on, could enhance children's sensitivity to/ability to manipulate of sound units more readily and benefit L2 learning later. Thus, it is necessary to provide explicit instruction on each metalinguistic awareness skill early on in L1, which could be eventually transferred to L2 learning later on.

Although Korean is an alphabetic (alpha-syllabic) orthography, which follows alphabetic principle (i.e., phoneme-to-grapheme correspondence), some researchers (Kim, 2010, 2011) pointed out that whole-language instruction has been prevalent in teaching Korean Hangul. However, in order to make the most out of it, it is important to teach Korean Hangul in a systematic way, following alphabetic principles, teaching

orthographic patterns, and morphological information. That way, not only L1 Korean but also L2 English would be benefited.

Conclusions

Adding to the previous research findings on metalinguistic awareness skills and cross-language transfer, the present study addressed whether Korean L1 phonological, orthographic and morphological awareness skills contributed unique and shared contribution to English L2 spelling, after taking into consideration English vocabulary, as well as Korean L1 spelling. Rickard Liow and Lau (2006) pointed out that very few studies have been conducted regarding the influence of cross-language transfer on English L2 spellings. However, given the continuously growing number of English learners with diverse L1 backgrounds, it is important to study the potential power of L1 literacy experience. By understanding of how the two languages interact and impact upon each other and more specifically, how the L1 underlying component skills (i.e., metalinguistic awareness) influence L2 spelling performance, we might better assist children with L1 literacy experiences to apply their valuable L1 skills to the learning of L2. Thus, further research needs to be conducted to examine the nature of L1 first and how they affect literacy learning in L2. In this sense, more research on Korean Hangul is necessary in order to fully understand Korean orthography and its relationship with second language development.

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APPENDIX

KOREAN AND ENGLISH MEASURES

영어 받아쓰기 과제 (English Word Spelling)

들려주는 영어단어를 듣고 그에 해당하는 단어를 쓰는 문제입니다. 잘 듣고 받아 써보세요.

No	list	Direction / Sentence
1	yes	Yes, I am.
2	in	Mom is in the house.
3	he	He is happy.
4	bed	She sleeps on a bed.
5	this	This is a desk.
6	she	She is my teacher.
7	like	I like you.
8	who	Who are you?
9	six	She has six apples.
10	next	He is next in line.
11	green	The grass is green.
12	are	Are you ready?
13	was	He was happy.
14	under	Look under the bed.
15	rain	Rain or snow, I have to go.
16	table	Our family has a very old table.
17	when	When does he go?
18	much	Thank you very much.
19	sixteen	My sister is sixteen years old.
20	house	The house is very big.
21	stop	Stop talking now.

22	name	What is your name?
23	two	There are two birds.
24	people	The people are eating now.
25	uncle	My uncle is coming.
26	knife	The knife is very sharp.
27	spend	Did you spend the money?
28	bicycle	John has a new bicycle.
29	early	I get up early.
30	floor	Please clean the floor.

한글 받아쓰기 과제 (Korean Dictation/Spelling task)

다음은 한글 받아쓰기 과제예요. 선생님이 들려주는 단어를 잘 듣고 받아 써 보세요.
선생님이 문장을 사용하여 한번 더 불러줄거예요.

번호 No.	실전문제 test items	문장 sentence
1	긁히고 scratched	부주의해서 책상 모서리에 **긁히고** 말았다. I was **scratched** by the edge of a desk because of carelessness.
2	숯불에 With charcoal	고기는 **숯불에** 구우면 아주 맛있다. The meat is delicious when you grill it **with charcoal.**
3	터뜨렸다 burst	나는 너무 속상해서 울음을 **터뜨렸다.** I was really upset and **burst** into tears.
4	섞여 mixed	옷장에 옷들이 마구 **섞여** 있어서 정리를 했다. I put the closet in order because my clothes were all **mixed.**
5	갇혀 confined	새장속에 **갇혀** 있는 작은 새가 애처로와 보인다. The bird that is **confined** in the cage looks so sad.
6	샅샅이 All over	이곳저곳을 **샅샅이** 뒤져보았지만 보물을 발견할 수 없었다. I was searching **all over,** but could not find the treasure.
7	안돼 Don't	그렇게 층계를 뛰어다녀서는 **안돼!** **Don't** run up and down the stairs!
8	갸륵히 commendable	그의 효성을 **갸륵히** 여기지 않는 이가 없었다. Everyone praised his **commendable** love for his parents.
9	캐묻고 Strictly press	동생에게 어디를 다녀왔냐고 **캐묻고** 싶었지만 참았다. I wanted to **strictly press** my brother about where he had been, but I restrained myself.
10	뙤약볕에 Blazing sunshine	밭에 나가서 일을 하는 동안 **뙤약볕에** 얼굴이 다 타고 말았다. I tanned my face under the **blazing sunshine** while I was working out in the field.
11	늠름하다 imposing	우리형은 군복을 입으면 **늠름하다.** My brother is so **imposing** in the uniform.
12	에워싸여 surrounded	나의 고향은 사방이 산으로 **에워싸여** 있다. My home town is **surrounded** by mountains in every corner.
13	숱하게 considerable	**숱하게** 많은 사람들이 그 버스에 타고 내렸다. A **considerable** number of people was getting on and off the bus.
14	넓다랗게 Wide-open	우리집 앞에는 갯펄이 **넓다랗게** 펼쳐져 있었다. There was **wide-open** seashore in front of my house.
15	엊저녁에 Last night	멀리 부산에 사시는 이모가 **엊저녁에** 오셨다. My aunt, who is living in Pusan, came to visit us **last night**.
16	데었다 Was burned	뜨거운 물에 손등을 **데었다.** My hand **was burned** by hot water.

17	설거지가 Washing dishes	나는 집안일 중에 **설거지가** 제일 좋다. Among all the housekeeping jobs, **washing dishes** is my favorite.
18	샅바 Thigh band	씨름 할 때 선수들은 **샅바**를 놓치지 말아야 한다. You should hold the **thigh band** tight when you are wrestling.
19	애끓는다 fret	부모는 항상 자식 걱정에 **애끓는다.** Parents always **fret** about their children.
20	끓는 boiling	**끓는** 물에 속옷을 삶으면 하얘진다. Underwear becomes white when you put it in **boiling** water.
21	말엽에는 At the close of	조선시대 **말엽에는** 많은 서양문화가 들어왔다. There was a great influx of western culture **at the close of** the Chosun Dynasty.
22	웬만큼 medium	**웬만큼** 큰 돌이 아니고서는 이 구멍을 막을 수 없다. You cannot fill this hole with a **medium** size rock.
23	땡볕에 Burning-hot sunlight	하루종일 **땡볕에** 있었더니 머리가 아프다. I have a headache since I was under **burning-hot sunlight** all day long.
24	덧씌워 cover	동생에게 두툼한 모자를 **덧씌워** 주었다. I **covered** my brother's hair with a hat.
25	읊조려 recite	조용히 슬픈 노래를 **읊조려** 보았다. I **recited** the plaintive melody quietly.
26	적잖이 Fairly	가수는 얼마 안되는 청중에 **적잖이** 실망을 하였다. The singer was **fairly** disappointed by the small audience.
27	놋숟가락을 a spoon made of brass	제삿상에는 **놋숟가락을** 놓는다. For a sacrificial table, use **a spoon made of brass**.
28	필력은 Talent	그 시인의 **필력은** 아무도 따라갈 수가 없다. Nobody can imitate the poet's **talent**.
29	망라한 Includes	엄마는여러나라의 명작들을 **망라한** 문학전집을 사주셨다. My mom bought me a collection that **includes** all the classics.
30	멀게졌다 watery	물을 너무 많이 부어서 국이 **멀게졌다.** The stew has become **watery** because we added too much water.

음운인식과제 (Korean Phonological Awareness Task A: KPB)

선생님이 들려주는 세개의 낱말을 잘 듣고 똑같은 소리로 시작되지 않는 낱말의 번호에 동그라미 해 주세요.

연습문제 (Practice Items)		
건 /geon/	순 /soon/	갈 /gal/
늡 /nup/	뭉 /mung/	만 /man/
찰 /Chal/	춧 /Chut/	훈 /hoon/
실전문제 (Test Items)		
구 /gu/	개 /gae/	벼 /byo/
사 /sa/	해 /hae/	소 /so/
배 /bae/	무/moo/	비 /bee/
너 /noe/	차 /cha/	초 /cho/
눙 /nung/	벙 /bung/	받 /but/
피 /pee/	파 /pa/	혀 /hye/
솓 /sot/	볻 /bot/	샆 /sap/
릭 /lick/	놉 /nop/	랜 /lan/
융 /yung/	뫂 /mop/	욜 /yol/
팅 /ting/	풉 /pup/	핌 /pim/
쿰 /kum/	굴 /gool/	군 /goon/
탑 /top/	잘 /jal/	탕 /tang/
낭 /nang/	눅 /nook/	긴 /gin/
닥 /dak/	볌 /byom/	딤 /dim/
잴 /jal/	존 /jon/	딜 /deal/
캘 /kal/	릴 /lil/	콥 /kob/
칭 /ching/	룹 /loop/	춧 /choot/
갭 /gap/	꼴 /kol/	끕 /koop/
흩 /hut/	핸 /han/	윰 /yum/
을 /ul/	슬 /sul/	은 /un/

음운인식과제 (Korean Phonological Awareness Task B: KPE)

선생님이 들려주는 세개의 낱말을 잘 듣고 이번에는 똑같은 소리로 끝나지 않는 낱말의 번호에 동그라미 해 주세요.

연습문제 (practice items)		
실 /sil/	감/gam/	삼 /sam/
봄 /bom/	곰/gom/	학 /hawk/
실전문제 (test items)		
문 /moon/	담 /dam/	잠/jam/
말 /mal/	발 /bal/	곰 /gom/
각 /gak/	석 /seok/	곤 /gon/
줍 /joop/	멀 /mol/	겹 /gyeop/
헛 /hut/	늣 /nut/	둠/doom/
잰 /gen/	낸 /nan/	몀/myeom/
슨 /soon/	폴 /pol/	올 /ol/
웁/oop/	슴 /soom/	눕 /noop/
돔 /dom/	벝/but/	답 /dop/
젭 /gep/	펙 /peck/	겝 /gap/
냅 /nap/	작 /gak/	칵 /kak/
완 /wan/	광 /kwang/	황 /hwang/
욥/yop/	켠 /kyun/	면 /myun/
핏 /pit/	딧 /dit/	츱 /choop/
생 /sang/	뇩/nyok/	뱅 /bang/
웜 /warm/	좡 /jang/	붬 /burm/
밀 /mil/	됀 /dyan/	닐 /nil/
컨 /kun/	썬/sun/	떳 /dut/
귬 /gyum/	향 /hyang/	븀 /booum/
칭 /ching/	측 /chook/	큭 /kook/

철자인식과제 (Korean Orthographic Awareness Task A: OAA)

다음 단어들 중에서 한글 맞춤법이 올바른 단어에 동그라미 해 주세요.

No.	실전문제 (Test items)				meaning
1	난말	낱말	낫말	낯말	Word
2	빗깔	빛깔	빅깔	빚깔	Color
3	덮쳤다	덥쳤다	덤쳤다	덮쳤다	Attacked
4	빚을 갑다	빚을 갘다	빚을 같다	빚을 갚다	Pay the debt
5	뙤약볃	뙤약볕	뙤약뼏	뙤약볓	Burning sunlight
6	그륻	그릇	그릋	그릊	Dish/plate
7	모슾	모슴	모습	모슷	Figure
8	향뇨	햑료	향료	햔료	spices
9	받침	밭침	밧침	밪침	Support
10	놛고	놓고	노코	놋고	Left
11	숲	슙	숟	숫	Woods
12	굾혀	굽혀	구펴	굼혀	Bending
13	얼힌	얼킨	얽힌	엶힌	Tangled
14	길썹	길섭	길섵	길섶	Trail
15	물똑	물독	뭍독	뭄독	Water pot
16	발걸음	발거름	발걷음	발걸름	Foot step
17	업치락뒤치락	엎취락뒤취락	업지락뒤지락	엎치락뒤치락	Turning up and down
18	미닽이문	미다지문	미닫이문	미닺이문	Sliding door
19	새쌕	새쌋	세싹	새싹	Sprout
20	균영	균형	군형	규녕	Balance
21	해도지	해돋이	햇오지	헤도지	Sunrise
22	핑게	핑괘	핑계	핑개	Excuse
23	휴게실	휴계실	휴개실	휴괘실	Rest area
24	뛰어쓰기	띄워쓰기	띠어쓰기	띄어쓰기	Writing rule
25	꺾고지	꺾꽂이	꺾꼿이	꺽꽂이	Tree trimming
26	온갓	옴갖	온갛	온갖	All/everything
27	반짓고리	반짇고리	반짙고리	반짇골이	Sewing stuff
28	승락	승낙	숭낙	승롹	Approval
29	흩터지다	흩어지다	흗터지다	흣터지다	Scatter
30	맞있는	마신는	맛있는	맛딘는	delicious

철자인식과제 (Korean Orthographic Awareness Task B: OAB)

다음 단어쌍 중에서 문맥에 맞게 바르게 쓰여진 단어에 동그라미 해 주세요.

1. 농부가 밭에 (거름, 걸음)을 줍니다.
2. 나그네는 오두막에 (묶기로, 묵기로) 결정을 했습니다.
3. 책상줄을 (반드시, 반듯이) 맞추어주세요.
4. 진수는 중간고사 걱정으로 마음을 (졸이고, 조리고) 있다.
5. 우리 아가는 (낮, 낫, 낮)을 너무 가려서 걱정입니다.
6. 옛날에는 (짚신, 집신)을 신고 다녔습니다.
7. 작은형은 그 (빗, 빚, 빛)내서 어쩌려고요?
8. 그분은 (잎, 입)이 무거운 사람입니다.
9. 할머니께서 약을 (달이십니다, 다리십니다.)
10. 불에 손을 (대어서, 데어서) 병원에 가야 합니다.

형태소 인식 과제 (Korean Morphological Awareness Task-Meaning: KMM)

다음 제시되는 두 단어쌍 중에서 공통으로 나오는 밑줄친 한 글자의 뜻이 같은지, 다른지를 판단하도록 합니다. 뜻이 같으면 같다, 다르면 다르다에 동그라미 해 주세요.

연습문제 (Practice items)

1	보리<u>차</u> barley tea	자동<u>차</u> Car	같다 Same	**다르다** Different
2	상<u>륙</u> landing	대<u>륙</u> land/Continent	**같다**	다르다
3	<u>책</u>상 Desk	<u>책</u> Book	**같다**	다르다

실전문제 (Test Items)

1	곶<u>감</u> persimmon	옷<u>감</u> clothes	같다 Same	다르다 Different
2	<u>어</u>부 fisherman	<u>어</u>항 Fish tank	같다	다르다
3	<u>벌</u>집 Bee hive	<u>벌</u>금 Fee/penalty	같다	다르다
4	<u>육</u>식 carnivore	<u>육</u>지 land	같다	다르다
5	<u>냉</u>면 Cold noodle	<u>냉</u>동 Freezing	같다	다르다
6	<u>거</u>인 giant	<u>거</u>대 Huge/gigantic	같다	다르다
7	횡<u>재</u> Windfall/godsend	<u>재</u>산 fortune	같다	다르다
8	<u>미</u>인 A beauty	<u>미</u>래 Future	같다	다르다

9	민심 Public sentiment	국민 people	같다	다르다
10	식당 restaurant	초식 herbivore	같다	다르다
11	추석 Thanksgiving	석양 sunset	같다	다르다
12	발자취 Footprint/trace	발견 Discovery	같다	다르다
13	일기 Diary	일등 First place	같다	다르다
14	인구 Population	위인 A great man	같다	다르다
15	손님 guest	손목 Wrist	같다	다르다
16	대학 University	위대한 great	같다	다르다
17	샛별 Morning star	별명 Nickname	같다	다르다
18	남자 Man/male	남북 North & South	같다	다르다
19	출구 exit	탁구 Ping pong ball	같다	다르다
20	상하 hierarchy	최상 The best	같다	다르다

형태소 인식 과제 (Korean Morphological Awareness Task-Form: KMF)

밑줄 친 열쇠가 되는 단어를 문장의 문맥에 맞게 바꾸어서 문장을 완성해 보세요.

연습문제 (Practice items):

➔ 행복 (happiness): 예주는 생일날 선물을 많이 받아서 _____.

Yeju was <u>happy</u> on her birthday because she got so many presents.

실전문제 (Test Items)

1. 빼다(subtract) : 지현이는 더하기와 _____ 을(를) 할 수 있다.

   Jihyun is good at addition and <u>subtraction.</u>

2. 춥다 (cold): 지민이는 올 겨울의 _____ 을(를) 견딜 수가 없었다.

   Jimin could not stand the <u>coldness</u> this winter.

3. 날다 (fly): 새가 _____을(를) 활짝 폈다.

   The bird spreads out <u>the wings</u> widely.

4. 발 (feet): 존은 신발도 신지 않고 _____ 로(으로) 길을 걸었다.

   John walked around in his <u>bare feet</u>.

5. 슬프다 (sad): 주호는 할머니가 아파서 _____ 을(를) 느낀다.

   Juho feels <u>grief</u> because his grandma is sick.

6. 놀라다 (get surprised): 예지가 선생님이 되었다는 사실이 매우 _____.

   It <u>is quite surprising</u> for Yeji to become a school teacher.

7. 과학 (science): 민호는 나중에 커서 _____ 가(이) 되고 싶다.

   Minho wants to be a <u>scientist</u> when he is grown-up.

8. 어리다 (young): 국가에서는 장차 나라를 이끌어 갈 _____을 (를) 보호해야 한다.

   Our country (grown-ups) should protect the <u>youth</u> who will be leading our country in the future.

9. 앓다 (pain): 지현이는 감기에 걸려서 몸이 _____.

   Jihyun felt sick because she catches a cold.

10. 향기롭다(be fragrant): 이 장미꽃에서는 아름다운 _____ 이(가) 난다.

    I can smell the aroma of the roses.

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11. 낮추다 (lower): 책상 높이가 너무 _____.

    The height of the desk is too low.

12. 거짓말쟁이 (liar): _____을(를) 하면 나빠요.

    It is bad to tell a lie.

13. 힘들다 (be strenuous): 지나는 이 상자를 들어올릴 _____ 이(가) 없다.

    Gina has no strength to lift the heavy box.

14. 길이 (length): 여름에는 낮이 밤보다 _____.

    In summer, daytime is longer than nighttime.

15. 다리다 (iron): 어머니께서 빨래를 걷어서 _____ 할 준비를 하신다.

    My mother took out the laundry and prepares for ironing the clothes.

16. 쉽다 (be easy): 이번 시험문제에는 _____ 문제가 많아 다행스러웠다.

    It was fortunate that there were so many easy questions on this test.

17. 삶 (life): 농부는 다 무너져가는 초가집에 _____ 있다:

    The farmer lives in a straw-thatched house.

18. 지도자 (teacher; leader): 선생님은 여러가지 자료를 활용하여 우리를

    _____.

    My teacher teaches us using multiple educational materials.

19. 작곡하다 (compose): 바하는 천재적인 _____(이)다.

    Bach is a genius composer.

20. 파랑 (blue): 여름바다는 색깔이 _____.

    The color of the sea is blue in summer.