ABSTRACT

Title of Dissertation **CROSS-LANGUAGE TRANSFER OF SUB-SYLLABIC UNITS IN THE ACQUISITION OF L2 PHONOLOGICAL AWARENESS: SEMIVOWEL PLACEMENT DIFFERENCES BETWEEN KOREAN AND ENGLISH**

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This study investigates the language-specific sub-syllabic awareness of two groups of eighty-six Korean-English speaking kindergarteners learning English as a foreign language or English as a second language and examines the effects of transferred sub-syllabic units from children's first language on their phonological awareness in a second language. The relationship between oral language proficiency and sub-syllabic units was also explored. Children were assessed in Korean/English on experimental tasks of sub-syllabic discrimination and production of semivowels in non-real words and a test of verbal ability. In addition, one group of ten monolingual English speaking kindergarteners as a reference group was tested only in English.

Results suggest that Korean-English as a foreign language speaking children have an implicit and explicit sensitivity to body structure in Korean that is highly correlated with their Korean language dominance, and which is transferred to their second language, English. On the other hand, Korean-English as a second language speaking children have an idiosyncratic sub-syllabic preference for rime in English and both rime and body in Korean, presumably resulting from both their English language dominance and dual language exposure. These results have implications for the availability of language-specific sub-syllabic awareness, the transfer of sub-syllabic units from one dominant language to the other language, and the possible influence of oral language proficiency on early reading and spelling. Furthermore, these findings suggest that the incorporation of sub-syllabic awareness measures into phonological assessments will result in a more accurate assessment of English language learners with diverse phonological representations and help guide early reading instruction for children at risk for difficulty learning to read, speak and spell in English as a second language.

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CHAPTER 1: INTRODUCTION

Statement of the Problem

For more than two decades, a considerable body of research on children's first language (L1) reading has consistently shown that one of the best predictors of learning to read is the attainment of phonological sensitivity (Adams, 1990; Blachman, 2000; Goswami, 1999; Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997; Wagner & Torgesen, 1987). It has been generally believed that although phonological awareness/recoding[1] is not a sufficient condition for successful reading acquisition, it is a necessary condition for learning to read and spell (Adams, 1990; Stanovich, 1985). Furthermore, phonological knowledge reciprocally develops further as literacy abilities advance (for review, see Castles & Coltheart, 2004; Perfetti, Beck, Bell, & Hughes, 1987; Wagner, Torgesen, & Rashotte, 1994).

Another dimension of related research on early literacy acquisition has highlighted how orthographic processing can contribute to word recognition or decoding[2] skills (Becker, Torgesen, & Wagner, 1992; Booth, Perfetti, & MacWhinney, 1999; Cunningham & Stanovich, 1990). Since each language's orthography reflects its structural characteristics, a crucial factor involved in processing words in the lexicon via print is the extent to which graphemic representation[3] (i.e., for consonant grapheme(s): m in *my*; th and ck in *thick*, for vowel grapheme(s): o in *go*; oo in *cook*) can be systemically mapped onto corresponding phonemic representation (Katz & Frost, 1992).

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[1] Translation from either oral or written representation into a sound–based system to arrive at the meaning of words in the lexicon (stored vocabulary) in long-term memory (Wagner & Torgesen, 1987)

[2] Translating individual letters or groups of letters into sounds to access the pronunciation of a word (Smith, Simmons, & Kameenui, 1998)

[3] The basic elements of a writing system that are combined to represent the oral language (i.e., phonemes) in the visual modality (Scarborough & Brady, 2002)

To date, much of the research on reading development has involved beginning readers with English as L1. However, languages vary in their orthographic, lexical, and morphosyntactic complexity and due to such differences, one cannot assume that learning to read in a second language (L2) is the same as the L1 literacy process. At this point, the debate on the importance of the underlying phonological and orthographic processes in L1 for the acquisition of L2 literacy is still unresolved. For languages in which the writing systems have different orthographies, the practical importance of the effect of L1 orthographic transfer on L2 reading has been argued extensively and passionately by several researchers (Akamatsu, 1999, 2003; Holm & Dodd, 1996; Koda, 1988, 1996; Wang, Koda, & Perfetti, 2003, 2004). However, due to the failure to rule out the possibility that L1 phonological system impacts on L2 word recognition, the importance of the transfer of L1 orthographic features on L2 reading abilities has recently been questioned (Chen, Wang, & Cheng, 2005; Yamada, 2004; see also Cisero & Royer, 1995; Comeau, Comier, Grandmaison, & Lacroix, 1999; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Linsey, Manis, & Baily, 2003; Pae, Sevcik, & Morris, 2004; Wang, Park, Lee, 2006; Wang, Perfetti, & Liu, 2005).

Similarly, there is also an equivocal issue regarding whether the sub-syllabic[4] unit of onset and rime[5] is universal. A preference for onset-rime division has appeared to be functionally significant in learning to read in English (De Cara & Goswami, 2002, 2003; Treiman, 1983, 1985, 1986, 1995; Treiman & Danis, 1988; see also Ziegler & Gozwami 2005). The strong consensus over whether this preferred intra-syllabic unit of

[4] Syllables can be broken down into other units smaller than the syllable (Scarborough & Brady, 2002)

[5] Within a monosyllable, the portion preceding the vowel is called the onset and the remainder of the syllable is called the rime (Scarborough & Brady, 2002) For example, in the CVC monosyllabic word *cat*, the c /k/ is the onset and the at /æt/ is the rime (C= consonant; V= vowel). In this study, the term rime is used to specifically refer to the phonological division of a single syllable (e.g., c-at, p-in).

onset and rime is a linguistic universal has been challenged by recent studies. In some languages such as Korean, Japanese, and Dutch, onset-vowel units referred to *bodies* and the remainder of the syllable called *coda* (i.e., the ca /kæ/ is the body and the t /t/ is the coda in a CVC monosyllabic word *cat*) are more salient than phonological rimes (for Korean: Yoon, Bolger, Kwon, & Perfetti, 2002), and rimes may not be implicitly and explicitly relevant to some languages (for Japanese: Inagaki, Hatano, & Otake, 2000; Tamaoka & Terao, 2004; for Dutch: Geudens & Sandra, 2003).

Given these debates mentioned above, an investigation of the connection between sub-syllabic units and L1 spoken features/L1 written forms naturally leads to the question of language-specific differences across languages. The reason is that sub-syllabic units may be idiosyncratic across orthographically and phonologically different languages. More specifically, sub-syllabic structures between the orthographically shallow, alphabetic-syllabic language of Korean and the orthographically deep, alphabetic language of English may be different. In particular, the placement of a semivowel[6], one of the sub-syllabic properties, which is tightly attached to vowel (Spencer, 1996), may be distinctively salient across languages with preferred sub-syllabic structures of either onset-rime (English) or body-coda (Korean) because placement of semivowels in Korean always occurs before a vowel, while placement of semivowels in English generally follows the vowel.

As a result, this unique property may have an impact on typically preferred sub-syllabic structures of either onset-rime or body-coda across different languages, even though previous research has been insufficient to form a theoretical rationale or

[6] A semivowel (i.e., /y/ and /w/ in English and Korean phonemes) functions like vowel and consonant, also referred to either semiconsonant or glide (IPA, 1999)

conceptual basis to justify the effect of this typical property on sub-syllabic units. This study makes an initial attempt to shift toward a new perspective on the preferred sub-syllabic units across languages by examining whether there are advantages of semivowel position in the preferred segmentation of the syllable and looking at the linguistically contrasting systems between Korean and English.

Purpose of the Study

The primary purpose of the current study is to investigate the language-specific sub-syllabic awareness of Korean-English bilingual children and to examine the effects of knowledge transfer from one language's set of sub-syllabic units on the phonological awareness in the other language. Specifically, this study investigated the sub-syllabic unit transfer phenomena between Korean and English, in terms of the semivowel properties such as /y/ [7]and /w/ which emerge before a vowel or occur after a vowel. Moreover as this study will explore the sub-syllabic analysis of spoken words, an investigation of the relationship between oral language proficiency and phonological awareness also was conducted.

This exploratory study contributes to our understanding of the effects of intra-syllabic division on word reading, metalinguistic awareness [8], and early literacy acquisition of English as an L2. Moreover, this study is important to the teaching of English as an L2 because the distinctive placement of the semivowel properties between Korean and English may cause additional difficulties in learning to read and spell in English.

[7] The sound value of English /y/ as in yes corresponds to [j], palatal approximant (IPA, 1999)
[8] Metalinguistic awareness indicates the ability to reflect on and manipulate the structural features of language (Nagy & Anderson, 1999)

Korean and English: A Brief Overview of Semivowel Differences

The phonological inventories of semivowels in Korean and English are the same. Specifically, /y/ and /w/ have sound qualities similar to /i/ and /u/ respectively and fall under Korean and English glides (for English: Cipollone, Keiser, & Vasishth, 1998; for Korean: Sohn, 1999). However, these semivowels of Contemporary Korean are always on-glides, in that they always occur before and never after a vowel (e.g., 벽 [pjək] 'wall'; see Sohn, 1999). On the other hand, with a few exceptions, these glides in English are off-glides, which follow a vowel (e.g., hide [hayd]). The exceptions occur when these English glides are either in the syllable-initial position or after the onset-voiceless stop sounds such as /k/, /t/, or /p/, in which case they are on-glides (e.g., will [wil], cube [kyub]; see Chomsky & Halle, 1968). Because the placement of the semivowel is predominantly occupied in phonological processing in Korean, Koreans learning to speak and read English as an L2 may confront drastic restructuring of their interlanguage phonologies and might have particular difficulties dealing with unstable phonological representations. Therefore, they would be at risk for difficulties in learning to read and spell in English.

Research Questions

In this cross-linguistic study comparing Korean children learning English as a foreign language (EFL) with Korean children learning English as a second language (ESL), the linguistic discrepancy between Korean (L1) and English (L2) would not only allow for the investigation of whether these children extend their preference for the sub-syllabic units of Korean to the speaking and reading of English, but also, whether the two groups exhibit distinct performance preferences for sub-syllabic structures. The specific

research questions addressed in this current study are:

(1) Given the linguistic discrepancy between Korean and English, what are the sub-syllabic preferences of Korean EFL children and Korean ESL children in the L1 (Korean) and in the L2 (English)?

(2) Do students transfer the sub-syllabic structure of one language (Korean or English) to their sub-syllabic awareness of the other language?

(3) Given differences in Korean/English oral language proficiency between the Korean EFL and Korean ESL groups and within each group, what is the relationship between Korean/English oral language proficiency and Korean/English sub-syllabic performance preferences of Korean EFL (Korean-dominant) and Korean ESL (English-dominant) children respectively?

The answers to these questions can provide insight for L2 basic reading based on three theoretical principles. First, the availability of sub-syllabic awareness as a "grain size" of psycholinguistic units is language-specific. Secondly, cross-language positive/ negative transfer of preferred sub-syllabic awareness is closely associated with the degree to which L1 and L2 phonological system share structural similarities. Finally, oral language proficiency may be a possible factor of the achievement in phonological awareness.

Significance of the Study

Investigating language-specific sub-syllabic awareness and strategic processes of intra-syllabic unit in L2 phonological awareness can shed a light on the degree of cross-language transfer and can furthermore suggest that the overgeneralized sub-syllabic preference in L2 may be related to interlanguage phonology factors. In addition, this study may fill a significant gap in this area of research. There has been little exploration

of whether the position of semivowel properties would show an advantage in preferred sub-syllabic awareness across languages. Much of the research on L2 phonological awareness has confined itself to examination of cross-language transfer of general phonological processing which is not specific to L1 or L2. Therefore, this study can show the extension of the typical sub-syllabic units in L1 to the phonological transfer in L2. Moreover, this cross-linguistic study can propose the relationship between oral language proficiency and language-specific sub-syllabic awareness to project on strategic analysis of spoken words.

From a pedagogical standpoint, the potential results of this study would improve the understanding of Korean-speaking children's performance on sub-syllabic awareness in English. Hence, this understanding would help teachers recognize the potential significance of phonological interference which could explain children's difficulties in learning to speak, read and spell in English. It should be considered not as language disability, but as language difficulty. With this view, the results of this study may inform the construction of alternative models of EFL and ESL phonics instruction because Korean-speaking children are faced with exclusively distinctive phonological representations across the two languages.

From the foregoing, this study may reveal the need for dynamic classroom instruction and assessment strategies of phonological awareness, essentially for Korean-speaking learners of English. Teachers might need to adjust phonics classroom instruction and assessment because children who read and speak an L2 that is phonologically different are likely to require additional help to understand metalinguistic concepts absent in their L1.

Limitations of the Study

This study is an attempt to put forth a bottom-up perspective on L2 reading by exemplifying the transfer of sub-syllabic preference from one language to another language given the linguistic discrepancy between Korean and English. Therefore, the findings of this study may not be applied to other bilingual populations or other settings. In addition, this study is limited to micro-skills that can contribute to L2 beginning literacy rather than higher order thinking processes such as reading comprehension in L2 reading or other macro-skills. Moreover, the results of this study should not rule out the possibility that at least some of the participants in this study might be exposed at home to informal phonics instruction in both Korean and English and this might be an uncontrolled mediating variable. In a similar vein, the findings of this study should take into account the chance of Korean/English orthographic effect on the preference for intra-syllabic units, as some of the children in this study may have been already exposed to written language through informal interaction with Korean and/or English text.

Additionally, while the demographic questionnaire attempted to capture children's exposure to reading and languages spoken in the home through parental report, a parallel questionnaire was not administered to educational personnel, thus raising the possibility that children's sub-syllabic preferences were influenced by early literacy instruction.

A further limitation to the study is the manner in which children's oral language proficiency was assessed and how these data were used to examine the possible relationship between oral language proficiency and sub-syllabic preference. Oral language proficiency as measured by Peabody Picture Vocabulary Test-Third edition

(PPVT III; Dunn & Dunn, 1997) yielded results related to children's receptive vocabulary; thus these results and may or may not have reflected children' productive oral language proficiency. Moreover, in comparing the possible relationship between oral language proficiency and sub-syllabic preference, only within group mean language proficiency scores were analyzed. Consequently, the results of this study did take into account within group variations of oral language proficiency in Korean and English.

Finally, this study is limited in that there is 1/3 chance of guessing in sound oddity task and 1/4 chance of guessing in sound similarity judgment task.

Summary of Chapter 1

The Chapter 1 presented an overview of the relationship of phonological/ orthographic processing to basic reading skills in terms of language transfer and provided a statement of language-specific sub-syllabic units. Additionally, this Chapter 1 delineated a brief introduction of semivowel properties between Korean and English. It also discussed the purpose of the study and the three research questions. Further, the significance and limitations of this study were discussed.

CHAPTER 2: LITERATURE REVIEW

Overview

Recently, the extensive investigation of the relationship between phonological processes and reading has been one of the most critical accomplishments to date. Researchers have conclusively demonstrated the role of phonological awareness in reading acquisition in an alphabetic first language (L1). In the meantime, an emerging body of studies of an alphabetic and non-alphabetic second language (L2) within the same domain has also documented that the sensitivity to the sound structure of oral language is a necessary predictor of the acquisition of L2 reading. A growing body of L2 literacy research findings and theoretical constructs has led one to increasingly understand the ways in which the sound systems of oral language in both L1 and L2 are mapped into the orthographic decoding of the L2 and transferred to the L2 reading.

In an attempt to explore cross-language transfer of sub-syllabic awareness, this study with a bottom-up perspective on L2 reading investigates the transfer of sub-syllabic preference between one language (Korean) and another language (English) given the linguistic discrepancy across the two languages. More specifically, this study focuses on sub-syllabic preferences in semivowel position because placement of semivowels in Korean always occurs before a vowel, while placement of semivowels in English generally follows the vowel. Thus, the placement of the semivowel, which is closely attached to vowel (Spencer, 1996) may be important to distinguish the sub-syllabic structure between Korean and English.

Accordingly, this literature review examines the linguistic role of sub-syllabic units in phonological processing. Within the context of L1 literacy, this review focuses

on the theoretical frameworks of basic reading process and the distinctively salient intra-syllabic structure of onset-rime in English and body-coda in Korean.

Secondly, this review attempts to investigate cross-language transfer of phonological and orthographic processing in L2 literacy. The review concentrates on the phonological and orthographic transfer across different orthographic systems: (a) between two alphabetic languages (e.g., English and Spanish), (b) between a non-alphabetic language (e.g., Chinese) and English, and (c) between an alphabetic-syllabic language (e.g., Korean) and English.

Finally, based on the results of the literature review, this Chapter 2 discusses the phonological transfer of sub-syllabic units and suggests general predictions for this study with an observation of a linguistic discrepancy between Korean and English with respect to semivowel.

Questions to Be Discussed

This literature review attempts to form a theoretical rationale to justify the effects of the typical sub-syllabic units found in L1 on L2 phonological processing by drawing the relationship of the preferred intra-syllabic structures in L1 to the transfer of phonological processing in L2. The specific questions addressed in this Chapter 2 are:

(1) Is the sub-syllabic unit of onset-rime linguistically universal?

(2) Which aspects of phonological and orthographic processing transfer between L1 and L2?

(3) Which aspect of L1 or L2 metalinguistic ability: phonological awareness or orthographic knowledge, plays a greater role in L2 word recognition?

(4) Given the cross-language transfer, is phonological awareness linguistically interdependent, regardless of similarities and differences in the phonological inventories of the L1 and L2?

The answers to the questions above can lead one to easily understand how the preferred sub-syllabic units in L1 can be transferred to L2 phonological awareness.

Linguistic Role of Sub-syllabic Units in L1 Literacy

In this section, this review specifically centers on the theoretical frameworks of basic reading process and the preferred segmentation of the syllable in the context of L1 literacy. I shall begin with an interpretation of phonological and orthographic processing in word recognition. I will then discuss the psycholinguistic grain size theoretical model (Ziegler & Goswami, 2005), providing a summary of its main tenets. Finally, I will analyze the studies on sub-syllabic units: (a) onset-rime in English and (b) body-coda in Korean. In elaborating these analyses, I will also attempt to apply the main findings of the preferred sub-syllabic units to the first question regarding whether the sub-syllabic unit of onset-rime is linguistically prevalent across languages.

Phonological and Orthographic Processing

Current models of word identification processes suggested that the information involved in identifying words from print falls within two broad domains: phonological and orthographic (Torgesen et al., 1997). The term *phonological processing* used in reading research, refers to the mental operations that are involved when the phonological, or sound structure, of oral language is utilized in decoding written language. As Scarborough and Brady (2002) explained:

> *phonological processing* has been applied to some reading and writing tasks, especially decoding of pseudowords and invented spelling, that are thought to depend heavily on the use of phonological information during the processing of printed material. (p. 319)

Similarly, according to Wagner and Torgesen (1987), phonological processing basically consists of the two broad dimensions, phonological awareness and coding. One component, *phonological awareness*, simply stated, is the ability to detect and manipulate sounds (e.g., move, combine, delete, isolate), access to the sound structure of oral language (e.g., phonemes, onset-rime, syllables), and hear sounds in spoken words, in contrast to recognizing sounds in written words. *Coding*, the other phonological processing component, involves going from written symbols to their phonological equivalents in short- and long-term memory. The distinction between the two coding dimensions, phonetic and phonological, is type of memory. That is, *phonetic* coding takes places in short-term memory for such processes as sounding out unfamiliar words. Thus, it is usually assessed by tasks requiring the repetition of novel verbal strings like nonsense words (Baddely, 1986; Stone & Brady, 1995). In contrast, *phonological* coding accesses the lexicon in long-term memory for known words. Rate of access to phonological information in long-term memory is typically measured by rapid automatic naming tasks (Wolf, Pfeil, Lotz, & Biddle, 1994).

Within the phonological awareness domain, the dimensions of phonological sensitivity are composed of three levels of awareness (Goswami, 1999; Smith, Simmons, & Kameeuni, 1998; see Ziegler & Goswami, 2005; Scarborough & Brady, 2002): *syllable, sub-syllabic,* and *phoneme awareness*. Syllable awareness refers to the ability to

detect consistent syllables, which are the most recognizable and largest units of sound. Sub-syllabic awareness refers to the ability to divide a syllable into sub-syllabic units such as onset-rime (C-VC) or body-coda (CV-C). Phoneme awareness refers to the ability to reflect upon the smallest and least accessible sound units that distinguish meaning between words (e.g., /k/ as in ***c***at vs. /b/ as in ***b***at by the initial phoneme).

Based on this phonological domain, words can be identified because of correspondence between the written representation and the word's phonological structure. Skill at identifying the words based on phonological information requires at least awareness of the phonological structure of the words (Blachman, 2000), knowledge of specific grapheme-phoneme correspondence (GPC) rules and skill in synthesizing the phonemes to produce a recognizable word (Torgesen et al., 1997; Wagner & Torgesen, 1987). In many cases, phonological knowledge and skill can be used to identify unfamiliar words.

In contrast to phonological knowledge and skill, orthographic processing in word identification is much more word specific. Orthographic knowledge involves memory for specific visual/spelling patterns that identify individual words, or word parts on the printed page. Cunningham and Stanovich (1990) described orthographic knowledge as the ability to use familiar orthographic sequences to access the lexical knowledge. It would seem to be acquired by repeated exposure to printed words until a stable visual representation of whole word, or meaningful subword units has been acquired, that is, orthographic ability can be regarded as skill in recognizing words directly on a visual basis.

Orthographic knowledge, therefore, includes the appropriate application of various graphemic candidates to a particular phoneme at different positions in a word (e.g., when to spell /k/ as k or ch); familiarity with the spelling patterns and lexical meanings of common morphemes (e.g., *macro-* is a prefix meaning *large*); and word-specific information about how particular words are spelled (Scarborough & Brady, 2002).

In the meantime, the relationship between phonology and orthography has been discussed from various theoretical perspectives, such as Dual Route (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001) and Parallel Distributed Processing (PDP: Coltheart, Curtis, Atkins, & Haller, 1993). Dual Route proposed that readers implicitly use a set of GPC rules in identifying the phonological representations of words (Coltheart, et al., 2001). However, PDP models have shown that rulelike behavior in the utilization of phonological information during the word recognition requires neither GPC rules nor lexicon, but rather arises as the formation of interletter associate network through repeated processes of graphic and phonological representations of words (Coltheart, et al., 1993). Although a discussion of these models is beyond the realm of this proposed study, the basic point is that one source of information about the identity of words in print arises from the systematic relationships between the phonological and visual representations of words.

For alphabetic languages, an extensive body of research on reading has unveiled that phonological processing is one of the major hallmarks of the development of beginning readers (Goswami & Bryant, 1990; Torgeson et al., 1997; Wagner & Torgesen, 1987) and that, in general, phonological processing predicts later success in reading and

spelling acquisition in young children (Bradley & Bryant, 1983; Goswami, 1998, 1999). More specifically, because phoneme awareness fully develops once children are taught to read and write, the ability to distinguish phonemes, small phonological units, is the most sophisticated predictor of individual processing abilities in explaining unevenness among students in the rate of early literacy acquisition (Treiman & Zukowaski, 1991; Byrne & Fielding-Barnsely, 1995). Still other studies have affirmed the importance of processing relatively large units such as onset-rime for boosting subsequent reading performance (Bradley & Bryant, 1983, Bryant, MacLean, Bradley, & Crossland, 1990).

Similarly, a large number of studies conducted on learning to read in an alphabetic native language have widely documented that orthographic processing is one of the significant contributors to word recognition and variation in orthographic processing abilities causes individual differences in word recognition abilities (Becker, et al., 1992; Booth, et al., 1999; Cunningham & Stanovich, 1990).

The notion of phonological awareness such as phoneme and sub-syllabic awareness and orthographic knowledge is critical to the questions I addressed earlier in that significant gains in this phonological sensitivity and memory for specific visual/spelling patterns directly affect the ease of reading acquisition and subsequent reading achievement. This sub-section provided the definition of phonological processing which consists of phonological awareness and coding, and described the levels of phonological awareness. It also reviewed orthographic processing along with current models of word identification. In addition, this sub-section interpreted the relationship of phonological and orthographic processing to early literacy. The next sub-section will

discuss the psycholinguistic grain-size models (Ziegler & Goswami, 2005) as an extension of the forerunning Orthographic Depth Hypothesis (OHD: Katz & Frost, 1992).

Psycholinguistic Grain Size Theory

Recently, Ziegler and Goswami (2005) developed a theoretical framework known as the "psycholinguistic grain size model" in an attempt to examine phonological and reading development in different languages, and describe slowness of reading acquisition and skilled reading across languages.

Psycholinguistic grain size theory has suggested that beginning readers are faced with the following three issues: phonological development prior to reading, orthographic consistency, and grain size (granularity) of orthographic and phonological representations. The focus of this current review, the issue of phonological availability prior to literacy, reflects the fact that the most accessible phonological units for the truly beginning readers are larger units such as whole words, syllables, and sub-syllabic divisions rather than smaller units such as phonemes. According to this theory, there is a developmental emergence of phonological domain from larger to smaller units (Bradley & Bryant, 1983; Caroll & Snowling, 2001; Goswami & East, 2000; Treiman & Zukowaski, 1991). However, literacy acquisition develops from smaller to larger units (Brown & Deavers, 1999).

Phonological development prior to reading. According to Ziegler and Goswami (2005), psycholinguistic grain size theory suggested that "phonological awareness of syllabic and sub-syllabic structure is an emergent property of phonological similarity at the lexical level" (p. 18). In other words, depending on structural regularities within dense neighborhoods of similar sounds, the rime (VC) appears as a cohesive unit in some

languages such as English (De Cara & Goswami, 2002, 2003), while the body (CV) does so in others such as Korean (Yoon et al., 2002) and Japanese (Inagaki et al., 2000; Tamaoka & Terao, 2004).

This notion strongly proposes that the phonological uniqueness of the spoken systems within a language has a considerable effect on a sequential progression in the phonological sensitivity from syllable, sub-syllabic division as a large unit to phoneme as a small unit. Consequently, phoneme awareness may be fully accessible once children are exposed to literacy.

Orthographic consistency. Orthographic systems can be divided into three categories: alphabetic, syllabic, and logographic. In the first, alphabetic system, in which the unit of representation is the phoneme, is used in languages such as English, Russian and Korean. In the second system, syllabary, each graphemic unit represents a syllable. This system is employed in languages such as Korean and Japanese (Kana). The third orthographic system is logography used in languages such as Chinese and Japanese (Kanji). One grapheme unit usually represents the meaning and the sound of the entire word or morpheme (Koda, 1996). It has been argued that visual, phonological, and morphosyntactic differences are closely related to different demands on word recognition processes in different languages (see Comier & Kelson, 2000; Geva, Wade-Woolley, & Shany, 1993, 1997; Pae, Sevik, & Morris, 2004; Wade-Woolley & Geva, 2000).

According to Koda (1996), orthographic structures vary in two critical dimensions: (1) the basic unit of orthographic representation (i.e., a linguistic unit- e.g., morpheme, phoneme, syllable- corresponding to individual symbols), and (2) the regularity of sound-to-letter correspondence (orthographic depth).

Based on the basic unit of representation, three major orthographies presently used in various languages can be classified into two types: logography (morphography) and phonograph. Different phonological processing mechanism can be expected between the two types. In logography, phonological information is lexically accessed primarily through whole-word or morpheme activation in visual word recognition. In short, phonological processing in logography occurs virtually without the need for phonetic representation. In contrast, in phonograph, segmental information such as phoneme in the alphabet and syllable in the syllabary, is analyzed and assembled together by grapheme-to-phoneme translation in order to acquire lexical processing.

The second dimension, orthographic depth, refers to the degree of consistency of a language's grapheme-to-phoneme correspondences. The Orthographic Depth Hypothesis (ODH) proposed that orthographic depth is directly related to the amount of lexical connection in gaining a word's phonology (Katz & Frost, 1992). An orthography in which letter combinations are consistent and completely equivalent to the phonemes in the spoken language is considered to be orthographically shallow languages, such as Spanish, German, Turkish, Persian, and Korean. In contrast, an orthography in which letter-to-sound correspondences are inconsistent and irregular is regarded as being orthographically deep languages, such as English, French and Hebrew.

According to OHD, in shallow orthographies, a phonological code of a word is available prior to lexical access through highly systematic analysis of segmental information. By contrast, in deep orthographies, a lack of phonological transparency generally impedes systematic letter-to-sound mappings. It states that phonological processing depends, in varying degrees, on lexical information. In other words,

phonological information of a word may not be available until after lexical access (Katz & Frost, 1992).

It seems relatively easier to learn about phonemes in orthographically consistent languages such as Greek and Italian because one grapheme systematically corresponds to one and the same phoneme or one phoneme regularly maps onto one and the same letter (Porpodas, Pantelis, & Hantziou, 1990; Cossu, Gugliotta, & Marshall, 1995). For inconsistent languages such as English, there is more than one graphemic candidate for a given sound (e.g., /k/ as spelled in k, ch, or c), whereas some graphemes can have more than one phoneme (e.g., ch as sounded in /k/ and /tʃ/). It seems slower to learn about phonemes within inconsistent and irregular languages (Ziegler & Goswami, 2005).

Grain size of orthographic and phonological representations. The grain size (granularity) of orthographic and phonological representations reflects the fact that the relationship between orthographic consistency and grain size is not necessarily systematic. As noted earlier, phonological sensitivity emerges developmentally from larger to smaller units (Bradley & Bryant, 1983; Caroll & Snowling, 2001; Goswami & East, 2000; Treiman & Zukowaski, 1991). However, at the stage of literacy acquisition, young readers of shallow orthographies such as Greek exclusively rely on the small psycholinguistic grain size (Goswami, Porpodas, & Wheelwright, 1997). Yet, small grain size units are not sufficient for reading in deep languages. For example, beginning readers of English have to learn the additional correspondence of larger units (i.e., onset-rime, syllable, and whole word) because there is greater inconsistency in this language's small units than in large units (Treiman, Mullennix, Bijeljac, & Richimond-Welty, 1995).

Therefore, readers in relatively inconsistent languages such as English may need to develop both small and large unit recoding strategies in parallel. Brown and Deavers (1999) found that less-skilled readers of inconsistent languages dominantly focus on smaller units while skilled-readers distinctively rely on larger units because they have already interpreted smaller units. It seems that reading acquisition should begin with small units.

Accordingly, Ziegler and Goswami (2005) concluded that "salient units of different size emerge in response to the following different kinds of pressure: (a) functional pressure toward smaller units that are orthographically less complex, (b) linguistic pressure toward bigger units that are phonologically accessible, and (c) statistical pressure toward units that are more consistent than others" (p. 20). In one sense, spoken and written languages initially prefer different grain sizes in that phonological development begins with larger units, whereas orthographic emergence begins with small units. In effect, the three pressures are critical for explaining the ease or difficulty of initial acquisition of reading and spelling across languages.

This theoretical framework is helpful to understand the availability of phonological unit at the stage of pre-readers and the language-specific "grain size" of psycholinguistic units at the phase of readers across languages. This sub-section discussed the three critical components of early reading acquisition, that is, the phonological availability prior to reading, the orthographic regularity, and the granularity between sounds and letters. The next sub-section will investigate whether the intra-syllabic division of onset-rime is preferred across different languages.

Analysis of Sub-syllabic Structure: Onset-rime vs. Body-coda

A preferred intra-syllabic unit of onset-rime structure has been widely accepted as being essential to learning to read in English. Such preference prior to the availability of phoneme process implies that the linguistic relationship between vowel and coda is closer, and therefore more easily accessible than that between onset and vowel (Chomsky & Halle, 1968). Thus this preferred rime structure can play a crucial role in the process of developing phonological analysis and capability in establishing initial phases of reading (Goswami, 1993; Treiman, 1983, 1985, 1986).

Recently, the debate on whether the intra-syllabic division of onset and rime is a linguistic universal is still controversial. If the onset-rime division of the syllable is not preferred across all languages, a point of disparity in sub-syllabic division units may be a popular way of explaining language-specific differences across languages. The analysis of sub-syllabic structures across different languages can resolve this uncertainty. Now, in this sub-section, empirical studies supporting a preference for onset-rime will be reviewed first, followed by the new evidence indicating that such preference might not be universal, instead, language-specific.

Onset-rime studies. The linguistic view that rime as a cohesive unit is a natural constituent in phonological awareness has been strongly supported by two strings of research: experimental studies on the special role of an onset-rime structure in English (De Cara & Goswami, 2003; Treiman, 1983, 1985, 1986, 1995; Treiman & Danis, 1988; Treiman, Fowler, Gross, & Berch, 1995; Treiman, Mullwnnix, Bijeljac-Babic, & Richmond-Welty, 1995) and statistical studies on analysis of the distribution of phonemes in English syllables (De Cara & Goswami, 2002; Kessler & Treiman, 1997).

To begin with, Treiman (1985) among the first to investigate this rime-cohesion hypothesis (Uhry & Ehri, 1999), suggesting that syllables consist of an onset and a rime, conducted four experiments on the division between onsets and rimes in English spoken syllables. Treiman examined English (L1)-speaking children' performance on phonemic awareness and reading skills to see whether syllable structure plays a role in the development of ability to analyze spoken words into phonemes.

In Experiment 1, forty-eight children in 7- to 9-year-olds were administered phoneme substitution tasks in two different conditions of CVC or CCV syllables. The purpose of this Experiment is to examine phonemic analysis of onsets or rimes as a natural constituent of the syllable. Children were asked to replace the first two phonemes of each stimulus with two fixed phonemes (Game A) and to substitute the last two phonemes of every stimulus with two fixed phonemes (Game B). For instance, in the CVC condition, Game A should replace /lʌ/ for the first CV (i.e., stimulus /mon/ should be transformed into /lʌn/) and Game B should substitute /ʌl/ for the final VC (i.e., stimulus /mon/ should be transformed into /mʌl/). In CCV condition, Game A should replace the first CC of each stimulus with /sl/ and Game B should replace the final CV with /li/. The experimenter predicted that in CVC syllables, Game B should be relatively easier than Game A, since it treats the final VC as a rime, which is a natural constituent of the syllable. The reverse pattern of results was expected for CCV syllables, since it regards the initial CC as an onset.

The most important finding was that as expected earlier, the rule that transformed the VC (rime) was significantly easier than the rule that transformed the CV (body) in the CVC condition. In the CCV condition, the reverse pattern of results

emerged. That is, children could treat the CC (onset) as a unit more easily than the final CV. The results of Experiment 1 indicate that English-speaking children treat the natural constituents of the syllable-onsets or rimes- more easily than the non-natural units-body (i.e., the initial CV in CVC syllables).

For Experiment 2, the researcher implemented phoneme recognition task to look more closely at the onset. Twelve children in the age of 4 to 6 were asked to recognize target phoneme within that syllable. Positive items, which begin with target phoneme, formed groups of 3- a CV syllable, a CVC syllable, and a CCV syllable in two conditions. For example, /sa/, /san/, and /sna/ are for the /s/ condition and /fo/, /fol/, and /flo/ for the /f/ condition. On the other hand, negative items, which do not include /s/ or /f/ anywhere within that syllable, were comparable to positive items. For instance, /te/, /zir/, and /plo/ are for the /s/ condition and /ri/, /vol/, and /bli/ for the /f/ condition. Children heard each teat stimuli from the tape, repeated it, and then judged whether it began with the target.

The major finding of Experiment 2 was that in the positive items, the error rate on CCV syllables (28%) was greater than that on CV (12%) or CVC syllables (14%). Performance on negative items did not vary as a function of the syllable structure-CV. CVC or CCV. This result implies that children have more difficulty analyzing the target phoneme when it was part of a consonant cluster than when it was a singleton. Simply saying, it appears to be especially difficult for children to break up the onset because they treat a consonant cluster (i.e., the initial CC in CCV syllables) as an onset-unit.

Of primary interest in the following Experiment 3 was 24 kindergarteners' performance on written words in which the target grapheme was the initial phoneme of a

cluster (i.e., *s* in snake) and written words in which the target was a singleton (i.e., *s* in sink). The researcher expected that children are less able to recognize a target in a cluster than in a singleton. Each child was asked to judge whether the name of each picture began with the target letter.

Not surprisingly, children performed more easily on singleton items than on cluster items. It seems consistent with the view that onsets are natural constituents of the syllable. In addition to spoken words, this finding of Experiment 3 extended the results of Experiment 2 by showing that children's difficulty in recognizing the initial graphemes of clusters occurs with printed words.

Finally, the primary aim of Experiment 4 was to explore children' performance on decoding printed words depending on the syllable structures. The experimenter conducted decoding task by comparing 20 first graders' and 20 second graders' ability to decode CVC and CCV pseudowords (i.e., san-sna, keer-kree). Children were asked to read nonsense words shown in index cards. The researcher predicted that syllable-initial consonant clusters cause difficulty in reading as in phonemic analysis.

Similarly, the results of Experiment 4 revealed that both first graders and second graders were less accurate on CCV items than on CVC items. In particular, first graders' errors were higher in decoding CCV syllables than CVC syllables. In summary, Experiment 4 showed that CCV nonsense syllables were more difficult for beginning readers to decode than CVC syllables.

Overall, this study supported evidence that English spoken syllables consist of onset and rime units. Moreover, syllables in printed words also can be extended to this

notion. In addition, this study suggested a specific link between phonemic awareness and decoding.

In addition, Treiman (1995) investigated short-term memory errors for speech by examining subjects across a wide range of age groups, including 67 kindergartners, 39 third graders, 46 sixth graders, and 24 undergraduates. The main purpose of this study is to identify the subjects' patterns of recall errors on nonsense CVC syllables. In a previous research (e.g., Treiman, 1985), many children could segment syllables into onsets and rimes. Thus, it might be expected that kindergarteners would code spoken syllables in terms of onsets-and rimes in short-term memory.

According to this view, the researcher predicted that although memory span should increase with development, onset-rime coding of syllables in short-term memory is a basic principle which characterizes all English-native speakers regardless of levels of cognitive maturity. For instance, children are more likely to recall /kal/ given /kus/ and /dal/ rather than to recall /kul/ or /kas/ as adults do. For each list of three nonsense syllables, the subjects heard each word with a one-second interval and they were asked to repeat all the three syllables in the given order, and then they recalled any syllables. Responses were analyzed and categorized in terms of the errors and their types.

The most significant finding of this study was that across all age groups, recall errors that preserve the rime of one word as a unit together with the onset of another word were the most frequent. This study extended the findings of Treiman and Danis (1988), which provided adults' onset-rime recombination errors and established the same psychological units in children. Furthermore, this result suggests that native speakers of

English code spoken syllables in terms of the onset-rime division as a psychological unit and this typical linguistic structure plays a critical role in language processing.

When considering the items used by Treiman' studies (1985, 1986, 1995) previously reviewed, a potentially important factor on which phonology research should focus is the effects of consonant sonority[9] and vowel quality (i.e., long vs. short, or stressed vs. unstressed) on the cohesion between the vowel and the coda (final consonant). Depending on variation in consonant sonority and vowel quality, subjects' performance on test items may be different, thus there is a need for controlling over these factors to justify the relevance of the onset-rime structure (Treiman, Bowey, & Bourassa, 2002).

The other string of onset-rime research focuses on the distributional properties of phonemes in a syllable. Kessler and Treiman (1997), for example, analyzed the syllable structures and the distributions of phonemes in about two thousand English monosyllabic (CVC) words found in the unabridged Random House Dictionary (Flexner, 1987, cited in Kessler & Treiman, 1997). The purpose of this statistical-analytic study is to understand the patterns of phonemes which occupy English syllables by identifying whether some consonants and some phonologically legal combinations (i.e., /siŋ/ as being phonologically legal but /ŋis/ as illegal) emerge in certain conditions of the syllable more or less often than by chance. For example, the authors find that the sequence of /ʌf/ emerges much more often than one would expect from the frequency of /ʌ/ and /f/ regarded independently.

[9] It is generally defined as a ranking on a scale-from vowel, glides (/y/, /w/), liquids (/l/, /r/), nasals (/m/, /n/), to obstruents (/p/, /t/, /k/)-the degree of resonance in the vocal track, that is, the degree of vowel-likeness (Spencer, 1996). For example, glides are much closer to vowel than nasals and therefore, in terms of sonority, glides are more resonant than nasals.

In Study 1, the researchers analyzed the 2001 monosyllabic CVC words by asking whether there are differences in the frequency of occurrence of the different consonants depending on the onset (initial) or coda (final) position. It was found that glides (/h/, /j/, /w/) can occur only in the onset and /ŋ/ can occur only in the coda. In particular, /b/, /ʃ/, and /r/ are preferred for the onset and /z/, /θ/, /n/, /t/, /l/, and /k/ show a preference for the coda.

Study 2 was intended to examine whether the vowel and the coda are more closely linked together than are the vowel and the onset. The researchers reanalyzed the words which contain particular phonemes in either the onset or the coda found in Study 1. The results of Study 2 showed that the connection between vowel and coda is stronger than that between vowel and onset by computing the percentages for onset-vowel (6.9 %), vowel-coda (43.3%), and onset-coda (4.7 %) pairs (only pairs whose expected frequencies are 5 or more are considered).

Indeed, the findings of this statistical study support the notion that onset-rime unit is a natural constituent in English by revealing the patterns of phonemes in English CVC syllables. These results are also compatible with the view that cohesion in the rime is stronger than in the body at least in English.

Similarly, there is another statistical study on phonological neighborhood density analyzed by De Cara and Goswami (2002). This statistical analysis of phonological similarity relations among English syllables is motivated by lexical restructuring theory (LRT: see Metsala, 1999). This theoretical construct suggests that as spoken vocabulary grows and mental lexicon[10] associated with phonological similarity

[10] A mental system which contains all the information such as pronunciation, grammatical patterns, and meaning a person knows about words (Richards, Platt, & Platt, 1999).

relations changes, phonological awareness can develop. Accordingly, phonological lexicon (phonological neighborhood density) has psycholinguistic structure. Assuming this notion of LRT, this statistical study focuses on not only the number of phonological neighbors for English spoken syllables, but the nature of these neighbors.

The authors expected that if one type of phonological neighbor dominantly exists, phonological neighborhood density may show levels of segmental representation. They analyzed four thousand monosyllabic (CVC) spoken words adapted from the Celex database (Baayen, Pienbrock, & Guilikers, 1995, cited in De Cara & Goswami, 2002, p. 417) in terms of rime (VC) neighbors (e.g., hat/cat), consonant (C-C) neighbors (e.g., hat/hit), and lead (CV) neighbors (e.g., ham/hat). Then the numbers of rime, consonant, and lead neighbors were calculated by type based on the absolute number of neighbors and by token based on the cumulated frequencies of neighbors. The statistical analyses showed that the portion of rime neighbors is much larger than either of the other two conditions of neighbors both by type (54.2% compared to the 17% of consonant neighbors and the 28.9% of lead neighbors) and by token (56% compared to the 24.2% of consonant neighbors and the 19.8% of lead neighbors).

In terms of the nature of these neighbors, the authors analyzed the rime neighbors against the total numbers of neighbors that include all three types, based on the age of acquisition data (Gilhooly & Logie, 1980, cited in De Cara & Goswami, 2002). The proportion of rime neighbors among words acquired by the age of 3 was 49.8%, and corresponding proportions for 4-, 5-, 6-, and 7-year-olds were 54.8%, 56.2%, 56.7%, and 57.1%, respectively.

These analyses demonstrated that the majority of phonologically similar words in English are rime neighbors and reflected that children may constantly change their lexicon. Theoretically, rime neighborhood density should have an impact on the development of phonological awareness. In line with this statistically analytic study, a following experimental study of effects in a rime awareness task in 48 five-year-olds children conducted by De Cara and Goswami (2003) indicated that the subjects with larger vocabularies outperform well in a rime oddity task (e.g., *peak*, dot, not) than those with smaller vocabularies. Moreover, the findings of this study strengthen the evidence for the special role of rimes in English and the notion of lexical restructuring theory (LRT), which suggests the strongly positive correlation between phonological neighborhood density and the emergence of phonological awareness in pre-readers.

Body-coda studies. Unlike the view with the special status of onset-rime as a linguistic universal, the strong arguments against the relevance of rime as a cohesive unit are attributed to two strands of research: body-coda structures studies (Wiebe & Derwing, 1994: Yoon et al., 2002, Yoon & Derwing, 2001) and CV saliency studies (Inagaki et al., 2000; Tamaoka & Terao, 2004; Geudens & Saundra, 2003).

At least, theoretically, it makes sense that readers of relatively transparent orthographies such as Korean may attempt to reduce the burdens presented by access to larger units and instead attempt to use smaller units because grapheme-phoneme correspondence (GPC) rules are nearly systematic whereas lack of transparency in English may require the double demands of access to both small and large units. In other words, because shallow writing systems are spelled as sounded, yet deep ones are not, Korean speakers would not require attention to the rime orthographic units present in

English (see Ziegler & Goswami, 2005). This theoretical justification of body-coda saliency in Korean will be reviewed.

This first strand of studies revealed the explicit preference for body-coda structures. Yoon and her associates (Yoon et al., 2002), for example, examined Korean participants of different age groups and their direct comparisons with a study of sub-syllabic units in English (Goswami. 1993). The main purpose of these four experiments eventually investigated a difference of sub-syllabic units between Korean and English.

Experiment 1 of Yoon et al.'s (2002) study intended to replicate the first author's 1997 dissertation study with use of grapheme substitution task and to establish the consistency of task demands. Therefore, Yoon and her colleagues employed an analogy task adopted in Goswami's (1993) study, in which an onset-rime preference was found for native speakers of English. Twenty-eight kindergarteners (mean age: 4 years old) were asked to decode CVC nonwords after clue words were presented to the subjects. Of interest was the manipulation of the test items: each test word shared the body (CV), the rime (VC), the nucleus (V) or the margin (C-C) with the clue words (e.g., for clue words, /byuk/; for test words, /byun/, /syuk/, /syun/, and /byok/ as a test word). The main results of Experiment 1 showed that children make a distinctive preference for the body (CV) division units (45% accuracy compared to the 21% of rime, the 22% of margin, and the 17% of nucleus). This finding directly suggests that the rime as a functional unit is not a linguistic universal even when task demands are held constant.

In order to examine whether orthographic differences between Korean and English may serve to influence the different sub-syllabic segmentation preferences, Experiments 2 and 3 examined the performance on the grapheme substitution task. After

a clue word along with its pronunciation was presented to subjects, a test word was spoken to the subjects, who were asked to say which part of the clue word has to be changed to produce the target word (e.g., for clue words, /mun/; for test words, /bun/, /min/, and /mul/). In Experiment 2, twenty seven Korean kindergarteners (mean age: 5 years) were tested on English words (CVC) and nonwords (CVC), while in Experiment 3, thirty adult native English speakers (range of age: 18-24 years old) were examined on artificial Korean syllables (CVC). The results provided that Korean children show much higher accuracy of final consonant substitution (79%) even in English alphabet than that of initial consonant (37%) and middle vowel substitution (11%). On the other hand, English-speaking undergraduates' performance on the initial consonant even in Korean orthography was more accurate than either of the other two types of substitution (84.5% of the initial consonant compared to 60% of the middle vowel and 59.5% of the final consonant). The findings of Experiment 2 and 3 suggest that regardless of the use of different orthographic systems, Korean children show a preference for the body-coda division over the onset-rime division, whereas English-native speakers still prefer the onset-rime structure to the body-coda structure. In summary, the preference for sub-syllabic units appears to be language-specific.

Failing to demonstrate orthographic discrepancy between the two languages, phonological factor emerges as a possible resource of language-specific sub-syllabic units. Accordingly, in Experiment 4, both 49 Korean-speaking and 49 English-speaking undergraduates were tested on similarity judgment task to examine the Linguistic Hypothesis Yoon and her colleagues asserted: the emergence of intra-syllabic units comes from the spoken language effects, as opposed to the onset-rime camp's

explanation of the relevance of sub-syllabic unit in reading typically driven by the redundancy of orthographic features identification (Treiman et al., 1995) as well as collocation of spoken structures in the acquisition of phonological awareness (Goswami & Bryant, 1990).

In this experiment, pairs of CVC words and CVCVC nonwords items in both Korean and English were employed to judge global similarity with a scale of 0 (completely different) to 6 (exactly same) between two stimuli. Each pair of CVC words and CVCVC nonwords items shared 0- to 3-phonemes and 0- to 5-phonemes in terms of position (e.g., for CVC words, /tug/-/tar/; for CVCVC nonwords, /cokam/-/cokan/). Each stimulus was heard twice with a one-second interval. The results of this Experiment demonstrated that Korean-speaking participants are more likely to accurately judge pairs of both words and nonwords if they share the CV (body) units than if they share the VC (rime) or C-C units, while English-speaking participants are more likely to accurately judge pairs of both words and nonwords if they share the VC (rime) units than if otherwise. Again, the evidence of the language-specific preferences was found here.

Overall, this study revealed that native speakers of Korean explicitly prefer CV-C (body-coda) to C-VC (onset-rime) in the analogy task, grapheme substitution task, and similarity judgment task. As a result, a preference for sub-syllabic units appears to be language-specific.

In contrast to the Linguistic Hypothesis the authors proposed, one potential problem of this study is that the adults' performance on similarity judgment task failed to rule out the impact of literacy on spoken words even though the stimuli presented in this study were spoken syllables. If the researchers would test pre-readers, they may possibly

reduce the effects of literacy on spoken languages. Another problem is that the stimuli presented in Experiment 1 were nonwords in print. The decoding skill of these printed nonwords may not be enough to support the emergence of sub-syllabic awareness in terms of the Linguistic Hypothesis. In order to be consistent with spoken language effects, spoken stimuli should be presented.

A similar study conducted by Wiebe and Derwing (1994) showed that Korean speakers tend to blend body (CV) with coda (C) rather than onset (C) with rime (VC) in a forced-choice word blending task (e.g., sem + thong: *seng* was easier than *song*). Moreover, Yoon and Derwing's (2001) study strengthens the special saliency of CV-C units in a global similarity judgment with Korean undergraduate students and in a reduplication task with Korean literate/pre-literate children (e.g., for body reduplication, make: ma-make; for rime reduplication, make: make-ake).

The second strand of body-coda studies implicitly supported that onset-rime unit may not be a salient unit at least in some languages such as Dutch and Japanese. Geudens and Sandra (2003) conducted four experiments to examine Dutch-speaking pre-readers' and beginning readers' segmentation of the syllable (CV vs. VC). The central aim of this study is to explore whether onset-rime units influence Dutch-speaking children' phonological awareness. In particular, quantitative analyses of the lexicon in Dutch are similar to those in English in terms of statistical distribution of rime neighbors (Baayen, Pienbrock, & van Rijn, 1993, cited in Ziegler & Goswami, 2005). That is, the rime neighbors predominate in Dutch phonology than the body neighbors.

In Experiment 1, fifty-six kindergarteners (mean age: 6 years) were examined on segmentation task of CV vs. VC syllables. Children first heard a two-phoneme

syllable, and then were asked to segment it. For Experiment 2, in the same way, thirty-two children (mean age: 6 years 11 month) who are about one year older than those in Experiment 1 were tested on the same task. The findings of Experiments 1 and 2 showed that it is more difficult for pre-readers to segment two-phoneme syllables (CV: / to**:**/) between onset and vowel than between vowel and coda within the rime (VC: /o**:**t/). The easier segmentation of VC syllables than that of CV reflects the difficulty to break up CV syllables. At the same time, this superior performance on segmenting of VC syllables directly contradicts the view that onsets and rimes are natural constituents of the syllable. Moreover, this result replicates the findings of Uhry and Ehri (1999), which suggest the greater ease of segmenting VC over CV words due to the salience of vowels in initial position.

In Experiment 3, the same subjects in Experiment 1 were tested on phoneme substitution task of CV vs. VC syllables. Children first heard a two-phoneme syllable and then were asked to replace a phoneme in a CV or VC syllable with a target phoneme (e.g., /to:/ -> replace the /t/ with a /s/). Again, it was easier for pre-readers to substitute a phoneme in a VC than in a CV. This result of this experiment is not consistent with the notion of rime as a cohesive unit

Finally, Experiment 4 conducted segmentation task of CVC syllables with 60 first-graders. The same procedures presented in Experiments 1 and 2 were used in this Experiment. Again, first-graders showed a disadvantage for segmenting out CV strings in CVC (e.g., in /sa**:**f/, /a**:**f/ and /s/-/a**:**f/ are less frequent).

Taken together, the results of this study are not compatible with the view that rime is a cohesive unit within the syllable. Therefore, this study implicitly challenges the

well established status of onset-rime as the preferred sub-syllabic units in English. More important, this study took into account the effect of consonant sonority as Treiman and her associates (2002) suggested. However, the exclusive use of long vowels as nucleus may cause different responses to syllables with short vowels.

Meanwhile, Tamaoka and Terao (2004) indicated that adult Japanese speakers showed a moraic (sub-syllabic rhythmic units: CV) structure in naming words which contain special sounds such as nasals (e.g., /n/, /m/), geminates (e.g., prolonged or doubled consonant), long vowels, and dual vowels. Inagaki et al.'s (2000) study also revealed that Japanese children's conscious and less conscious segmentation of words shows tendency toward moraic segmentation. In summary, it is apparent that onset-rime units appear to be irrelevant to Japanese.

The whole review of sub-syllabic structure: onset-rime vs. body-coda can answer the first question addressed earlier. As explained above, the distinctive segmentation of syllables in Korean and English has been observed. One can argue that the extent to which vowel can be closer to either coda or onset seems peculiar across languages. Accordingly, the intra-syllabic units appear language-specific.

Up to this point, within the area of L1 literacy, this section interpreted phonological and orthographic processing in terms of word recognition. In addition, it discussed the applicability of these basic reading processes to beginning literacy. Next, this section also reviewed the most updated theoretical frameworks of early reading acquisition: psycholinguistic grain size model (Ziegler & Goswami, 20005) which proposes the phonological availability problem, the orthographic consistency problem, and the granularity problem between sounds and letters. In addition, the extensive review

of sub-syllabic structures between English and Korean could resolve the uncertainty regarding whether the intra-syllabic unit of onset-rime is a linguistic universal. Now, this Chapter 2 moves toward the issues on cross-language transfer in L2 literacy. The next section will discuss conceptual frameworks of L2 literacy acquisition, and review phonological and orthographic transfer in L2 literacy.

Cross-language Transfer in L2 Literacy

To date, a multitude of research on L1 reading acquisition has primarily focused on alphabetic languages. In the meantime, L2 researchers have increasingly turned their attention to the study of the effects of L1 phonological and orthographic processing on the L2 reading acquisition across different orthographic systems.

In this section, this review particularly highlights the conceptual constructs of L2 literacy acquisition and discusses phonological and orthographic transfer within the context of variations in orthographic consistency. I shall begin with the notion of bilingualism and biliteracy. I will then discuss specific points of theoretical frameworks for understanding language transfer in terms of L2 phonology. Finally, I will review the cross-language transfer studies across diverse languages. In addition, I will attempt to clarify the remaining questions addressed at the beginning of this Chapter 2.

Bilingualism and Biliteracy

The process of becoming biliterate involves the construction and creation of meaning in two languages through text (Hudelson, 1994; Riggs, 1991). The terms *bilingualism/biliteracy* in its broad sense refers to the regular use of two languages. In that regard, Cook (1995), moreover, viewed bilingualism as follows: “bilinguals are not two monolinguals in the same head” (p. 58). Children generally do not have problems

with mixing up languages regardless of the separateness of contexts for use of the languages. For example, most bilingual children typically engage in code-switching, the act of inserting words, phrases, or even longer structures of one language into the other, when they communicate with another bilingual. Furthermore, early studies on the effects of bilingualism have mainly found a considerable cognitive benefit of early childhood bilingualism, supporting contention that bilingual children are more facile at concept formation and have a greater mental flexibility (Collier, 1992; Krashen, 1997, 1998; Cummins, 1999).

In some cases, however, the acquisition of both languages in bilingual children may be slightly slower than the normal schedule for first language acquisition (see Garcia, 1991; Lamber & Tucker, 1972). Children who have a first language (L1) other than English are faced with the challenge of learning a new language completely different from their native language. The syntactic, semantic, morphemic, phonetic, and pragmatic aspects of different languages may be significantly idiosyncratic.

For instance, Spanish and English are both in the Roman alphabetic language family and have some similarities, such as the use of an alphabetic writing system and similar cognates/word stems (Crystal, 1987). In contrast, Korean and English belong to different language families and are different not only in the writing system used, but also in other aspects, such as syntactic, morphemic, and phonemic. (Crystal, 1987). For example, the two sounds /l/ and /r/ are not distinctive in Korean, where they are mapped into /r/ because the sound /l/ never occur in the onset (Sohn, 1999), but they are in English (Cipollone, Keiser, & Vasishth, 1998). In English, certain pairs of words differ in that one has /l/ and the other has /r/, yet they differ in meaning (e.g., lap/rap). Quite

simply, linguistic discrepancies between L1 and L2 present additional challenges to bilingual children who are attempting to learn an L2 that is orthographically and phonologically different (Bialystok, Majumder, & Martin, 2003; Cormier & Kelson, 2000; Wade-Woolley & Geva, 2000).

Simultaneous vs. sequential bilingualism. Children who hear more than one language virtually from birth are referred to as '*simultaneous bilinguals*', whereas those who begin to learn an L2 later are referred to as '*sequential bilinguals*'. In most cases, a simultaneous bilingualism seems to develop the two languages within an equal or near equal time-frame usually achieved through exposure to and opportunities to use both languages. A child who becomes bilingual through a process of simultaneous bilingualism follows a similar pattern of language acquisition as a child who learns a native language (Genesee, 1989). Due to variations in the input received or uneven opportunities to use two languages, however, progress in acquisition may not be equal.

Sequential bilingualism occurs when a child is exposed to a second language after age of three (Baker, 1996). Most English as a second or foreign language (ESL/EFL) students are sequential bilinguals in that they do not acquire English fully even after they enroll in school. There are many factors influencing language acquisition of sequential bilinguals: (a) the stage of acquisition, (b) level of mastery of the first language at the time of exposure to English, (c) the number of years of exposure to English, and (d) the nature and quality of that exposure (Langdon, 1989).

Additive vs. subtractive bilingualism. Children can be enriched by knowing more than one language as long as they are *additive* rather than *subtractive* bilinguals. An additive bilingual has learned an L2 in addition to the L1, whereas a subtractive bilingual

has gradually lost one language while acquiring another one. The distinction is significant from a pedagogical viewpoint because research indicates that children with high levels of proficiency in two languages show positive cognitive effects (Collier, 1992; Krahsen, 1997, 1998; Cummins, 1999). In effect, children who come to school speaking and reading more than one language, or who learn an L2 in school, will be beneficial academically as long as both language are nurtured and developed to the fullest extent (Cummins, 1981).

The research on bilingualism and biliteracy can contribute to the understanding of the characteristics of the EFL and ESL populations and to give some insights for additional difficulties in learning to read and speak two languages simultaneously. Moreover, the notion of bilingualism and biliteracy puts an emphasis on balanced language development in both L1 and L2. The next sub-section will discuss theoretical basis for understanding language transfer in chronological order.

L2 Phonology and Language Transfer

It is very important to examine the language itself by establishing a comprehensive understanding of the acquisition of the linguistic system, because this forms the foundation for psychological principles of L2 acquisition. Most theoretical constructs, in historical progression, have dealt with literatures of contrasts between the native language (L1) and the target or second language (L2), and the influence of L1 on the development of L2. Then the recent literature incorporating the notion of cross-language transfer has focused on utilizing experience and knowledge from one language to another. In this sub-section, I will discuss the main points of three theoretical frameworks for understanding language transfer with respect to L2 phonology.

Contrastive Analysis Hypothesis. One of the most popular inquiries for applied linguists was the study of two languages in contrast. Eventually the paradigm of comparative and contrastive data on a multitude of pairs of languages yielded what commonly came to be known as the Contrastive Analysis Hypothesis (CAH). Deeply rooted in the behavioristic approach, the CAH claimed that a structural analysis of the similarities and differences between L1 and L2 would predict the ease or difficulty of L2 acquisition (Lado, 1957).

Such claims were supported by Stockwell, Bowen, and Martin (1965), who posited a hierarchy of difficulty in L2 acquisition with respect to the contrast of the sound system. For phonological system in contrast, Stockwell and his associates suggested possible degrees of difficulty based upon the notions of positive, negative, and zero transfer and of optional and obligatory choices of certain phonemes in the two languages in contrast. Through systematic analysis of the properties of the two languages in references to the hierarch of difficulty, comparative linguists were able to derive a reasonably accurate inventory of phonological difficulties that L2 learners would encounter.

The strong prediction of the CHA was quite unrealistic and impracticable (Gass, 1988). Research on L2 phonology found that the errors made by L2 learners are somewhat similar to those made by children acquiring the phonology of L1 (Bailey, Madden, & Krashen, 1974; Dualy & Burt, 1972). Furthermore, another criticism of the strong version of the CAH was offered by Brown's (1993) study of Japanese and Chinese adults' auditory discrimination ability, which asserted that the CAH was of little practical importance in predicting the interference problems of phonemic contrast between the two

languages. Although the /r/-/l/ phoneme contrast is absent in both Japanese and Chinese, Chinese speakers were significantly more accurate than Japanese speakers in discriminating /r/ and /l/ in the onset position. More importantly, Brown proposed that the L1-specific features rather than the simple presence of absent specific features in L1 impede the acquisition of L2 target features.

A weak version of the CAH was proposed by Wardhaugh (1970) who recognized the significance of interference across languages and the important role that prior experience plays in any learning act. Moreover, the influence of the L1 as prior experience can explain difficulties in L2 acquisition. This version remains today under the label cross-linguistic influence (CLI): CLI implies not only the effects of L1 on the L2, but the influence of L2 on the L1. However, although the predictions of the CAH may not be adequate to explain the acquisition of all phonological processes, less familiar L2-specific phonological rules seem to present additional challenges to L2 beginning learners (Comier & Kelson, 2000; Wade-Woolley & Geva, 2000).

Markedness Differential Hypothesis. A functional tool for determining a directionality of difficulty was proposed by Eckman (1977, 1987). The Markedness Differential Hypothesis (MDH) maintains that L1-L2 differences are a necessary condition for predicting L2 difficulty, but these differences are not a sufficient condition for explaining the difficulty that occurs in L2 learning. Thus the MDH can explain why some differences between L1 and L2, in fact, do not predict difficulty caused by the CAH. Moreover, the MDH can derive a hierarchy of relative difficulty by means of a systematic comparison of the grammar of the L1, L2, and the markedness relations stated

in universal grammar (White 1989), which consists of "core grammar" as unmaked and "peripheral grammar" as marked.

In the application of markedness theory to L2 phonology, according to Eckman (1987), markedness can be defined as follows:

> Markedness: A phenomenon *A* in some languages is more marked than *B* if the presence of *A* in a language implies the presence of *B*; but the presence of *B* does not imply the presence of *A* (p. 60).

For instance, in the case of English indefinite articles such as *a* and *an*, *an* is the more complex or marked form because it has an additional sound whereas *a* is the unmarked form with the wide distribution.

Accordingly, three claims are made by the MDH: (1) Those areas of the second language (L2) which differ from the native language (L1) and are more marked than L1 will be difficult; (2) The relative degree of difficulty of the areas of the L2 which are more marked than the L1 will correspond to the relative degree of markedness; (3) Those areas of the L2 that are different from the L1, but are not more marked than the L1 will not be difficult (Eckman, 1987, p. 61).

Empirically, evidences for MDH derives from the performance differences in syllabication between Chinese- and Arabic-speaking learners of English were closely associated with degree of markedness and with the quality of L1-L2 differences (Anderson, 1987). Several studies have also showed performance differences resulting from the influence of L1 syllable structure on the development of L2 phonology (Broselow, 1987; Carlisle, 1991; Sato, 1987).

The potential problem with the MDH is that it cannot account for errors produced in structures that reflect a similar marked relationship in both L1 and L2. Hence, the era of MDH gave way to an era of Structural Conformity Hypothesis (SCH), with its guiding concept of interlanguage (Gass & Selingker, 2001), widely referred to as learner language. The SCH stated "the universal generalization that holds for primary language holds also for interlanguage" (Eckman, 1991, p. 24). In other words, this notion of the SCH, which is beyond the realm of this proposal, proposes that typological markedness is continuously used, eliminating the differences between L1 and L2 in order to clarify the interlanguage patterns that are neither L1-like nor L2-like.

Linguistic Interdependence Hypothesis. Recent research has shifted toward the view that L2 learners play an active role in drawing the knowledge and experience from one language to another one. This evolving theoretical paradigm has been more fully worked out by Cummins' Linguistic Interdependence Hypothesis (1981, 1989, 1991, 1994), which has been referenced explicitly and implicitly in the L2 and bilingual literature, and used as organizing principles helpful in reviewing the cross-language transfer literature. In Cummins (1981), the hypothesis was explicitly theorized as follows:

> To the extent that instruction in a certain language is effective in promoting proficiency in that language, transfer of this proficiency to another language will occur, provided there is adequate exposure to that other language (either in the school or environment) and adequate motivation to learn that language.
>
> (p. 29)

According to Cummins, the Linguistic Interdependence Hypothesis (LIH) posits that reading performance in L2 is largely associated with reading ability in L1. Once the

child develops reading skills in L1, he or she is able to transfer those skills to L2. Within this hypothesis, one can predict not only transfer from L1 to L2, but from L2 to L1.

In an alignment with Cummin's (1981, 1989, 1991, 1994) Interdependence Hypothesis, in the past decade, there is growing evidence for cross-language transfer of phonological processing between Korean and English (Pae, Sevcik, & Morris, 2004; Wang, Park, & Lee, 2006); between Spanish and English (Cisero & Royer, 1995; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Linsey, Manis, & Baily, 2003); Chinese and English (Gottardo, Yan, Siegel, & Wade-Woolley, 2001; Wang, Perfetti, & Liu, 2005); French and English (Comeau, Comier, Grandmaison, & Lacroix, 1999; Comier & Kelson, 2000); and Turkish and Dutch (Veroheven, 1994).

It makes sense that certain kinds of knowledge obtained early in phonological skill development would play a fundamental role in the acquisition of reading skills in both L1 and L2 and hence would yield cross-linguistic correlations. However, such advantage in bilingual children is particularly evident when the bilingual children's L1 has straightforward and less irregular phonological systems (e.g., Campbell & Sais, 1995) and has more prominent syllable unit (e.g., Bruck & Genessee, 1995).

At this point, it is uncertain whether cross-language transfer can occur when one language does not share the phonological features specific to another language, just as cross-language transfer emerges when two languages share specific overlapping parallel features. Depending on the extent of similarity between L1 and L2 phonological properties, the performance on phonological processing might be more compelling in non-overlapping phonological features rather than in overlapping ones across the two languages.

The three theoretical constructs demonstrated specific points of language transfer and drew on potential problems of L2 literacy acquisition. The next sub-section will provide the information of these problems by reviewing empirical studies on phonological and orthographic transfer.

Analysis of Cross-language Transfer Studies

In spite of the popular view that reading is acquired as naturally as spoken language, there is overwhelming evidence that a growing number of L2 children, even mainstream students, still struggle with the beginning literacy (Snow, Burns, & Griffin, 1998). Emerging evidence suggests that the rate of acquisition of basic reading skills in L2 is related to both L1 reading and L2 proficiency (Cormier & Kelson, 2000; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Geva & Petrulis-Wright, 2000; Geva, Wade-Woolley, & Shany, 1993; Verhoeven, 2000). In addition, children would read more accurately and faster in their L1 than in their L2 (Geva & Verhoeven, 2000; Geva, Wade-Woolley, & Shany, 1993). In summary, limited L2 proficiency, interference from L1, restricted background knowledge, and L1 reading proficiency all might influence the L2 basic reading skills such as phonological and orthographic processing.

Verhoeven (2000) recently pointed out that "[T]he problems encountered while learning to read in L2 are a consequence of difficulties grasping the linguistic patterns of the target language and difficulties with the use of metalinguistic cues for reading" (p. 314). Whenever such problems occur, L2 readers thus will have more difficulties phonemically segmenting and spelling words than will L1 readers; indeed, L2 orthographic processing in even highly balanced bilinguals often turns out to be slower than L1 orthographic processes.

With regard to word decoding and spelling, Geva and Verhoeven (2000) suggested that L2 learners might have certain problems with the phonemic decoding of letters or phonic mediation. Because L2 learners are often less capable of identifying sounds in their L2 than in their L1, this difficulty may result in the slow rate of acquisition of grapheme-phoneme correspondence rules. There can also be difficulties with the assignment of the full range of correct pronunciations to individual letters due to less specified representation of orthographic constraints or a restricted awareness of phoneme distribution rules in the L2.

Given such difficulties in L2 literacy acquisition, L2 researchers have raised the questions regarding how important the transfer of language skills from one's L1 is to the L2 or whether reading in L2 is different when the writing systems have different orthographies. Therefore, it is important to examine how phonological and orthographic transfer across various orthographies. Now studies on linguistic transfer (a) between alphabetic languages (e.g., Spanish, French) and English, (b) between a non-alphabetic language (e.g., Chinese) and English, and (c) between an alphabetic-syllabic language (e.g., Korean) and English are reviewed.

Alphabetic language and English. Durgunoglu and colleagues (1993) investigated the relationship of Spanish phonological awareness to English word recognition. Durgunoglu et al. examined the variables closely related to affect the English word identification performance of Spanish-speaking beginning readers.

In this study, Durgunoglu et al. (1993) tested 27 first-grade Spanish-dominant children who were enrolled in a transitional bilingual education program both Spanish and English reading skills. Subjects were classified by their teachers as nonfluent,

beginning readers. They were individually administered tests of letter identification in both English and Spanish, English and Spanish word recognition, PA in Spanish, and transfer test. In the first, letter-naming test was used to verify the numbers of letters that the first graders could correctly recognize. Next, Clay's (cited in Durgunoglu et al., 1993) Ready-to-Read Word Test as an English word recognition was employed to judge how many words the beginning readers could already identify in English. Similarly, Spanish word recognition test was constructed by assembling a list of 15 common Spanish words from Spanish storybooks and basal reading books.

Meanwhile, phonological awareness test was developed; segmenting, blending, and matching tasks. In addition to phonemes, this test included syllables as units that needed to be manipulated in basic phonemic tasks because Spanish has a more shallow orthography, as well as better syllabic structure than does English. All instructions, materials, and examples were in Spanish. Then phonological awareness was measured only in Spanish. Interestingly, this study noted a parallel English phonological awareness measure was not used. One reason is that due to subjects' home literacy experiences and school literacy instruction in Spanish, phonological awareness would first build up in Spanish. The other reason is that the capability to recognize segments of speech may be greatly correlated between Spanish and English, based on the pilot data (r = +.76 between the two languages). It seems plausible that this study did not use English phonological awareness measure to test for transfer of Spanish phonological awareness to English pseudoword reading abilities. According to the Linguistic Interdependence Hypothesis, however, reading abilities can transfer not only from L1 to L2, but also from L2 to L1. Phonological awareness in English may predict the ability to read psuedowords in

Spanish. In order to obtain valid results of bi-directional phonological awareness transfer across the two languages, English phonological awareness and Spanish pseudoword reading task should have been given to the first grade bilingual students.

With respect to transfer test, pesudoword reading and word reading were used to evaluate the extent to which phonological awareness in Spanish would transfer to English word recognition. The two measures allowed researcher to explore (1) how effectively children learned to read the pseudowords and (2) children's performance on the real words made up of parts of those pseudowords.

Their multi-regression analyses indicated that only Spanish word recognition was statistically significant for both English pseudoword (t= 2.96, p< .05) and word reading tests (t= 4.31, p< .05). Their results demonstrated that children who could perform well on Spanish word recognition tasks were more likely to be able to read English words and pseudowords. Additionally, Spanish phonological awareness was a significant predicator of performance on English word reading (t= 3.34, p< .05), indicating cross-language transfer of reading skills from one language to another in bilingual readers.

Interestingly, for English pseudoword decoding items which are divided into two sets of items with overlapping and non-overlapping pronunciations across English and Spanish, the two groups with different levels of phonological awareness in Spanish, but similar level of word reading in Spanish showed more significant difference on the non-overlapping items (z score[11] = 1.18) than on the overlapping items (z score =.59).

[11] This standardized score means how far a given raw score is from the mean in standard deviation units. That is, if this score get larger, the individual scores is far from the mean score (Brown, 2000).

This finding suggests that phonological awareness in L2 could depend on the extent of similarity between L1 and L2 phonological properties.

This study also suggests that beginning bilingual readers who had phonological awareness and word recognition skills in L1 are able to transfer metalinguistic abilities to L2 word recognition, without formal phonics instruction in L2, because underlying processes of word recognition is similar between the two languages.

The review of Durgunoglu et al.'s (1993) study implies that the similar processes of phonological awareness and word decoding are associated with in learning to read in L1 and L2. In like manner, Comier and Kelson (2000), in a study of English-speaking children in French immersion program, examined the extent to which phonological awareness is involved in spelling in bilingual children who attend an immersion curriculum, because bilingual children's performance on spelling would be predicated by the levels of phonological awareness. The purpose of this study was to explore the factors related to the spelling development of plural morphemes in English and French. In fact, there were three major purposes in this study: (1) to delineate the development of the plural morphemes in both languages, (2) to test the hypothesis that spelling of voiced features of number morphemes would more accurate than that of silent morphemes marking plurality and (3) to contrast exclusive involvements of phonological awareness and syntactic awareness in the writing and spelling development, and word decoding.

In their study, Comier and Kelson (2000) predicted that cross-orthography differences may influence the ease or difficulty of spelling development because French and English present a distinctive pattern in terms of the morphology of the plural form.

French is a more deep language regarding the pronunciation of the plural morphemes than English. In English, with a few exceptions, plural are represented as either *–s* or *–es*, and are articulated all the time. In contrast to English, there are three forms for marking the plural of nouns in French: *-s, -x,* and *–aux.* The French *-s,* and *–x* are unarticulated and the irregular morpheme *–aux* guides transformations of the noun that is mirrored in its pronunciation. Due to these differences, the researchers studied how these characteristics have an effect on the learning of spelling of plural morphemes in French and English.

Ninety-two children in Grades 1 to 3 in French immersion classes were selected. All tests were individually administered to them. Spelling of plural morphemes, word decoding, and phonological awareness assessed by Auditory Analysis Test were conducted in French and English. Tests administered only in English, the native language of the subjects, included visual-spatial reasoning measured by Test of Nonverbal Intelligence, lexical access assessed by rapid naming test, verbal working memory via pesudowords and words span test, and syntactic error judgment in order to attain the child's best performance on these tasks.

Their results confirmed that phonological systems operationalize when children begin to read and write plural forms in L1 and L2, which are alphabetical languages (auditory analysis x correct spellings of plural form in English F (1, 84) = 14.79, $p < .001$, and in French F (1, 84) = 5.69, $p < .05$). In other words, phonological awareness shared significant unique amounts of variance with spelling in L1 and L2, whereas syntactic awareness contributed significantly to the variances with spelling in English (L1). At this point, syntactic awareness may not be a better predicator of spelling of the plural

morphemes than auditory analysis. Additionally, phonological awareness in L1 and L2 uniquely contributed to word decoding in L1 and L2 (F (1, 84) = 33.36, p<.05 in French and F (1, 84) = 25.87, p<.001 in English). These results suggest that there might be a reciprocal influence between each set of phonological skills and word decoding skills across the two languages. Furthermore, phonological awareness in the native language, which may help acquire word decoding as well as spelling, should be taken into account by practitioners in bilingual programs.

ANOVA analyses showed that spelling of the plural form in English was easier than in French, indicating that unarticulated forms of the French plural is more difficult to spell than articulated ones of English (type of plural form x grade interaction, F (2.88) = 3.99, p<.05). This result suggests that phonological and orthographic elements specific to the L2 present additional challenges to beginning L2 readers. Their assumptions of the development of sensitivity to plural markers seem consistent with the Geva et al.'s (1993) study showing that a difficult-to-discriminate alphabetic code is connected with more difficult in decoding words reflecting that alphabetic code. More importantly, this study led to an important new direction for studies on bilingual children in the sense that phonological awareness would be the predicators and correlates of spelling of the plural morphemes. It is also significant to extend the findings of Comier and colleagues' study (cited in Comier & Kelson, 2000) on regular plural morphemes to irregular plural morphemes in English and French.

A major focus on the processing of novel phonemic contrasts in the acquisition of L2 word reading was raised by Wade-Woolley and Geva (2000). In this study, they investigated phonological and orthographic processing of English-speaking children

learning Hebrew as an L2. This cross-linguistic study had three objectives. In first, an attempt was made to verify the relative difficulty of orthographic and phonological components specific to the L2 for second-grade bilingual readers. Second, the hypothesis was tested that application of the elements that are present in English (L1) would be overgeneralized to the elements that are salient in Hebrew (L2). Third, the relation was explored between L2 phonological processing, and real-word recognition and L2 basic reading skills.

In terms of the phonetic inventories, one fundamental component appearing in Hebrew that does not exist in English is the phonemic contrast between /s/ and /ts/, which occur both in onsets and rimes. Thus, /s/ and /ts/ are minimal pairs which are critical for differences in meaning (i.e., /tsair/ means youth, whereas /sair/ means hairy). In contrast to Hebrew, both candidates /s/ and /ts/ appear in English rimes (i.e., sense, kits), but only /s/ is a legal candidate for English onsets. Due to such differences in a phonetic contrast, Wade-Woolley and Geva (2000) would predict that unfamiliar (L2-specific) phonological information would be more difficult to distinguish than familiar phonological rules in the L1.

The subjects in the study were 34 second-grade English-speaking children in bilingual English-Hebrew elementary classes, in which concomitantly read in English, and develop oral and written language skills in Hebrew. Tests administered in English and Hebrew included the word recognition, pseudoword decoding, phoneme deletion, phonological recognition, and orthographic recognition tasks. The order of administration of these two tasks batteries was randomized. Then the phoneme identification (/ts/ vs. /s/ in onset and rime) measured by cross-modal pseudoword recognition tasks and the

Hebrew sentence comprehension tasks for assessing the ability to comprehend oral Hebrew were administered to L2 readers. At the stage of analysis, the participants were categorized as more skilled or less skilled readers based on their performance on the Hebrew word recognition.

Using a MANOVA, Wade-Wooley and Geva (2000) demonstrated that Hebrew reading level (more skilled vs. less skilled) had significant effect (F (5, 26) = 2.73, p< .05) on the English measures. Moreover, follow-up ANOVAs explained that skilled Hebrew readers outperformed less skilled Hebrew readers on English word reading, F (1, 30) = 3.96, p< .05, pesudoword decoding, F(1, 30) = 9.02, p<.05, phoneme deletion, F (1, 30) = 4.57, p<. 05 and phonological recognition, F (1, 30) = 13.86, p<.001. There were no differences on the measure of orthographic recognition. A significant effect of reading level, F (1, 32) = 45.47, p<.0001, and error type, F (1, 32) = 13.42, p<.01, was also seen in the ANOVA (reading level x error type: visual vs. phonological error) on the phoneme identification task. The difference between the two reading levels is far smaller for visual errors than for phonological errors.

When it comes to language transfer, 2 x 2 x 2 ANOVA (word length: one vs. two syllables x structural position: onset vs. rime x phoneme: /s/ vs. /ts/) on the phoneme identification task showed that children more accurately discriminated the contrast when in the rime than the onset, F (1, 32) = 45.47, p<.001. This finding appears aligned with the stated hypothesis; language transfer from L1 would be evident in participants' errors on the L2 phoneme contrast measure. Regardless of reading level, both skilled and less skilled Hebrew (L2) readers experienced greater difficulty identifying the contrast in positions (e.g., onsets) which are unfamiliar to them. In other words, there was no

significant interaction of reading level and language transfer.

In addition, phonological knowledge in English (L1) and Hebrew (L2) were correlated with various component skills of reading across languages. Especially, phonological recognition in L1 showed significant cross-language transfer at phonological knowledge in L2 (r= .47, p< .01). However, transfer of orthographic knowledge did not significantly occur in L1 orthographic recognition. Accordingly, these results might reflect the fact that linguistic interdependence at the phonological systems affects the performance on phonological processing.

In accordance with the Linguistic Interdependence Hypothesis, this study supported that multilingual experiences may enhance a child's metalinguistic awareness; therefore, it is possible that exposure to L2 increase the performance on phonemic awareness in L1, or the development of phonological knowledge in L1 facilitate L2 phonological recognition. Equally important, current understanding of L2 error rate between the target phonemes in both onset and in rime suggests that specific components in the oral language or the writing system might impede children's mastery of specific word recognition and spelling development, and cause the negative transfer from one language to another.

Methodologically, one point needs to be highlighted. In this study, researchers did not compare the development of current participants with Hebrew-speaking children who concurrently learn English as a second language. If they had done so, then one could clearly figure out the similarity and difference of cross-language transfer. Similarly, one can question whether if reading levels were classified based on the performance on English (L1) word recognition task, the findings of this study would have been altered.

This question arises from the fact that cross-language transfer one can capture from the standpoint of reading ability in L1 might not be similar to that from L2 perspective.

A related question is the role of orthographic depth, and linguistic and cognitive factors in the concurrent development of basic reading skills across languages (Gholamain & Geva, 1999). This study aimed to explore empirical evidence for the script dependent hypothesis and the central processing hypothesis. According to the script dependent hypothesis, the development of word recognition skills may vary as a function of orthographic consistency (Katz & Frost, 1992). In accordance with the central processing hypothesis (Gholamain & Geva, 1999), word-based reading processes in different languages are primarily affected by underlying cognitive and linguistic factors such as working memory and rapid automatized naming.

Gholamain and Geva (1999) examined these hypotheses by investigating the relative impact of orthographic differences between English (L1) and Persian (L2) on decoding skills, and the role of verbal working memory and speed of letter naming in word recognition. As mentioned earlier in orthographic consistency, in Persian there is consistent and systematic correspondence between graphemes and phonemes. Unlike Persian, English orthography is more complex in that letter-to-sound mappings are irregular and inconsistent. Given these differences in the orthographic transparency, one would predict that bilingual children would develop more readily in Persian than in English. On the other hand, the central processing hypothesis predicts that language and reading skills in L1 and L2 would be positively correlated and individually different depending on capacity of underlying cognitive processes.

The sample was composed of 70 children in Grades 1 to 5 learning to read at

the same time in English and Persian. One of the most important aspects of Persian curriculum is that this program is held only on Sunday during school year. Consequently, the students are placed in different grades based on their previous exposure to formal instruction and oral proficiency in Persian. On an individual basis, the participants were administered tests of working memory and letter naming speed in English and Persian as independent variables. On the other hand, tests as dependent variables included word recognition and word attack skills (pseudoword decoding) in both languages.

This study revealed positive and significant correlations between basic reading and cognitive skills, being consistent with the central processing hypothesis. More specifically, basic reading skills (word recognition, word attack) in L1 and L2 were all significantly intercorrelated at $p < .001$. Among these tasks, the L1-L2 measure of pseudoword decoding was the highest correlations ($r = .64$, $p < .001$). In addition, the correlation between working memory in L1 and in L2 was $r = .57$, $p < .001$, and the correlation between Persian and English rapid naming tasks was $r = .44$, $p < .001$.

The multiple regression analyses indicated that working memory and rapid automatized naming in both L1 and L2 were major predicators of L2 word recognition and L2 word attack skills. Similarly, speed of letter naming and working memory in Persian (L2) were statistically significant for word recognition in Persian (L2). Especially, memory and rapid naming in Persian (L2) were more solid predictors of word reading and pesudoword decoding in English (L1) than were the parallel measures in L1.

With respect to age in Grade 1 to 5, the MANOVA showed that grade levels had highly significant effect for students' performances on reading and cognitive factors (L1 grade: $F(4, 66) = 4.17$, $p < .001$ and L2 grade: $F(4, 66) = 4.43$, $p < .001$). In other words,

basic reading skills and cognitive factors developed from low grade to high grade. This result suggests that instruction and maturation may improve their performance on all these measures, as students grow older. Moreover, the finding that in spite of differences in amount of instruction, and insufficient exposure to oral and written Persian, once exposed to Persian (L2), their performance on reading in L2 approximate their accuracy in L1 possibly supports the script dependent hypothesis. From this result, one can learn that the role of differences in orthographic depth cannot be ruled out in order to compare systematically longitudinal changes in word recognition.

This study provides one some insights into the importance of working memory and rapid naming which may be a proxy for cognitive-linguistic processes underlying basic reading skills in L1 and L2. Moreover, as might be expected, the high degree of sound-to-letter regularity may relatively facilitate the rapid development of accurate decoding skills and word recognition.

As can be seen above, research on the effects of L1 on the acquisition of L2 reading skills has heavily centered on cross-language transfer between alphabetic languages, such as Spanish and English (Durgunoglu et al., 1993), English and French (Comier & Kelson, 2000), English and Hebrew (Wade-Woolley, & Geva, 2000), and English and Persian (Gholamain & Geva, 1999). In recent years, of particular interest is the study of the acquisition of learning to read concurrently in an alphabetic language such as English and a non-alphabetic language such as Chinese because it is not sure whether a parallel pattern of cross-language transfer occur in two different writing systems as in the similar writing systems.

Non-alphabetic language and English. Gottardo and colleagues (2001) investigated the extent to which phonological processing in Chinese (L1) would contribute to reading skill in English (L2), within the two languages with very different phonological and orthographic systems. As explained earlier, Chinese is classified into logography: one grapheme unit usually represents the meaning and the sound of the entire word or morpheme. Accordingly, the basic unit of Chinese writing system is the character. In contrast to English, the graphemes in Chinese map onto syllabic morpheme. Gottardo et al. (2001) described that as follows: "Although phonetic information is available in Chinese…the phonetic information in Chinese characters does not appear to be encoded at the phonemic level as it can be in regular English words" (p. 531). Given the phonological and orthographical structures in Chinese (L1), this study examined the question of cross-language transfer of basic reading skills from L1 to L2 and the contribution of L1 and L2 phonological processing to L2 reading skill.

The subjects were 65 children who speak Cantonese as their L1 and English as their L2. Based on English grade, they fell into the range of Grades 1 to 8. Tests administered in Chinese and English included word recognition, orthographic legality and phonological processing such as rhyme detection, phoneme detection, phoneme deletion, rapid automatized naming, and pesudoword repetition. Especially, tone detection was added in Chinese measures because tone is crucial for distinguishing the meaning of Chinese syllables with identical phonemes.

On the basis of Gottardo et al.'s (2001) correlational analyses, performance on the English phoneme deletion task was significantly related to English word recognition ($r = .59$, $p < .001$) and also correlated with other English phonological awareness tasks

such as rhyme[12] detection (r= .43, p < .001) and phoneme detection (r= .45, p < .001). Interestingly, this task was also correlated with Chinese tone detection (r= .50, p < .001). In addition, the Chinese rhyme detection task was the only Chinese measure that was significantly correlated with English word recognition (r= .50, p < .001) and also correlated with two of the English phonological awareness measures, the rhyme detection (r= .52, p < .001) and the phoneme deletion (r= .54, p < .001). In further analyses, the hierarchical regression examined that performance on the English phoneme deletion, F (1, 62) = 20.72, p< .001 and Chinese rhyme detection, F (1, 62) = 14.89, p< .001 contributed to English word recognition.

This study examined the exclusive impact of L1 and L2 phonological processing on L2 reading performance. Specifically, it is not surprising that L2 phonemic awareness measured by L2 phoneme deletion task is significantly correlated with L2 onset-rhyme awareness assessed by L2 phoneme and rhyme detection task because onset-rhyme sensitivity is an earlier developing skill than phonemic sensitivity. More importantly, L1 rhyme detection and L2 phoneme deletion were significantly correlated and unique predicators of L2 word reading even if the first language is not an alphabetic orthography.

The findings of this study suggest that phonological processing skills are not entirely dependent upon reading instruction in an alphabetic orthography. In addition, the results of this study also imply that performance on orthographic processing measured by orthographic legality in both languages may require a few years of exposure to the orthography to use this alphabetic understanding.

[12] In this study, the term rhyme is used to refer to the phonological unit of any words following the onset (e.g., t-opic, r-abbit), whereas the term rime is used to refer to the phonological division of a single syllable (e.g., k-it, p-in)

More recently, Wang, Perfetti, and Liu (2005) also investigated the sharply contrasting features in two different writing systems as well as spoken forms of the language-Chinese and English. In the development of bilingual reading across different writing systems, children may have to deal with the unique burdens of the different writing systems and languages. Chinese characters are considered to be acquired primarily by visual memory and direct association of orthographic with lexical decision, based on the assumption that Chinese is opaque orthography with irregular consistency between letters and sounds.

In this study, by examining the phonological and orthographic processing skills in both Chinese (L1) and English (L2), Wang et al. (2005) explored whether 46 readers in Grades 2 and 3 with a non-alphabetic L1 are less likely to rely on phonological information in reading words in L2. The experimental tasks for Chinese phonological skill included onset, rhyme, and tone matching tasks. The corresponding experiments that measured English phonological knowledge were onset and rhyme matching, and phoneme deletion which has been known to be one of the most difficult tasks for young children. An orthographic choice test designed for the two languages separately was employed to assess orthographic processing skills. In terms of reading measures, real word and pseudoword naming in English were tested. In Chinese, real character naming and Pinyin[13] naming which guides to learn the Chinese language through phonetics were administered.

Based on Wang et al.'s (2005) analyses, Chinese onset matching skill was significantly correlated with English onset and rhyme matching skills, r= .36 and .33, respectively, p< .05. Pinyin reading was also highly correlated with English pseudoword

[13] Pinyin used in Mainland China is alphabetic phonetic scripts (Chen et al., 2005).

reading, r= .36, p< .05, and English phoneme deletion, r= .33, p< .05. Interestingly, Chinese tone matching was significantly correlated with English pseudoword reading. Chinese orthographic choice was significantly correlated only with Chinese character naming, r= .58, p< .01, but not with English orthographic choice, word reading, and pseudoword reading. In the hierarchical regression analyses, Chinese tone processing, F (1, 43) = 6.16 p< .05, and English phoneme deletion, F (1, 43) = 41.08, p< .01 significantly contributed to English pseudoword reading.

Aligned with the study conducted by Gottardo et al. (2001), the findings of this study also confirmed the unique significance of L1 and L2 phonological knowledge on L2 reading performance. In particular, the crucial Chinese phonological element, tone, and English phoneme deletion contributed significant amount of variance to English pseudoword reading. This finding points to the importance of general auditory processing which underlies some shared phonological properties in learning to read Chinese and English, providing that phonological processing in a child's L1 can influence reading performance in an alphabetic orthography, regardless of the writing system (e.g., non-alphabetic) used in the child's L1.

With respect to orthographic transfer, the lack of a relationship between L1 and L2 orthographic skills may reflect that there is an orthography specific contrast in mapping codes and visual characters across the two languages. Wang et al. (2005) argued that the transfer of orthographic skills from Chinese to English is less likely. Most importantly, unlike previous studies on phonological transfer, it is strikingly remarkable that these studies (Gottardo et al., 2001; Wang et al., 2005) included orthographic processing skills to tap into the significance of cross writing system differences in

bilingual reading and supported the notion that reading in a deep orthography such as Chinese primarily relies on visual-orthographic processes in that Chinese orthographic choice significantly contributed to Chinese character reading, F (2, 41)= 19.26, p< .001.

Alphabetic-syllabic language and English. In another attempt to study the cross language and writing system transfer, Pae and her colleagues (2004) explored the factors related to phonological processing and orthographic sensitivity between Korean, a morpho-phonemic syllabic language, and English. The Korean writing system provides interesting contrasts to English. At first, Korean was more invented than developed, and its letter-phoneme correspondences are completely transparent at the orthographic level. Secondly, the main writing system of Korean, Hangul, is alphabetic; however, unlike the Roman alphabetic system, it is nonlinear. That is, the letters are not written one after another in a line, but they are grouped together into syllable blocks consisting essentially of phonetic syllables (i.e., left-to-right, top-to-bottom).

In a syllabary, each letter represents a syllable. Hangul can also be thought a syllabary because a visual object, seen as a letter, represents a syllable. In other words, Hangul is unique in that one or more consonants are always combined with a vowel to form a syllable such as VC, CV, CVC, and CVCC. Multiple Hangul symbols in a single syllable are packed in a square-like block. For instances, a simple CV block 다 (/ta/, meaning "all") contains one consonant (ㄷ: /t/) and one vowel (ㅏ: /a/). A more complex CVCC block 닭 (/talk/, meaning "hen") is composed of three consonants (ㄷ: /t/; ㄹ: /l/, ㄱ: /k/) and one vowel (ㅏ: /a/). Therefore, syllable-blocks are the basic unit of orthographic processing during the reading and spelling of Hangul words. In a word, Korean writing, Hangul, is an alphabet and a syllabary all at once. Each word is made

from alphabet letters that combine into syllables, which are combined into a compact character block.

Given these differences, Pae et al. (2004) investigated how children' L1 and reading skills influence their literacy in L2 and how oral language and literacy skills in L1 are associated with reading skills in L2. The sample consisted of 27 children in kindergarten to second grade who speak English as their L1 and Korean as their L2. Measures of oral language in both Korean and English included listening comprehension, vocabulary/semantic knowledge, phonological processing, and verbal learning. For reading tests, word recognition/decoding, orthographic skills and reading comprehension were selected.

Their correlational analyses demonstrated that every parallel measures in the two languages were significant except for vocabulary and pseudohomophones. With respect to correlation coefficient, the orthographic awareness test was the highest (r= .83), followed by blending words (r= .75), and phonological processing (r= .70). In addition, the regression model showed that performance on Korean blending words, English rapid naming objects, Korean listening comprehension, and verbal memory in both English and Korean significantly contributed 47% of the total variances to Korean letter identification and 57% of those to word identification, and 48% of those to orthographic awareness skills.

To sum up, this study illustrated that phonological awareness in L2 and phonological processing in L1 play a prominent role in L2 reading skills such as letter and word recognition, and orthographic awareness. Regardless of the difference in spoken forms and writing systems across the two languages, phonological processing in

L1 and L2, and verbal working memory in L1 and L2 seem to facilitate L2 reading performances.

In like manner, Wang, Park, and Lee (2006), in a study of the biliteracy development between Korean (L1) and English (L2), explored the notion that phonology in L1 and L2 is predicative of L2 reading. Wang and her colleagues were also interested in any possible transfer at the orthographic level due to the aforementioned differences in visual forms across these two writing systems.

The participants in this study were 45 children in Grades 1 to 3 who speak Korean as their L1 and English as their L2. They were learning to read Korean within a Korean curriculum (Friday school). The experimental tasks in Korean and English tapped phonological, orthographic, and word reading skills. Phonological skill tests included onset-rhyme detection and phoneme deletion. Orthographic choice test was selected to identify children's ability to detect acceptable and unacceptable letter sequences and their relation to letter positions in words. Word reading skills were tested in two tasks: real word and pseudoword reading.

In terms of grade, children's performance on orthographic task and phoneme deletion task in Korean significantly improved F (2, 42) = 9.37; 3.30, p< .001 and p<. 05, respectively while all of the tasks in English were significantly improved. This discrepancy of improvement in both languages may result from differences in the input received or unequal opportunities to use the two languages at home and school although Korean is their native language. Correlation analyses indicated that onset-rhyme detection and phoneme deletion skills in both orthographies were closely correlated. More importantly, Korean phonological processing skills were highly correlated with

English real word and pseudoword reading. Also English onset-rhyme detection tasks were more likely to be significantly correlated with Korean pseudoword reading.

With hierarchical regression analyses, age significantly contributed to learning to read Korean and English. Within a language, phoneme deletion in both languages was a significant predicator of Korean and English word reading as well as Korean and English pesudoword reading. With regard to cross-language transfer, most importantly, the Korean phoneme deletion task significantly contributed to English pseudoword reading. However, this was not true for English real word reading. There was no orthographic transfer from Korean to English or from English to Korean when reading real words and pseudowords.

This study strongly suggests that the quality of phonological representation in L1 allows the child to reflect on word recognition in L2 in that Korean (L1) phoneme deletion was the unique precursor of English (L2) pseudoword reading. The findings that orthographic skills in L1 were not predictive of word reading in L2 beyond phonological and orthographic skills in L2 points to limited orthographic transfer in learning to read two different writing systems. Interestingly, in contrast to Orthographic Depth Hypothesis (Katz & Frost, 1992) suggesting that reading in a shallow orthography such as Korean relies heavily on phonological information, this study showed that orthographic processing in Korean further contributed to word reading in Korean above phonological processing skill in Korean. This finding implies that there seem to be fundamental differences between reading the unique Korean alphabetic system, Hangul and other Roman alphabetic systems.

Evidence from the studies noted above (Comier & Kelson, 2000; Durgunoglu et al., 1993; Gholomain & Geva, 1999; Gottardo et al., 2001; Pae et al., 2004; Wade-Woolley & Geva, 2000; Wang et al., 2005; Wang et al., 2006) yielded the two major results: (1) phonological awareness in one language is highly correlated with that in another language; (2) phonological awareness in one language is a powerful predictor of word reading in another language, which is consistent with the findings of research on L1 reading. Therefore, one can argue that a child with well developed phonological awareness in L1 and L2 is more likely to perform well on L2 reading.

Now, the second question, 'Which aspects of phonological and orthographic processing transfer between L1 and L2?' can be responded. Within a language, phonological processing such as phonemic and sub-syllabic awareness, and orthographic processing such as decoding skills are highly intercorrelated. However, on transfer measurements, only phonological awareness in one language is significantly transferred to that in another language. Next, the answer to the third question, 'Which aspect of L1 or L2 metalinguistic ability: phonological awareness or orthographic knowledge, plays a greater role in L2 word recognition?' is that only phonological awareness in L1 and L2, in particular, at the phonemic level uniquely facilitates L2 word reading. The response to the final question, 'Given the cross-language transfer, is phonological awareness linguistically interdependent, regardless of similarities and differences in the phonological inventories of the L1 and L2?' is that the rapid acquisition of L2 phonological awareness could depend on the degree to which the phonological properties of the L1 and L2 overlap.

For cross-language transfer in L2 literacy, this Chapter 2 provided the importance of L1-L2 balanced development and the potential problems embedded in bilingualism and biliteracy. It also discussed the specific points of theoretical frameworks concerning language transfer, raising additional difficulties in learning to speak and read in two languages concurrently. In addition, by looking at experimental cross-language transfer studies, this section could answer the remaining questions regarding cross-language phonological and orthographic transfer.

At this point, this literature review attempts to make the connection between sub-syllabic units in L1 and phonological transfer in L2. Based on the review of studies on sub-syllabic units in L1 literacy and phonological/orthographic transfer in L2 reading, the confirmatory evidence of sub-syllabic units and transfer can be summarized as follows: (1) the sub-syllabic units of onset-rimes is not linguistically universal, but language-specific (for English: De Cara & Goswami, 2002, 2003; Treiman, 1985, 1995; Treiman & Danis, 1988; Kessler & Treiman, 1997, for Korean: Wiebe & Derwing, 1994; Yoon et al., 2002; Yoon & Derwing, 2001, for Dutch: Geudens & Sandra, 2003); (2) general phonological processing skills in L1 is significantly correlated to those in L2, and well developed phonological awareness in L1 also helps children to read and spell in L2, regardless of phonology and orthography across languages (Comier & Kelson, 2000; Durgunoglu et al., 1993; Gholomain & Geva, 1999; Gottardo et al., 2001; Pae et al., 2004; Wade-Woolley & Geva, 2000; Wang et al., 2005; Wang et al., 2006); (3) there is limited facilitation of orthographic skills between English and Chinese, and between English and Korean (Gottardo et al., 2001; Pae et al., 2004; Wang et al., 2005; Wang et al, 2006); (4) phonological awareness in L2 could depend on the degree to which the L1 and

L2 phonological systems share structural similarities (Comier & Kelson, 2000; Durgunoglu et al., 1993; Wade-Woolley & Geva, 2000).

Taking into account the language-specific sub-syllabic units found in L1 and phonological transfer in L2, one may question how the sub-syllabic units in L1 would have an impact on phonological processing in L2. As mentioned earlier, moreover, current understanding of phonological transfer in the areas of overlap between L1 and L2 phonological structures presents positive transfer in which cognitive demands operate with relative ease. Yet, in the areas that do not overlap between the two spoken systems, negative transfer, which requires the learner's attention to language-specific elements, may increase the difficulty in L2 phonological processing. Therefore, the distinctive sub-syllabic properties between L1 and L2 may impede learning to read and spell in L2.

The next section will discuss general predictions for this research in conjunction with an overview of semivowel discrepancy between Korean and English.

Linguistic Discrepancy: Semivowel Placement Differences

In Korean phonetics, in addition to nineteen consonants and ten vowels, there are two semivowel phonemes /w/ and /j/, which are also referred to as either glides or semiconsonants (IPA, 1999) and similar to /u/ and /i/ respectively in terms of sound quality (Sohn, 1999). Typically the Korean sound system has strong vowel harmony and distinct syllable boundaries (Yoon et al., 2002). Thus a combination of some vowels such as /a/, /e/, /u/, /ɛ/, and /ə/ with the two glides /w/ and /j/ produces eleven diphthongs, which involve a quick and smooth movement from one vowel to another within a syllable, often interpreted by listeners as a single vowel sound or phoneme (Sohn, 1999).

Although diphthongs are transcribed by two symbols, these are not simply a sequence of two pure vowels (or monothongs). For example, English "seeing" as [siːɪŋ], where the vowel [iː] is followed by the vowel [ɪ], is not a diphthong because the [iː] and [ɪ] are not in the same syllables. In contrast, English "same" as either [seym] or [seɪm], where the two sounds are supposed to indicate that tongue starts out in the position for [e] and moves toward the position for the vowel [ɪ] or the corresponding glide [y] within the same syllable (Cipollone et al., 1998).

Interestingly, these two glides (G) in Korean are always on-glides, as always precede a vowel and never follow a vowel (e.g., 곽 [kwak] "box", Sohn, 1999). Therefore, glide-embedded Korean syllables are possibly arranged in the structure (C)GV(C). When GV structure is fixed, syllables may include an optional consonant as the onsets and one optional consonant as the coda (e.g., GV, CGV, GVC, and CGVC). Within such a syllable structure, as mentioned above, eleven diphthongs are represented as follows:

jV= /je/ , /ja/, /ju/, /jo/, /jɛ/, /jə/

wV= /wi/, /we/, /wa/, /wə/, /wɛ/ (Sohn, 1999, p. 161).

English has the same glides /w/ and /y/[14], which is equal to the sound quality of /j/, palatal approximant (IPA, 1999). In the all General American (GA)[15] vowel sounds, a mixture of some vowels such as /a/, /e/, and /ɔ/ with the two glides /w/ and /y/ makes five diphthongs. However, as opposed to on-glides in Korean, the two glides of English

[14] The positions of the vocal organ for /w/ and /y/ are very close to the positions for /ʊ/and /ɪ/, respectively. So diphthongs are often transcribed using the symbols for two vowels: [ay] and [aw] can be written [aɪ] and [aʊ] (Cipollone et al., 1998)

[15] The term GA is an idealization over a group of accents whose speakers inhibit a vast portion of the United Sates (Carr, 1999)

are mostly off-glides, which occur after vowel; when these semivowels occur in the onset or follow the voiceless stop sounds in the syllable-initial position, they appear on-glides (e.g., yes [jes], twist [twist], Chomsky & Halle, 1968). In case of prevocalic /y/ and /w/ glides, for instance, [fju:] as in *few* is considered to be as a phonemic sequence of /j/ as a glide and /u:/ as a monothong rather than a diphthong (Carr, 1999).

Accordingly, the underlying representation of glide-embedded English syllables would be the syllabic structure of (C)VG(C). Within this syllable type, five diphthongs in English are followed as:

Vy: /ay/ as in *buy*, /ey/ as in *lay*, /ɔy/ as in *coin*

Vw: /aw/ as in *cow*, /ow/ as in *low* (Carr, 1999, p. 60)

As explained above, the position of semivowel is phonotactically constrained in Korean and English respectively. That is, depending on the position in which the semivowels are attached to the vowel, the sub-syllabic structure can be either body (GV) in Korean or rime (VG) in English, because the semivowels in Korean always occur before a vowel, while those in English dominantly occur after a vowel. In short, the placement of the semivowel may be a possible factor of preferred sub-syllabic structures between the two languages.

Recalling the research questions addressed earlier, therefore, a hypothesis would be that the effect of semivowel position which is predominantly occupied in either Korean or English, would determine the preferred sub-syllabic unit. Secondly, non-overlapping features specific to one language either on-glides present in Korean or off-glides in English would interfere and impede the acquisition of the other language's sub-syllabic awareness. Finally, on the basis of Linguistic Interdependent Hypothesis

(Cummins, 1994), this study would predict that the achievement in L1 and L2 phonological awareness would differ, depending on the L1 and L2 language proficiency.

Summary of Chapter 2

In order to predict cross-language transfer of intra-syllabic structure preference from one language to another language, the Chapter 2 provided the linguistic role of sub-syllabic units in L1 phonological processing along with the conceptual frameworks of L1 basic reading process. It also presented cross-language transfer of phonological and orthographic processing in L2 literacy. Further, given a linguistic discrepancy between Korean and English with respect to semivowel placement, general predictions for this study along with the phonological transfer of sub-syllabic units were discussed.

CHAPTER 3: METHOD

Description of the Study

The data in this study investigating the effects of transferred sub-syllabic units in children's first language on their phonological awareness in a second language come from a set of three experimental language tasks and a test of verbal ability, administered to two groups of Korean-English speaking kindergartners who differed with respect to their home language, and one group of same-age monolingual English speaking kindergarteners. Children were assessed with four individually administered tasks: (a) a receptive vocabulary test; (b) a sound oddity judgment task; (c) a sound similarity judgment task; and (d) a phoneme isolation task. Korean-English speaking children were assessed in both languages, while English monolingual speakers were assessed only in English.

The receptive vocabulary test, in which children select from a group of four pictures, the picture corresponding to an audio stimulus, served as a test of verbal ability. As mastery of receptive language skills is generally followed by mastery of productive skills (Brown, 1994), this measure of language ability can be used with children who are at the beginning stage of second language acquisition.

The sound oddity judgment task (SOJ), in which children select from a group of three words, the word that differs in initial (i.e., bus, bun, *rug*), medial (i.e., hip, pin, *bus*) or final (i.e., bun, gun, *hip*) position, is believed to reveal an implicit sensitivity to sub-syllabic units at an unconscious level (Geudens & Sandra, 2003). The SOJ task was initially devised by Bradley and Bryant (1983) to examine onset-rime awareness and has additionally been used to measure rhyme awareness in beginning readers (De Cara &

Goswami, 2003; Goswami & East, 2000). In this study, the SOJ task required discrimination among a stimulus set of three non-real words which differed with respect to (a) body (initial and medial sounds), (b) rime (medial and final sounds), (c) nucleus (medial sounds), or (d) margins (initial and final sounds).

The sound similarity judgment task (SSJ), which employs an experimental paradigm adapted from Wang, Chen, and Baek's study (2006), requires children to listen to a series of non-real word pairs and to judge their sound similarity along a four-point scale representing different levels of similarity and difference. Sound similarity judgment tasks were first used to measure phonological units (Greenberg & Jenkins 1964). More recently, the SSJ task has been widely used to identify basic phonological units in a variety of languages, such as Arabic (Beinhert & Derwing, 1993), Taiwanese (Wang & Derwing, 1993), and Korean (Yoon, Bolger, Kwon, & Perfetti, 2002; Yoon & Derwing, 2001). These studies also found that language-specific phonological structures such as mora in Japanese and the body in Korean were significant factors in predicting SSJ scores. Like the sound oddity judgment task, the SSJ task also suggests an implicit sensitivity to particular segments (Geudens & Sandra, 2003). In this study, the SSJ task required judgment among pairs of non-real words with 0-3 shared units along the dimensions of onset, vowel, coda, body, rime, and margin.

The phoneme isolation task, developed by Stahl and Murray (1994) requires children to listen to and repeat a non-real word, then isolate a targeted sound within the stimulus word. In this study, semi-vowel phonemes were targeted for isolation within a set of real/non-real word which differed by the placement of semi-vowel across Korean and English. Unlike the previous two tasks, the phoneme isolation task requires explicit

recognition of individual sounds in a spoken word, and consequently, can reveal an explicit sensitivity to sub-syllabic units at conscious level (Geudens & Sandra, 2003).

Participants

Two groups of Korean-speaking kindergartners, one group attending kindergarten in Seoul, Korea (Group 1; EFL) and a second group attending Korean language school in Maryland (Group 2; ESL) were invited to voluntarily take part in this study. Ninety four children (forty eight for Group 1 and forty six for Group 2) were initially recruited. However, a total of eighty-six students (forty three for Group 1 and forty three for Group 2) were selected based on: (a) Korean (Korean and English for ESL participants) as the language of the home; (b) continuous enrollment in kindergarten, (c) status as emergent readers of English; (d) family's willingness to participate; and (d) age at time of testing. To be eligible for kindergarten, Group 2 ESL students had to turn five years old by September 1 (Maryland State Department of Education); while kindergarten enrollment in Korea is not similarly regulated, to control for age between the two groups, only students between the ages of four years and 11 months and five years and 11 months were invited to participate. Therefore, four children below four years and 11 months from Group 1 and two children above five years and 11 months from Group 2 were excluded. In addition, one child' parents from Group1 spoke Korean and English at home and one child' parents from Group 2 spoke only English at home. These two children were also excluded.

Finally, the Children in Group 1 EFL (N = 43, mean age = 5 years 7 months) were 22 boys and 21 girls. A majority (93%) of children was born in Korea and 74% of those were first–born. Korean was the language spoken at home by both parents and by

any adults living in the home, as well as by the children. The majority (91%) of parents was university educated and in the majority of homes, after school care was provided by the children's mothers. According to parental report, the children's dominant language was Korean. They began reading Korean between the ages of 3 years and 5 years (mean age: 4 years and 3 months) and English between the ages of 4 years and 5.5 years (mean age: 5 years and 2 months) and they had between 6 months and 3 years of preschool experience (mean: 1 year and 10 months).

The children in Group 2 ESL (N = 43, mean age = 5 years 4 months) were 24 boys and 19 girls. A little over half of the children (56%) were born in the U.S. An additional 40% of children were born in Korea. The remaining numbers of children were born in the United Kingdom and Canada. 61% of those were first-born. For 51 % of families, Korean was spoken at home by fathers and for 58% of families, Korean was spoken by mothers. For 81% of the families having any adults, Korean was spoken at home by the other adults. While for an additional 49 % of families, both Korean and English were spoken at home by fathers and for an additional 42 % of families, both Korean and English were spoken by mothers and for an additional 19 % of the families having any other adults, both Korean and English were spoken at home by the other adults. A majority of children (77%) spoke both Korean and English at home while an additional 23% of children spoke only English at home. A majority of parents (for father: 98%; for mother: 93%) was university educated and after school care was mainly provided by the children's mothers in the majority of homes. According to parental report, the children's dominant language was English, they began reading Korean between the ages of 4 years and 5.5 years (mean age: 5 years) and English between the

ages of 3 years and 5 years (mean age: 4 years and 2 months) and 76% of those had between 6 months and 3 years of preschool experience (mean: 1 years 11 months).

A third group of native monolingual English-speaking kindergarten students (Group 3) was recruited from the Center for Young Child at the University of Maryland, College Park and Greater Washington DC area to serve as a reference group in order to demonstrate that monolingual English speakers' preference for onset-rime can be documented during sub-syllabic awareness tasks containing semi-vowel properties. Ten students for Group 3 with the permission from their parents were chosen based on their: status as: (a) native, monolingual English speakers, and (b) emergent readers of English. The children in Group 3 (N = 10, mean age = 5 years 6 months) were 6 boys and 4 girls. All of the children were born in the U.S. All of parents were university educated and after school care was mainly provided by the children's mothers or/and fathers. English was the language spoken at home by both parents and by any adults living in the home, as well as by the children. According to parental report, the children began reading English alphabet between the ages of 2 years and 3.5 years (mean age: 3 years) and English words between the ages of 3 years and 5 years (mean age: 4 years) and they had between 1 years and 3 years of preschool experience (mean: 2 years 6 months).

Language Environment Settings

Learning English as a foreign language (EFL) refers to the language environment in which English is formally taught in schools and it is not the official language in social or national life (Brown, 2000). Therefore, the participants in Group1 (EFL), who typically speak Korean as L1, acquire English as a foreign language with few

limited opportunities to use English. They typically learn to speak and read English within a Korean public and private educational system.

In contrast, learning English as a second language (ESL) refers to the language situation in which English officially spoken and natively used, is learned at schools and acquired in society as well (Brown, 2000). Thus, the participants in Group 2 (ESL) children whose native language is Korean and who simultaneously learn to speak and read Korean by attending Korean language school which is regularly open on Friday evenings or Saturday mornings, acquire English as L2 through extensive exposure to English, resulting from attendance in public school where instruction is delivered exclusively in English, continuous interaction with native English speakers, and exposure to English language media.

Measures

Demographic Questionnaire

A demographic questionnaire was designed to gather data from parents, regarding: (a) the language(s) of the home; (b) parents' educational background; (c) the oral language and reading proficiency of all adults living in the home (in Korean and English for families of Group 1 and Group 2 participants, in English for families of Group 3 participants); (c) parent's report of their child's educational history; (d) parents' estimation of their child's reading and oral ability in Korean and English; (e) parent's estimation of their child's language proficiency in Korean and English; and (f) length of residence in the U.S. (see Appendices G and H). The demographic questionnaire was translated into Korean (see Appendix I) to enable parents to select the language in which these data were collected.

Test of Verbal Ability

A test of verbal ability was constructed for separate measures of language ability in Korean and in English to compare each group's oral language proficiency. Twenty items selected from the Peabody Picture Vocabulary Test-Third Edition (PPVT III; Dunn & Dunn, 1997), served to assess children's verbal ability (See Appendix B). Forty items from sets 1 through 7 were initially selected and field-tested with three Korean ESL children and three Korean EFL children to screen out ceiling items, in which there were five or more errors in any one item among the six children. In addition, items for which pictorial representations to audio stimuli were unclear and/or confusing were also eliminated. For the Korean receptive vocabulary measure, to ensure the cross-language comparability, forty items from sets 1 through 7 that are equivalent to Korean objects or concepts and non-ambiguous in Korean were adapted and then translated into Korean by a Korean-English speaker (See Appendix A).These items also were field-tested with the same six children and selection of the twenty Korean items followed the same procedures described for English item selection.

The Sound Oddity Judgment Task

Within the four conditions corresponding to body, rime nucleus and margins, ten sets of three glide-embedded non-real words in both English and Korean were invented for use with this task. Within each stimulus set, words were constructed such that in order to distract target word, the phoneme(s) (bold font) in non-target word appeared in the same position within the word, as the phoneme(s) in the target word (e.g., [t^{h}aɪ**k**], [t^{h}aɪn], [*p^{h}eɪ**k***]).

For the English sound oddity task, one syllable non-real CVGC words were constructed to create ten stimulus sets of each oddity: body oddity (e.g., [t^haɪk], [t^haɪn], [p^heɪk]), rime oddity (e.g., [t^haɪk], [t^haʊm], [k^haɪk]), nucleus oddity (e.g., [t^haɪk], [p^haɪm], [t^hoʊk]), and margins oddity (e.g., [p^haɪt], [p^heɪt], [t^haɪk]). A complete list of the items used in the English Sound Oddity Judgment task is found Appendix D.

For the Korean sound oddity task, one syllable non-real CGVC words were constructed to create ten stimulus sets of each oddity: body oddity (e.g., [t^hjak], [t^hjap], [p^hjok]), rime oddity (e.g., [t^hjak], [t^hjel], [p^hjak]), nucleus oddity (e.g., [t^hjak], [p^hjal], [t^hjek]), and margins oddity (e.g., [t^hjak], [t^hjok], [p^hjap]). A complete list of the items used in the Korean Sound Oddity Judgment task is found Appendix C.

As previously mentioned in Chapter 2, sonority[16] has been found to play a crucial role in how sub-syllabic units (i.e., onset-rime awareness) are identified (Geudens & Sandra, 2003; Treiman, 1985, 1988, 1995; Treiman et al., 2002). Accordingly, sonority in the generation of oddity items was considered to control the effect of consonant sonority on the cohesion between the nucleus (For English: VG; For Korean: GV) and the following consonant (C) and between the initial consonant (C) and the nucleus (For English: VG; For Korean: GV). Based on the sonority scale (Giegerich, 1992), stops (i.e., /p/, /t/, /k/), fricatives (i.e., /s/, /h/), nasals (i.e., /m/, /n/), and liquids (i.e., /l/, /ɹ/) were attached to the target position such as body, rime, and margins. However, the sonority of nucleus oddity items was controlled for both the initial consonant and final consonant

[16] "[T]he sonority of a sound is its relative loudness compared to other sounds, everything else (i.e., pitch) being equal. Speech sounds can be ranked in terms of their relative sonority: voiceless stops (i.e., /p/, /t/, /k/ are minimal sonority while low vowels have the highest degree of sonority of all speech sounds" (Giegerich, 1992, p.132).

because targeted-nucleus position is already occupied by semivowel properties. With this same reason, vowel length was not considered to in the generation of the oddity items.

The Sound Similarity Judgment Task

Using items adapted from the studies conducted by Yoon, Bolger, Kwon, and Perfetti (2002), and Yoon and Derwing (2001), four sets of glide-embedded non-real words (CGVC in Korean, CVGC in English), which differed with respect to the number of units they shared (i.e., all or none) and position within the words of these shared units (i.e., onset, nucleus, body, rime, coda, and margins), were constructed for use in this task. Examples of stimulus pairs are illustrated below: shared units are bold-typed and the nucleus (vowel) is counted as one phoneme.

Table 1

Examples of Stimulus Pairs

Number of Matched Phonemes	Matched-Unit	Examples
0	None	[t^hjan]-[swak]
1	Onset	[**t^h**jan]-[**t^h**wim]
1	Nucleus	[t^h**ja**n]-[s**ja**k]
1	Coda	[t^hja**n**]-[k^hwe**n**]
2	Body	[**t^hja**n]-[**t^hja**k]
2	Rime	[t^h**jan**]-[k^h**jan**]
2	Margins	[**t^h**ja**n**]-[**t^h**wi**n**]
3	All	**[t^hjan]-[t^hjan]**

In this study, none- and all-matched units served as a dummy unit to identify sub-syllabic preference among the other six matched-units in both English and Korean.

The Phoneme Isolation Task

In this study, items used in the phoneme isolation task were constructed with syllable GV (e.g., [je]) and GVC (e.g., [jek]) real/non-real words in Korean and VG (e.g., [aʊ]) and CVG real/non-real words (e.g., [k^haɪ]) in English (see Appendices E and F). This phoneme isolation task excluded the use of CGV and CGVC words in Korean and VGC and CVGC words in English, because it is difficult for children to segregate target semivowels between the vowel and consonant. In addition, the creation of syllable GV in Korean and VG in English could not avoid real words because GV in Korean and VG in English were already occupied by itself.

As sonority was controlled in the generation of items for the sound oddity task, in the same way, sonority was controlled in the generation of phoneme isolation items. However, sonority was not considered in the generation of GV real/non-real word items in Korean nor in VG real/non-real word items in English because consonants can not be attached.

Fourteen items were invented for English phoneme isolation task and twenty two items were created for Korean phoneme isolation task. The uneven number of diphthongs between the two languages, as discussed in Chapter 2 (for English: 5 diphthongs; for Korean: 11 diphthongs), resulted in the different number of phoneme isolation items used.

Procedures

Recorded directions for each of the four tasks as well as for all task items were provided by a female native speaker of English and a female native speaker of Korean

respectively, via the Cool Edit Pro Version 2.0 program. Audio stimuli were presented by a Windows Media Player.

Children were assessed in four individual testing sessions, lasting for approximately 30-35 minutes per language task. Children were tested on individual days in each language, such that each session targeted a single language. The order of the two language sessions was randomized. Within a language session, the order of presentation of the four tasks was randomly assigned and children were given a break between task administrations. All tasks were conducted by fluent Korean-English experimenters, who recorded students' responses over the course of the four tasks. The directions for each of the four tasks were given to children in their dominant language, regardless of language task (i.e., Korean for Group1 EFL; English for Group 2 ESL; English for Group 3 English monolingual).

Prior to the administration of the four tasks, the researcher met individually with a parent of each participant to: (a) explain the study's purpose, (b) answer questions about the study, (c) obtain parental permission through completion of a parental consent form prepared by the University of Maryland, Institutional Review Board (IRB), and (d) to assist in completion of the demographic questionnaire. Parental consent forms and demographic questionnaires were available in both Korean and English and parents were encouraged to complete forms in their preferred language.

Korean/English Receptive Vocabulary

The children were instructed as follows: "I have some pictures to show you. See all the pictures on this page. I will say a word. Then I want you to put your finger on the picture that best describes that word or say the number of the picture that best describes

that word. Let's try one; put your finger on the picture of "ball" (5-second pause) Good. Now, I am going to show you some more pictures. Each time I will say something and you will point to the best picture that best describes it. Even although you may not sure which one to point to, I want you to look carefully at all the pictures anyway, then, choose the picture you think is correct." Equivalent directions for Korean receptive vocabulary task were presented in Korean. The children then listened to a total of twenty tape-recorded items, with 5-second-interval between target words respectively such as:

"Number 1" (1 sec) "bus" (5 sec)-response-"Number 2 (1 sec) "climbing"

Simultaneously the audio stimulus of each target word was presented with four pictures. They were then asked to point out the corresponding picture.

Korean /English Oddity Task

Prior to the oddity task, the children were asked to identify a beginning, middle, and ending sound in a non-real word in order to ensure each child's understanding that the practice word contains three sounds. For example, in the word [t^haIn] the beginning sound is /t^h/, the middle sound is /aI/, and the ending sound is /n/. Then the children were guided as follows: "Now listen carefully, you are going to hear three words. One of these words will have a different beginning and middle sound than the other two words. After you hear the three words, your job is to point to, or say the number of the word with the different beginning and middle sound. Let's do some practice; Listen to theses three words. Which word has the different beginning and middle sounds? [naɪm] (1sec) [laʊm] (1sec) [naɪk]-(response)-(feedback)." In the same way, directions for the Korean oddity task were also provided in Korean.

Each condition (i.e., body, rime, nucleus, and margins) was presented in a counterbalanced order. In addition, ten items per each condition were randomly recorded. Children listened to a tape-recorded presentation of three words with a one-second pause, inserted between each word and a five-second pause presented between items, such as:

"Number 1" (1 sec) "[t^haɪk]" (1 sec) "[t^haɪn]" (1 sec), "[k^heɪn]" (5 sec)-response

Then the children were asked to identify the non-real word containing targeted sounds in body, rime, nucleus, and margins position from a group of three non-real words.

Korean /English Similarity Judgment Task

In this task, the children were instructed follow as: "Listen carefully, you are going to hear two words. Then you are going to hear these same words one more time. Your job is to tell how similar the two words are by pointing to a set of pictures on the table next to you. These pictures marked 0, 1, 2, and 3 contain two circles. The closeness of the circles shows how similar the two words are. In the first picture, the two circles do not touch at all. This picture is marked zero because the two words are completely different. In the second picture marked 1, the two circles meet in the middle only a bit. This means that the two words are a little bit similar. In the third picture marked 2, the two circles touch even more. This means that the two words are even more similar. In the last picture marked 3, the two circles cover each other completely. This means that the words are exactly same. Now let's do some practice; [k^haɪm]-[k^haɪk] (1sec) [k^haɪm]-[k^haɪk] (5sec)-feedback." In the same way, directions for the Korean similarity judgment task were also presented in Korean.

A total of thirty two items containing stimuli pairs with 0-3 shared phonemes, was recorded in a single random order and played back to the participants. The children heard two spoken non-real words twice with pauses inserted between the two words as well as each test item, such as:

"Number 1" (1 sec) "[neɪk]" "[heɪk]" (1 sec) "[neɪk]" "[heɪk]" (5 sec) –response

They were then asked to judge the global similarity of each pair by pointing to one of four pictures representing different levels of similarity and difference (i.e., pictures marked with 0, 1, 2, and 3).

Korean /English Phoneme Isolation Task

In this task, as Stahl and Murray (1994) suggested, the children first heard, then were required to repeat a non-real word and to isolate the target initial sound in the twenty two items of Korean GV and GVC structures or final sound in the fourteen items of English VG and CVG structures. Accordingly, the children were instructed as follows: "Listen carefully, you are going to hear some words. After I say a word, you need to repeat it once, then you will be asked to tell me what the ending sound is. Now let's do some practice. Say [k^hoʊ] (3-sec pause), what is the ending sound?" This session was audio-taped for later coding of accuracy and researchers directed the children to pronounce the target word correctly if they did pronounce the word in wrong.

Coding

Within a language, each item of PPVT III was scored as 1: a total score of a PPVT III set was 20. For the oddity task, each item, a group of three non-words, was also scored as 1: a maximum score of each set of 10 items was 10. For global similarity judgment task, each pair of stimuli was scored as 1 point: a maximum score of each

matched-unit (i.e., body, rime, nucleus, margin, onset, and coda) was 4. As mentioned earlier, none and all matched-unit were excluded as a dummy variable.

The English phoneme isolation task was coded by one native speaker of English who majored in linguistics and by a student investigator while the Korean phoneme isolation task was coded by one native speaker of Korean who majored in Korean linguistics and by a student investigator using the following procedures: (a) after listening to recorded audio file, due to the children's status as emergent speakers and/or readers of English for the EFL children and of Korean for the ESL children, regardless of accuracy of the repeated target word, the response of an attempt to isolate the target phoneme(s) was broadly transcribed; (b) then the coders subdivided each subject's segmented phonemes into 3 categories such as G, GV, and other type in Korean and G, VG, and other type in English. If the correct target phoneme(s) was not segmented, the segmented phoneme(s) was incorrectly pronounced, or a response such as "I don't know" was given, these responses were classified as an other type; (c) to be sure that the two coders are in proportional agreement of the transcribed target-phoneme(s), inter-rater reliability was established (for Korean: .90; for English: .94).

For each group, a total frequency for each category was calculated and converted into percentage of accuracy for each language: the total number of each categorized-item was divided by the total number of items to which each participant responded in each language.

Summary of Chapter 3

The Chapter 3 described the participants and language environment settings. This Chapter also provided the rationale and considerations of each measure and the restrictions behind the experimental items created. Further, the data collection procedure and coding employed in this study were discussed.

CHAPTER 4: RESULTS

Overview

The primary goal of this research was to investigate the language-specific sub-syllabic awareness of Korean-English bilingual children and to examine the effects of knowledge transfer from one language's set of sub-syllabic units on the phonological awareness in the other language. The research sought to determine the sub-syllabic preferences of Korean EFL children (Group1) and Korean ESL children (Group 2) in Korean (L1) and English (L2) through the sound oddity judgment (SOJ) task, the sound similarity judgment (SSJ) task, and the phoneme isolation task. The scores from SOJ and SSJ tasks and the isolated tendency from the phoneme isolation task were analyzed to measure each group's awareness of sub-syllabic units and to examine the preferences for sub-syllabic units in each language respectively.

A further objective of the study was to examine cross-language transfer of sub-syllabic preferences across the two languages. Within each group, the scores from the sound oddity and similarity judgment tasks and the isolated tendency from phoneme isolation task were compared across languages to investigate the possible effect of sub-syllabic preference in one language on the other language.

Another goal of this study was to compare the sub-syllabic preferences of Korean EFL and Korean ESL children in Korean and in English to suggest the possible relationships between Korean/English oral language proficiency and sub-syllabic awareness in Korean and English. Within group scores of the Korean and English oral language proficiency tests were compared to determine each group's mean difference in Korean and English language proficiency. Next, oral language proficiency scores in each

language were compared across groups to examine differences between groups. Given differences in Korean and English oral language proficiency between the Korean EFL and Korean ESL children, the scores from the sound oddity and similarity judgment tasks and the isolated tendency from phoneme isolation task were compared across groups within each language to investigate the relationship between oral language proficiency and sub-syllabic awareness. Furthermore, the scores from the sound oddity and similarity judgment tasks were analyzed to identify the contribution of each sub-syllabic unit to the prediction of oral language proficiency.

This chapter begins with the results of verbal ability measured by PPVT III, followed by the results of the statistical analyses employed in the present study to answer the three research questions.

Oral Language Proficiency of the Study Samples

As discussed in Chapter 3, the children's oral language proficiency was measured by PPVT. The mean performance scores of PPVT are shown in Table 2. Inspection of this Table 2 indicates that for Group1 EFL, Korean language proficiency (M = 16.79) was higher than English language proficiency (M = 14.23) while for Group2 ESL, English language proficiency (M = 16.72) was higher than Korean language proficiency (M = 13.46). Within each language proficiency, Korean language proficiency of EFL (M = 16.79) was higher than that of ESL (M = 13.46) whereas English language proficiency of EFL (M = 14.23) was lower than that of ESL (M = 16.72). As a reference group, the mean score of English monolingual children was 16.70.

Table 2

Participants' Mean Performance Scores of PPVT (for EFL: N = 43; for ESL: N = 43; for English monolingual: N = 10)

		Mean	*SD*
EFL	Korean	16.79	1.58
	English	14.23	3.13
ESL	Korean	13.46	3.71
	English	16.72	2.43
English Monolingual		16.70	3.56

Note: Total possible score = 20.

In order to compare Korean with English language proficiency within each group, two repeated-measures ANOVAs were carried out. For Group 1 EFL, the ANOVA showed within-subjects effects of PPVT, F (1, 42) = 45.35, p< .001. In addition, adjustment for comparisons measured by Bonferroni showed that the mean difference between the two languages was significant at the .05 level. In the same analysis for Group 2 ESL, another ANOVA showed within–subjects effects of PPVT, F (1, 42) = 38.89, p< .001. Bonferroni adjustment for comparisons also confirmed that the mean difference between the two languages was significant at the .05 level. In other words, Group 1 EFL and Group 2 ESL differently performed across the two languages: Group 1 EFL preformed better on the Korean PPVT than on the English PPVT and Group 2 ESL performed less well on the Korean PPVT than on the English PPVT.

Furthermore, two One-way ANOVAs were run to investigate two group's performance difference within each language proficiency. For Korean language proficiency, the One-way ANOVA revealed that there was a mean difference between Group 1 EFL and Group 2 ESL, F (1, 84) = 29.12, p< .001. In the same way, for English language proficiency, the other One-way ANOVA also showed that there was a mean

difference between the two groups, F (1, 84) = 16.93, p< .001. In other words, Group 1 EFL performed better on the Korean PPVT than did Group 2 ESL, while Group 2 ESL performed better on the English PPVT than did Group 1 ESL.

An independent-samples T-test was carried out to compare Group 2 ESL with Group 3 English monolinguals within English language proficiency. Although the two groups' subject numbers were uneven, assuming the two groups' equal variances, there was no mean difference between the two groups' English language proficiency (t = .022, p = .982). That is, Group 2 ESL and Group 3 English monolinguals have similar English language proficiency.

Results for Research Question 1

As noted in Chapter 1, Research Question 1 is as follows: Given the linguistic discrepancy between Korean and English, what is the sub-syllabic preference of Korean EFL children and Korean ESL children in the L1 (Korean) and in the L2 (English)? This Research Question 1 was divided into 5 sub-questions below:

1.1 What is the sub-syllabic performance preference of the Korean EFL children in Korean?

1.2 What is the sub-syllabic performance preference of the Korean ESL children in Korean?

1.3 What is the sub-syllabic performance preference of the Korean EFL children in English?

1.4 What is the sub-syllabic performance preference of the Korean ESL children in English?

1.5 What is the sub-syllabic performance preference of the English monolingual children in English?

In order to answer the Research Question 1 concerning sub-syllabic preference in each language, this section provides the results of oddity, similarity judgment, and phoneme isolation task corresponding to each sub-question.

Research Question 1.1

What is the sub-syllabic performance preference of the Korean EFL children in Korean?

Oddity task. As discussed in Chapter 3, there were four oddity tasks, namely, body (**CGV**-C), rime(C-**GVC**), nucleus (C-**GV**-C), and margins (**C**-GV-**C**) in Korean. Table 3 shows the mean and standard deviation of participants' scores on each oddity task in Korean. The total possible score for each oddity task was 10. The mean performance, from highest to lowest, was as follows: Korean Body Oddity mean = 7.42, Korean Rime Oddity mean = 5.20, Korean Nucleus Oddity mean = 4.74, and Korean Margins Oddity mean = 3.44. Inspection of the Table 3 reveals that the Korean EFL children were most sensitive to the perception of differences in spoken non-words (M = 7.42) when the test non-real words shared bodies (CGV). In other words, they preferred the sub-syllabic structure of body in the Korean oddity task.

Table 3

Korean EFL Participants' Scores on Four Oddity Tasks in Korean (N = 43)

Oddity Type	*Mean*	*SD*
Body	7.42	1.05
Rime	5.20	1.72
Nucleus	4.74	2.09
Margins	3.44	1.03

Note: Total possible score on each task = 10.

In order to investigate the effect of oddity type, a repeated measure ANOVA was carried out, comparing main effects of 4 oddity types. The ANOVA showed within-subjects effects of oddity type, F (3, 126) = 60.29, p< .001. In addition, multiple comparisons measured by Bonferroni are outlined in Figure 1.

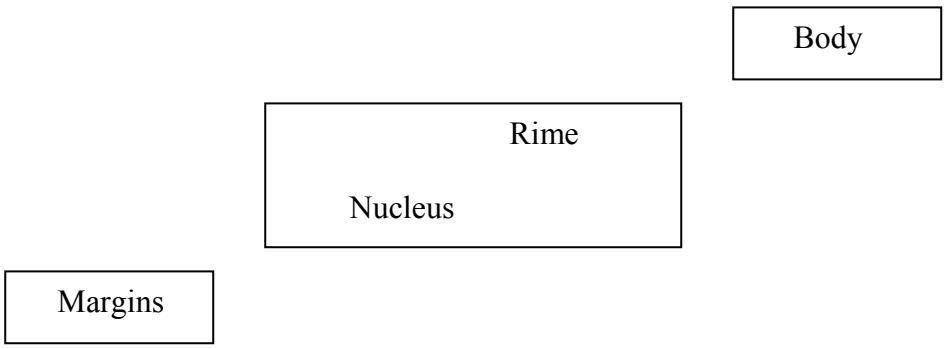

Figure 1. Korean EFL's Bonferroni groupings for the four oddity types in Korean.
Note: Boxes enclose means that are not significantly different at the .05 level.

As can be seen in Figure 1, there was a significant difference between body and rime. However, there was no significant difference between rime and nucleus. Additionally, there were significant differences between margins and the other types. The results of multiple comparisons show that the Korean EFL children had greater success in detecting differences among non-real words when the target sounds occurred within the position of body (CGV) as opposed to rime (GVC).

Similarity judgment task. There were six matched-units in the similarity judgment task, namely, body, rime, margins, onset, coda, and nucleus unit in Korean. The total possible score for each matched unit was 4. Table 4 presents the mean similarity scores for the six non-identical types of test pairs.

Table 4

Korean EFL Participants' Scores on Six Matched-Units in Korean (N = 43)

Sub-syllabic Matched Units	Examples	*Mean*	*SD*
Body	[**t^{h}ja**n]-[**t^{h}ja**k]	2.83	.89
Nucleus	[t^{h}**ja**n]-[s**ja**k]	2.02	.41
Onset	[**t^{h}**jan]-[**t^{h}**wim]	1.53	.85
Rime	[t^{h}**jan**]-[k^{h}**jan**]	1.39	.90
Margins	[**t^{h}**ja**n**]-[**t^{h}**wi**n**]	.88	.85
Coda	[t^{h}ja**n**]-[k^{h}we**n**]	.74	.95

Note: Total possible score on each matched-unit = 4.

As earlier observed in the oddity task, the Korean EFL children were most accurate in their judgment of spoken non-real words (M = 2.83) when the test pair of non-real words contained identical sounds within the position of body (CGV). Furthermore, a repeated-measures ANOVA was run to measure the within-subjects effects of the six similarity units. The ANOVA revealed a main effect of similarity type, F (5, 210) = 37.09, p< .001. Additionally, Bonferroni's multiple comparisons among the six types of pairs are shown in Figure 2.

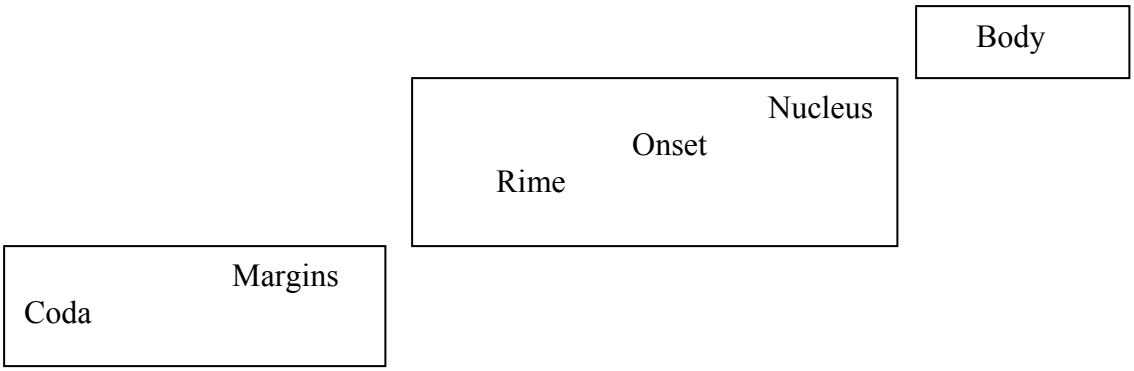

Figure 2. Korean EFL's Bonferroni groupings for the six matched-units in Korean.
Note: Boxes enclose means that are not significantly different at the .05 level.

As shown above in Figure 2, there were significant differences between body and the other units. However, there were no significant differences among nucleus, onset and rime unit. Additionally, there were no significant differences among onset, rime and margin unit and also between margins and coda unit. The results of multiple comparisons among six matched units reveal that the Korean EFL children were more accurate in their judgment of spoken non-real words when the stimuli pairs shared the same sounds within the position of body (CGV).

Phoneme isolation task. There were twenty two syllables used in Korean phoneme isolation task. Eleven GVC syllable types (e.g., [jek]) and eleven GV syllable types (e.g., [je]) were used in the Korean phoneme isolation task. The mean and percentage of three isolated categories of Korean GV/GVC syllable is shown in Table 5.

Table 5

Korean EFL Participants' Tendency of Korean Phoneme Isolation in GV/GVC Syllable Type (N =43)

Isolated Type	*Mean*	Percentage
GV	3.56	16.17
G	.12	.53
Other	18.32	83.30

Notes: 1. Total syllables = 22.

2. Other category represents items for which the target sounds was incorrectly segmented or the correct segment was inaccurately pronounced or failure to respond.

Most of the Korean EFL children had difficulties in isolating the first sound (G) in GV and GVC syllable types. They also showed a tendency to isolate GV in the same syllable. These results indicate that Korean EFL children regarded GV as one unit in GV/GVC syllable. Of particular interest, their central responses from the other category were "ㅇ" (Korean alphabet name: [iɯŋ]) and 으 [ɯ], which means they tried to isolate the first sound (G) but their responses were wrong because 'ㅇ' is a null consonant in GV/GVC syllable (e.g., ㅇ as in 얍 [jap]). In addition, they also isolated the V in GV/GVC syllable (e.g., [a] as in [jap]). That is, they had difficulties segmenting G in GV/GVC syllable and tended to isolate GV in GV/GVC syllable. The percentage of each isolated type in the total syllables (N = 946) to which the participants responded is visualized as bar graph in Figure 3.

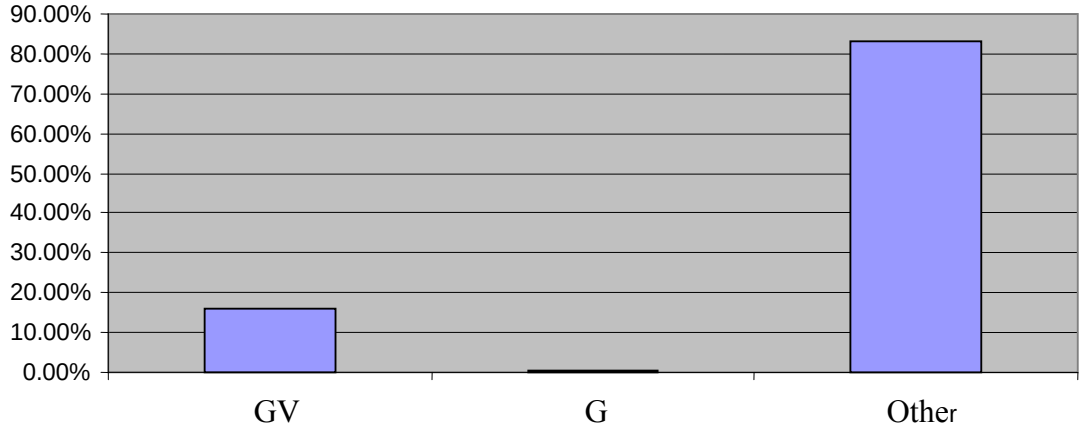

Figure 3. Korean GV/GVC syllable phoneme isolation performed by Korean EFL children.

More specifically, when it comes to the GVC syllable type, 16.28% of the total syllables (N = 473) to which the participants responded was isolated as GV and 83.09% of those syllables was segmented as other category such as responses not answered or incorrectly pronounced. However, only .63% of those syllables was isolated as G.

In the similar way, for the GV syllable type, 16.07% of the total syllables (N = 473) was isolated as GV and 83.51% of those syllables was segmented as other category. On the other hand, only .42 % of those syllables was isolated as G.

In this task, overall, Korean EFL children failed to segregate the first consonant (G) in the GV/GVC syllable and considered GV as one unit. These results suggest that Korean EFL children preferred body structure since the semivowel (G) cannot be segregated from the following vowel (V).

In summary, Korean EFL children showed that the connection between onset and vowel is stronger than that between vowel and coda: that is, the sub-syllabic

preference of body structure in Korean phonological awareness was similar across the three measurements.

Research Question 1.2

What is the sub-syllabic performance preference of the Korean ESL children in Korean?

Oddity task. As discussed in the previous section, in the same way, there were four oddity tasks, namely, body (**CGV**-C), rime(C-**GVC**), nucleus (C-**GV**-C), and margins (**C**-GV-**C**) in Korean. The descriptive statistics with respect to these participants' scores on each oddity task in Korean are shown in Table 6. This table shows that Korean ESL children were most accurate in their detection of differences within spoken non-real words when the test non-real words items shared rime (GVC), as calculated by computing the mean for rime (M = 7.58), body (M = 6.35) nucleus (M = 4.91) and margins (M = 3.19). These results suggest that the intra-syllabic unit of rime structure in Korean is more easily accessible to Korean ESL children than is body structure.

Table 6

Korean ESL Participants' Scores on Four Oddity Tasks in Korean (N = 43)

Oddity Type	*Mean*	*SD*
Body	6.35	1.06
Rime	7.58	1.05
Nucleus	4.91	1.50
Margins	3.19	.96

Note: Total possible score on each task = 10.

When it comes to the within-subjects effects of oddity type, a repeated measure ANOVA showed the mean differences of 4 oddity types, F (3, 126) = 139.26, p< .001. Moreover, Bonferroni's adjustment for multiple comparisons revealed the mean differences among the 4 oddity types, as shown below in Figure 4.

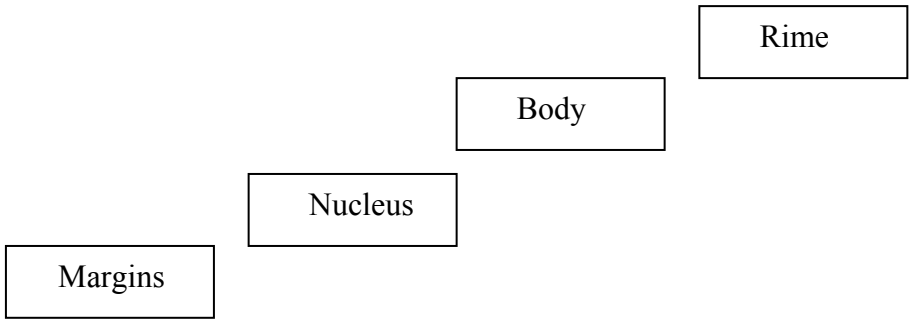

Figure 4. ESL's Bonferroni groupings for the four oddity types in Korean.
Note: Boxes enclose means that are not significantly different at the .05 level.

As can be seen in Figure 4, there were significant mean differences among the 4 oddity types respectively. The results of multiple comparisons propose that for Korean ESL children, the linguistic relationship between vowel and coda in Korean is closer than that between onset and vowel in Korean.

Similarity judgment task. The mean of correct responses at each sub-syllabic matched-unit is shown in Table 7. The mean performances on the six non-identical types of test pairs show that the mean of rime (M = 2.88) is higher than the other units' mean, nucleus (M = 2.06), body (M = 1.97), Onset (M = 1.86), Coda (M = 1.02) and margins (M = 1.01). These results suggest that the performance of Korean ESL children was more accurate in their similarity judgment of spoken non-real words (M = 2.88) when the test pairs of non-real words shared identical segments within the word position of rime (GVC).

Table 7

Korean ESL Participants' Scores on Six Matched-Units in Korean (N = 43)

Sub-syllabic Matched Units	Examples	*Mean*	*SD*
Rime	[t^{h}**jan**]-[k^{h}**jan**]	2.88	.69
Nucleus	[t^{h}**ja**n]-[s**ja**k]	2.06	.78
Body	[**t^{h}ja**n]-[**t^{h}ja**k]	1.97	.81
Onset	[**t^{h}**jan]-[**t^{h}**wim]	1.86	.74
Coda	[t^{h}ja**n**]-[k^{h}we**n**]	1.02	.81
Margins	[**t^{h}**ja**n**]-[**t^{h}**wi**n**]	1.01	.73

Note: Total possible score on each matched-unit = 4.

Using a repeated-measures ANOVA, there were within-subjects effects of similarity type, F (5, 210) = 41.23, p< .001. With respect to comparison of the main effect of 6 matched-units, the Bonferroni's multiple comparisons reveal that rime is the most sensitive phonological structure, as shown below in Figure 4.

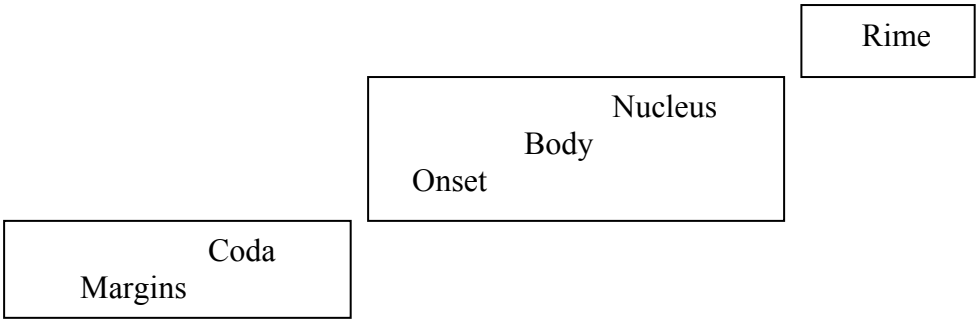

Figure 5. ESL's Bonferroni groupings for the six matched-units in Korean.
Note: Boxes enclose means that are not significantly different at the .05 level.

Similar to performance on the oddity task, the accuracy rate for the rime matched-unit was the highest among the 6 matched units. These results suggest that Korean ESL children had a distinctive preference for the sub-syllabic structure of rime in Korean as a cohesive unit.

Phoneme isolation task. The mean and percentage of three isolated types of Korean GV/GVC syllable is shown in Table 8. Among the three isolated types, the mean performance of GV was 17.17, followed by other (M = 3.83) and G (M = 1).

Table 8

Korean ESL Participants' Tendency of Korean Phoneme Isolation in GV/GVC Syllable Type (N =43)

Isolated Type	*Mean*	Percentage
GV	17.17	78.07
G	1	4.54
Other	3.83	17.39

Notes: 1. Total syllables = 22.

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

Most of the Korean ESL children showed a tendency to isolate GV in GV and GVC syllable types. For example, [je] was isolated from target syllable [je] and [jek]. They also isolated V in GV/GVC syllable (i.e., [e] as in [jek]) as Korean EFL children did. These results suggest that Korean ESL children regarded GV as a cohesive unit in GV/GVC syllable. The percentage of each isolated type in the total syllables (N = 946) to which the participants responded is shown in Figure 6.

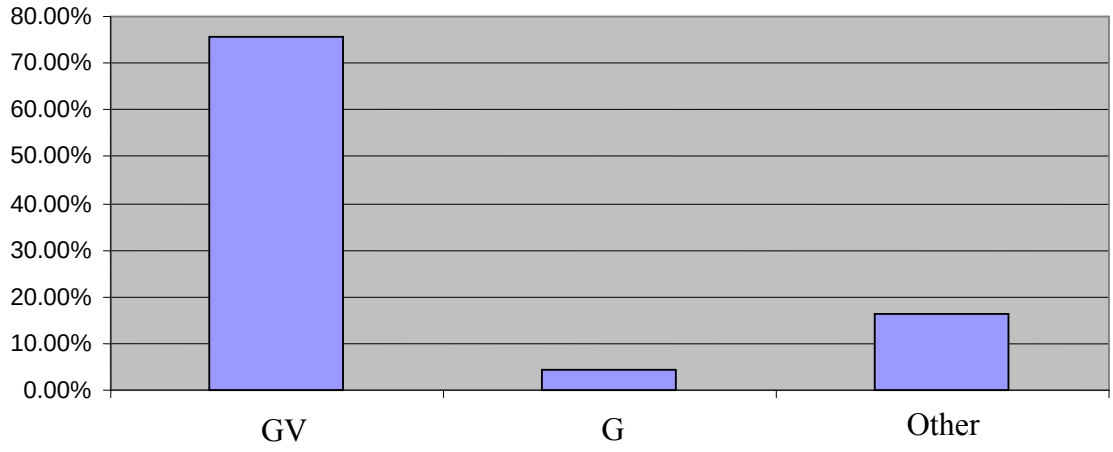

Figure 6. Korean GV/GVC syllable phoneme isolation performed by Korean ESL children.

With respect to syllable type, 82.27% of total GVC syllables (N = 473) was isolated as GV and 13.64% of those syllables was not answered or wrongly pronounced. However, only 4.09% of those syllables was segmented as G.

Similarly, 73.86% of total GV syllables (N = 473) was isolated as GV and 21.14% of those syllables was categorized as other. Meanwhile, only 5.00 % of those syllables was isolated as G.

In this task, on the whole, as Korean EFL children, Korean ESL children regarded GV as a cohesive unit and failed to isolate the first sound (G) in GV/GVC syllable. These findings propose that Korean ESL were sensitive to body structure because the preceding semivowel (G) cannot be isolated from the vowel (V)

In short, Korean ESL children preferred rime structure across Korean oddity and similarity judgment tasks whereas they preferred body structure in the Korean phoneme isolation task. They seem to have both body and rime preference in Korean phonological awareness.

Research Question 1.3

What are the sub-syllabic performance preferences of the Korean EFL children in English?

Oddity task. As implemented in Korean oddity task, four oddity tasks, namely, body (**CVG**-C), rime(C-**VGC**), nucleus (C-**VG**-C), and margins (**C**-VG-**C**), were measured to investigate the preferences of sub-syllabic structure in English. Table 9 shows the mean and standard deviation of correct responses on each oddity task in English. The total possible score for each oddity task was 10. Examination of the Table 9 reveals that the Korean EFL children were most sensitive to the detection of differences among spoken non-real English words (M = 7.25) when the target sounds occurred within the position of body (CVG). These results suggest that the Korean EFL children again preferred body more than rime even in English.

Table 9

Korean EFL Participants' Scores on Four Oddity Tasks in English (N = 43)

Oddity Type	*Mean*	*SD*
Body	7.25	1.13
Rime	4.88	1.49
Nucleus	4.30	2.21
Margins	3.30	1.63

Note: Total possible score on each task = 10.

In order to investigate the within-subjects effects of oddity type, a repeated measure ANOVA was run, comparing main effects of oddity type. The ANOVA showed within-subjects effects of oddity type, F (3, 126) = 45.00, p< .001. In addition, Bonferroni's multiple comparisons show the main effects of each oddity type as outlined in Figure 7.

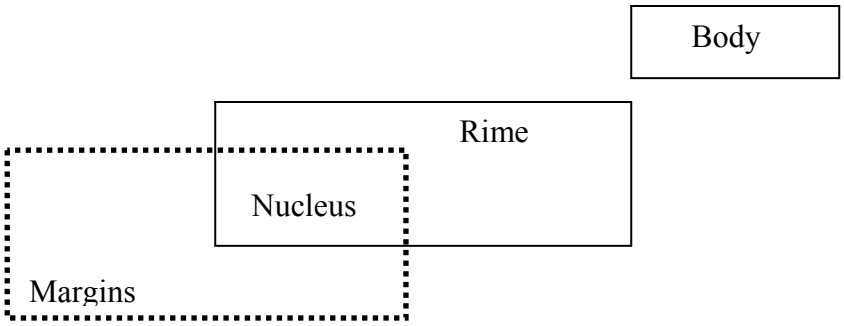

Figure 7. Korean EFL's Bonferrni groupings for the four oddity types in English.
Note: Boxes and doted box enclose means that are not significantly different at the .05 level.

As can be seen in Figure 7, the mean differences between body and the other units were significant. However, the mean difference between rime and nucleus was not significant. In the meantime, the mean difference between nucleus and margins was not significant. These results indicate that again, Korean EFL children showed a dominant accuracy rate of body than that of rime even in English.

Similarity judgment task. As in the Korean similarity judgment task, there were six matched-units in similarity judgment task, namely, body, rime, margins, onset, coda, and nucleus unit in English. The total possible score for each matched-unit was 4. Table 10 provides the mean similarity scores for the six sub-syllabic matched-units.

Table 10

Korean EFL Participants' Scores on Six Matched-Units in English (N = 43)

Sub-syllabic Matched Units	Examples	*Mean*	*SD*
Body	[**t^{h}aɪ**n]-[**t^{h}aɪ**k]	2.93	.81
Nucleus	[t^{h}**aɪ**n]-[s**aɪ**k]	1.81	.76
Onset	[**t^{h}**aɪn]-[**t^{h}**oʊm]	1.76	.86
Rime	[t^{h}**aɪn**]-[k^{h}**aɪn**]	1.46	.97
Coda	[t^{h}aɪ**n**]-[k^{h}oʊ**n**]	1.18	.81
Margins	[**t^{h}**aɪ**n**]-[**t^{h}**eɪ**n**]	.79	.74

Note: Total possible score on each matched-unit = 4.

As earlier shown in the Korean similarity task, Korean EFL children more accurately judged the similarity of spoken non-real words (M = 2.93) when the test pairs of non-real words shared identical segments within the word position of body (CVG). Furthermore, a repeated-measures ANOVA was run to measure the mean differences of the six similarity units within subjects. The ANOVA revealed the within-subjects effects of similarity type, F (5, 210) = 27.11, p< .001. Besides, Bonferroni's multiple comparisons among the six types of pairs are shown in Figure 8.

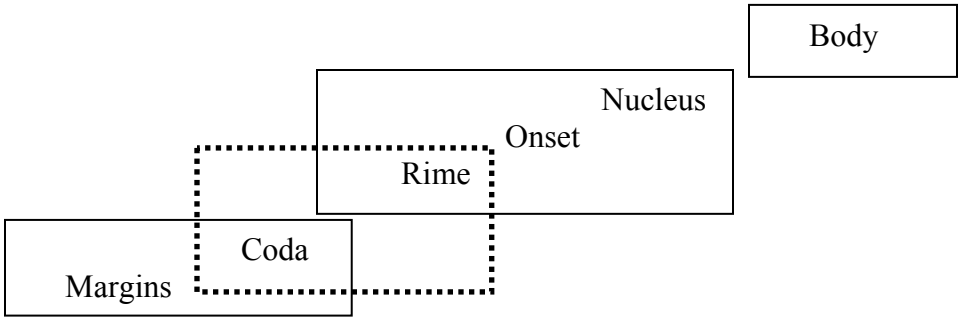

Figure 8. Korean EFL's Bonferroni groupings for the six matched-units in English

Notes: Boxes and doted box enclose means that are not significantly different at the .05 level.

As shown above in Figure 8, the judgment of non-real test pairs with common segments in body was significantly more accurate than for other pairs, while the nucleus pairs were judged no more similar than the onset pairs and rime pairs. Additionally, there was no significant difference between rime pairs and coda pairs, and between coda pairs and margins pairs. The multiple comparisons among six matched units suggest that the Korean EFL children consider body matched-unit as most salient sub-syllabic structure in English similarity judgment task, which is consistent with the results of English oddity task.

Phoneme isolation task. Unlike in the Korean phoneme isolation task, there were fourteen syllables used in the English phoneme isolation task. Nine CVG syllable types (e.g., [k^haɪ]) and five VG syllable types (e.g., [aɪ]) were used in the English phoneme isolation task. The mean and percentage of three isolated types of English VG/CVG syllable is shown in Table 11.

Table 11

Korean EFL Participants' Tendency of English Phoneme Isolation in VG/CVG Syllable Type (N =43)

Isolated Type	*Mean*	Percentage
VG	0	0
G	11.48	81.97
Other	2.52	18.03

Notes: 1. Total syllables = 14.

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

Overall, most of the Korean EFL children tended to isolate the final sound (G) in VG and CVG syllable types in English. For example, [ɪ] was segmented from the target syllable [aɪ] and [k^haɪ]. Based on the results of Table 11, Korean EFL children regarded VG as a separate unit in VG/CVG syllable. Therefore, they had no tendency to isolate VG in the same syllable at all. The percentage of each isolated type in the total syllables (N = 602) to which the participants responded is displayed in Figure 9.

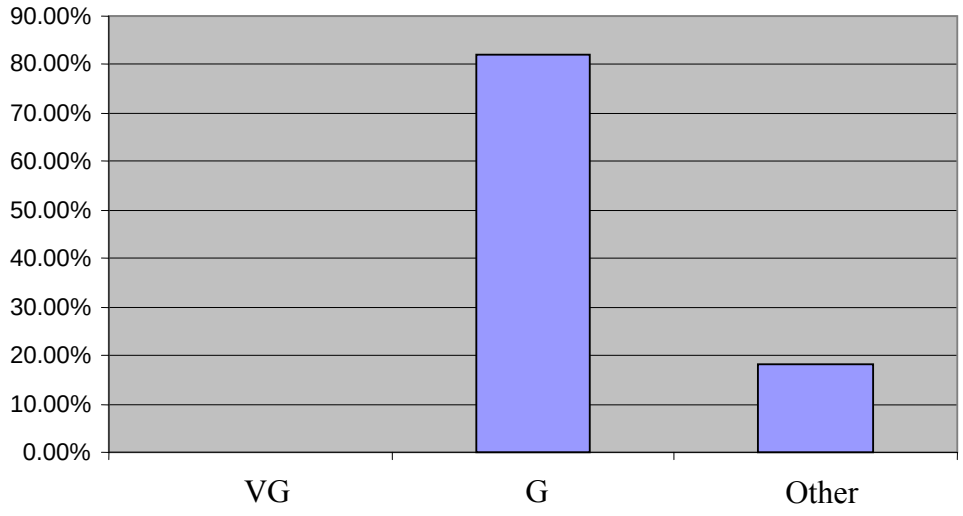

Figure 9. English VG/CVG syllable phoneme isolation performed by Korean EFL children.

According to the responses of syllable type, 80.16% of the total CVG syllables (N = 387) to which the participants responded was isolated as G and 19.84% of those syllables was responded as other category such as responses not answered or incorrectly pronounced. However, any CVG syllable was not responded as VG.

In a similar vein, 79.52% of total VG syllables (N = 215) was segmented as G and 20.48% of those syllables was isolated as other category. On the other hand, any VG syllable was not isolated as VG. These findings suggest that Korean EFL children were

more sensitive to body structure than rime because, on the basis of the vowel placement, the following semivowel after vowel was considered to be separate part.

In one sense, for Korean EFL children, body was most salient sub-syllabic structure in English phonological awareness across the three experimental measures.

Research Question 1.4

What is the sub-syllabic performance preference of the Korean ESL children in English?

Oddity task. As implemented in Korean oddity task, there were four oddity tasks in English, namely, body (**CVG**-C), rime(C-**VGC**), nucleus (C-**VG**-C), and margins (**C**-VG-**C**). Table 12 shows the mean and standard deviation of correct responses on each oddity task in English. Observation of the Table 12 reveals that the Korean ESL children were most sensitive to the perception of differences within spoken non-real words (M = 7.82) when the target sounds occurred within the position of rime (VGC). That is, they again showed rime preference over body preference in English, as shown in Korean oddity task.

Table 12

Korean ESL Participants' Scores on Four Oddity Tasks in English (N = 43)

Oddity Type	*Mean*	*SD*
Body	5.73	1.39
Rime	7.82	.84
Nucleus	4.95	1.31
Margins	3.40	1.17

Note: Total possible score on each task = 10.

In addition, a repeated measure ANOVA showed within-subjects effects of oddity type, F (3, 126) = 117.26, p< .001. Next, Bonferroni's adjustment for multiple comparisons show the main effects of each oddity type as outlined in Figure 10.

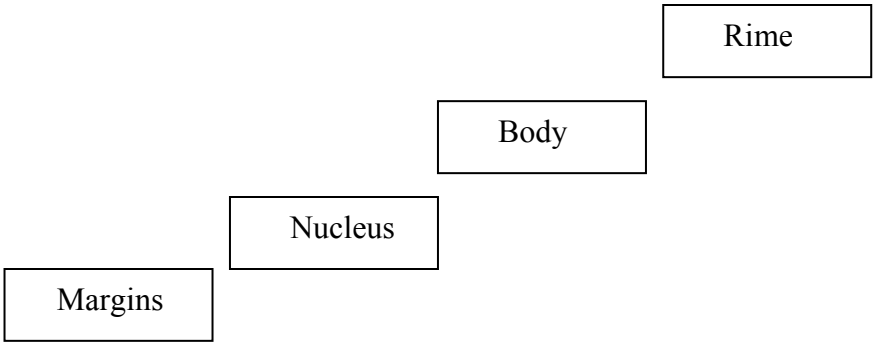

Figure 10. Korean ESL's Bonferroni groupings for the four oddity types in English.
Note: Boxes enclose means that are not significantly different at the .05 level.

As shown in Figure 10, there were significant mean differences among body, rime, nucleus, and margins. These results imply that again, Korean ESL children were most accurate in their detection of differences within English spoken non-real words when they occurred within the position of rime as opposed to body.

Similarity judgment task. As implemented in Korean similarity judgment tasks, there were six matched-units in similarity judgment task, namely, body, rime, margins, onset, coda, and nucleus unit in English. Table 13 presents the mean scores of correct responses on the six sub-syllabic matched-units.

Table 13

Korean ESL Participants' Scores on Six Matched-Units in English (N = 43)

Sub-syllabic Matched Units	Examples	*Mean*	*SD*
Rime	[t^{h}**aɪn**]-[k^{h}**aɪn**]	3.20	.74
Body	[**t^{h}aɪ**n]-[**t^{h}aɪ**k]	2.27	.78
Onset	[**t^{h}**aɪn]-[**t^{h}**oʊm]	2.14	.67
Nucleus	[t^{h}**aɪ**n]-[s**aɪ**k]	1.97	.95
Margins	[**t^{h}**aɪ**n**]-[**t^{h}**eɪ**n**]	1.16	1.08
Coda	[t^{h}aɪ**n**]-[k^{h}oʊ**n**]	.93	.88

Note: Total possible score on each matched-unit = 4.

As earlier observed in the Korean similarity task, the English rime pairs were judged with significantly more accuracy than the body pairs. Furthermore, a repeated-measures ANOVA was run to measure the mean differences of the six similarity units within subjects. The ANOVA revealed the within-subjects effects of similarity type, F (5, 210) = 38.28, p< .001. Moreover, Bonferroni's adjustment for multiple comparisons was employed to measure the mean differences of the six types of pairs, as displayed in Figure 11.

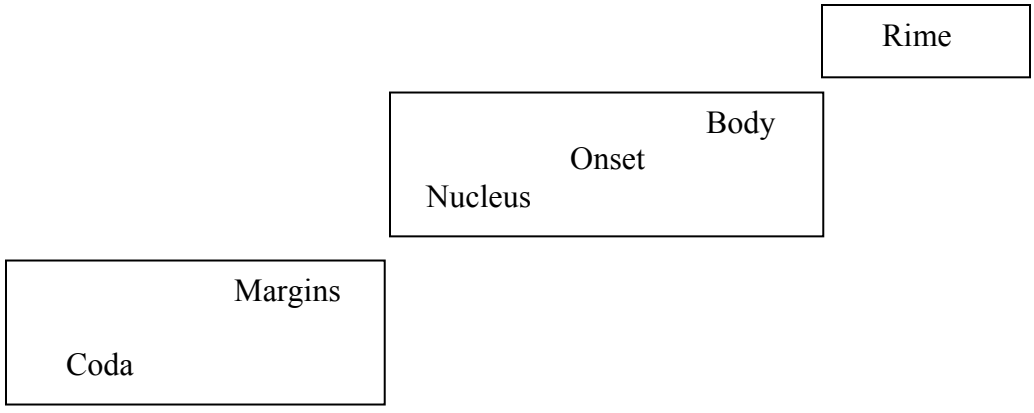

Figure 11. Korean ESL's Bonferroni groupings for the six matched-units in English

Notes: Boxes enclose means that are not significantly different at the .05 level.

As shown above in Figure 11, the Korean ESL children judged significantly rime pairs as the most similar. These results of multiple comparisons suggest that Korean ESL children regard the rime structure as the most accessible sub-syllabic unit in the English similarity judgment task, which is consistent with the results of the English oddity task.

Phoneme isolation task. There were fourteen syllables used in English phoneme isolation task including nine CVG syllable types (e.g., [k^haɪ]) and five VG syllable types (e.g., [aɪ]). The mean and percentage of three isolated types of English VG/CVG syllable is shown in Table 14.

Table 14

Korean ESL Participants' Tendency of English Phoneme Isolation in VG/CVG Syllable Type (N =43)

Isolated Type	*Mean*	Percentage
VG	8.80	62.86
G	3.53	25.18
Other	1.67	11.96

Notes: 1. Total syllables = 14.

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

In this phoneme isolation task, most of the Korean ESL children tended to segment VG in VG and CVG syllable types. For instance, [aɪ] was segmented from the target syllable [aɪ] and [k^haɪ]. Based on the results of Table 14, Korean ESL children regarded VG as a cohesive unit in VG/CVG syllable. Meanwhile, as Korean EFL children did, they also had a similar tendency of isolating the final sound (G) in the same

syllable. For example, [ɪ] was segmented from the target syllable [aɪ] and [k^haɪ]. Overall, they seemed to have the dominant preference of rime structure even though body preference somewhat occurred in English. The percentage of each isolated type in the total syllables (*N* = 602) to which the participants responded is bar-graphed in Figure 12.

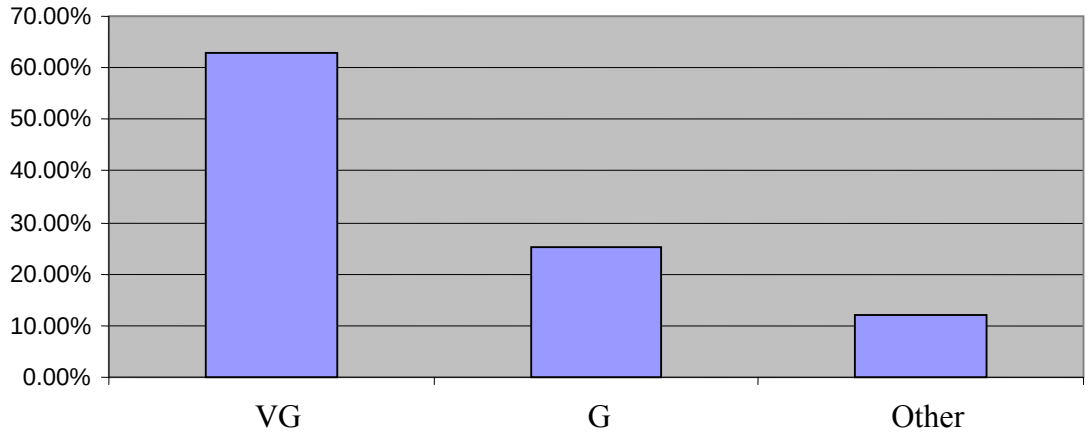

Figure 12. English VG/CVG syllable phoneme isolation performed by Korean ESL children.

Based on the responses of syllable type, 65% of total CVG syllables (*N* = 387) was segmented as VG and 24.17% of those syllables was isolated as G. Likewise, 59% of total VG syllables (*N* = 215) was responded as VG and 27% of those syllables was responded as G.

On the whole, these tendencies propose that Korean ESL children were more sensitive to rime structure than body structure because, on the basis of the vowel position, the following semivowel cannot be segregated, although they somehow preferred body structure.

In conclusion, Korean ESL children were most sensitive to rime structure in English phonological awareness across the three experimental measurements.

Research Question 1.5

What is the sub-syllabic performance preference of the English monolingual children in English?

Oddity task. As implemented in the English task for Korean EFL and Korean ESL children, there were four oddity tasks in English, namely, body (**CVG**-C), rime(C-**VGC**), nucleus (C-**VG**-C), and margins (**C**-VG-**C**). Observation of the Table 15 indicates that the English monolingual children were most accurate to detect spoken non-words (*M* = 7.50) when the test non-words shared rime (VGC). These results indicate that the English monolingual children had a great preference for rime over body. This is consistent with the performance of the Korean ESL children.

Table 15

English Monolingual Participants' Scores on Four Oddity Tasks (N = 10)

Oddity Type	*Mean*	*SD*
Body	5.40	1.07
Rime	7.50	1.17
Nucleus	4.80	1.47
Margins	2.70	.95

Note: Total possible score on each task = 10.

In addition, a repeated measure ANOVA showed within-subjects effects of oddity type, F (3, 27) = 31.43, $p < .001$. Next, Bonferroni's adjustment for multiple comparisons shows the main effects of each oddity type, as outlined in Figure 13.

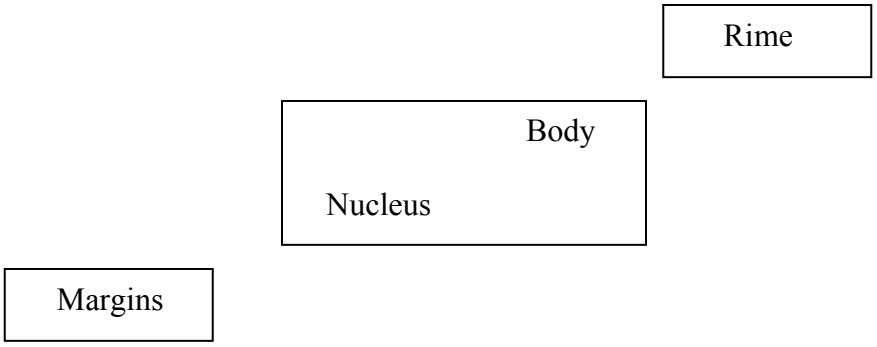

Figure 13. English Monolingual's Bonferroni groupings for the four oddity types.
Note: Boxes enclose means that are not significantly different at the .05 level.

As shown in Figure 13, the English monolingual children had a greater significant accuracy rate in their detection of differences within English spoken non-real rime oddity than within the other oddity types. Meanwhile, there was no significant mean difference between body and nucleus whereas there were significant mean differences between margins and the other oddity types. These results propose that for English monolingual children, rime was the most accessible sub-syllabic structure.

Similarity judgment task. As implemented in the English similarity judgment tasks for Korean EFL and Korean ESL children, there were six matched-units in similarity judgment task, namely, body, rime, margins, onset, coda, and nucleus unit in English. Table 16 presents the mean scores of correct responses on the six sub-syllabic matched-units.

Table 16

English Monolingual Participants' Scores on Six Matched-Units (N = 10)

Sub-syllabic Matched Units	Examples	*Mean*	*SD*
Rime	[t^{h}**aɪn**]-[k^{h}**aɪn**]	2.90	.67
Body	[**t^{h}aɪ**n]-[**t^{h}aɪ**k]	1.80	.69
Nucleus	[t^{h}**aɪ**n]-[s**aɪ**k]	1.50	.52
Onset	[**t^{h}**aɪn]-[**t^{h}**oʊm]	1.40	1.05
Margins	[**t^{h}**aɪ**n**]-[**t^{h}**eɪ**n**]	1.00	.48
Coda	[t^{h}aɪ**n**]-[k^{h}oʊ**n**]	.90	.81

Note: Total possible score on each matched-unit = 4.

As earlier observed in the English oddity task, the rime pairs containing identical segments within the position of rime were judged significantly more similar than those with identical segments within the position of body. Furthermore, a repeated-measures ANOVA was run to measure the mean differences of the six similarity units within subjects. The ANOVA unveiled the within-subjects effects of similarity type, F (5, 45) = 14.01, p< .001. Bonferroni's multiples comparisons were employed to measure the mean differences of the six types of pairs, as displayed in Figure 14.

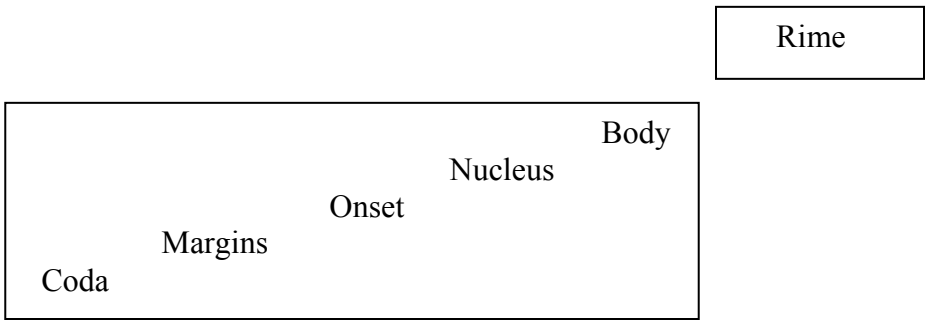

Figure 14. English Monolingual's Bonferroni groupings for the six matched-units.
Note: Boxes enclose means that are not significantly different at the .05 level.

As shown above in Figure 14, similarity within the rime pairs were judged with significantly greater accuracy than the other pairs, while the body pairs were judged no more similar than the nucleus pairs, onset pairs, margins pairs and coda pairs. The multiple comparisons among six matched units suggest that the English monolingual children considered the rime matched unit as the most salient sub-syllabic structure in the English similarity judgment task, which is aligned with the results of English oddity task.

Phoneme isolation task. Identical to the tasks performed by Korean EFL and Korean ESL children, there were fourteen syllables used in English phoneme isolation task with English native speakers, including nine CVG syllable types (e.g., [k^haɪ]) and five VG syllable types (e.g., [aɪ]). The mean and percentage of three isolated types of English VG/CVG syllable is shown in Table 17.

Table 17

English Monolingual Participants' Tendency of English Phoneme Isolation in VG/CVG Syllable Type (N =10)

Isolated Type	*Mean*	Percentage
VG	11.30	80.71
G	1.30	9.29
Other	1.40	10.00

Notes: 1. Total syllables = 14.

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

In this phoneme isolation task, most of the English monolingual children tended to segment VG from VG and CVG syllable types For instance, [aɪ] was segmented from the target syllable [aɪ] and [k^haɪ]. According to the results of Table 17, English

monolingual children regarded VG as a cohesive unit in VG/CVG syllable as Korean ESL children performed. On the whole, they seemed to have the dominant preference of rime structure in English. The percentage of each isolated type in total syllables (N = 140) to which the participants responded is bar-graphed in Figure 15.

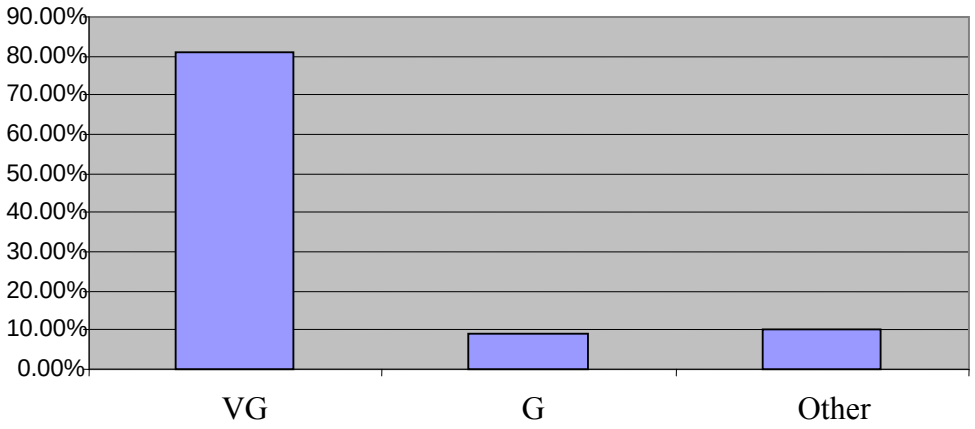

Figure 15. English VG/CVG syllable phoneme isolation performed by English monolingual children.

Based on the responses of syllable type, 78.89% of total CVG syllables (N = 90) was segmented as VG and 13.33% of those syllables was isolated as G. Likewise, 58% of total VG syllables (N = 50) was responded as VG and 28% of those syllables was responded as G. On the whole, these tendencies propose that English monolingual children were more sensitive to rime structure than body structure because the following semivowel cannot be separated from the vowel.

In conclusion, English monolingual children had a distinctive preference for rime structure across the three experimental measurements.

Results for Research Question 2

Research Question 2 is: Do students transfer the sub-syllabic structure of one language (Korean or English) to their sub-syllabic awareness in the other language?

In order to explore cross-language transfer of sub-syllabic preferences across the two languages, this Research Question 2 was broken down into the two questions as follows:

2.1 Is the sub-syllabic preference of the Korean EFL children in Korean similar to their sub-syllabic preference in English?

2.2 Is the sub-syllabic preference of the Korean ESL children in Korean similar to their sub-syllabic preference in English?

In order to answer the two sub-questions above, this section provides the results of oddity, similarity judgment, and phoneme isolation task across the two languages.

Research Question 2.1

Is the sub-syllabic preference of the Korean EFL children in Korean similar to their sub-syllabic preference in English?

Oddity task. Table 18 shows the mean and standard deviation of correct responses on each oddity task in Korean and English. Inspection of the Table 18 suggests that the Korean EFL children showed body preference over rime preference in both Korean and English.

Table 18

Korean EFL Participants' Scores on Four Oddity Tasks in Korean and English (N = 43)

Oddity Type		*Mean*	*SD*
Korean	Body	7.42	1.05
	Rime	5.20	1.72
	Nucleus	4.74	2.09
	Margins	3.44	1.03
English	Body	7.25	1.13
	Rime	4.88	1.49
	Nucleus	4.30	2.21
	Margins	3.30	1.63

Note: Total possible score on each task = 10.

In order to investigate cross-language transfer of intra-syllabic preferences in 4 oddity types across the two languages, separate paired-samples T-tests were employed. Within each oddity type, language tasks were compared such as comparison between Korean body and English body. For 4-pair oddity types, there were no mean differences of each pair oddity across the two languages at the .05 level (body pair: t =.332, p = .741; rime pair: t = .825, p =.414; nucleus pair: t =1.185 p =.243; margins: t =.443 p = .660).

These results indicate that Korean EFL children performed similarly in Korean and English. One possible explanation which warrants future study is that they transferred their sub-syllabic preference for body structure in their dominant language to the other language.

Similarity judgment task. The mean similarity scores for the six sub-syllabic matched-units in Korean and English are shown in Table 19. Examination of this table indicates that Korean EFL children's preferred sub-syllabic structure is the body unit

across the two languages, as previously discussed in the results of the Korean and English oddity tasks.

Table 19

Korean EFL Participants' Scores on Six Matched-Units in Korean and English (N = 43)

Sub-syllabic Matched Units	*Mean*	*SD*
Korean Body	2.83	.89
English Body	2.93	.81
Korean Nucleus	2.02	.41
English Nucleus	1.81	.76
Korean Onset	1.53	.85
English Onset	1.76	.86
Korean Rime	1.39	.90
English Rime	1.46	.97
Korean Margins	.88	.85
English Margins	.79	.74
Korean Coda	.74	.95
English Coda	1.18	.81

Note: Total possible score on each matched-unit = 4.

In order to explore transfer of intra-syllabic preferences in 6 matched similarity types across the two languages, in the same way, separate paired-samples T-tests were carried out. Within each matched-unit, language tasks were compared such as comparison between Korean body and English body. There were no mean differences of 6-pair units across the two languages at the .05 level (body pair: $t = -.636$, $p = .528$; rime pair: $t = -.374$, $p = .711$; nucleus pair: $t = 1.648$ $p = .107$; margins: $t = .521$ $p = .605$; onset pair: $t = -1.184$, $p = .151$; coda pair: $t = -1.910$, $p = .063$).

These results propose that overall, the Korean EFL children performed similarly regardless of each language task and they regarded the body matched-unit as the most

salient sub-syllabic structure in both Korean and English similarity judgment tasks. These findings also suggest that the possible transfer of the Korean EFL children's sub-syllabic preferences for body structure in their dominant language to other language.

Phoneme isolation task. The mean and percentage of three isolated types of Korean GV and GVC syllable and English VG and CVG syllable is shown in Table 20. There were twenty two syllables in Korean GV (e.g., [je]) /GVC syllable (e.g., [jek]) whereas there were fourteen syllables used in English VG (e.g., [aɪ]) /CVG syllable (e.g., [k^haɪ]).

Table 20

Korean EFL Participants' Tendency of Korean (GV/GVC) and English (VG/CVG) Phoneme Isolation (N =43)

Isolated Type	*Mean*	Percentage
Korean GV	3.56	16.17
G	.11	.53
Other	18.32	83.30
English VG	0	0
G	11.48	81.97
Other	2.52	18.03

Notes: 1. Total Korean syllables = 22.

2. Total English syllables = 14.

3. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

Overall, most of the Korean EFL children had difficulties segmenting the first sound (G) in Korean GV and GVC syllable and they also tended to isolate GV in the same syllable in Korean. For the English phoneme isolation task, they had a tendency to

segment the final sound (G) in English VG and CVG syllable and they did not isolate the final sound (VG) in the same syllable in English at all.

The percentage of each isolated type in Korean and English phoneme isolation task to which the participants responded is bar-graphed in Figure 16.

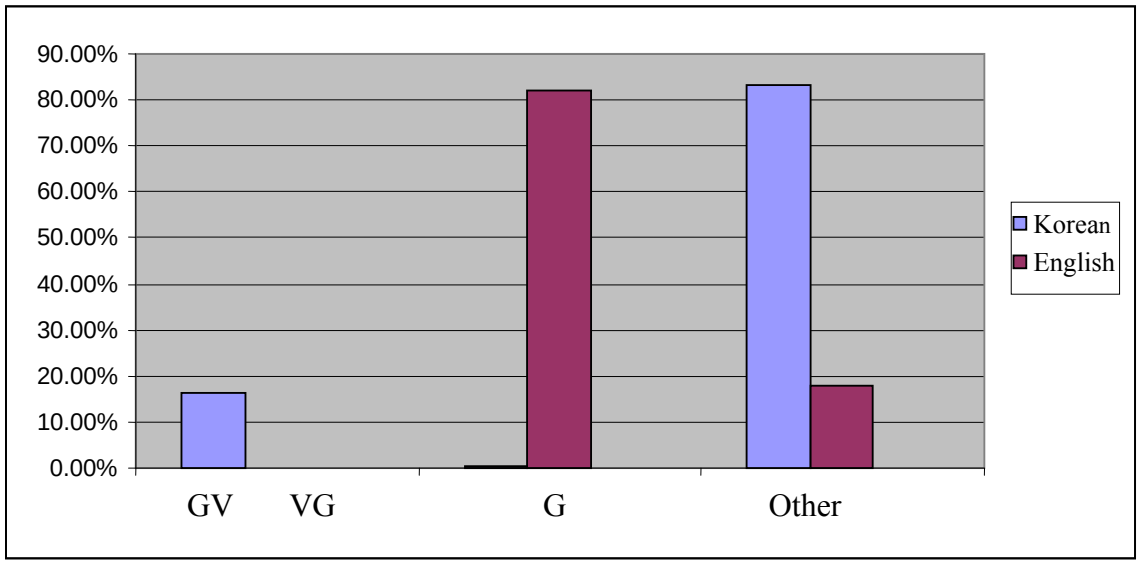

Figure 16. Korean and English phoneme isolation performed by Korean EFL children.

Based on the results of Table 20 and Figure 16, Korean EFL children considered GV as a cohesive unit in the Korean syllables and regarded VG as a separate unit in the English syllables. In addition, they had no tendency to isolate VG in the English syllables at all. These results suggest that Korean EFL children were more sensitive to body structure than rime structure across the two languages.

Finally, based on the results of the three measures, Korean EFL children showed the sub-syllabic preference for body across the two languages. As discussed earlier in this Chapter 4, Korean EFL children preformed better on the Korean PPVT (*M* =16.79) than on the English PPVT (*M* = 14.23). Accordingly, Korean EFL children's

high Korean proficiency may account for the possible of transfer of their dominant language' sub-syllabic awareness to the other language's one.

Research Question 2.2

Is the sub-syllabic preference of the Korean ESL children in Korean similar to their sub-syllabic preference in English?

Oddity task. The mean and standard deviation of correct responses on each oddity task in Korean and English are shown in Table 21. Observation of the Table 21 indicated that the Korean ESL children showed rime preference over body preference in both Korean and English.

Table 21

Korean ESL Participants' Scores on Four Oddity Tasks in Korean and English (N = 43)

Oddity Type		*Mean*	*SD*
Korean	Body	6.35	1.06
	Rime	7.58	1.05
	Nucleus	4.91	1.50
	Margins	3.19	.96
English	Body	5.73	1.39
	Rime	7.82	.84
	Nucleus	4.95	1.31
	Margins	3.40	1.17

Note: Total possible score on each task = 10.

Using a set of paired-samples T-test in order to investigate transfer of sub-syllabic preferences in 4 oddity types across the two languages, within each oddity type, Korean and English tasks were compared, for instance, Korean body and English body.

For 4-pair oddity types, there were no mean differences of rime-, nucleus-, and margins-pair oddities across the two languages at the .05 level (body pair: t = 1.844, p = .072; rime pair: t = -1.182, p =.244; nucleus pair: t = -.151 p =.881; margins pair: t = -.707, p = .484). In other words, for Korean ESL children, the sub-syllabic preference for rime was stronger than body in both Korean and English.

These results indicate that the Korean ESL children performed similarly on oddity task in Korean and English, suggesting the possible of transfer of their sub-syllabic preference for rime in their dominant language to the other language.

Similarity judgment task. The mean similarity scores for the six sub-syllabic matched-units in Korean and English are shown in Table 22. Inspection of the Table 22 indicates that the rime unit is the most salient sub-syllabic structure for Korean ESL children across the two languages.

Table 22

Korean ESL Participants' Scores on Six Matched-Units in Korean and English (N = 43)

Sub-syllabic Matched Units	*Mean*	*SD*
Korean Rime	2.88	.69
English Rime	3.20	.74
Korean Nucleus	2.06	.78
English Nucleus	1.97	.95
Korean Body	1.97	.81
English Body	2.27	.78
Korean Onset	1.86	.74
English Onset	2.14	.67
Korean Margins	1.01	.73
English Margins	1.16	1.08
Korean Coda	1.02	.81
English Coda	.93	.88

Note: Total possible score on each matched-unit = 4.

Separate paired-samples T-tests were run to investigate whether one language's sub-syllabic preference would impact the other language's one. Within each matched-unit, the two language tasks were compared, for example, Korean rime and English rime. For 6-pair units, there were no mean differences of 5-pair units other than onset pair across the two languages at the .05 level (body pair: t = -2.009, p = .051; rime pair: t = -1.968, p =.056; nucleus pair: t = .227 p =.822; margins: t = -.643 p = .710; coda: t = .374, p = .710). However, onset pair (t = -2.389, p =.021) was stronger in English than in Korean.

These results suggest that overall, except for onset pair, the Korean ESL children performed similarly regardless of language of the task and they considered the rime matched-unit to be the most accessible sub-syllabic structure across the Korean and English similarity judgment tasks, even though their performance for onset pair judgment

differed across the two languages. These findings also indicate the possible of transfer of their sub-syllabic preference for rime in their dominant language to the other language.

Phoneme isolation task. The mean and percentage of three isolated types of Korean GV and GVC syllable and English VG and CVG syllable is shown in Table 23. There were twenty two syllables in Korean GV (e.g., [je]) /GVC syllable (e.g., [jek]) whereas there were fourteen syllables used in English VG (e.g., [aɪ]) /CVG syllable (e.g., [k^haɪ]).

Table 23

Korean ESL Participants' Tendency of Korean (GV/GVC) and English (VG/CVG) Phoneme Isolation (N =43)

Isolated Type	*Mean*	Percentage
Korean GV	17.17	78.07
G	1	4.55
Other	3.8	17.39
English VG	8.8	62.86
G	3.53	25.18
Other	1.67	11.96

Notes: 1. Total Korean syllables = 22.

2. Total English syllables = 14.

3. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

Overall, most of the Korean ESL children tend to segment the GV in Korean GV and GVC syllable and they had a tendency to isolate VG in English VG and CVG syllable. The accurate percentage of each isolated type in Korean and English phoneme isolation task to which the participants responded is bar-graphed in Figure 17.

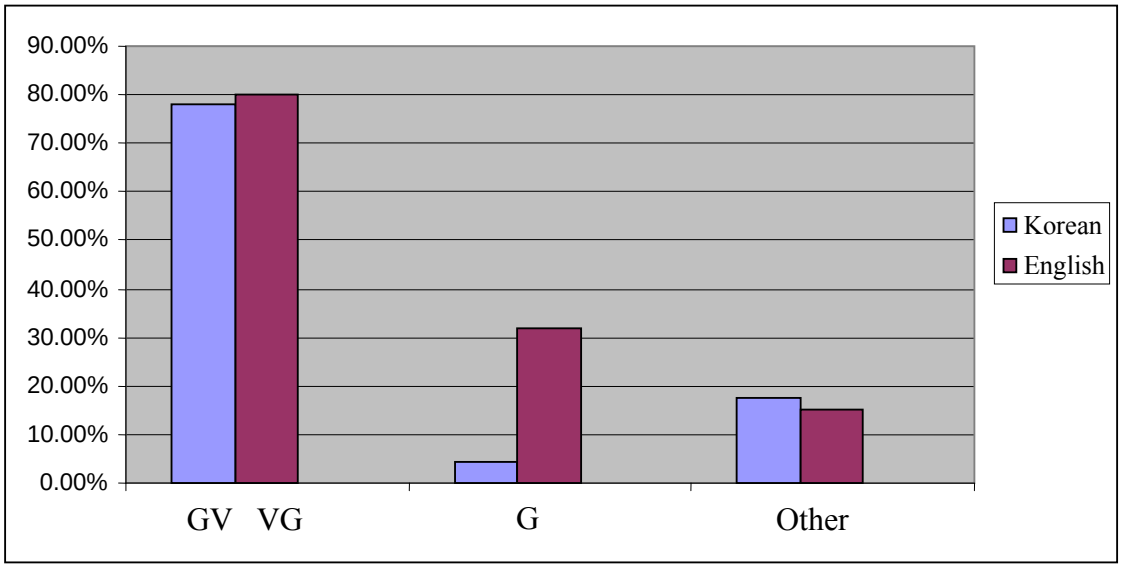

Figure 17. Korean and English phoneme isolation performed by Korean ESL children.

On the basis of the results of Table 23 and Figure 17, the Korean ESL children regarded GV as a cohesive unit in the Korean syllables and also considered VG as one unit in the English syllables. These results suggest that the Korean ESL children were more sensitive to body structure than rime structure in the Korean phoneme isolation task. In contrast, they were more aware of rime structure than body structure in English phoneme isolation task.

In short, for Korean ESL children, the sub-syllabic awareness of rime was dominantly preferred for the Korean/English oddity and Korean/English similarity judgment task. However, for the phoneme isolation task, depending on the language of each task, body was preferred in Korean whereas rime was preferred in English. Recalling that the Korean ESL Group performed better on the English PPVT (M = 16.72) than on the Korean PPVT (M = 13.46), to some degree, Korean ESL children's high English proficiency may account for the possible of transfer of their dominant language' sub-syllabic awareness to their other language. However, their discrepant performance on

the phoneme isolation task suggests that transfer of sub-syllabic preference from the dominant language to the other language for this particular group of children may not be guaranteed.

Results for Research Question 3

Research Question 3 is as follows: Given differences in Korean/English oral language proficiency between the Korean EFL and Korean ESL groups and within each group, what is the relationship between Korean/English oral language proficiency and Korean/English sub-syllabic performance preferences of Korean EFL (Korean-dominant) and Korean ESL (English-dominant) children respectively?

In order to investigate the possible effect of oral language proficiency in Korean (L1) and English (L2) on the L1 and the L2 sub-syllabic awareness preferred by each group, this Research Question 3 was divided into the three questions as follows:

3.1 Is there a difference between the performance of the Korean EFL and Korean ESL children in Korean sub-syllabic awareness? If so, what is the relationship between oral language proficiency and the Korean sub-syllabic awareness preferred by each group?

3.2 Is there a difference between the performance of the Korean EFL and Korean ESL children in English sub-syllabic awareness? If so, what is the relationship between oral language proficiency and the English sub-syllabic awareness preferred by each group?

In order to answer the two sub-questions above, this section provides the results of oddity, similarity judgment, and phoneme isolation task between the two groups.

Research Question 3.1

Is there a difference between the performance of the Korean EFL and Korean ESL children in Korean sub-syllabic awareness? If so, what is the relationship between oral language proficiency and the Korean sub-syllabic awareness preferred by each group?

Oddity task. The mean and standard deviation of correct responses on each oddity task in Korean between the groups are shown in Table 24. Observation of the Table shows that the Korean EFL children were most sensitive to the perception of differences in spoken non-real words when the target sounds occurred within the position of body (CGV) while the Korean ESL children were most accurate in their detection of differences in spoken non-real words when the test non-real words items shared rime (GVC).

Table 24

Korean EFL/ESL Participants' Scores on Four Oddity Tasks in Korean (Each Group N = 43)

Oddity Type		*Mean*	*SD*
EFL	Body	7.42	1.05
	Rime	5.20	1.72
	Nucleus	4.74	2.09
	Margins	3.44	1.03
ESL	Body	6.35	1.06
	Rime	7.58	1.05
	Nucleus	4.91	1.50
	Margins	3.19	.96

Note: Total possible score on each task = 10.

In order to compare each oddity type's mean performance between the two groups, One-way ANOVA was employed. For body oddity type, there was a significant mean difference between the groups, F (1, 84) = 12.25, p< .001 and for rime oddity type, there was also a significant mean difference between the two groups, F (1, 84) = 59.23, p< .001. That is, the Korean EFL Group performed better on the body oddity than did the Korean ESL Group whereas the Korean ESL Group outperformed the Korean EFL Group on the rime oddity. However, for nucleus and margins oddity types, there were no significant mean differences between the two groups (for nucleus; p = .811; margins; p = .236). In other words, the two groups performed similarly on the nucleus and margins oddity.

As earlier discussed in this Chapter 4, Korean language proficiency of EFL (M = 16.79) was higher than that of ESL (M = 13.46) whereas English language proficiency of EFL (M = 14.23) was lower than that of ESL (M = 16.72). An One-way ANOVA revealed that there was a mean difference between the Korean EFL and Korean ESL Groups, F (1, 84) = 29.12, p< .001. In the same way, for the English language proficiency, the other One-way ANOVA also showed that there was a mean difference between the two groups, F (1, 84) = 16.93, p< .001. These results indicate that the Korean EFL Group has higher Korean proficiency than the Korean ESL Group whereas the Korean ESL Group has higher English proficiency than the Korean EFL Group.

In order to more closely investigate the relationship of oral language proficiency to each oddity type, correlations among all of the Korean oddity tasks, Korean language proficiency, and English language proficiency performed by each group were obtained, as shown in Table 25.

Table 25

Correlations among Korean Oddity Type and Korean/English Language Proficiency performed by Korean EFL (N =43) and ESL Participants (N =43)

Variable	1	2	3	4	5	6
EFL						
1. KLP	_	.18	.59**	-.32*	.39**	.16
2. ELP		-	-.01	.07	.45**	.26
3. Body			-	-.34*	.21	.27
4. Rime				-	.09	.12
5. Nucleus					-	.13
6. Margins						-
ESL						
1. KLP	_	.13	-.01	-.21	.33*	.09
2. ELP		-	-.53**	.57**	-.16	.12
3. Body			-	-.41**	.17	.18
4. Rime				-	-.07	.10
5. Nucleus					-	-.14
6. Margins						-

Note: *p<.05; ** p<.01.

KLP: Korean Language Proficiency. ELP: English Language Proficiency

Based on the results of Table 25, for the Korean EFL children, body and nucleus oddity were closely correlated with their Korean language proficiency (r = .59, and .39, respectively; all p <.01). However, rime oddity was negatively correlated with their Korean language proficiency (r = -.32, p< .05). Meanwhile, nucleus oddity was closely correlated with their English language proficiency (r = .45, p< .01). These results suggest that Korean language proficiency was closely reliable to the Korean oddity types such as body, rime, and nucleus whereas English language proficiency was consistent only with Korean nucleus oddity. In other words, Korean EFL children's performance of Korean oddity task depends on the degree of Korean language proficiency; the higher Korean language proficiency, the higher Korean body and nucleus oddity, and the lower Korean rime oddity

For the Korean ESL children, nucleus oddity was closely correlated with their Korean language proficiency (r = .33, p< .05). Their English language proficiency was highly correlated with rime oddity (r = .57, p< .01) and negatively correlated with body oddity (r = -.53, p< .01). These results propose that their English language proficiency was closely reliable to the Korean oddity types such as body, rime, and nucleus whereas their Korean language proficiency was related only with Korean nucleus oddity. That is to say, Korean ESL children's English language proficiency can account for their Korean oddity performance; the higher English language proficiency, the higher Korean rime oddity and the lower Korean body oddity.

Furthermore, within each group, two sets of multiple linear regression analysis were planned to explore which sub-syllabic structure in Korean oddity (i.e., body, rime, nucleus, and margins) can contribute to predict Korean and English language proficiency respectively. The details of correlation coefficients with Korean language proficiency are shown in Table 26.

Table 26

Korean Oddity Types' Multiple Linear Regression Analyses Predicting Korean Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	.63	.19	.45**
	Rime	-.12	.12	-.19
	Nucleus	.23	.09	.32*
	Margins	.03	.19	.02
ESL	Body	-.62	.45	-.23
	Rime	-1.06	.57	-.30
	Nucleus	.92	.37	.37*
	Margins	.82	.59	.21

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, body oddity was a strong predictor of their Korean language proficiency (β = .45, p = .003) and nucleus also significantly contributed to predict their Korean language proficiency as well (β = .32, p = .015). Neither rime nor margins played a significant role in predicting their Korean language proficiency at all. These results suggest that a child sensitive to body and nucleus is more likely to be highly proficient in Korean.

For the Korean ESL children, only nucleus contributed a significant amount of unique variance to their Korean language proficiency (β = .37, p = .017). More importantly, body and rime were not significant predictors of their Korean language proficiency.

Next, another linear regression analysis was employed to investigate the contribution of each oddity type such as body, rime, nucleus, and margins to prediction of English language proficiency. The Table 27 illustrates the results of multiple linear regression analysis predicting English language proficiency.

Table 27

Korean Oddity Types' Multiple Linear Regression Analyses Predicting English Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	-.57	.45	-.21
	Rime	-.14	.28	-.08
	Nucleus	.71	.22	.46**
	Margins	.82	.45	.27
ESL	Body	-.66	.24	-.38*
	Rime	.94	.31	.41**
	Nucleus	-.08	.19	-.05
	Margins	.34	.32	.13

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, nucleus oddity was a strong predictor of their English language proficiency (β = .46, p = .003). In the meantime, for the Korean ESL children, rime oddity was a positively significant contributor to their English language proficiency (β = .41, p = .004), while body oddity was a negatively significant predictor of English language proficiency (β = -.38, p = .010). These results propose that the relationship of the Korean ESL children's English language proficiency to body and rime

was negatively intertwined; a child who is sensitive to rime and less sensitive to body is more likely to have high English proficiency.

In summary, the Korean EFL Group with high Korean proficiency was more sensitive to body than rime. In contrast, the Korean ESL Group with high English proficiency was more sensitive to rime than body. In other words, taking into consideration the results of correlation and regression analyses, although the Korean EFL Group's high Korean language proficiency and the Korean ESL Group's high English proficiency cannot account for the direct cause of the Korean sub-syllabic awareness preferred by each group, one may implicitly infer that their dominant language proficiency can be a potential factor of each group's sub-syllabic preference in the Korean oddity task.

Similarity judgment task. The mean of correct responses on the six matched-units in Korean between the two groups are shown in Table 28. Inspection of the Table 28 shows that the Korean EFL children were most accurate in their judgment of spoken non-real words when the test pairs of non-real words contained identical sounds within the position of body (CGV) while the Korean ESL children were most accurate in their judgment of spoken non-real words when the test pairs shared identical segments within the word position of rime (GVC).

Table 28

Korean EFL/ESL Participants' Scores on Six Matched-Units in Korean (Each Group N = 43)

Sub-syllabic Matched Units	*Mean*	*SD*
EFL Body	2.83	.81
ESL Body	1.97	.81
EFL Nucleus	2.02	.76
ESL Nucleus	2.06	.78
EFL Onset	1.53	.86
ESL Onset	1.86	.74
EFL Rime	1.39	.97
ESL Rime	2.88	.69
EFL Margins	.88	.74
ESL Margins	1.01	.73
EFL Coda	.74	.81
ESL Coda	1.02	.81

Note: Total possible score on each matched-unit = 4.

In order to compare six matched units' mean performance between the two groups, One-way ANOVA was carried out. For body unit, there was a significant mean difference between the groups, F (1, 84) = 21.42, $p < .001$ and for rime unit, there also was a significant mean difference between the two groups, F (1, 84) = 73.14, $p < .001$. That is, the Korean EFL Group performed better on the body matched-unit than did the Korean ESL Group whereas the Korean ESL Group outperformed the Korean EFL Group on the rime matched-unit. However, for the nucleus, onset, coda and margins matched-unit, there were no significant mean differences between the two groups (for nucleus: $p = .878$; for onset: $p = .063$; for coda: $p = .185$; for margins: $p = .419$). In other words, the two groups performed similarly on the nucleus, onset, coda and margins matched-unit.

In addition, correlations among all of the Korean similarity judgment tasks, Korean language proficiency, and English language proficiency performed by each group are obtained to examine the relationship of oral language proficiency to six matched-units, as shown in Table 29

Table 29

Correlations among Korean Similarity Types and Korean/English Language Proficiency performed by Korean EFL (N =43) and ESL Participants (N =43)

Variable	1	2	3	4	5	6	7	8
EFL								
1. KLP	-	.18	.55**	-.41**	.51**	.14	.23	-.01
2. ELP		-	-.16	.08	.43**	.05	.15	-.06
3. Body			-	-.30*	.49**	.21	.24	.27
4. Rime				-	-.37*	.00	-.22	-.21
5.Nucleus					-	-.04	.12	.09
6.Margins						-	.25	-.07
7. Onset							-	-.09
8. Coda								-
ESL								
1. KLP	-	.13	.09	.03	.52**	-.08	.10	-.08
2. ELP		-	-.52**	.69**	.04	.04	.11	-.07
3. Body			-	-.42**	.11	.00	-.08	.14
4. Rime				-	.09	.24	.01	.00
5.Nucleus					-	.12	.09	.19
6.Margins						-	-.12	.00
7. Onset							-	.28
8. Coda								-

Note: * p<.05; ** p<.01.

KLP: Korean Language Proficiency. ELP: English Language Proficiency

Based on the results of Table 29, for the Korean EFL children, body and nucleus unit were closely correlated with their Korean language proficiency (r = .55, and .51, respectively; all p <.01). However, rime unit was negatively correlated with their Korean language proficiency (r = -.41, p< .01). Meanwhile, nucleus unit was closely correlated with their English language proficiency (r = .43, p< .01). These results suggest that the Korean language proficiency was closely reliable to the Korean body, rime, and

nucleus unit whereas the English language proficiency was consistent only with the Korean nucleus unit. In other words, Korean EFL children's similarity judgment depends on the degree of Korean language proficiency; the higher Korean language proficiency, the higher Korean body and nucleus unit score, and the lower Korean rime unit score.

For the Korean ESL children, nucleus unit was closely correlated with their Korean language proficiency (r = .52, p< .01). In the meantime, their English language proficiency was highly correlated with rime unit (r = .69, p< .01) and negatively correlated with body unit (r = -.52, p< .01). These results propose that their English language proficiency was closely reliable to the Korean similarity units such as body and rime unit whereas their Korean language proficiency was related only with the Korean nucleus unit. That is, Korean ESL children's English language proficiency can account for their Korean similarity judgment; the higher English language proficiency, the higher Korean rime unit score and the lower Korean body unit score.

Furthermore, within each group, multiple linear regression analysis was planned to explore the significant contribution of six matched-units to prediction of Korean and English language proficiency respectively. At first, the following Table 30 illustrates the details of correlation coefficients with Korean language proficiency.

Table 30

Korean Similarity Types' Multiple Linear Regression Analyses Predicting Korean Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	.64	.26	.37*
	Rime	-.43	.23	-.24
	Nucleus	.80	.38	.30*
	Margins	.14	.25	.07
	Onset	.01	.26	.01
	Coda	-.18	.21	-.11
ESL	Body	.28	.69	.06
	Rime	-.13	.83	-.02
	Nucleus	2.67	.66	.56**
	Margins	-.66	.71	-.13
	Onset	.49	.72	.09
	Coda	-.99	.65	-.21

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, body unit significantly contributed to predict their Korean language proficiency (β = .37, p = .022) and nucleus also significantly contributed to predict their Korean language proficiency as well (β = .30, p = .041). Neither rime nor margins played a significant role in predicting their Korean language proficiency at all. These results suggest that a child who judged well English body and nucleus similarity is more likely to be highly proficient in Korean.

For the Korean ESL children, only nucleus unit was a strong predictor of their Korean language proficiency (β = .56, p = .002). More importantly, body and rime unit did not significantly contribute to their Korean language proficiency.

Next, another linear regression analysis was carried out to investigate the contribution of each matched-unit to prediction of English language proficiency. The results of linear regression analysis predicting English language proficiency are shown in Table 31.

Table 31

Korean Similarity Types' Multiple Linear Regression Analyses Predicting English Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	-.12	.60	-.03
	Rime	1.07	.55	.31
	Nucleus	2.84	.89	.54**
	Margins	-.31	.57	-.08
	Onset	.70	.58	.19
	Coda	-.09	.49	-.03
ESL	Body	-.75	.36	-.26*
	Rime	2.12	.44	.60**
	Nucleus	.09	.35	.03
	Margins	-.31	.37	-.09
	Onset	.27	.38	.08
	Coda	-.19	.35	-.06

Note: * p< .05; ** p<.01.

For the Korean EFL children, nucleus unit was a strong predictor of their English language proficiency (β = .54, p = .003). Meanwhile, for the Korean ESL children, rime unit was a significant positive contributor to their English language proficiency (β = .60, p = .002) whereas body unit was a significant negative predictor of their English language proficiency (β = -.26, p = .048). These results propose that the relationship of Korean ESL children's English language proficiency to body and rime was negatively entwined; a child who judged well English rime similarity and judged less well English body similarity is more likely to have high English proficiency.

In short, the Korean EFL Group with high Korean proficiency was more accurate in their judgment of body than rime. In contrast, the Korean ESL Group with high English proficiency was more accurate in their judgment of rime than body. Accordingly, as shown in the Korean oddity task, for the Korean EFL Group, their Korean language proficiency seemed to play a crucial role in judging well body structure in Korean similarity judgment task whereas, for the Korean ESL Group, their English language proficiency seemed to play a significant role in judging well rime structure in Korean similarity judgment task.

Phoneme isolation task. The mean and percentage on each isolated type in Korean between the two groups are shown in Table 32 and displayed in Figure 18. Inspection of the Table 32 and Figure 18 shows that most of the Korean EFL children failed to isolate G in Korean GV and GVC syllable types and most of the Korean ESL children isolated GV in Korean GV and GVC syllable types.

Table 32

Korean EFL/ESL Participants' Tendency of Korean (GV/GVC) Phoneme Isolation (Each Group N = 43)

Isolated Type	*Mean*	Percentage
EFL GV	3.56	16.17
G	.11	.53
Other	18.32	83.30
ESL GV	17.17	78.07
G	1	4.55
Other	3.8	17.39

Notes: 1. Total Korean syllables = 22

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

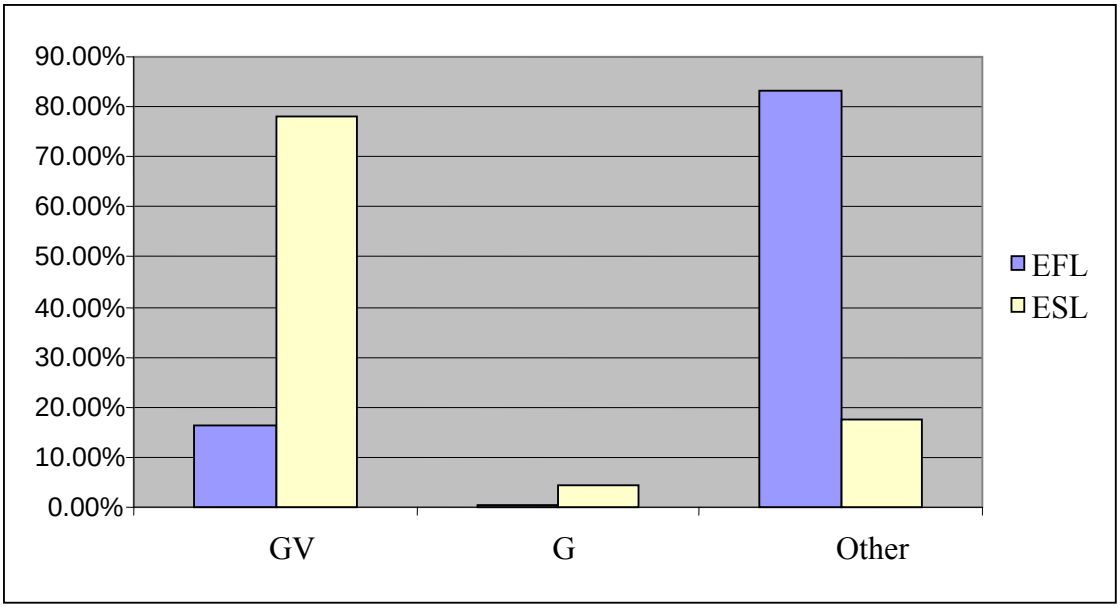

Figure 18. Korean phoneme isolation performed by Korean EFL and ESL children.

According to the results of Table 32 and Figure 18, the outcomes of each isolated type between the two groups were different, but both groups seemed to pay

attention to body. As discussed in the results of the Korean phoneme isolation task, the Korean EFL children seemed to come up with Korean alphabet corresponding to the spoken non-words when hearing them. Therefore, their orthographic processing forced them to isolate the initial sound (G) in Korean GV and GVC syllable. However, this driving force made them fail to correctly isolate the initial sound (G) in Korean GV and GVC syllable (e.g., ㅇ [iɯŋ]: Korean alphabet name or 으 [ɯ] isolated from 얍 [jap]). If they correctly isolated the initial sound (G) from Korean GV and GVC syllable, they should have responded as [j]. Finally, they could not segregate the initial sound (G) from Korean GV and GVC syllable since the G is closely attached to the V in Korean GV and GVC syllable. Meanwhile, some of the Korean EFL children isolated GV from Korean GV and GVC syllable since they regarded the GV as one unit

On the other hand, most of the Korean ESL children isolated GV from Korean GV/GVC syllable due to the tuition of low Korean literacy, which force them to perceive the GV as one sound rather than Korean alphabet corresponding to the GV. Therefore, they seemed to consider the GV as a cohesive unit.

No matter where the reasons came from, more importantly, both the Korean ESL and EFL children thought the GV as a cohesive unit even though the outcomes between the two groups were not the same at the surface level. Due to this, both groups were sensitive to body structure in Korean phoneme isolation task.

Overall, among the Korean sub-syllabic tasks, the Korean EFL children paid more attention to body rather than rime whereas the Korean ESL children paid more attention to rime rather than body. Of particular interest, both groups were sensitive to the body structure in the phoneme isolation task. In a word, Korean EFL children

consistently preferred the sub-syllabic structure of body in Korean phonological awareness. In contrast, the Korean ESL children showed the sub-syllabic preference for both body and rime in Korean phonological awareness.

Research Question 3.2

Is there a difference between the performance of the Korean EFL and Korean ESL children in English sub-syllabic awareness? If so, what is the relationship between oral language proficiency and the English sub-syllabic awareness preferred by each group?

Oddity task. The mean and standard deviation of correct responses on each oddity task in English between the groups are shown in Table 33. Observation of the Table shows that the Korean EFL children were most sensitive to body (CGV) while the Korean ESL children were most accurate to rime (GVC).

Table 33

Korean EFL/ESL Participants' Scores on Four Oddity Tasks in English (Each Group N = 43)

Oddity Type		*Mean*	*SD*
EFL	Body	7.25	1.13
	Rime	4.88	1.49
	Nucleus	4.30	2.21
	Margins	3.30	1.63
ESL	Body	5.73	1.39
	Rime	7.82	.84
	Nucleus	4.95	1.31
	Margins	3.40	1.17

Note: Total possible score on each task = 10.

To begin with, in order to compare each oddity type's mean performance between the two groups, as analyzed in the Korean oddity task, One-way ANOVA was employed. For body oddity type, there was a significant mean difference between the groups, F (1, 84) = 27.43, p< .001 and for rime oddity type, there was also a significant mean difference between the two groups, F (1, 84) = 127.43, p< .001. That is, the Korean EFL Group performed better on the body oddity than did the Korean ESL Group whereas the Korean ESL Group outperformed the Korean EFL Group on the rime oddity. However, for nucleus and margins oddity type, there were no significant mean differences between the two groups (for nucleus; p = .115; margins; p = .880). In other words, the two groups performed similarly on the nucleus and margins oddity.

Secondly, in order to more closely identify the relationship of oral language proficiency to each oddity type, correlations among all of the English oddity tasks, English language proficiency, and Korean language proficiency performed by each group were analyzed, as shown in Table 34.

Table 34

Correlations among English Oddity Type and English/Korean Language Proficiency performed by Korean EFL (N =43) and ESL Participants (N =43)

Variable	1	2	3	4	5	6
EFL						
1. ELP	_	.18	.01	.09	.34*	.09
2. KLP		-	.47**	-.34*	.35*	.19
3. Body			-	-.41**	.14	.12
4. Rime				-	-.15	.03
5. Nucleus					-	.08
6. Margins						-
ESL						
1. ELP	_	.13	-.43**	.56**	.45**	.19
2. KLP		-	-.09	.02	.49**	.05
3. Body			-	.26	.34**	.07
4. Rime				-	.23	.19
5. Nucleus					-	.01
6. Margins						-

Note: *p<.05; ** p<.01.

ELP: English Language Proficiency. KLP: Korean Language Proficiency.

Based on the results of Table 34, for the Korean EFL children, only nucleus oddity were closely correlated with their English language proficiency (r = .34, p <.05). Meanwhile, their Korean language proficiency was closely correlated with body (r = .47, p< .01 and nucleus oddity (r = .35, p< .05). However, rime oddity was negatively correlated with the Korean language proficiency (r = -.34, p< .05). These results suggest that the Korean language proficiency was closely reliable to the English oddity types such as body, rime, and nucleus whereas the English language proficiency was consistent only with English nucleus oddity.

In other words, the Korean EFL children's performance of English oddity task depends on the degree of Korean language proficiency; the higher Korean language proficiency, the higher English body and nucleus oddity, and the lower English rime oddity.

For the Korean ESL children, rime and nucleus oddity was closely correlated with their English language proficiency (r = .56, and .45, respectively; all p< .01). The English language proficiency was negatively correlated with body oddity (r = -.43. p< .01). Meanwhile, nucleus oddity was correlated with their Korean language proficiency (r = .49. p< .01). These results propose that their English language proficiency was closely reliable to the English oddity types such as body, rime, and nucleus whereas their Korean language proficiency was related only with the English nucleus oddity. That is to say, Korean ESL children's English language proficiency can account for their English oddity performance; the higher English language proficiency, the higher English rime and nucleus oddity, and the lower English body oddity.

Moreover, within each group, two sets of linear regression analysis were employed to investigate which sub-syllabic structure in English can contribute to predict English and Korean language proficiency respectively. The details of correlation coefficients with English language proficiency are shown in Table 35.

Table 35

English Oddity Types' Multiple Linear Regression Analyses Predicting English Language Proficiency

Variable		B	*SE* B	β
EFL	Body	.10	.46	.04
	Rime	.34	.34	.16
	Nucleus	.51	.22	.36*
	Margins	.12	.29	.06
ESL	Body	-.36	.21	-.22
	Rime	1.22	.27	.42**
	Nucleus	.50	.23	.28*
	Margins	.19	.25	.09

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, nucleus oddity was a strong predictor of their English language proficiency (β = .36, p = .024). More importantly, neither body nor rime played a significant role in predicting their English language proficiency at all.

For the Korean ESL children, rime and nucleus oddity significantly contributed to their English language proficiency (for rime: β = .42, p = .002; for nucleus: β = .28, p = .035). These results propose that a child sensitive to English rime and nucleus has a tendency to be highly proficient in English.

Next, another linear regression analysis was used to examine the contribution of each oddity type to prediction of Korean language proficiency. Table 36 illustrates the results of linear regression analysis predicting Korean language proficiency.

Table 36

English Oddity Types' Multiple Linear Regression Analyses Predicting Korean Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	.62	.19	.44**
	Rime	-.19	.15	-.18
	Nucleus	.20	.09	.28*
	Margins	.23	.13	.23
ESL	Body	.17	.39	.07
	Rime	-.34	.66	-.08
	Nucleus	1.47	.41	.53**
	Margins	-.11	.44	-.03

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, body and nucleus oddity were strong contributors to their Korean language proficiency (for body: β = .44, p = .003; for nucleus: β = .28, p = .033). These results propose that the Korean EFL children's performance of English oddity task depends on their Korean language proficiency; a child sensitive to English body and nucleus is more likely to have high Korean proficiency.

In the meantime, for the Korean ESL children, nucleus oddity was a positively significant contributor to their Korean language proficiency (β = .53, p = .001). Of particular interest, neither boy nor rime contributed to predict their Korean language proficiency.

In summary, the Korean EFL Group with high Korean proficiency was more sensitive to body than rime even in the English oddity task. On the other hand, the

Korean ESL Group with high English proficiency was more sensitive to rime than body in the English oddity task. In other words, taking into account the findings of correlation and regression analyses, although the Korean EFL Group's high Korean language proficiency and Korean ESL Group's high English proficiency cannot be an explicit foundation of the English sub-syllabic awareness preferred by each group, this finding proposes that their dominant language proficiency can be a possible factor of each group's sub-syllabic preference in the English oddity task.

Similarity judgment task. The mean and standard deviation of correct responses on six matched units in English between the groups are shown in Table 37. Inspection of the Table 31 shows that the Korean EFL Group was most sensitive to body (CGV) while the Korean ESL Group was most accurate to rime (GVC).

Table 37

Korean EFL/ESL Participants' Scores on Six Matched-Units in English (Each Group N = 43)

Sub-syllabic Matched Units	*Mean*	*SD*
EFL Body	2.93	.89
ESL Body	2.27	.78
EFL Nucleus	1.81	.41
ESL Nucleus	1.97	.95
EFL Onset	1.76	.85
ESL Onset	2.14	.67
EFL Rime	1.46	.90
ESL Rime	3.20	.74
EFL Margins	.79	.85
ESL Margins	1.16	1.08
EFL Coda	1.18	.95
ESL Coda	.93	.88

Note: Total possible score on each matched-unit = 4.

In order to compare six matched units' mean performance between the two groups, first of all, One-way ANOVA was carried out. For body unit, there was a significant mean difference between the two groups, F (1, 84) = 13.33, p< .001 and for rime unit, there was also a significant mean difference between the two groups, F (1, 84) = 93.73, p< .001. In addition, for onset unit, there was a significant mean difference between the two groups, F (1, 84) = 4.92, p< .05.

These results propose that the Korean EFL Group performed better on the body matched-unit than did the Korean ESL Group whereas the Korean ESL Group outperformed the Korean EFL Group on the rime matched-unit. Of particular interest, the Korean ESL Group performed better on the onset matched-unit than did the Korean EFL

Group. However, for nucleus, coda and margins matched-unit, there were no significant mean differences between the two groups (for nucleus: $p = .320$; for coda: $p = .258$; for margins: $p = .068$). In other words, the two groups performed similarly on the nucleus, coda and margins matched-unit.

Next, correlations among all of the English similarity judgment tasks, English language proficiency, and Korean language proficiency performed by the two groups were analyzed to investigate the relationship of oral language proficiency to six non-identical units, as shown in Table 38.

Table 38

Correlations among English Similarity Types and Korean/English Language Proficiency performed by Korean EFL (N =43) and ESL Participants (N =43)

Variable	1	2	3	4	5	6	7	8
EFL								
1. KLP	-	.18	.01	-.03	.56**	.02	.25	.00
2. ELP		-	.58**	-.53**	.44**	.16	.05	.28
3. Body			-	-.45**	.05	.17	.24	.25
4. Rime				-	.15	.28	-.03	-.23
5.Nucleus					-	.01	.36*	.15
6.Margins						-	.07	-.28
7. Onset							-	-.05
8. Coda								-
ESL								
1. KLP	-	.13	-.39*	.55**	.45**	.00	.26	-.01
2. ELP		-	-.08	.10	.42**	.07	.12	-.15
3. Body			-	-.34**	.20	.11	-.29	.01
4. Rime				-	.36*	.10	.32*	.06
5.Nucleus					-	.08	.37*	.14
6.Margins						-	-.45*	.33*
7. Onset							-	.38*
8. Coda								-

Note: * $p<.05$; ** $p<.01$.

ELP: English Language Proficiency. KLP: Korean Language Proficiency

Based on the results of Table 38, for the Korean EFL children, nucleus unit was closely correlated with their English language proficiency ($r = .56$, $p < .01$). Meanwhile, body and nucleus unit were closely correlated with their Korean language proficiency ($r = .58$, and .44, respectively; all $p < .01$). However, rime unit was negatively correlated with their Korean language proficiency ($r = -.53$, $p < .01$). These results suggest that their Korean language proficiency was closely reliable to the English body, rime, and nucleus unit whereas their English language proficiency was consistent only with the English nucleus unit. In other words, the Korean EFL children's performance of English similarity judgment depends on the degree of Korean language proficiency; the higher

Korean language proficiency, the higher English body and nucleus unit score, and the lower English rime unit score.

For the Korean ESL children, rime and nucleus unit were closely correlated with their English language proficiency (r = .55, and .45, respectively; all p< .01). However, body unit was negatively correlated with their English language proficiency (r = -.39, p< .01). Meanwhile, their Korean language proficiency was highly correlated with nucleus unit (r = .42, p< .01). These results propose that the English language proficiency was closely reliable to the English similarity units such as body, rime, and nucleus unit whereas the Korean language proficiency was related only with the English nucleus unit. That is to say, Korean ESL children's English language proficiency can account for their English similarity judgment; the higher English language proficiency, the higher English rime and nucleus unit score and the lower English body unit score.

Furthermore, within each group, multiple linear regression analysis was planned to explore which matched-unit in English can significantly contribute to predict English and Korean language proficiency respectively. At first, the following Table 39 illustrates the details of correlation coefficients with English language proficiency.

Table 39

English Similarity Types' Multiple Linear Regression Analysis Predicting English Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	.39	.56	.11
	Rime	.31	.48	.09
	Nucleus	1.95	.58	.47**
	Margins	-.16	.59	-.03
	Onset	.55	.43	.19
	Coda	-.19	.37	-.07
ESL	Body	-.62	.44	-.20
	Rime	1.29	.47	.39**
	Nucleus	.74	.36	.31*
	Margins	.10	.33	.04
	Onset	-.22	.64	-.06
	Coda	-.25	.41	-.09

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, nucleus unit significantly contributed to predict their English language proficiency (β = .47, p = .002). More notably, neither body nor rime played a significant role in predicting their English language proficiency at all.

For the Korean ESL children, rime and nucleus unit were strong predictors of their English language proficiency (for rime: β = .39, p = .010; for nucleus: β = .31, p = .045). These findings suggest that a child who judged well English rime and nucleus similarity is more likely to be highly proficient in English.

Next, another linear regression analysis was carried out to investigate the contribution of each matched-unit to prediction of English language proficiency. The results of linear regression analysis predicting Korean language proficiency are shown in Table 40.

Table 40

English Similarity Types' Multiple Linear Regression Analyses Predicting Korean Language Proficiency

	Variable	B	*SE* B	β
EFL	Body	.81	.23	.44**
	Rime	-.42	.20	-.26*
	Nucleus	.74	.24	.36**
	Margins	.01	.25	.00
	Onset	.04	.22	.02
	Coda	.09	.15	.07
ESL	Body	.03	.79	.01
	Rime	-.29	.86	-.06
	Nucleus	1.52	.64	.41*
	Margins	.31	.61	.09
	Onset	.32	1.15	.06
	Coda	.36	.73	.08

Note: * $p < .05$; ** $p < .01$.

For the Korean EFL children, body and nucleus unit were significant predictors of their Korean language proficiency (for body; $\beta = .44$, $p = .002$; for nucleus: $\beta = .36$, $p = .005$). However, rime unit was a significant negative predictor of their Korean language proficiency ($\beta = -.26$, $p = .049$). These findings suggest that a child who judged well

English body and nucleus similarity, and judged less well English rime similarity tends to have high Korean proficiency.

Meanwhile, for the Korean ESL children, nucleus unit was a significant contributor to their Korean language proficiency ($\beta = .41$, $p = .024$). More noticeably, neither body nor rime was a significant contributor to their Korean language proficiency.

In short, the Korean EFL Group with high Korean proficiency was more accurate in their judgment of body than rime. In contrast, the Korean ESL Group with high English proficiency was more accurate in their judgment of rime than body. Accordingly, as shown in the English oddity task, for the Korean EFL Group, the Korean language proficiency seemed to play a crucial role in judging well body structure in English similarity judgment task whereas, for the Korean ESL Group, the English language proficiency seemed to play a significant role in judging well rime structure in English similarity judgment task. Interestingly, even though the Korean ESL children performed better on the onset similarity judgment than did the Korean EFL children, the onset unit was not a powerful predictor of Korean ESL children's English language proficiency.

Phoneme isolation task. The mean and percentage on each isolated type in English between the groups are shown in Table 41 and displayed in Figure 19. Inspection of the Table 41 and Figure 19 shows that most of the Korean EFL children tended to isolate G in English VG and CVG syllable types and most of the Korean ESL children tended to segment VG in English VG and CVG syllable types.

Table 41

Korean EFL/ESL Participants' Tendency of English (VG/CVG) Phoneme Isolation (Each Group N = 43)

Isolated Type	*Mean*	Percentage
EFL VG	0	0
G	11.48	81.97
Other	2.53	18.03
ESL VG	8.80	62.86
G	3.53	25.18
Other	1.67	11.96

Notes: 1. Total English syllables = 14.

2. Other category represents items for which the target sound was incorrectly segmented or the correct segment was inaccurately produced, or failure to respond.

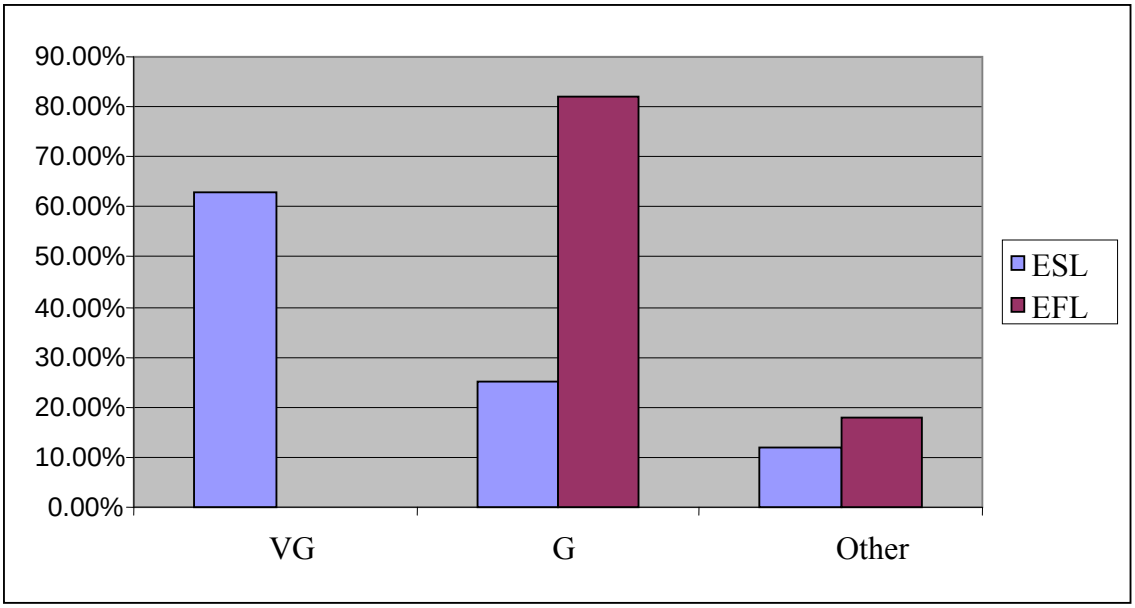

Figure 19. English phoneme isolation performed by Korean EFL and ESL children.

Based on the results of Table 41 and Figure 19, the patterns of isolated type between the two groups were different. The Korean EFL children regarded VG as a

separate unit since they showed a tendency to isolate the G from English VG and CVG syllable. In contrast, the Korean ESL children considered VG as a cohesive unit since they tended to segment the VG from English VG and CVG syllable.

Overall, among the English sub-syllabic tasks, the Korean EFL children paid more attention to body rather than rime whereas the Korean ESL children paid more attention to rime rather than body. In a word, the Korean EFL children consistently preferred the sub-syllabic structure of body even in English phonological awareness whereas the Korean ESL children showed the sub-syllabic preference for rime in English phonological awareness.

Summary of Chapter 4

The Chapter 4 illustrated the findings of the three research questions across the three experimental measurements: (1) the sub-syllabic structure preferred by each group within each language, (2) cross-language transfer of the sub-syllabic awareness preferred by each group between Korean and English, and (3) the relationship of oral language proficiency to the sub-syllabic unit preferred by each group.

For Research Question 1, the Korean EFL children preferred body structure in both Korean and English whereas the Korean ESL children preferred body and rime structure in Korean and rime structure in English. Meanwhile, the English monolingual children preferred rime structure in English.

For Research Question 2, the Korean EFL children did not differ in their preference for body structure across the two languages. In reverse, the Korean ESL children preferred rime structure in the two languages.

For Research Question 3, the Korean EFL children's high Korean language proficiency seemed to play a potential factor in body preference across the two languages. On the other hand, the Korean ESL children's high English language proficiency seemed to play a possible factor in rime preference across the two languages.

CHAPTER 5: DISCUSSION, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

This Chapter 5 discusses the results of the three research questions based on the framework of the objectives of this study. Furthermore, theoretical and educational implications are presented. Finally recommendations for future research and conclusion are illustrated.

Discussion

Korean EFL children had a distinctive sub-syllabic preference for body structure in both Korean and English across the three experimental measurements, namely, sound oddity task, sound similarity judgment task, and phoneme isolation task. These results suggest that they were implicitly and explicitly sensitive to body structure across the two languages. Their sub-syllabic awareness of body in Korean is compatible with the results of previous research concerning Korean native speakers' salient intra-syllabic structure of body in Korean (Wiebe & Derwing, 1994; Yoon, Bolger, Kwon, & Perfetti, 2002, Yoon & Derwing, 2001).

More importantly, Korean EFL children preferred the sub-syllabic structure of body even in English, which is a new finding of this study since as a forerunner, this study made an initial attempt to explore cross-language transfer of sub-syllabic units between Korean and English. Upon a set of separate paired-samples T-tests, they similarly preferred body structure across the two languages and seemed to transfer their dominant language's (Korean) sub-syllabic awareness to the other language (English). These results were also true for the phoneme isolation task across the two language tasks.

Furthermore, correlations and multiple regression analyses regarding the relationship of Korean and English language proficiency to body sub-syllabic structure preferred by Korean EFL children reconfirmed the cross-language transfer of body awareness between the two languages. Their body preference across Korean and English phonological awareness was highly associated with their Korean language proficiency and the body awareness across the two languages was a powerful predictor of their Korean language proficiency. In a word, due to their relatively higher Korean language proficiency, they were most sensitive to body structure not only in Korean, but in English.

Meanwhile, Korean ESL children had a salient intra-syllabic preference for rime structure in English across the three experimental assessments. Recalling that a T-test showed that Korean ESL children's English language proficiency was similar to English monolingual children's one ($t = .022$, $p = .982$), as earlier discussed in Chapter 4, their intra-syllabic sensitivity to rime in English runs along with the English monolingual children's sub-syllabic preference for rime structure. Moreover, these findings are consistent with the results of experimental studies on the special role of an onset-rime structure in English (De Cara & Goswami, 2003; Treiman, 1983, 1985, 1986, 1995; Treiman & Danis, 1988; Treiman, Fowler, Gross, & Berch, 1995; Treiman, Mullwnnix, Bijeljac-Babic, & Richmond-Welty, 1995).

When it comes to cross-language transfer of sub-syllabic awareness, a set of separate paired-samples T-tests showed that Korean ESL children consistently preferred rime structure across the two languages and thus they seemed to transfer their dominant language's (English) sub-syllabic awareness to the other language (Korean).

Of particular interest, Korean ESL children had an idiosyncratic sub-syllabic preference for both rime measured by oddity and similarity judgment task and body measured by phoneme isolation task in Korean phonological awareness. In other words, they were sensitive to rime structure at unconscious level and body at conscious level.

These findings propose that their inconsistent sub-syllabic preference for both rime and body may result from their home language as reported by their parents in the demographic questionnaire. Even though some of the Korean ESL children spoke only English at their home, most of them spoke both Korean and English and all of their parents spoke either Korean or Korean and English at their home. However, all of the Korean EFL children and their parents spoke only Korean at their home. In other words, Korean EFL children' language spoken at home was not English at all. Given the unique language setting at home, it seems reasonable that Korean ESL children showed a conflicting sub-syllabic preference for body and rime in Korean phonological awareness. However, the results of phoneme isolation task across the two languages may suggest that Korean ESL children have a bilingual advantage in the phoneme isolation task as a production task. In other words, due to their oral language proficiency in both Korean and English at home, these students showed dual preference for the sub-syllabic structures across the two languages (for Korean: body; for English: rime).

In terms of the relationship of English and Korean language proficiency to rime structure preferred by Korean ESL children at unconscious level, their rime preference across English and Korean phonological awareness measured by oddity and sound similarity task was highly related to their English language proficiency. In a similar vein, the rime awareness across the two languages was a strong predictor of their English

language proficiency. In other words, because of their relative higher English language proficiency, they were most sensitive to rime structure in English and in Korean as well.

It seems logical that Korean EFL children's high Korean language proficiency was closely connected with body preference in Korean and Korean ESL children's high English language proficiency was highly associated with rime preference in English. However, the body awareness preferred by Korean EFL children in the English tasks can be traced back to the following two reasons: (1) their relative lower English language proficiency or (2) transfer of their relative higher Korean language proficiency to English language tasks. Based on the results of correlations and regression analyses, the body sensitivity in English language tasks was related to not English language proficiency but Korean language proficiency. In addition, the body structure significantly contributed to predict Korean language proficiency, not English language proficiency. Therefore, this study may infer that transfer of high Korean language proficiency to English language tasks may account for the body awareness preferred by Korean EFL children. In the same logical procedures, the rime awareness preferred by Korean ESL children in the Korean tasks can be traced back to transfer of their relative higher English language proficiency to Korean language tasks. Subsequently, depending on their dominant language proficiency, the two groups differently performed on sub-syllabic awareness in the other language.

Implications

Theoretical Implications

According to the dominant language's sub-syllabic awareness preferred by each group in phoneme isolation task, Korean EFL children considered GV as a cohesive unit

in Korean, which implies that they were sensitive to body structure in Korean while Korean ESL children and English monolingual children regarded VG as a one unit in English, which means that they were responsive to rime structure in English. Recalling that all of the experimental items used in this study contain the semivowel (i.e., [j] and [w]), and in terms of the placement of semivowel, the syllabic structure of Korean (on-glides: CGVC) and that of English (off-glides: CVGC) differs, the semivowel placement which is phonotactically constrained in Korean and English respectively may be a potential factor of the language specific sub-syllabic awareness preferred by each group.

Secondly, the major findings of the distinctive sub-syllabic awareness observed in Korean and English may support that the sub-syllabic unit of onset-rime is not linguistically universal: the availability of sub-syllabic unit as a "grain size" of psycholinguistic units is language-specific. More specifically, based on the results of multiple regression analyses predicting Korean/English language proficiency, nucleus was one of the powerful predictors of Korean/English language proficiency regardless of language groups and language tasks. These results suggest that nucleus seemed to be a starting point of a sequential phonological progression toward the sub-syllabic emergence of body or rime. This notion of nucleus as a preliminary point of phonological development seems to runs along with the direction of vowel-salience hypothesis, in which vowels are more salient in speech than consonants since vowels with a lower frequency range make them easier to hear than consonants (Uhry & Ehri, 1999). Then, depending on the phonological structural similarity and neighborhood density relevant to a language, sub-syllabic awareness may developmentally emerge (Ziegler & Goswami, 2005). As discussed earlier in Chapter 2, the statistical studies concerning the

distributions of phonemes and phonological neighborhood densities in English CVC syllables supported the notion that rime unit is a natural constituent in English (De Cara & Goswami, 2002; Kessler & Treiman, 1997).

One of the major salient phonological features in Korean that is not shared by English is that no Korean consonant is released in the syllable-final (coda) position (Sohn, 1999). Due to this rule, Korean EFL children may be able to concentrate on the more salient unit of body structure in which the semivowel is closely attached to the following vowel. Moreover, because of the unreleased final consonant, only a limited umber of consonants may occur in the syllable-final position. That is, for Korean phonetics, only [p], [t], [k], [s], [m], [n], [ŋ], and [l] out of the nineteen consonants can occur in the coda position (Sohn, 1999).

The phonological uniqueness of the spoken systems within each language may account for the relevance of sub-syllabic awareness of body or rime. Other linguistic evidence of the unique sub-syllabic awareness of body in Korean and rime in English can be explained by each language's syllable structure: the Korean syllable is considered to be a left-branching (CV-C) structure whereas the English syllable is a right-branching (C-VC) structure (Yoon & Derwing, 2001).

Next, in terms of cross-language transfer of phonological awareness, the dominant language's sub-syllabic awareness of each group was transferred to the other language's one. However, by looking at the acquisition of the other language's phonological awareness, these phonological transfer phenomena can be regarded as negative transfer which impedes and interferes the acquisition of the other language's sub-syllabic awareness, Due to the placement of semivowel which is predominantly

occupied in Korean (on-glides) and English (off-glides), Korean EFL children failed to acquire rime awareness in English. In addition, Korean ESL children partially succeeded in acquiring body awareness in Korean since they showed the sub-syllabic awareness of body in phoneme isolation task and rime in oddity and similarity judgment task. These results suggest that phonological awareness in the target language could depend on the degree to which L1 and L2 phonological systems share structural similarities and the non-overlapping phonological properties specific to the L1 or the L2 may increase the difficulty in the L1 and the L2 phonological processing (Comier & Kelson, 2000; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Wade-Woolley & Geva, 2000).

Finally, one of the major findings revealed by this study is the relationship of oral language proficiency to the sub-syllabic awareness preferred by each group: Korean EFL children's body preference in Korean and English phonological awareness was highly associated with their Korean language proficiency. Furthermore, the body awareness across the two languages was a robust predictor of Korean language proficiency. On the other hand, Korean ESL children's rime preference in Korean and English phonological awareness was closely connected to their English language proficiency. Moreover, the rime awareness across the two languages was a powerful predictor of English language proficiency. These results propose that each group's dominant language proficiency impacts sub-syllabic awareness in the other language, as suggested by Linguistic Interdependent Hypothesis (Cummins, 1994).

Assuming that sub-syllabic awareness of body or rime is a strong predictor of oral language proficiency, and phonological sensitivity is a necessary condition for learning to read and spell (Adams, 1990; Stanovich, 1985), so sub-syllabic awareness, as

a phonological dimension, may be a necessary condition for learning to speak. In a similar vein, taking into account that sub-syllabic awareness is part of phonological awareness and phonological awareness is one of the best precursors of successful reading acquisition (Adams, 1990; Blachman, 2000; Goswami, 1999; Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997; Wagner & Torgesen, 1987) and assuming sub-syllabic awareness to be a significant predictor of oral language proficiency, one may naturally consider the possibility that beginning literacy may be implicated in oral language proficiency. Although the conclusive evidence and strong theoretical rationale supporting the relationship of L1/L2 oral language proficiency to L2 reading has not been adequate, these findings can shed a light on the relationship between L1/L2 oral language proficiency and L2 literacy at word-level skills such as word reading, pseudo word reading and spelling.

Educational Implications

Sub-syllabic awareness such as body structure awareness in Korean or rime awareness in English is one of the phonological dimensions which are a necessary condition for successful reading acquisition (Adams, 1990; Stanovich, 1985). Therefore, the achievement of sub-syllabic awareness can be functionally significant in learning to read and spell.

Subsequently, the incorporation of a language-specific sub-syllabic awareness measure as well as a measure of cross-language transfer of sub-syllabic awareness may contribute to more accurate phonological assessment of Korean-speaking English language learners (ELLs). Similarly, exploring the possible impact of language-specific sub-syllabic awareness and cross-language transfer of sub-syllabic awareness on

children's developing language skills may help to guide teachers of Korean-speaking ELLs in their delivery of phonics instruction. As observed in the Korean EFL Group with high Korean proficiency and low English proficiency simultaneously, they transferred their dominant language's sub-syllabic awareness (body awareness in Korean) to English sub-syllabic awareness. This negative transfer, which requires the learners' attention to language specific elements in less straightforward and irregular phonological systems, may interfere and hinder the acquisition of rime awareness as a functionally significant factor in learning to read in English. Subsequently, Korean-speaking ELLs may confront drastic restructuring of interlanguage phonologies and may have additional difficulties dealing with unstable phonological representations. Therefore, they would be at risk for difficulties in learning to speak, read and spell in English.

These potential problems in learning to speak and read in English may raise the need for phonics instruction adjustment, especially for Korean-speaking ELLs. Considering the way of learning to read in Korean, in which Korean children are typically taught to learn grapheme-phoneme correspondences because one grapheme systematically and consistently corresponds to one phoneme or one phoneme regularly maps onto one letter (Taylor, 1980), analytic phonics based on rime and analogy may not be a panacea for ELLs with diverse first language (L1) backgrounds. Although analytic phonics which involves the introduction of rime-oriented teaching (i.e., p*eak* and b*eak* share *–eak*) can be useful to teach English monolingual children (Goswami, 1999), this large unit teaching may conflict with the body sub-syllabic awareness preferred by Korean-speaking ELLs with high Korean proficiency and low English proficiency and furthermore cannot accommodate their strategic analysis of words.

Taking into account the characteristics of shallow Korean orthography and the Korean phonics leaning in the direction of syntactic phonics[17] which involves the introduction of phonemic awareness and then blending or synthesizing the phonemic awareness, synthetic phonics as a small unit teaching can be helpful to teach the knowledge of phoneme-grapheme corresponding rules to at least Korean-speaking ELLs with high Korean language proficiency and low English proficiency.

Even though the phonics debate on synthetic based on bottom-up processing versus analytic based on top-down processing in early reading instruction has not been resolved yet, of course, eventually teachers can utilize students' oral language proficiency in a holistic manner. But as this study focused on beginning literacy heavily relying on micro-skills such as phonological awareness, decoding and spelling, the syntactic phonics as a dynamic phonics instruction supporting the ELLs with diverse phonological representations should be maintained until they reach a certain level of oral language proficiency.

Consequently, phonological assessment strategies should be changed since Korean-speaking ELLs with high Korean proficiency and low English proficiency may show different sub-syllabic awareness from those with high English proficiency and low Korean proficiency and English monolingual children. In other words, phonological awareness should be measured based on the synthetic approach rather than the analytic approach. Furthermore, ELLs' practitioners should be well aware of the potential problems of interlanguage phonologies and also recognize the negative transfer as language difficulty which requires an additional help to understand metalinguistic

[17] When taught the letter sound /t/, /s/,/p/, and /æ/, children can build up the words such as tap, pat, and sat (Bowey, 2006)

concepts absent in L1. In addition, the results of English phoneme isolation task performed by Korean EFL children can help the ELLs' teachers understand why Korean-speaking ELLs in a phonics classroom are more likely to count the syllable of eye [aɪ] as two syllables.

Recommendations for Future Research

In this current study, the oral language proficiency of each group was measured by the receptive vocabulary test, namely, PPVT III (Dunn & Dunn, 1997). In order to reflect a clearer picture of the relationship of oral language proficiency to sub-syllabic awareness, various aspects of oral language proficiency such as story telling as a productive vocabulary, grammar skills assessed by cloze test, or listening comprehension need to be measured in future research. In addition, qualitative investigation in conjunction with quantitative research on comparisons of different grades is also needed to establish the causal or reciprocal relationship between oral language proficiency and phonological awareness. The insights obtained through bi-focal analyses can allow one to precisely detect its developmental pathway. Furthermore, the multifaceted research concerning the relationship between oral language proficiency and literacy skills at the word- and text-level is expected to secure ELLs at risk for speaking and reading failure and to help them successfully learn to speak and read in English.

Conclusion

This study provided the availability of sub-syllabic unit as a language-specific "grain-size" of psycholinguistic units shown by Korean EFL/ESL children and English monolingual children, and also examined cross-language transfer of sub-syllabic awareness between Korean and English. In addition, this research investigated the

relationship of oral language proficiency to sub-syllabic awareness across the two languages.

More importantly, this exploratory study adapting the semivowel placement difference between Korean and English revealed a new picture of the effect of the typical phonetic factor on the preferred sub-syllabic units. In a similar vein, depending on the degree of language proficiency, Korean EFL and ESL children showed different performance on cross-language transfer of their sub-syllabic awareness which is implicated in the placement of the typical phonetic element.

Furthermore, this research put one step forward to open a new perspective on L2 early literacy by incorporating sub-syllabic awareness into cross-language transfer running along with oral language proficiency.

APPENDIX A: Korean PPVT Item

Testing Item Number	English	Korean
1	drum	북
2	parachute	낙하산
3	vegetable	야채
4	group	집단
5	arrow	화살
6	envelope	봉투
7	vase	꽃병
8	signal	신호등
9	fly	파리
10	fountain	분수대
11	cactus	선인장
12	selecting	선택하다
13	astronaut	우주비행사
14	gigantic	거대한
15	castle	성
16	island	섬
17	empty	비어있는
18	calculator	계산기
19	feather	깃털
20	nest	둥지

APPENDIX B: English PPVT Item

Test Item Number	English
1	bus
2	climbing
3	key
4	reading
5	jumping
6	helicopter
7	lamp
8	cow
9	drum
10	painting
11	elbow
12	shoulder
13	square
14	penguin
15	farm
16	going
17	harp
18	rectangle
19	target
20	oval

APPENDIX C: Korean Oddity Item

Body Oddity Item

Sonority	Base Word	Body(CGV) Oddity
Obstruent(Stop)	[t^hjak]	[t^hjap] [p^hjok]
Obstruent (Stop)	[k^hjop]	[k^hjol] [t^hjep]
Obstruent (Stop)	[p^hjek]	[p^hjen] [t^hjuk]
Obstruent (Fricative)	[sjut]	[sjun] [hjat]
Obstruent (Fricative)	[hjɛt]	[hjɛp] [k^hjət]
Obstruent (Fricative)	[sjət]	[sjən] [hjet]
Nasal	[nwiŋ]	[nwip] [mweŋ]
Nasal	[mwen]	[mwel] [nwin]
Liquid	[ɾwəl]	[ɾwəp] [k^hwal]
Liquid	[ɾwal]	[ɾwan] [twəl]

Coda Neutralization

Fricative /s/ /ʒ/, /h/ → /t/____# (Syllable Boundary)

Rime Oddity Item

Sonority	Base Word	Rime(GVC) Oddity
Obstruent (Stop)	[t^hjak]	[t^hjel] [p^hjak]
Obstruent (Stop)	[k^hjop]	[k^hjan] [t^hjop]
Obstruent (Stop)	[p^hjek]	[p^hjat] [t^hjek]
Obstruent (Fricative)	[sjut]	[sjem] [hjut]
Obstruent (Fricative)	[hjɛt]	[hjan] [tjɛt]
Obstruent (Fricative)	[sjət]	[sjan] [hjət]
Nasal	[nwiŋ]	[nwen] [twiŋ]
Nasal	[mwen]	[mwit] [nwen]
Liquid	[ɾwəl]	[ɾwap] [kwəl]
Liquid	[ɾwal]	[ɾwəm] [twal]

Nucleus Oddity Item

Sonority	Base Word	Nucleus(GV) Oddity
Obstruent (Stop)	[tʰjak]	[pʰjal] [tʰjek]
Obstruent (Stop)	[kʰjop]	[tʰjon] [kʰjup]
Obstruent (Stop)	[pʰjek]	[kʰjet] [pʰjak]
Obstruent (Fricative)	[sjut]	[hjum] [sjot]
Obstruent (Fricative)	[hjɛt]	[sjɛn] [hjət]
Obstruent (Fricative)	[sjət]	[hjəp] [sjɛt]
Nasal	[nwiŋ]	[mwim] [nweŋ]
Nasal	[mwem]	[nwen] [mwim]
Liquid	[ɾwəl]	[nwəp] [ɾwal]
Liquid	[ɾwal]	[mwam] [ɾwil]

Margins Oddity Item

Sonority	Base Word	Margins(C-C) Oddity
Obstruent (Stop)	[tʰjak]	[tʰjok] [pʰjap]
Obstruent (Stop)	[kʰjop]	[kʰjap] [tʰjot]
Obstruent (Stop)	[pʰjek]	[pʰjuk] [tʰjet]
Obstruent (Fricative)	[sjut]	[sjet] [hjup]
Obstruent (Fricative)	[hjɛt]	[hyət] [sjɛp]
Obstruent (Fricative)	[sjət]	[sjɛt] [hjəp]
Nasal	[nwiŋ]	[nweŋ] [twim]
Nasal	[mwen]	[mwin] [kweŋ]
Liquid	[ɾwəl]	[ɾwal] [twək]
Liquid	[ɾwal]	[ɾwəl] [pwan]

APPENDIX D: English Oddity Item

Body Oddity Item

Sonority	Base Word	Body(CGV) Oddity	
Obstruent(Stop)	[t^haɪk]	[t^haɪn]	[p^heɪk]
Obstruent (Stop)	[k^hɔɪp]	[k^hɔɪm]	[t^haʊp]
Obstruent (Stop)	[p^hoʊt]	[p^hoʊn]	[t^haʊt]
Obstruent (Fricative)	[saʊf]	[saʊn]	[hɔɪf]
Obstruent (Fricative)	[hoʊf]	[hoʊk]	[k^heɪf]
Obstruent (Fricative)	[saɪf]	[saɪm]	[heɪf]
Nasal	[neɪŋ]	[neɪn]	[mɔyŋ]
Nasal	[mɔɪn]	[mɔɪl]	[naʊm]
Liquid	[ɹaɪl]	[ɹaɪk]	[k^haʊl]
Liquid	[ɹaʊl]	[ɹaʊn]	[naɪl]

/aɪ/ as in *buy*, /eɪ/ as in *lay*, /ɔɪ/ as in *coin*, /aʊ/ as in *cow*, /oʊ/ as in *low*, /ɹ/ as in rye

Rime Oddity Item

Sonority	Base Word	Rime(GVC) Oddity
Obstruent (Stop)	[t^haɪk]	[t^haʊm] [k^haɪk]
Obstruent (Stop)	[p^heɪt]	[k^haɪn] [t^heɪt]
Obstruent (Stop)	[p^hɔɪk]	[p^haɪt] [t^hɔɪk]
Obstruent (Fricative)	[saʊf]	[sɔɪm] [haʊf]
Obstruent (Fricative)	[hoʊf]	[heɪn] [soʊf]
Obstruent (Fricative)	[saɪf]	[seɪt] [haɪf]
Nasal	[neɪŋ]	[nɔɪn] [meɪŋ]
Nasal	[naʊm]	[nɔɪm] [maʊm]
Liquid	[ɹɔɪp]	[ɹaʊl] [maʊl]
Liquid	[ɹaɪl]	[ɹaʊn] [naɪl]

Nucleus Oddity Item

Sonority	Base Word	Nucleus(GV) Oddity
Obstruent (Stop)	[tʰaɪk]	[pʰaɪm] [tʰoʊk]
Obstruent (Stop)	[kʰeɪf]	[tʰeɪn] [kʰaʊt]
Obstruent (Stop)	[pʰɔɪk]	[kʰɔɪt] [pʰaʊk]
Obstruent (Fricative)	[saʊt]	[haʊm] [sɔɪt]
Obstruent (Fricative)	[hɔɪs]	[sɔɪn] [heɪs]
Obstruent (Fricative)	[seɪp]	[heɪf] [sɔɪp]
Nasal	[nɔɪŋ]	[mɔɪn] [naɪŋ]
Nasal	[maʊn]	[naʊŋ] [mɔɪn]
Liquid	[ɹoʊk]	[loʊt] [ɹaɪl]
Liquid	[ɹaɪl]	[laɪp] [ɹaʊl]

Margins Oddity Item

Sonority	Base Word	Margins(C-C) Oddity
Obstruent (Stop)	[pʰaɪt]	[pʰeɪt] [tʰaɪk]
Obstruent (Stop)	[kʰeɪf]	[kʰaʊf] [tʰeɪt]
Obstruent (Stop)	[pʰɔɪk]	[pʰaʊk] [tʰɔɪt]
Obstruent (Fricative)	[saʊf]	[sɔɪf] [haʊk]
Obstruent (Fricative)	[hoʊf]	[heɪf] [meɪp]
Obstruent (Fricative)	[saɪf]	[soʊf] [haɪp]
Nasal	[neɪŋ]	[naʊŋ] [meɪm]
Nasal	[naʊm]	[nɔɪm] [maʊŋ]
Liquid	[ɹaʊl]	[ɹaɪl] [naɪp]
Liquid	[ɹaɪl]	[ɹɔɪl] [laɪp]

APPENDIX E: Korean/English Similarity Judgment Item

Korean Similarity Judgment Item

Unit / Item Number	None (0)	Onset (C1) (1)	Vowel (V) (1)	Coda (C2) (1)	Body (CV) (2)	Rime (VC) (2)	Margins (C1C2) (2)	All (3)
1	[tʰjan] [swak]	[tʰjan] [tʰwim]	[tʰjan] [sjak]	[tʰjan] [kʰwen]	[tʰjan] [tʰjak]	[tʰjan] [kʰjan]	[tʰjan] [tʰwin]	[tʰjan] [tʰjan]
2	[njek] [kʰwan]	[njek] [nwap]	[njek] [kʰjet]	[njek] [tʰwik]	[njek] [njep]	[njek] [hjek]	[njek] [nwak]	[njek] [njek]
3	[mwan] [tʰjet]	[mwan] [mjup]	[mwan] [nwat]	[mwan] [ɾjon]	[mwan] [mwal]	[mwan] [pʰwan]	[mwan] [mjon]	[mwan] [mwan]
4	[kʰwip] [njet]	[kʰwip] [kʰjat]	[kʰwip] [pʰwim]	[kʰwip] [tʰjap]	[kʰwip] [kʰwit]	[kʰwip] [swip]	[kʰwip] [kʰjap]	[kʰwip] [kʰwip]

jV= /je/ , /ja/, /ju/, /jo/, /jɛ/, /jə/ wV= /wi/, /we/, /wa/, /wə/, /wɛ/

English Similarity Judgment Item

Unit / Item Number	None (0)	Onset (C1) (1)	Vowel (V) (1)	Coda (C2) (1)	Body (CV) (2)	Rime (VC) (2)	Margins (C1C2) (2)	All (3)
1	[tʰaɪn] [saʊk]	[tʰaɪn] [tʰoʊm]	[tʰaɪn] [saɪk]	[tʰaɪn] [kʰoʊn]	[tʰaɪn] [tʰaɪk]	[tʰaɪn] [kʰaɪn]	[tʰaɪn] [tʰeɪn]	[tʰaɪn] [tʰaɪn]
2	[neɪk] [kʰaʊn]	[neɪk] [naʊp]	[neɪk] [kʰeɪf]	[neɪk] [tʰoʊk]	[neɪk] [neɪp]	[neɪk] [heɪk]	[neɪk] [naʊk]	[neɪk] [neɪk]
3	[maʊn] [tʰeɪt]	[maʊn] [meɪp]	[maʊn] [naʊt]	[maʊn] [ɹoɪn]	[maʊn] [maʊl]	[maʊn] [pʰaʊn]	[maʊn] [mɔɪn]	[maʊn] [maʊn]
4	[kʰoʊf] [neɪt]	[kʰoʊf] [kʰaɪm]	[kʰoʊf] [pʰoʊm]	[kʰoʊf] [tʰaɪf]	[kʰoʊf] [kʰoʊs]	[kʰoʊf] [soʊf]	[kʰoʊf] [kʰeɪf]	[kʰoʊf] [kʰoʊf]

/aɪ/ as in *buy*, /eɪ/ as in *lay*, /ɔɪ/ as in *coin*, /aʊ/ as in *cow*, /oʊ/ as in *low*

APPENDIX F: Korean/English Phoneme Isolation Item

Korean Phoneme Isolation Item

Sonority	Initial Sound(G-VC)	Initial Sound (G-V)
Obstruent (Stop)	[jek]	[je]
Obstruent (Stop)	[jək]	[jə]
Obstruent (Stop)	[jap]	[ja]
Obstruent (Stop)	[jut]	[ju]
Obstruent (Fricative)	[jot]	[jo]
Obstruent (Fricative)	[jɛt]	[jɛ]
Obstruent (Fricative)	[wet]	[we]
Nasal	[wim]	[wi]
Nasal	[wan]	[wa]
Liquid	[wəl]	[wə]
Liquid	[wɛl]	[wɛ]

English Phoneme Isolation Item

Sonority	Final Sound(CV-G)	Final Sound (V-G)
Obstruent (Stop)	[k^haɪ]	[aɪ]
Obstruent (Stop)	[t^heɪ]	[eɪ]
Obstruent (Stop)	[p^hɔɪ]	[ɔɪ]
Obstruent (Fricative)	[faʊ]	[aʊ]
Obstruent (Fricative)	[hoʊ]	[oʊ]
Obstruent (Fricative)	[saɪ]	
Nasal	[neɪ]	
Nasal	[məɪ]	
Liquid	[ɹaʊ]	

/aɪ/ as in *buy*, /eɪ/ as in *lay*, /ɔɪ/ as in *coin*, /aʊ/ as in *cow*, /oʊ/ as in *low*

APPENDIX G:
Korean Demographic Questionnaire

Date _____ Child's Name _____

1. Age: _____years _____months 2. Gender: Male Female
3. Birth Order (please circle) 1ST 2ND OTHER
4. Grade Level: American School _____
5. Country of Birth_____
6. Length of Stay in the United States_____
7. Language spoken at Home (Please circle)
   By child: English Korean Korean and English
   By mother: English Korean Korean and English
   By father: English Korean Korean and English
   By other adults: English Korean Korean and English
8. Mother's Korean proficiency
   Speaking: High Mid Low
   Reading: High Mid Low
9. Mother's English proficiency
   Speaking: High Mid Low
   Reading: High Mid Low
10. Father's Korean proficiency
   Speaking: High Mid Low
   Reading: High Mid Low
11. Father's English proficiency
   Speaking: High Mid Low
   Reading: High Mid Low
12. Highest level of school completed: Father _____ Mother_____
13. What is the dominant language of your child? (Please circle) English Korean
14. Your child's Korean proficiency
   Speaking: High Mid Beginner
   Reading: High Mid Beginner
15. Your child's English proficiency
   Speaking: High Mid Beginner
   Reading: High Mid Beginner
16. When did your child begin to read Korean words (not alphabet)? _____
17. When did your child begin to read English words (not alphabet)? _____
18. What kinds of Korean/English reading activities do you /others do with your child?
    _____
19. How much time do you/others spend English/ Korean reading with your child?
    _____
20. Please indicate the person/persons who assume primary responsibility for your child after school. _____
21. Has your child attended preschool? Yes No
    If yes, for how many years? _____

APPENDIX H:

English Monolingual Demographic Questionnaire

Date _____ Child's Name _____

1. Age: _____years _____months
2. Gender: Male Female
3. Grade Level: American School _____
4. Country of Birth_____
5. Language Spoken at Home (Please circle)
   - By child: **English** if not English, please specify other language(s) _____
   - By mother: **English** if not English, please specify other language(s) _____
   - By father: **English** if not English, please specify other language(s) _____
   - By other adults **English** if not English, please specify other language(s) _____
   - By other adults **English** if not English, please specify other language(s) _____
6. *Only if a language other than English is spoken in the home, please answer the following:*

Mother's English proficiency	Father's English proficiency
Speaking: High Mid Low	Speaking: High Mid Low
Reading: High Mid Low	Reading: High Mid Low
Listening: High Mid Low	Listening: High Mid Low
Writing: High Mid Low	Writing: High Mid Low

7. Highest level of education completed:
   Father_____ Mother_____
   Other Significant Adults_____
8. Is English the only language your child speaks? (Please circle)
   YES if not, please specify the other languages s/he speaks_____
9. Does your child read the English alphabet? _____
   If yes, at what age did s/he begin?
10. Does your child read English words? _____
    If yes, at what age did s/he begin?
11. What kinds of reading activities do you /others do with your child?
    _____
12. How much time do you/others spend reading with your child?
    _____
13. Please indicate the person/persons who assume primary responsibility for your child after school. _____
14. Has your child attended preschool? Yes No
    If yes, for how many years? _____

APPENDIX I: Korean Translation of Demographic Questionnaire

질문지

날짜_____ 자녀의 성명_____

1. 나이: _____년 _____개월 2. 성별: 남 여
3. 출생 순서 (해당사항에 표기해 주세요): 첫째 아이 둘째 아이 그 외
4. 학년: _____
5. 출생국가:_____
6. 미국에서 지낸 기간:_____
7. 집에서 사용하는 언어 (해당사항에 표기해 주세요)

자녀:	영어	한국어	영어과 한국어
어머니:	영어	한국어	영어과 한국어
아버지:	영어	한국어	영어과 한국어
그밖의 어른들:	영어	한국어	영어과 한국어

8. 어머니의 한국어 능력
듣고/말하기 능력: 상 중 하
읽기능력: 상 중 하

9. 어머니의 영어 능력
듣고/말하기 능력: 상 중 하
읽기능력: 상 중 하

10. 아버지의 한국어 능력
듣고/말하기 능력: 상 중 하
읽기능력: 상 중 하

11. 아버지의 영어 능력
듣고/말하기 능력: 상 중 하
읽기능력: 상 중 하

12. 최종학력: 아버지_____ 어머니_____
13. 자녀가 편하게 자주 사용하는 언어는 무엇입니까? 영어 한국어
14. 자녀의 한국어 능력
듣고/말하기 능력: 상 중 초급자
읽기능력: 상 중 초급자

15. 자녀의 영어 능력
듣고/말하기 능력: 상 중 초급자
읽기능력: 상 중 초급자

16. 언제부터 자녀가 한국어 (단어수준) 로 **읽기** 시작했습니까? _____
17. 언제부터 자녀가 영어 (단어수준) 로 **읽기** 시작했습니까? _____
18. 어떤 종류의 한국어/영어 **읽기 학습**을 자녀와 함께 하십니까? _____
19. 하루에 얼마동안 자녀와 함께 한국어/영어 **읽기학습**을 하십니까?_____
20. 방과후 자녀는 누가 돌봅니까? _____
21. 자녀를 본 원에 입학하기 전에 다른 종류의 교육기관 (놀이방, 어린이집, 학원) 에 보내신적이 있습니까? 예 ____ 아니오 ____
예라고 하신경우 그 기관에 다닌 기간은 어느정도 입니까? _____

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