THE ROLE OF MORPHOLOGICAL AWARENESS IN BILINGUAL CHILDREN’S FIRST AND SECOND LANGUAGE VOCABULARY AND READING

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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Abstract

The present dissertation research had two main purposes. The first one was to compare the development of morphological awareness between English Language Learners (ELLs) who speak Chinese or Spanish as their first language, and between these two groups of ELLs and native English-speaking children. Participants included 78 monolingual English-speaking children, 76 Chinese-speaking ELLs, and 90 Spanish-speaking ELLs from grade four and grade seven. Two aspects of morphological awareness were measured, derivational awareness and compound awareness. The results indicated that ELLs’ morphological awareness is influenced by the characteristics of their first language. While Chinese-speaking ELLs performed more similarly to English native speakers on compound awareness than Spanish-speaking ELLs, Spanish-speaking ELLs outperformed Chinese-speaking ELLs on derivational awareness. The second purpose of this dissertation was to examine the within and across language contributions of morphological awareness to word reading, vocabulary and reading comprehension in Spanish-speaking ELLs. Morphological awareness in Spanish and in English was evaluated with two measures of derivational morphology, respectively. The results showed that Spanish morphological awareness contributed unique variance to Spanish word reading, vocabulary and reading comprehension after controlling for other reading related variables. English morphological awareness also explained unique variance in English word reading, vocabulary and reading comprehension. Cross-linguistic transfer of morphological awareness was observed from Spanish morphological awareness to English
word reading and vocabulary, but not to reading comprehension. English morphological awareness did not predict performance on any of the three Spanish outcome measures. These results suggest that morphological awareness is important for word reading, vocabulary and reading comprehension in Spanish, which has a shallow orthography with a complex morphological system. They also suggest that morphological awareness developed in children’s first language is associated with word reading in English, their L2. Overall, results indicate that the ability to perform morphological analysis is important for ELLs.
ACKNOWLEDGMENTS

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Thanks to my wonderful friends Ranya, Grace, Alison, Ariadne, Monica, Jose, Alba, Nick, Shauna, Mario, and to all the members of CECULEA for listening, for sharing
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What would I have done without Barbara, who rescued me from the perils and tribulations of editing and formatting my thesis? Thanks Barbara for lifting that weight off of my shoulders and for making sure that Shakespeare would not revolve in his grave by any inappropriate use of his beloved language.
Papá, este logro es suyo. El amor que siento por los libros y mi curiosidad por aprender nuevas cosas son su legado, son el resultado de sus sueños. Usted en mi lugar hubiera hecho lo mismo. Es solo cuestión de haber nacido en otra época, en otras circunstancias…
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CHAPTER 1. INTRODUCTION

The proliferation of worldwide migration and multicultural societies has resulted in a large number of learners whose native language is different from the language of instruction in the schools they attend. The largest school board in Canada, the Toronto District School Board (TDSB), is an illustration of this diverse linguistic landscape. More than 80 languages are spoken by the TDSB’s students, making English the second or third language for approximately 41% of elementary school children and for approximately 47% of secondary school students. Moreover, 12% of secondary school students are English Language Learners (ELLs) who have been in Canada for three years or less (TDSB, 2009). These students face a double challenge of learning academic content and developing their second language simultaneously. It is important to understand the factors that affect the language and reading development of ELLs in order to make informed instructional decisions that ensure that these students achieve academic success. However, this population has scarcely been systematically researched in Canada (Gunderson, 2007) and “little is known about the academic trajectories of these students” (Canadian Council on Learning (CCL), 2008, p. 2).

Good word reading skills, vocabulary knowledge, and text comprehension need to be developed rather quickly to achieve academic success. Research has shown that while ELLs usually develop good word skills, they experience a delay in vocabulary knowledge when compared to native speakers of English (Carlo et al. 2004; Jean & Geva, 2009; Verhallen & Schoonen, 1993). A serious consequence of this delay is that ELLs are less able to comprehend text at their grade level than native speakers of English (August, Carlo, Dressler, & Snow, 2005), a disadvantage that negatively impacts their academic performance. This
observation underscores the importance of identifying language skills that facilitate vocabulary acquisition and reading development in ELLs.

Morphological awareness is the ability to identify or manipulate the smallest units of meaning in words. According to Nagy and Anderson (1984), approximately 60% of the new words children may encounter in academic reading materials are morphologically complex. Training children in developing morphological sensitivity may be an effective way to enhance their vocabulary knowledge and reading skills, as research among monolingual children suggests that morphological awareness is strongly associated with vocabulary development (Carlisle, 2000; Champion, 1997; Chow, McBride-Chang, Cheung, Chow, & Sze-Lok, 2008; Wagner, Muse, & Tannenbaum, 2007), with word reading (Deacon & Kirby, 2004; Nagy, Berninger, & Abbott, 2006), and with reading comprehension (Carlisle, 2000; Champion, 1997; Freyd & Baron, 1982; Mahony, 1994; Tyler & Nagy, 1990).

In contrast to available information on monolinguals, relatively little is known about the development of morphological awareness and its relationship with vocabulary and reading for ELLs. Given the large number of ELLs in Canada, it is important to understand the role of morphological awareness in vocabulary and reading in this population, to know whether the associations among these skills differ in significant ways from those of children who are native speakers of English, and to examine whether morphological skills developed in the first language facilitate second language literacy.

The purpose of the present research was to contribute to the understanding of morphological word analysis skills in ELLs. First, it examined the effects of L1 experience and extent of exposure to L2 in the development of two aspects of morphological awareness:
derivational and compound\textsuperscript{1}. These two components of morphology are relevant to the developmental stage of 4\textsuperscript{th} and 7\textsuperscript{th} graders, who participated in these studies. Previous research suggested that the importance of morphological awareness increases with reading experience (Carlisle, 1995; Singson, Mahony, & Mann, 2000). Second, this research investigated the role of morphological awareness in vocabulary acquisition and reading performance in Spanish-speaking ELLs. These relationships were examined in several ways. Within-language associations looked at the relationships among morphological awareness, vocabulary and reading for Spanish-speaking ELLs within each of their languages. Cross-linguistic transfer examined the relationships between morphological awareness in one language and literacy skills in the other language.

The first chapter provides an overview of the characteristics of the derivational and compound morphological systems for English, Chinese and Spanish, a review of empirical research on the development of these skills, and evidence of the role of morphological awareness in vocabulary and reading. A subsequent chapter presents theoretical frameworks that discuss the transfer of linguistic, cognitive, and literacy skills across languages, and empirical evidence on the cross-linguistic transfer of morphological awareness. The background information in these two chapters provides the rationale for my research. A method chapter outlines the procedures followed to conduct the current research and

\textsuperscript{1} Derivational awareness is the ability to analyze a word and derive meaning from its constituent prefixes, roots, and suffixes (e.g., inconsistency). Compound awareness is the ability to derived meaning from a word created by joining two or more words (e.g., airport). Inflectional awareness, which is not examined in these studies, relates to the ability to derive meaning from words formed by a root and a suffix that marks tense, aspect, number, person, possession, or comparison (e.g., walked).
provides specific details about the measures used and the participants’ demographic characteristics.

This dissertation describes four related studies. Study One examined the effect of native language (English vs. Chinese), and extent of exposure to L2 (English) on English derivational and compound awareness in Chinese- and Spanish-speaking ELLs. The subsequent studies focused exclusively on the Spanish-speaking children, allowing an in-depth examination of cross-linguistic effects between two languages with shared alphabets and with overlapping lexical units (known as cognates). A further reason for drawing special attention to the Spanish-speaking children is their high risk (40%) for academic failure and school dropout as indicated by a recent TDSB report on secondary school students (Brown, 2006). Study Two concentrated on the within- and cross-languages contribution of derivational morphological awareness to word reading, Study Three and Study Four focused on vocabulary and reading comprehension, respectively.
CHAPTER 2. REVIEW OF THE LITERATURE

In this chapter, I provide a review of empirical evidence on the role of morphological awareness in vocabulary and reading acquisition. To achieve a better understanding of this body of research, I first provide details about the main characteristics of the morphological systems in English, Chinese and Spanish, as well as a review of research on the development of derivational and compound morphological awareness in English, and where available in Chinese and Spanish.

Word-formation Processes

Across many languages, words are formed by inflection (e.g. car, cars), derivation (e.g. music, musician), and compounding (e.g. cowboy). Inflectional morphemes are added to root words to indicate tense or aspect (e.g., kill, killed), number (e.g., car, cars), person (e.g., listen, listens), possession (e.g., her, hers), or comparison (e.g., slow, slowest) without altering the meaning of words. Inflectional morphemes in English are always suffixes, added after the root. By contrast, in languages such as English and Spanish derivational morphemes can be attached either as a prefix or as a suffix. When added before the root (prefix), derivational morphemes do not change the syntactic property of a word, but can alter its meaning (e.g., decent (adjective) – indecent (adjective)). The same prefix can provide different semantic information depending on the grammatical category of the base to which it attaches. For example, un- when attached to adjectives and participle bases (e.g., unhappy) means “not, opposite of”, while when attached to verbs and nouns (e.g., undo) means “reverse action, deprived of, released from”. These selective restrictions can create ambiguity
in meaning deduction. Derivational suffixes, on the other hand, usually change the syntactic property of a word (e.g. *communicate* (verb) - *communication* (noun)). However, not all derivational suffixes produce changes in the part of the speech. The nominal suffix –*ism*, for example, can attach to nouns to form another noun (e.g., *terror* (noun) – *terrorism* (noun)).

Finally, compounding is the process of forming a new word by putting two or more words together (e.g. *fireplace*). In the process of word formation by compounding, combinations may occur between words of the same part of the speech (e.g., *policeman* (noun + noun)), as well as between words from different categories (e.g., *forward-looking* (adverb + verb)). In most cases, the meaning of the new compound word results from the semantic contribution of the combined words (literal compound, e.g., *dishwasher*). Sometimes, the meaning of the compound word is very different from each component in isolation (metaphorical compound, e.g., *hotdog*). In isolation, the first word refers to temperature and the second to a domestic animal; put together they form a compound word that refers to a type of fast food consisting of a split piece of long bread with a sausage in the middle. While literal compounds allow meaning inference by combining the meaning of two or more components, metaphorical compounds require additional contextual clues and cultural knowledge. The current study focused only on derivational suffixes and literal compounds because of certain advantages they provide. Derivational suffixes were chosen over prefixes, because they are more productive and provide both syntactic and semantic information. Literal, and not metaphorical, compounds were chosen because as shown by research (e.g., Dominieck, 1990; Wang, Peng, Guan & Kuang, 1999) they are processed in terms of constituent morphemes whereas metaphorical compounds are processed as a whole.
Cross-linguistic Contrasts in Word Formation

*Derivation*

Spanish and English both belong to the family of Indo-European languages. Although Spanish is a Romance language and English is a Germanic language, there are many commonalities between their derivational systems. Similar to English, Spanish derivational morphology involves relational, syntactic, and distributional aspects. The first aspect refers to the common morpheme shared between two or more words (e.g., *heal, health*). The second aspect involves the association of derivational suffixes with specific syntactic categories and by this virtue, their ability to change the syntactic category of words to which they are attached (e.g., *-ness* and *-tion* indicate noun, while *–ify* indicates verb). The third aspect refers to the restrictions that apply to the combination of affixes. For example, *-ous* is attached to nouns to make them adjectives, but not to verbs.

English and Spanish have many lexical similarities in derivational suffixes, which stem from shared Greek and Latin suffixes. Some of the Greek suffixes include *–ocrat, -ology, -cy/-acy, -ism*. Some of the Latin suffixes are *-itude, -ance/-ence, -age, -ure, –able/-ible, –al/-ial*, and the agentive *–er/-or*. Table 1 presents a list of common suffixes across the two languages and their grammatical functions. Despite the common origins of many Spanish and English derivational suffixes, their association can be obscured by spelling transformations in each language (e.g., *familiarize, familiarizar*).

Along with the similarities, differences also exist between Spanish and English in the processes involved in forming words by derivation. Spanish has a larger inventory of derivational suffixes than does English (Whitley, 1986) and has a more complex structure. One of the sources of complexity in the Spanish morphological system is the frequent
coexistence of inflectional morphemes bound to derivational morphemes to mark number and gender. The only inflectional suffixes in English that may appear following derivational ones are the plural marker –s/-es/ and the possessive –‘s. Furthermore, while in English these inflectional suffixes are only attached to noun suffixes (e.g., *teacher*), in Spanish inflectional suffixes, marking number and gender, can attach to adjective suffixes as well (e.g., *controvertido, controvertida, controvertidos, controvertidas*; in English, *controversial*).

Further differences between English and Spanish suffixation involve suffixes that exist only in one of the two languages. Suffixes with Germanic origins exist in English but not in Spanish (e.g., *-ness, -let, -kin, -ard, -hood, -th, -ford, -ish, -ful, -less, -some, -ward, -ly, -ways*; see Marchand, 1969). By contrast, “appreciate morphemes” are an interesting group of derivational morphemes that exist in Spanish but not in English. Some of them are attached to nouns as augmentatives (e.g., *silla – sillón; chair – big chair*), or as pejoratives (e.g., *periódico – periodico; newspaper-bad-quality newspaper*), and others as diminutives (e.g., *mesa, mesita; table; in English little table*).

### Table 1

Sample of Suffixes Common to English and Spanish

<table>
<thead>
<tr>
<th>Origin and Category</th>
<th>English Spelling</th>
<th>Spanish Spelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek Nouns</td>
<td>-ocrat</td>
<td>-ocrata</td>
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<tr>
<td></td>
<td>-ology</td>
<td>-ología</td>
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<td>-cy/acy</td>
<td>-cia/acia</td>
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<td>-ism</td>
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<td>Origin and Category</td>
<td>English Spelling</td>
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<td>Greek Verbs</td>
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<tr>
<td>Latin Nouns</td>
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<tr>
<td>Latin Adjectives</td>
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<td>-able</td>
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<td>-al/ial</td>
<td>-al</td>
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</tr>
</tbody>
</table>

In English, the process of suffixation may produce phonological shifts and spelling modifications in the root. Not all suffixes produce a phonological shift on the stem— all Germanic suffixes are neutral, while several Greek and Latin suffixes trigger phonological changes. Alterations include changing a soft sound for a hard one after a suffix is added (e.g., *reduce* – *reduction*) as well as modifications in the position of the stressed syllable (e.g., *extreme* – *extremist*). Although in some instances derivational suffixes may produce similar phonological changes in Spanish (e.g., *reducir* – *reducción, réplica-replicar*), it is a much rarer phenomenon than in English. Another unique aspect of English morphological processes is the effect of suffixation on syllable boundaries. In the presence of derivational
suffixation, the internal syllabic structure of several words changes. For example, in the
derivation of signal from sign, the letter “n” becomes part of a different syllable; similarly, in
bomb, bombard, and bombardier, the syllabic distribution changes each time a new suffix is
added.

**Compounding**

While inflectional and derivational morphemes are extremely rare in Chinese, compounding
is a resourceful word generation feature in this language; more than 75% of Chinese words
are compounds (Taylor & Taylor, 1995). Chinese and English have similar compounding
rules. In both languages, compound words are formed by combining words from either the
same or different categories (noun, verb, adjective, particle, or adverb). Both English and
Chinese are right-headed, which means that the word on the right is the head and the one on
the left is the modifier. For example, dish soap is a soap used to clean dishes, but a soap dish
would be a dish to put soap in. Another shared feature is that a compound word can be
formed by up to five nouns modifying each other in a cumulative sequence, e.g., fire alarm
usage handbook, 火警钟使用手册.

Compounding is much less productive in Spanish than in English and Chinese. In
Spanish, word combinations in the compounding process fall into only four categories: noun
+ noun, verb + noun, noun + adjective, and noun + adverb. By contrast, in English there are
at least eleven different combinations: adjective + noun, adjective + noun-ed, noun +
adjective, verb + noun, noun + verb-ing, verb-ing + noun, noun + verb-er, noun + noun,
particle + verb, verb + particle, and adverb/particle + noun. Furthermore, while the most
common combination in Spanish is verb + noun, in English the most productive category is
noun + noun (Whitley, 1986). A particularly interesting feature of Spanish compound
morphology is the left-headedness of compounds formed by two nouns (e.g., *perro policía*, *police dog*), that is, the modifier follows the head.

**The Development of Morphological Awareness across Several Languages**

Compound awareness develops at an early age across languages such as English, French, Spanish and Chinese (e.g., Casalis & Louis-Alexandre, 2000; Clark & Berman, 1987; Ku & Anderson, 2003; Nicoladis, 1999, 2003). It has been observed that three- and four-year old monolingual English-speaking children are able to understand the meaning of novel compounds and produce them by combining familiar morphemes (Nicoladis, 2003). Similar findings have been reported in Chinese kindergartners and second graders (McBride-Chang, Shu, Zhou, Wat, & Wagner, 2003). Despite its early development, there are individual differences in compound awareness among older children (Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003), especially when the compound task requires manipulation of complex compounds with more than two constituent morphemes, with low-frequency compounds, or with phonological shifts (e.g., stress alterations). In a cross-cultural comparative study, Ku and Anderson (2003) observed a steady increase in compound awareness from grade two to grade six among native speakers of Chinese and native speakers of English. No previous research has examined the development of compound awareness among ELLs. Because ELLs have more limited exposure to English than native speakers do, their compound awareness may continue to develop beyond their elementary school years.

Being a much more complex system, English derivational awareness emerges later than compound morphological awareness and continues to develop from elementary to high
school years (Derwing & Baker, 1979; Derwing, Nearey, & Dow, 1986; Nagy et al., 2003; Tyler & Nagy, 1989; Windsor, 1994). Anglin (1993) observed that monolingual English-speaking children experienced accelerated growth in derived words between grades three and five, presumably due to increased awareness of the internal structure of words. Development of the three aspects of derivational morphological awareness – relational, syntactic, and distributional – does not happen simultaneously. Children become sensitive to relational properties at a relatively early age (e.g. at age 4, Clark & Cohen, 1984), while distributional and syntactic sensitivity take longer to develop and involve greater awareness (Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). Tyler and Nagy observed that children displayed the ability to recognize a familiar stem in a derivative (relational awareness) before fourth grade. They also noticed that overgeneralization errors (a sign of initial stages of awareness) related to the distributional properties of suffixes increased with grade six students, while sensitivity to the syntactic properties of derivational suffixes increased through eighth grade.

Children’s ability to understand the relationship between the stem and the suffix in English morphologically complex words and to recognize syntactic properties of derivational morphemes seems to depend on whether the suffix is neutral (Carlisle, 2000; Carlisle & Stone, 2005; Jones, 1991; Kiparsky, 1982; Tyler & Nagy, 1989). Neutral suffixes such as –ness, -er, -ize, and –ment, are added to free morphemes\(^2\) and are used frequently. These suffixes do not cause orthographic or phonological shifts to the stems to which they attach and do not obscure the meaning of the stem. On the other hand, non-neutral suffixes such as –ity, -ify, -ous, or –ive, usually attach to bound morphemes\(^3\) and are used with less regularity.

\(^2\) Free morphemes are stems that can stand on their own.

\(^3\) Bound morphemes are stems that cannot stand on their own; they need a suffix.
These suffixes produce phonological and orthographic changes in the stems to which they attach and have less transparent semantic relationships with their stems than do neutral affixes. Neutral suffixes seem to develop before non-neutral suffixes (e.g., Carlisle & Fleming, 2003; Carlisle & Nomanbhoy 1993; Dale & O’Rourke, 1976; Gordon, 1989). For example, Gordon (1989) found that children aged 5, 7, and 9 recognized neutral-suffixed words at a higher rate than non-neutral suffixes, regardless of the frequency status of the word. Carlisle and her colleagues showed that first graders’ awareness of derivations is largely limited to transparent and common forms. It was not until grade three that children became more adept in decomposing less familiar and non-neutral derived words.

The most advanced level of morphological awareness is distributional knowledge (Tyler & Nagy, 1989) and is developed after relational and syntactic knowledge. This form of awareness involves knowing that with a few exceptions, most suffixes attach to only one of the four syntactic categories: nouns, verbs, adjectives, and adverbs (e.g., -ize indicates a verb). It is believed that distributional awareness “lag[s] behind the acquisition of relational and syntactic knowledge, because without being able to recognize the stem in a complex word or differentiate different syntactic categories, one can hardly see the distributional constraints on derivational suffixes” (Kuo & Anderson, 2006, p. 167). In a cross-language study of English- and Chinese-speaking children at second, fourth, and sixth grades, Ku and Anderson (2003) found that second and fourth graders in both language groups did not perform significantly above chance in distinguishing well-formed and ill-formed derivatives. According to Ku and Anderson (2003) these results suggest that distributional knowledge may not be acquired until the late elementary grades in both English and Chinese. These researchers also found that derivational awareness took longer to develop in Chinese children.
To my knowledge, the Ku and Anderson (2003) study is the only one that compares children’s development of derivational awareness across English and Chinese. There are no known studies that examine the development of derivational awareness in Spanish-speaking children. Similarly, the developmental trajectory of English derivational awareness in ELLs is unknown.

**Morphological Awareness and Reading-related Skills**

*Morphological Awareness and Phonological Awareness*

A morpheme encodes both phonological and semantic information. Therefore, there is an amount of overlap between phonological and morphological awareness skills, as confirmed by strong correlations between these two skills (Fowler & Liberman, 1995; Shankweiler et al., 1995). Because of this overlap, to understand the contribution of morphological awareness to reading, we also need to know to what extent this contribution is distinct from that of phonological awareness (Nagy et al., 2006). There are contrasting positions explaining the nature of the associations among phonological awareness, morphological awareness, and reading. Some researchers (e.g., Fowler & Liberman, 1995; Shankweiler et al., 1995) speculate that the relationship between morphological skills and reading is a derivative of the relationship between phonological skills and reading. By contrast, others argue that morphological awareness contributes to reading independently of the shared variance with phonological awareness (e.g., Carlisle & Nomanbhoy, 1993; Deacon & Kirby, 2004; Mahony, Singson, & Mann, 2000; Singson et al., 2000).

Phonological awareness (PA) refers to the insight that spoken words consist of smaller units of sound. A wealth of research exists demonstrating that, in kindergarten and
early elementary school, PA is the strongest predictor of word reading in both English monolinguals and ELLs (Blachman, 2000; Geva, 2000; Hulme, Hatcher, & Nation, 2002; Kirby, Parilla, & Pfeiffer, 2003; Lesaux & Geva, 2006; MacDonald & Cornwall, 1995; McBride-Chang, 1995; Stanovich & Siegel, 1994) and a strong contributor to reading comprehension both concurrently and longitudinally (Verhoeven, 1990; see Yaghoub Zadeh et al., 2008 for a meta-analysis) primarily through its influence on word reading. At about grade four, however, the role of PA in reading begins to be surpassed by that of morphological awareness (Nagy et al., 2006).

Methodological variations (e.g., phonologically transparent vs. obscure words) may partly explain the inconsistency in results examining the association between morphological skills, phonological awareness, and reading. It is likely that when new words are phonologically transparent EL1 children draw mostly on phonological skills, while when new words are opaque and multimorphemic they use morphological analysis skills (e.g., Nagy et al., 2006). Inconsistencies across studies may also be the result of age sampling differences. After grade four, the importance of morphological awareness tends to surpass that of phonological awareness (Carlisle, 2000; Green et al., 2003). As children get older, reading vocabulary becomes more morphologically complex (Mann, 2000) and increasingly different from their oral vocabulary. It is therefore not surprising to find that while phonological awareness plays a stronger role in basic reading skills (e.g., word reading) at earlier stages of literacy instruction, morphological awareness plays a more prominent role than phonological awareness in later elementary and secondary school literacy development.
The Role of Morphological Awareness in Word Reading

The significant role that morphological awareness plays in word reading is well established in monolingual English speakers (e.g., Carlisle, 1995, 2003; Singson et al., 2000). Research has consistently demonstrated that morphological awareness explains unique variance in word reading after other reading related variables are controlled for (e.g., Carlisle & Nomanbhoy, 1993; Fowler & Liberman, 1995; Singson et al., 2000). For example, Singson et al. demonstrated that knowledge of derivational suffixes made a unique contribution to decoding over and above vocabulary and phonemic awareness. In particular, a small number of studies have demonstrated a specific link between morphological awareness and reading morphologically complex words (Carlisle, 2000; Nagy et al., 2003, 2006). In a study involving English-speaking children from grade four to grade eight, Nagy et al. (2006) found that morphological awareness was more closely related to the decoding of words that were morphologically complex than to words that were relatively simple.

There are two reasons why morphological awareness may contribute to word reading in English. First, English has a ‘deep’ orthography, which encodes both phonological and morphological information. A morpheme tends to preserve the same spelling when it undergoes a phonological shift due to affixation, for example, heal-health; and a phoneme often has different spellings when it represents different morphemes, for example, two-too. Thus, morphological awareness provides insights about the mapping between print and speech in addition to the alphabetic principle (Kuo & Anderson, 2006; Nagy et al., 2003, 2006). Second, English has many polysyllabic words that are morphologically complex, for example, sleeplessness. The simple ‘sounding out’ strategy may not be very efficient with these long words. By enabling children to recognize constituent morphemes within a word,
morphological awareness improves the accuracy and fluency of decoding (Carlisle, 2000; Nagy et al., 2003, 2006).

The existing literature highlights the importance of morphological awareness in reading deep orthographies such as English and French. Different from English, Spanish has a shallow orthography with a near perfect correspondence between phonemes and letters. Because of the phonological transparency of Spanish, researchers have to date tended to emphasize the importance of phonological recoding in Spanish word reading (e.g., Goswami, Gombert, & de Barrera, 1998; Signorini, 1997; Ziegler & Goswami, 2006). Often overlooked is the fact that Spanish is also a language with a rich and complex derivational system. In spite of the transparent correspondence between letters and sounds in Spanish, morphological awareness may be related to reading success by improving the reading accuracy and fluency of morphologically complex words.

Previous studies conducted in Finnish and Italian suggested that morphological awareness facilitates reading in shallow orthographies (e.g., Burani, Dovetto, Spuntarelli, & Thornton, 1999; Burani, Marcolini, & Stella, 2002; Lyytinen & Lyytinen, 2004; Müller & Brady, 2001). Müller and Brady (2001) observed that for Finnish first graders, a measure of inflectional forms explained unique variance in reading fluency after controlling for vocabulary, naming speed, and listening comprehension. Burani et al. (2002) found that Italian children aged 8 to 10 years named pseudo-derived forms faster and more accurately than pseudowords matched for orthographic-phonological properties but with no morphological constituency. These results indicated that morphological strategies are available and productive for young Italian readers, and provide a point of reference for my research as Italian is very close to Spanish in terms of morphology.
Few studies have examined the role of morphological awareness in Spanish language and literacy development. There is some limited evidence that morphological awareness is associated with language proficiency and vocabulary growth in Spanish (e.g. Auza, 2003; Morin, 2003; Restrepo, 1998). García and González (2006) found that a morphological awareness task measuring judgment and production of inflections and derivations was strongly correlated with vocabulary, spelling, and composition among monolingual Spanish-speaking children from grade 3 to grade 6. This study, however, did not control for other reading related variables such as phonemic awareness. Using primed lexical decision tasks, a number of studies have shown that adult Spanish readers identify morphological complex items faster than other items (e.g., Alvarez, Carreiras, & Taft, 2001; see Dominguez, Cuetos, & Segui, 2000, for a comprehensive review). These studies suggest that morphology is represented in the mental lexicon of Spanish readers. No previous studies, however, have directly assessed the contribution of morphological awareness to Spanish word reading. Given the morphological complexity of Spanish and findings of previous studies involving Spanish and other shallow orthographies, I anticipate that morphological analysis is beneficial for word reading in Spanish.

*The Role of Morphological Awareness in Vocabulary Acquisition*

Children’s awareness of the morphological structure of words has been found to be correlated with vocabulary knowledge (Carlisle & Fleming, 2003; Nagy et al., 2003; Singson et al., 2000). It has also been found that children with more advanced morphological awareness have an advantage in acquiring new vocabulary (see Reed, 2008). For example, Freyd and Baron (1982) found that compared to average readers, good readers used
derivational rules more frequently and were faster at learning derived words. In another study, Wysocki and Jenkins (1987) observed that sixth- and eighth-grade students were better able to deduce the meaning of a root word (e.g., anxiety) than fourth-grade students, if they had already learned a related derived word (e.g., anxious). The ability to manipulate morphemes to create new words plays a significant role in predicting vocabulary knowledge; this has been observed even after accounting for other factors such as phonological processing, word reading, and age (e.g., McBride-Chang et al., 2005; Nagy et al., 2006).

A body of research indicates that the importance of morphological awareness in learning vocabulary increases with age (Carlisle, 2000; Carlisle & Fleming, 2003; Nagy et al., 2006; Nagy et al., 2003). For example, Nagy et al. (2003) found the relationship between morphological awareness and vocabulary knowledge to be stronger in fourth grade than in second grade. Anglin (1993) reported that students’ morphological awareness skills got better in later grades. This may partly explain the incremental importance of morphological awareness in learning new words throughout the school years. As the students sharpen their ability to analyze words using morphological clues, they become more able to use this strategy to acquire new vocabulary.

Morphological awareness contributes to vocabulary knowledge in several ways. First, understanding the morphological structure of complex words enables children to infer the meanings of these words from constituent morphemes. Morphologically complex words make up approximately 60% of the new vocabulary encountered by school-aged children, and the constituent morphemes of these words are familiar enough to make a reasonable guess about their meanings (Nagy & Anderson, 1984). In addition, knowledge of
morphemes’ syntactic properties and their distributional rules help children understand and produce new vocabulary more effectively, particularly in sentence contexts.

Most research on morphological awareness has involved children who are native speakers of English. Little is known, however, about the role of different aspects of morphological awareness in vocabulary development among ELLs. As Carlo (2007) asserts, morphological awareness may be particularly important in accelerating the vocabulary growth of ELLs as an alternative strategy to deducing meaning from context. According to research with monolinguals, repeated incidental exposure to new words contributes to vocabulary acquisition (Biemiller & Boote, 2006; Swanborn & de Glopper, 1999). However, learning from context requires knowledge of a high proportion of the surrounding words. When many of these words are unknown, are morphologically complex, or conceptually advanced, it is very unlikely for incidental vocabulary learning to occur (Nagy, Anderson, & Herman, 1987). Monolinguals can often extract meaning by interpreting clues provided by surrounding words. This strategy may be of little help, however, for ELLs due to their low levels of vocabulary knowledge. For this reason, morphological awareness may be more important for ELLs than for monolinguals.

No studies to date have examined the contribution of morphological awareness to vocabulary among ELLs; only indirect evidence exists. Carlo et al. (2004) carried out an intervention study aimed at increasing the breadth and depth of word knowledge in fifth grade Spanish-speaking ELLs. Children were trained, among other things, to infer meaning from context by using roots, affixes and morphological relationships. The ELLs improved on several measures of vocabulary by the end of the intervention. Based on this observation it
was hypothesized that training on morphological awareness may have a positive effect on vocabulary, but this hypothesis has yet to be tested.

**The Role of Morphological Awareness in Reading Comprehension**

An important question one may ask about morphological awareness is whether it facilitates reading comprehension. A small number of studies have demonstrated that morphological awareness is significantly associated with reading comprehension among monolingual children (e.g. Carlisle, 2000; Carlisle & Fleming, 2003; Casalis & Louis-Alexandre, 2000; Deacon & Kirby, 2004; Mahony, 1994; Nagy et al., 2003, 2006). In a study with high school and college students, Mahony et al. (2000) observed that sensitivity to the syntactic properties of derivational suffixes was positively related to scores on the Nelson Reading Test, a combined measure of vocabulary, comprehension, and reading fluency. Similarly, Carlisle (2000), in a study of third- and fifth-grade English-speaking children, found that awareness of the structure and meaning of derived words was uniquely associated with reading comprehension in both grades. Additional evidence comes from Carlisle and Fleming (2003), who also observed a contribution of semantic and syntactic knowledge of morphemes to reading comprehension in another sample of third and fifth graders.

Some studies report that morphological awareness makes a unique contribution to reading comprehension even after controlling for cognitive ability and oral language. For example, Casalis and Louis Alexandre (2000) found that morphological awareness explained 35% of the variance in reading comprehension after taking into account verbal and non-verbal intelligence and vocabulary among French-speaking second graders. Deacon and Kirby (2004) showed in a longitudinal study that morphological awareness measured in the second grade predicted reading comprehension two and three years later, even after
controlling for phonological awareness, as well as verbal and non-verbal intelligence. The incremental importance of morphological awareness throughout children’s school years has been attributed to the increasing number of morphologically complex words that children encounter in academic texts (Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). In addition, morphological awareness seems to also be correlated with struggling readers’ ability to comprehend texts. Nagy et al. (2003) found that for second-grade at-risk readers, morphological awareness accounted for unique variance in reading comprehension over and beyond its shared covariance with other language predictors (phonological and orthographic awareness and oral vocabulary) and was the strongest predictor among the factors considered in the model.

Aside from meaning construction, morphological awareness may be related to reading comprehension through its role in syntactic parsing (Mahony, 1994; Nagy et al., 2006; Tyler & Nagy, 1989). Being able to extract the syntactic information that suffixes carry enables readers to anticipate the grammatical category of surrounding words and helps them to identify the syntactic structure of a sentence. This, in turn, may facilitate accurate semantic associations between words and clauses, and ultimately lead to successful text comprehension.

Whether the same relationship between morphological awareness and reading comprehension found in English exists in Spanish remains an open question. Studies conducted in Finnish, another shallow orthography which also has a highly inflected morphology, seem to suggest that morphological awareness is important in these orthographies (Lyytinen & Lyytinen, 2004; Müller & Brady, 2001). Müller and Brady (2001) found that performance on a measure of inflectional forms explained unique variance in the
reading comprehension of Finnish first graders after accounting for vocabulary, naming speed, listening comprehension, and phonemic awareness.

There is some recent evidence that for ELLs, as for monolinguals, morphological awareness plays an increasingly important role in reading comprehension. Kieffer and Lesaux (2008) followed Spanish-speaking ELLs from grade four to grade five and found that derivational morphological awareness in grade four significantly predicted reading comprehension a year later, after controlling for other reading related variables. Moreover, they found that the relationship between morphological awareness and reading comprehension strengthened from grade four to grade five. The contribution of morphological awareness to reading comprehension has also been observed in ELLs with Chinese L1. Wang, Cheng, and Chen (2006) examined compound and derivational awareness in a mixed-grade sample (grade one to four) of Chinese-speaking ELLs. In this study, as well, ELLs’ morphological awareness in English made a unique contribution to both word reading and reading comprehension over and above age, grade, vocabulary and phonological awareness. To date, these are the only two studies which have examined the association between morphological awareness and reading comprehension in ELLs.

To summarize, evidence of a strong relationship between morphological awareness, vocabulary development, and reading comes mostly from studies with monolingual learners. Relatively little is known about the development of morphological awareness and its relationship with vocabulary and reading in ELLs. Moreover, the majority of EL1 and EL2 studies available to date have focused on primary school learners. There is an alarming dearth of research examining factors associated with the reading development of ELLs in upper elementary and middle school (August & Shanahan, 2006).
The Role of Cognate Words in the Literacy Development of Spanish-speaking ELLs

Cognates are words that share a historical origin and that have similar spelling and meaning across languages (Whitley, 2002). Spanish and English share an enormous number of cognates. Even when there are spelling differences, the saliency and frequency of correspondence patterns (e.g., *action-acción, nation-nación, curious-curioso, delicious-delicioso*) make it easy to guess the meaning of the word in the other language. “Cognates in English and Spanish account for one-third to one-half the average educated person’s active vocabulary, estimated at 10,000 to 15,000 words” (Nash, 1997, p. viii).

There is a substantial body of studies, mostly involving adults, documenting the facilitating role of cognate words in second language learning (see Moss, 1992). The more the L2 is related to the L1, the greater the language learner will benefit from the existence of cognate words, and even if the full meaning of these words is not thoroughly known, some familiarity with them helps a reader to accomplish smooth reading (Ringbom, 1992).

A particularly interesting aspect of Spanish-English cognates is that a substantial number of them are commonplace in Spanish but low in frequency in English, appearing mostly in academic contexts (Cunningham & Graham, 2000). The majority of cognate words shared between English and Spanish come from Latin words used during medieval times to discuss scholarly matters and thus nowadays appear in English scientific and academic texts (Bravo, Hiebert, & Pearson, 2007). Because of this, cognate awareness may accelerate Spanish-speaking ELLs’ vocabulary development and enhance their reading comprehension (August & Shanahan, 2006; August et al., 2005; Malabonga, Kenyon, Carlo, August, & Louguit, 2008).
A group of studies have examined the use of cognates by Spanish-speaking ELLs. Jimenez, Garcia, and Pearson (1996) investigated the metacognitive strategies of sixth and seventh grade Spanish-speaking ELLs who were successful readers. The researchers found that participants used cognate strategies to understand English narrative and expository passages. Similarly, Nagy, Garcia, Durgunoglu, and Hancin-Bhatt (1993) found a strong relationship between the ability to recognize cognates and the reading comprehension skills of Spanish-English bilingual children in elementary school, even after controlling for Spanish and English vocabulary knowledge. In another study with Spanish-speaking ELLs in fourth, sixth, and eighth grade, cognate and morphological awareness were found to be closely related (Hancin-Bhatt & Nagy, 1994). The researchers investigated two levels of morphological knowledge that contribute to Spanish-English bilingual students' ability to recognize cognates: (1) the ability to recognize a cognate stem within a suffixed English word, and (2) knowledge of systematic relationships between Spanish and English suffixes (e.g., the fact that English words ending in "-ty" often have a Spanish cognate ending in "-dad"). The participants were asked to give the Spanish equivalent for English words, some of which had derivational and inflectional suffixes. Results indicated that the participants recognized cognate stems of suffixed words more easily than non-cognate stems, suggesting that in closely related languages such as Spanish and English the morphological knowledge of bilingual speakers of these two languages is likely affected by cognate vocabulary (Hancin-Bhatt & Nagy, 1994; Nagy et al., 1993). Results also indicated that students' ability to translate cognates increased with age above and beyond any increase in their vocabulary knowledge in Spanish and English.
While a large portion of the English vocabulary may already exist in the lexicon of Spanish-speaking ELLs, a very limited number of English words would exist in the lexicon of Chinese-speaking ELLs before they started to learn English. Given that English-Chinese cognates are rare, it is very unlikely that cognates facilitate Chinese-speaking ELLs’ literacy development. Therefore, in the current research I examined the facilitating role of cognates in the literacy development of Spanish-speaking ELLs only.

**Similarities and Differences in the Literacy Development of ELLs and Monolinguals**

There is some evidence that the reading development of ELLs is in many ways similar to that of native English-speaking children (see Lesaux, Koda, Siegel, & Shanahan, 2006; Lipka, Siegel, & Vukovic, 2005). Phonological processes, including phonological awareness, rapid naming, and working memory are important for reading development in both groups of children (e.g., Geva & Yaghoub-Zadeh, 2006; Geva, Yaghoub-Zadeh, & Schuster, 2000; Lesaux & Geva, 2006; Lesaux, Rupp, & Siegel, 2007). In particular, phonological awareness is critical for reading success among both native English speakers and ELLs (August & Shanahan, 2006; Lesaux & Geva, 2006; Lesaux & Siegel, 2003).

There is also emerging evidence that morphological awareness can help to identify reading and language difficulties in both English native speakers and ELLs (e.g., Restrepo, 1998; Siegel, 2008). Restrepo observed that the ability to learn novel bound-morphemes in Spanish discriminated between Spanish-English bilingual children with normal language development and those with language impairment. The results were similar to those of comparable research with native English speakers (e.g., Gavin, Klee, & Membrino, 1993). In a large-scale study that included 1,238 sixth graders, Siegel (2008) examined the contribution
of morphological awareness to reading in average and below average readers, some of whom were English monolinguals and others ELLs. She found that morphological awareness made a significant contribution to reading beyond the contribution of phonological awareness and oral language skills, and that morphological awareness discriminated between good and poor readers in a similar way for the English L1s as for the ELLs. These findings indicate that morphological awareness discriminates between normal and struggling readers regardless of their language status (ELLs vs. English native speakers).

Despite the similarities between ELLs and native speakers of English identified above in the predictors of reading performance, differences also exist. The differences between ELLs and their native-English-speaker peers are in the levels of performance on precursors of reading, oral language, and reading itself (August et al., 2005). Some of these differences decrease throughout schooling, while others remain constant. ELLs with little or no English proficiency scored lower on phonological processing and decoding than did native English-speaking children at school entry (e.g., Chiappe, Siegel & Gottardo, 2002), but were able to catch up with and even surpass their L1 peers in a few years (e.g., Chiappe, Siegel, & Wade-Woolley, 2002; McBride-Chang & Kail, 2002). In contrast, ELLs continued to experience difficulties in vocabulary and reading comprehension in high school and beyond (National Center for Education Statistics, 2006). Because of the close relationship between morphological awareness and vocabulary, ELLs may also lag in morphological awareness. Carlo et al. (2004) found that grade five Spanish-speaking ELLs had lower derivational awareness than those of native speakers. However, there may have been a confounding of language status and SES; the Spanish-speaking ELLs had lower SES than
their English-speaking peers. It is possible that SES, not language status, could have been the reason for the difference observed in derivational awareness.
CHAPTER 3. CROSS-LINGUISTIC ASSOCIATIONS

Theoretical Considerations of Cross-linguistic Transfer

Reading is the process of extracting and constructing meaning from language presented in print. Reading builds on oral language competence and therefore, learning to read requires making links between a language and its writing system (Koda, 2007). To understand the reading development of learners who speak more than one language, it is necessary to consider several aspects: (a) the typology of the languages involved; (b) the learner’s knowledge of each language; (c) the learner’s cognitive, literacy and metalinguistic skills; and (d) the mechanisms of cross-linguistic influences. Pioneering work in second language acquisition research offers a foundation for theories of second language (L2) reading.

A major endeavor of L2 acquisition researchers has been to understand the effects of a speaker’s first language (L1) on learning a second or a third one. These investigations can be classified into two groups: one is dominated by studies focusing on the negative effects of one language upon the other (see Dechert & Raupach, 1989; Odlin, 1989), and the other group considers the process of language interaction as a facilitating device in the development of the L2 (e.g., Cummins, 2000; Genesee, Geva, Dressler, & Kamil, 2006). The former research has mainly dealt with issues related to the acquisition of a second-language grammatical and phonological system, and is represented by studies which focus on learners’ errors that reflect characteristics of their L1. More recent research has examined a more comprehensive array of aspects of language learning such as lexical units and meta-linguistic skills, and assumes that skills acquired successfully in one language are transferred to the second language.
It is widely accepted that the transfer of knowledge and skills from L1 plays a role in L2 acquisition and L2 reading. However, the conceptualization of how cross-linguistic transfer operates remains controversial. Dechert and Raupach (1989) provided a list containing 17 different definitions of the term ‘transfer’. This illustrates the ambiguity of the term and the lack of consensus among researchers when referring to this concept. Twenty years later, we are still facing the same dilemma. The definitions range from too narrow to extremely broad and from purely linguistic to cognitive perspectives. Recent conceptualizations argue for the use of a more inclusive definition that incorporates both cognitive and linguistic aspects as well as learning strategies and other problem-solving skills (e.g., August & Shanahan, 2006; Genesee et al., 2006).

The process of L2 learning and the relationship between skills in first and second languages have been conceptualized within different theoretical frameworks. For example, Contrastive Analysis guided the pioneering efforts of cross-linguistic research; Universal Grammar underscores common features across all languages; developmental frameworks attribute developmental factors in specific aspects of L1 to acquisition of similar aspects in L2; the Linguistic Interdependence Hypothesis emphasizes the transfer of linguistic as well as academic and cognitive skills; Current frameworks of cross-linguistic relationships in L2 language and literacy learning bring attention to underlying cognitive abilities. Of relevance to the present study are Contrastive Analysis, Universal Grammar, developmental theories, Processability Theory, the Competition Model, the Linguistic Interdependence Hypothesis, and new conceptual paradigms. In the following sections I discuss the main points of these theoretical positions in relation to the transfer of language and literacy skills in general and of morphological skills in particular.
Contrastive Analysis

The Contrastive Analysis Hypothesis focused on the influences of the learners’ first languages on the additional languages acquired (e.g., Lado, 1957; Levenston, 1971; Weinreich, 1968). Lado argued that comparisons of a learner’s first language with the second or subsequent languages reveal commonalities and differences among the languages. He postulated that a language learner would find it easy to acquire areas of the second language that are similar to his/her native language and by contrast, would experience difficulty learning language structures and elements that greatly differ cross-linguistically. In spite of the acknowledged contributions that Contrastive Analysis has made to second language acquisition theory, it has also been widely criticized. Some researchers observed inaccuracy in the predictions of Contrastive Analysis Hypothesis (e.g., Andersen, 1978; Gass, 1988; Lee, 1968). The difficulty or easiness of acquiring a target language structure was not always directly associated with whether the structure existed in the learner’s native language. Moreover, error analysis research showed that mistakes made by a second language learner were similar to those made by children who were native speakers of the target language (Bailey, Madden, & Krashen, 1974). For example, according to typological similarities between English and Spanish, errors related to the use of the verb to be would not be expected. However, several studies have observed omission of this verb in Spanish speakers learning English, similar to native English-speaking children (e.g., Butterworth & Hatch, 1978; Peck, 1978; Shapira, 1978).

From the Contrastive Analysis Hypothesis perspective, phonological but not morphological aspects are eligible for cross-linguistic transfer. According to Kellerman (1977), bound morphemes are language specific and therefore unlikely to transfer. However recent research provides evidence of the cross-linguistic transfer of morphological skills
(e.g., Bindman, 2004; Deacon, Wade-Woolley, & Kirby, 2007; Ku & Anderson, 2003; Wang et al., 2006) and thus challenges Kellerman’s assumptions. This evidence suggests that there are overlapping morphological features across pairs of languages that facilitate transfer of morphological awareness skills from one language to the other. Studies on cross-linguistic transfer of morphological skills will be reviewed in more detail later in this chapter. Given the limitations of interpreting cross-linguistic interactions within the Contrastive Analysis Hypothesis framework, Universalist and developmental explanations have appeared as alternative theories for second language acquisition.

**Universal Grammar**

Chomsky’s transformational-generative grammar theory has exerted a major influence in the effort to understand how languages are learned and sources of difficulty in L2 learning. Central to Chomsky’s theory is the hypothesis that all humans are born with an innate mechanism to learn languages and that all natural languages share the same underlying structure. According to this position, the differences among languages are superficial and a deeper examination should reveal the same underlying principles in widely differing languages. This argument has been used by some bilingual researchers to support the view that if children are born with a language device, learning several languages is a natural process that can take place if environmental requirements (e.g., enough language exposure) are provided (Genesee, 2001). Chomsky’s more recent work has shifted from a search for the universal rules of grammar to a refinement of his theory, providing an account of principles and parameters. Principles are grammar aspects common to all languages (e.g., all languages have a subject) and parameters are syntactic variations across languages (Chomsky, 1981, 1982, 1986). The distinction between these two aspects of grammar is referred to by
linguists as *markedness*. Linguistic features that are not generated by the principles and parameters of Universal Grammar are called *marked* linguistic features (e.g., irregular, infrequent, and semantically opaque forms). Core grammar, which is generated from Universal Grammar’s fixed invariant principles, is unmarked, meaning that similar rules apply across several languages.

In second language acquisition research, the Differential Hypothesis considers an additional factor that restricts transfer (Eckman, 1977). Eckman integrates Contrastive Analysis Hypothesis and markedness relations stated in Universal Grammar to note that the areas of difficulty that a language learner will have are not only the results of the differences between L1 and L2, but also of the degree of those differences as measured by saliency and complexity (degree of markedness). Thus, those areas of the target language which are different and more complex than in the native language will be difficult to learn, and the relative degree of difficulty will correspond to the relative degree of markedness.

Analyses of markedness in cross-linguistic research have mainly focused on L2 phonology and in a few occasions on the effect of L1 morpho-syntax on the acquisition of parallel or divergent L2 structures. For example, Carlisle (1998) used a criterion measure of 80 percent accuracy in production to examine the acquisition of English syllable onsets in a markedness relationship (based on length of the onsets) by native speakers of Spanish. In 90 percent of the cases, the more marked structure was acquired after the corresponding unmarked structure had been acquired. Observing Mandarin speakers learning English, Hansen (2001) noticed that in 73 percent of the items, the learners modified marked syllable structures in favor of shorter and less complex ones. This demonstrated that the learners knew how to use simple syllable structures (unmarked), but that they had not mastered the
more complex (marked) ones yet. Askildson (2008) investigated L2 acquisition of French object pronominal clitics in native speakers of English and Spanish. Results revealed that Spanish speakers outperformed English speakers. The researcher argued that the degree of markedness of French object pronominal clitics facilitated native-Spanish speakers’ performance and inhibited native-English speakers. Given the similarities of the clitic pronoun phenomenon between Spanish and French, the highly accurate performance of the Spanish participants suggests that they transferred elements from their L1 morpho-syntactic knowledge. Taken together, these studies provide support for the cross-linguistic transfer of language features.

Eckman’s Markedness Differential Hypothesis provides a useful framework that refines the Contrastive Analysis Hypothesis framework. It also accounts for the contributions of Universal Grammar to the understanding of the role of L1 in L2. However, the framework is incomplete because cognitive factors, developmental processes, and language and literacy proficiency are not taken into account.

**Developmental Theories**

Along with explanations of second language acquisition accounting for similarities and differences between languages, and for degree of markedness of language features in L1 and L2, another group of researchers turned to observations of developmental patterns in the order of acquisition of discrete syntactic, morphological, phonological, and semantic elements (e.g., Corder, 1971, as cited in Richards, 1974; Selinker, 1972). These researchers noted that learners acquiring a new language displayed very similar patterns to the ones observed in children’s L1 process of acquisition. That is, despite individual differences, L2 learners seemed to display a systematic pattern of language acquisition regardless of their L1

Of particular relevance to my dissertation research is a group of empirical studies that has become known as the morpheme studies (see Goldschneider & DeKeyser (2005) for a meta-analysis of this research). The main goal of L2 morpheme acquisition studies was to identify whether the same fixed order that had been found for L1 morpheme acquisition (Brown, 1973) existed for L2 acquisition. For example, Dulay and Burt (1973, 1974) studied Spanish-speaking children aged six to eight in several cities in Mexico and the USA. Despite children’s various degrees of exposure to the target language (English), the morpho-syntactic aspects examined (e.g., plural –s, third person –s) from their speech samples displayed a systematic order of acquisition. Dulay and Burt concluded that a fixed order existed for acquisition of the inflectional morphemes –ing, -ed by English L2 learners. This order, however, was noticed to be different to the one observed by Brown (1973) in English L1 speakers. Similar findings were confirmed in studies with adults (e.g., Bailey et al., 1974; Krashen & Scarcella, 1978; Larsen-Freeman, 1976). Larsen-Freeman also noticed that in her study the order of acquisition was affected by oral vs. written administration of the task.

Evidence accumulated from the studies comparing L2 and L1 morpheme acquisition motivated scholars to propose hypotheses outlining the order of acquisition for L2 morphemes and grammar features. For example, a Natural Order Hypothesis proposed by Krashen (1977, as cited in Krashen, 1982), was based on data elicited from ESL learners. According to this hypothesis, ESL learners acquire the –ing form, the plural and the copula in the first stage, auxiliaries and articles in the second stage, irregular pasts in the third stage, and regular pasts, 3rd person –s and possessives in the fourth stage.
The studies on the order of acquisition of morphemes have been criticized with respect to methodological issues. Ellis (1990) pointed out that these studies seemed to measure the accuracy of use rather than the order of acquisition, thus providing a misleading interpretation. A morpheme cannot be assumed to be acquired unless its function has been fully understood (Ellis, 1990; Hatch, 1983). More recent evidence on the developmental sequence for language forms suggests that there is more ordinal variation than what was initially believed, and that there might be multiple paths and processes in language acquisition (McLaughlin, 1987).

A recent meta-analysis of the L2 morphology acquisition studies (Goldschneider & DeKeyser, 2005), which included data from children and adults, provides interesting insights into different factors that play a role in L2 morpheme acquisition order. This grouping of data allowed for an estimate of the magnitude of the experimental effects across studies and the relative importance of different factors. The researchers examined the contribution of perceptual salience (how easy it is to hear or perceive a given structure), semantic complexity, morphophonological regularity, syntactic category, and frequency to variance in acquisition order of selected grammatical functors (inflections, articles, copulas, and auxiliaries). Results showed that the combination of the 5 predictors explained a large proportion of the variance in acquisition order. This was interpreted as an indication that the order in which the functors are acquired could be explained by the cumulative effect of perceptual salience, semantic complexity, morphophonological regularity, syntactic category, and frequency.
**Processability Theory**

This theory was proposed by Pienemann (1985, 1998, 2005). It proposes six stages in a hierarchy of syntax development, some of which extend to the development of morphology. At the core of Pienemann’s theory is his argument that second language acquisition is constrained not only by learnability but also by processability. Within this framework, “L1 transfer is constrained by the capacity of the language processor of the L2 learner (or bilingual speaker) irrespective of the typological distance between the two languages” (Pienemann, Di Biase, Kawagushi, & Hakansson, 2005, p. 86). The first stage is lemma access, in which single words are accessed without any of their associated features. There is no sense of syntax or morphology. In the second stage words are accessed with their associated features (e.g., word class) and morphemes are present only in the oral domain but do not yet have a relationship with other elements of the sentence. In the third stage grammatical elements are unified at the phrase level (e.g., gender and number agreement). In the fourth stage the processing occurs at the sentence level with interphrasal unification from a salient position (e.g., the end of a clause in verb separation). In the fifth stage the process of interphrasal unification occurs from two non-salient positions (e.g., clause-internal subject-verb agreement). And finally in the sixth stage, which has no morphological equivalents, subordinate clauses are processed.

Despite evidence supporting a fixed sequence of the acquisition of L2 structures (Pienemann, 2005), there is contending evidence that the process of L2 morpheme acquisition is complex and affected by additional factors such as language typology and learners’ perception of a given structure at a specific stage of acquisition (Ellis, 2006). Schumann (1979) argued that because of the existence of *no* (negation) + *verb* in Spanish
grammar (e.g., no tengo, no puedo, in English I don’t have, I can’t) Spanish-speakers learning English find it harder than speakers of other languages to eliminate this error from their L2. That is to say, the characteristics of L1 play a role in L2 acquisition. As the interest in explaining second language acquisition continues to grow, not only linguistic but also cognitive factors have been incorporated in contemporary theoretical orientations of cross-linguistic transfer.

The Competition Model

Whether second language acquisition is driven by the salience of meaning versus form and degree of transparency to establish form-meaning mapping (as stated by Dekeyser, 2005), there are yet other factors that add to the complexity of interpreting when and how English L2 morphemes are acquired. According to the competition model (McWhinney, 1987, 2001) L2 acquisition is governed by general cognition and the communicative function of language structures. From this perspective – radically different from theories operating under concepts of Universal Grammar and Contrastive Analysis – the language learner’s main task is to discover form and meaning mapping of a specific language structure. Establishing form-meaning relationships is a challenging task because grammatical and semantic functions are represented in different ways across languages (e.g., morphemes) and because this association is constrained by their frequency and complexity. Therefore, language learners (as observed in studies with adult immigrants, e.g., Dekeyser, 2000; Yeni-Komshian, Robbins, & Flege, 2001) take time to internalize and productively use L2 morphological representations. Similarly, intermediate English-speaking foreign language students fail to interpret morphological cues to sentence meaning (e.g., MacWhinney, 2001; VanPatten, 2004).
A critical difference between the Competition Model and Processability Theory regarding cross-linguistic transfer is that while the point of departure for the Competition Model is the initial state (L1 knowledge) of the L2 learner, for Processability Theory the point of departure is the processing constraints of a given structure.

*Linguistic Interdependence Hypothesis*

More recent frameworks such as the linguistic interdependence hypothesis proposed by Cummins (1979, 2000) incorporate psycholinguistic and cognitive factors. The linguistic interdependence principle is formally stated as follows: “To the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this proficiency to Ly will occur provided there is adequate exposure to Ly (either in school or environment) and adequate motivation to learn Ly” (Cummins, 1996, p. 111). Cummins’ hypothesis argues that knowing two languages offers general intellectual benefits, such as cognitive flexibility and divergent thinking, increased meta-linguistic awareness, and higher sensitivity to feedback cues in discourse. However, a child will be able to exploit these cognitive and academic benefits only if he/she has a strong academic foundation in the first language (Cummins, 1979, 2000). Elaborating on this point Cummins states:

In concrete terms, what this principle means is that in, for example, a Spanish-English bilingual program, Spanish instruction that develops Spanish reading and writing skills (for either Spanish L1 or L2 speakers) is not just developing Spanish skills, it is also developing a deeper conceptual and linguistic proficiency that is strongly related to the development of literacy in the majority language (English). In other words, although the surface aspects (e.g., pronunciation, fluency, etc.) of different languages are clearly separate, there is an underlying cognitive/academic proficiency that is common across languages. This “common underlying proficiency” makes possible the transfer of cognitive/academic or literacy-related skills from one language to another. (1996, p. 111)
Studies have confirmed the interdependence principle by demonstrating transfer of L1 language and literacy skills to L2 literacy (e.g., Abu-Rabia & Siegel, 2002; Da Fontoura & Siegel, 1995; D’Angiulli, Siegel, & Serra, 2001; Ramirez, Yuen, & Ramey, 1991; Sierra & Olaziregi, 1991; Verhoeven, 1994). These studies can be grouped into two categories. One group comprises studies that compare the general language proficiency and academic performance of students attending bilingual programs in which the L1 is the primary language of instruction; the second is bilingual programs in which the medium of instruction is the L2. The most notable of these studies is the Ramirez Report. Ramirez et al. (1991) compared the academic progress of 2,352 Spanish-speaking elementary students attending three different school programs. One program involved almost exclusively English instruction. A second program used some Spanish in the early stages but switched students to English-only instruction after grade 1. In the third program Spanish was the primary language of instruction up to grade 2, after which instruction in English was gradually increased and reached 60% by grade 6. Ramirez reported that the growth in the English reading skills of the students in the third program was greater than that of the other two programs.

In a study of Basque-native second graders attending Basque-Spanish bilingual programs with a parallel structure to the ones studied in the Ramirez report, a similar pattern of results was observed (Sierra & Olaziregi, 1991). Students who received initial literacy instruction in their L1 for more prolonged periods of time performed better than those who were primarily schooled in their L2. In the two studies reviewed above, better performance of the students attending bilingual programs with emphasis on the students’ L1 was interpreted as an indication that the skills developed in students’ primary language facilitated
the acquisition of language and literacy skills in their L2 through cross-linguistic skills transfer.

To summarize, the Linguistic Interdependence Hypothesis is in principle a plausible theory of cross-linguistic transfer as it emphasizes the facilitating role of L1 in second language acquisition and views the transfer process as a mechanism that includes not only linguistic skills but also learning strategies and underlying common cognitive, academic, and literacy skills. However, the hypotheses of this theory are general, making it difficult to test hypotheses of the transfer process of specific constructs at precise stages of language and cognitive development.

**Current Conceptual Paradigms of Cross-linguistic Transfer in Reading Research**

One of the main goals of current cross-linguistic studies of reading is to identify which and how L1 skills are transferred to L2 reading. A group of studies provides evidence of transfer through across-languages associations of language and literacy skills and through across-language contributions of these skills to reading achievement. Learning facilitation from the first to the second language has been found for phonological awareness (Cisero & Royer, 1995; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Lindsey, Manis, & Bailey, 2003; Verhoeven, 1994), pseudo-word reading (Comeau, Cormier, Grandmaison, & Lacroix, 1999), rapid automatized naming (Geva et al., 2000), vocabulary-related skills (e.g., Nagy et al., 1993; Ordoñez, Carlo, Snow, & McLaughlin, 2002), comprehension (Royer & Carlo, 1991; van Gelderen et al., 2004), and metacognitive strategies (Jiménez et al., 1996). For example, Verhoeven (1994) examined the development of lexical, morphosyntactic, pragmatic, phonological, and literacy abilities among 98 6-year-old Turkish children in the Netherlands in their first and second languages. The results showed that language transfer
was quite limited at the level of lexicon and syntax; however, positive evidence of transfer appeared in their bilingual development at the level of pragmatic skills, phonological skills, and literacy skills.

To explain this cross-linguistic transfer, Genesee et al. (2006) proposed a notion of *underlying cognitive abilities*. Genesee et al. stated that, “underlying cognitive abilities are thought to be fundamentally cognitive and nonlinguistic in nature and are part of one’s innate endowment—they are not learned” (p. 159). Relationships found between L1 and L2 working memory, phonological short-term memory, phonological awareness and phonological recoding have been taken as evidence that these abilities are part of a cognitive mechanism that operates during the acquisition of any language (Geva & Ryan, 1993). Arguably, phonological awareness and phonological recoding are not innate, but learned through experience with any language. Therefore, if the L2 learner has already acquired these resources they are available when learning an L2.

Alternatively, there seem to be some aspects of reading ability that are more language-dependent and language-specific (Bialystok, 2007; Bialystok, Luk, & Kwan, 2005; Geva & Siegel, 2000). According to the script-dependent hypothesis (e.g., Lindgren, DeRenzi, & Richman, 1985) the skills in one language are influenced by its orthographic system and the degree of transparency in grapheme - phoneme correspondence. Language-specific effects have been identified in bilinguals learning to read two orthographically dissimilar languages. For example, Geva and Siegel (2000) observed that children in grades 1 to 5, learning to read concurrently in English L1 and Hebrew L2, could read voweled Hebrew more accurately than English. The developmental profiles associated with English word recognition and pseudoword decoding were much steeper than those depicting Hebrew
word recognition and Hebrew pseudoword word decoding, and decoding error categories were orthography-specific. In studies with adults, Koda (1989, 1990) has shown that Japanese native speakers, when reading English, apply distinctive reading strategies that reflect their experience in reading in a non-alphabetic language. This suggests that their L2 reading is influenced by the orthographic characteristics of their L1.

After reviewing several theoretical frameworks that have attempted to interpret the process of second language acquisition and the interplay of L1 and L2 literacy skills, it is clear that no single theory is comprehensive enough to account for the multiple factors that affect the process of language and literacy transfer. Each of them, however, offers unique insights that contribute to the understanding of such a complex phenomenon. Universal vs. language-specific theories are complimentary rather than contradictory.

In the present research, I investigated cross-linguistic skills transfer from two different perspectives. First, I looked at language-specific effects in the development of English L2 derivational and compound awareness in Chinese L1 and Spanish L1 English language learners. Better performance on compound awareness by the Chinese children in comparison to the Spanish children, and better performance on derivational awareness by the Spanish children in comparison to the Chinese children, would confirm language-specific hypothesis. Second, I examined associations of parallel morphological awareness measures across English and Spanish, and the unique contribution of morphological awareness in one language to reading performance on another language. Because morphological awareness involves both metalinguistic skills and some vocabulary knowledge, significant results would lend support for both universal and language-specific theories.
Cross-Linguistic Transfer of Morphological Awareness

An important goal of the present research was to examine whether morphological awareness transfers between Spanish and English among Spanish-speaking ELLs. As stated earlier, the term *transfer* is used here to indicate the contribution of morphological awareness in one language to word reading, vocabulary and reading comprehension in the other language. Among different aspects of metalinguistic awareness, transfer of phonological awareness has received the most research attention. Cross-linguistic effects of phonological awareness have been reported between many language combinations such as Spanish and English (Cisero & Royer, 1995; Durgunoglu et al., 1993), French and English (Comeau et al., 1999; LaFrance & Gottardo, 2005), and even between more distantly related languages such as Hebrew and English (Wade-Woolley & Geva, 2000), Arabic and English (Wagner, Spratt, & Ezzaki, 1989), and Chinese and English (Gottardo, Yan, Siegel, & Wade-Woolley, 2001). Given these findings, phonological awareness is considered part of one’s cognitive endowment, largely independent of specific language experiences (Genesee et al., 2006).

In comparison, much less is known about transfer of morphological awareness. Some researchers have argued that certain aspects of morphological knowledge, such as bound morphemes, are language specific and are unlikely to transfer between first and second language (Dulay, Burt, & Krashen, 1982; Jiang, 2000; Kellerman, 1977, 1983). These assumptions, however, have been challenged by studies that examined morphological awareness in second language learners. Jarvis and Odlin (2000) showed that for Finnish-speaking adolescent learners of English, bound morphemes that mark spatial reference in their native language influenced the use of prepositions referring to spatial relations in English. Also relevant is a study by Hancin-Bhatt and Nagy (1994) that found that Hispanic
students in grades 4, 6 and 8 recognized cognate stems of suffixed words more easily than non-cognate stems. This finding suggests that the learning of English derivational morphology is affected by first language experience in Spanish.

Transfer of morphological skills in relation to literacy achievement has been assessed in only a few studies (Bindman, 2004; Deacon et al., 2007; Saiegh-Haddad & Geva, 2008; Schiff & Calif, 2007; Wang et al., 2006). Schiff and Calif (2007) found that for Israeli fifth graders, a Hebrew morphological awareness task predicted performance on a parallel English L2 task and performance on English word reading. Saiegh-Haddad and Geva (2008) investigated the transfer of morphological awareness among Canadian-Arabic children for whom English was the stronger language. The researchers observed that Arabic morphological awareness as measured by two derivational tasks predicted English word reading accuracy and fluency, but English morphological awareness was not related to Arabic word reading. In a longitudinal study, Deacon et al. (2007) followed children in a Canadian French immersion program from grade 1 to grade 3, and measured their morphological awareness with a past tense analogy task in both languages every year. Results showed that English morphological awareness measured in grade 1 and grade 2 predicted word reading in French, and that French morphological awareness measured in grade 2 and grade 3 predicted English word reading. The pattern emerging from these studies is that for bilingual children, morphological awareness in one of their languages facilitates word reading in their other language.

Although this small group of studies provides some qualified evidence for cross-linguistic transfer of morphological awareness, little is known about the direction of transfer. Researchers have proposed that the direction of transfer may be influenced by children’s
proficiency levels of the two languages, the aspect of morphological awareness under investigation (inflectional vs. derivational), and the morphological complexity of the two languages. However, it is unclear how these different factors interact with each other in determining the transfer process. Some researchers propose that the direction of transfer is determined by language proficiency (Deacon et al., 2007; Wang et al., 2006). That is, morphological awareness tends to transfer from children’s more proficient language to the less proficient one. However, language proficiency alone cannot explain all the results. Transfer of morphological awareness was found from children’s native language (Hebrew) to second language (English) word reading by Schiff and Calif (2007), but from a weaker (Arabic) to a stronger language (English) by Saiegh-Haddad and Geva (2008). In fact, a general pattern emerging from these two studies is that transfer occurs from a language with a more complex morphological system (e.g., Hebrew, Arabic) to a language with a less complex system (e.g., English).

Research concerning L1-L2 crossover effects of morphological awareness on reading comprehension is scarce. To the best of my knowledge, Wang et al. (2006) are the only authors who have addressed this issue. Their study of Chinese-immigrant elementary school children in the United States reported a significant contribution of English compound, but not derivational morphological awareness to Chinese reading comprehension. None of the two Chinese morphological awareness tasks were found to play a role in English reading comprehension. It is important to note that the researchers did not control for within-language measures when examining cross-linguistic transfer. It remains to be seen whether the cross-linguistic predictability power of morphological awareness holds after taking into
account within-language morphological awareness. It is also important to test whether these findings can be generalized to ELLs from different linguistic backgrounds.

So far transfer of morphological awareness has only been investigated in ELLs who are native speakers of Chinese, Hebrew, Arabic, Finish, and French. It remains to be seen whether within and cross-linguistic associations found between morphological awareness and reading in these learners also exist in Spanish-speaking ELLs. Studies reported in the current dissertation contribute to this growing body of research by examining the relative facilitating effect of Spanish L1 morphological awareness in English L2 vocabulary, word reading, and reading comprehension. They advance previous research in three ways: by examining ELLs with a different L1 (Spanish) from the previous language groups studied, by controlling for within language measures, and by focusing on children from upper elementary and middle school.

This research also sheds light on the issue of the acquisition of morphological awareness in ELLs with typologically different L1 backgrounds (Chinese and Spanish) by examining the effect of L1 and L2 experience in English derivational and compound awareness.

The research questions that were examined in each study are:

Study 1. What is the effect of L1 experience and extent of exposure to English in the development of compound and derivational awareness in Chinese-speaking and Spanish-speaking ELLs?

Study 2. (a)What is the unique contribution of morphological awareness to word reading within Spanish and within English? (b) What is the unique contribution of
Spanish-speaking ELLs’ morphological awareness from one language to word reading in the other language?

Study 3. (a) What is the unique contribution of morphological awareness to vocabulary within Spanish and within English? (b) What is the unique contribution of Spanish-speaking ELLs’ morphological awareness from one language to vocabulary in the other language?

Study 4. (a) What is the unique contribution of morphological awareness to reading comprehension within Spanish and within English? (b) What is the unique contribution of Spanish-speaking ELLs’ morphological awareness from one language to reading comprehension in the other language?
CHAPTER 4. METHOD

Participants

Data for the current research were collected from 260 fourth graders and seventh graders who were English monolinguals, Spanish-speaking ELLs or Chinese-speaking ELLs. Participants were recruited from 22 schools located in a large multicultural Canadian city. The Spanish- and Chinese-speaking children were selected to participate in the study provided they (a) had spent at least three years in Canada or any other English-speaking country prior to the study, and (b) spoke in either Mandarin or Spanish with their parents, siblings or other relatives living with them. Seven children were excluded from the sample because they scored below the 10th percentile on non-verbal reasoning or had a learning disability. Five children were excluded because they had been in Canada for less than two years. The final sample included 245 children, of which 42% were boys and 58% were girls. There were 78 monolingual English-speaking children (39 in each grade), 76 Chinese-speaking ELLs (36 fourth graders and 40 seventh graders), and 90 Spanish-speaking ELLs (39 fourth graders and 51 seventh graders). English was the language of instruction for all the children. Data from all three language groups were elicited for Study 1 to be able to contrast the effect of L1 experience with typologically different languages on English derivational and compound awareness. Only data from the Spanish-speaking children were used in Studies 2 to 4 because the overlapping characteristics between English and Spanish language systems allows for the in-depth examination of cross-linguistic transfer of morphological awareness.

A family profile questionnaire was used to collect information about children’s home language use and immigration experience (see Appendix A). According to the questionnaire,
most ELLs spoke their first language at home. About 87% of the Chinese and 39% of the Spanish-speaking children also attended heritage language classes offered at no cost by their school boards for 2.5 hours per week. These classes focus mainly on the development of oral language skills, with very little time devoted to literacy development. With respect to the country of birth, 48% of the Spanish-speaking children were born outside Canada. These children came from 13 different Latin-American countries including Colombia (8%), El Salvador (6%), Mexico (5%), Argentina (5%), Costa Rica (4%), Ecuador (3%), Uruguay (3%), Peru (2%), and Chile, Dominican Republic, Guatemala, and Venezuela, each representing 1%. By contrast, 83% of the Chinese children were born outside Canada and represented only two countries of origin: Mainland China (82%) and Singapore (1.3%). On average, the Spanish-speaking children had been living in Canada longer (8 years and 6 months) than the Chinese children (5 years and 2 months).

Measures

A test battery including standardized and non-standardized tasks was used for this dissertation research, but different sub-sets were targeted in each study (see Table 2).

**Family questionnaire.** A family questionnaire (see Appendix A) was used to collect information about children’s home language use and immigration experience and parents’ educational levels. The questionnaire was completed in written form by the parents of the participating children. In particular, the variables *Maternal Education* and *Exposure to English* were used in the data analysis. Parents were asked to indicate their education level on a scale of 1 to 6, where 1 = primary school, 2 = junior high school, 3 = high school, 4 = college, 5 = university degree, and 6 = graduate degree. Exposure to English was measured by the number of months a child had lived in an English-speaking country.
Cognitive Measures

**Non-verbal reasoning.** Non-verbal ability was measured with the Raven’s Standard Progressive Matrices (Raven, 1958, 2000). This test requires the child to complete visual-spatial matrices by choosing the missing piece from six or eight patterned segments. There are five subtests each composed of 12 matrices: pattern completion, reasoning by analogy, serial reasoning and spatial visualization, for a total of 60 items. This test was administered to groups of 15 to 20 students. Each child was given a booklet with the stimulus plates and a scoring sheet to record the answers. This control variable was used as a measure of general reasoning ability because it did not require verbal skills, and thus reduced the possibility of bias against the ELLs. Percentile scores were used.

**Verbal short term and working memory.** This skill was measured using the Digit Span subtest from the WISC-R (Wechsler, 1996). This test consists of two parts. In the first part, the participant is asked to repeat strings of digits in the same order heard. In the second part, the participant is asked to repeat strings of digits in reverse order. Each part (forward and backward) consists of eight items. Each item is given in two trials, and the test is discontinued if a child fails both trials. The total number of correct answers was the score used.

Oral Skills

**Phonological awareness.** This ability was measured using the Elision subtest of the Complete Test of Phonological Processing (CTOPP, Wagner, Torgeson, & Rashote, 1999). This is a phoneme segmentation-deletion test. Children were asked to delete phonemes (individual sounds) from words and give the remaining part. For example, say *cat*, now say it
without /k/. The test contains 20 items involving initial, middle and last phoneme deletion. Five practice items preceded the administration of the test items. The test was discontinued after three consecutive errors. Standard scores were used.

**Vocabulary.** The Peabody Picture Vocabulary Test, Third Edition, Form III A (PPVT-III A; Dunn & Dunn, 1997) was used to assess children’s oral vocabulary in English. To save testing time, every third item from the original test was selected to create a shortened version of 60 items. This test was administered in a group format. Each child received a booklet with pictures depicting the four options for each test item, and a scoring sheet. The experimenter read each item twice and the child selected the picture that represented the word heard by recording the corresponding number on the scoring sheet. The inter-item reliability was .68 for the English monolinguals, .89 for the Chinese-speaking ELLs, and .77 for the Spanish-speaking ELLs.

Following a parallel procedure to the creation of the English vocabulary test, a shortened Spanish version with 60 items was created from the Test de Vocabulario de Imágenes Peabody (TVIP; Dunn, Padilla, Lugo, & Dunn, 1986). There were 3 practice items for which feedback was provided. This test was administered in a group format following the same procedure used in the administration of the English version. The Spanish version of this test had an inter-item reliability of .85.

**Morphological Awareness**

**Derivational awareness.** Derivational awareness in English was assessed with two measures (see Appendix B and C): a modified version of the Test of Morphological
Structure (Carlisle, 2000) and the Test of Morphological Sensitivity (Mahony et al., 2000). The Test of Morphological Structure was used to assess children’s ability to manipulate derivational suffixes. The child heard a target word, e.g., Magic, followed by an incomplete sentence, e.g., The performer was a good______. The child was then required to complete the sentence by saying the proper derived form of the target word, e.g., magician. There were 25 test items and 3 practice items. Feedback was provided for the practice items before children began the test items. This was an oral test with no reading involved. The target words required manipulation of either nominal, adjectival, adverbial, or verbal morphemes. The inter-item reliability was .75 for the English monolinguals, .94 for the Chinese-speaking ELLs, and .84 for the Spanish-speaking ELLs.

The second measure of derivational awareness, the Test of Morphological Sensitivity, assessed sensitivity to the syntactic properties of derivational suffixes in English. In this test, the child was asked to complete sentences with a derived word by choosing one out of four options. Half of the test used low-frequency real words for the answer options, for example, He likes to __________ (gratify, gratuity, grateful, gratification) his desires. To reduce potential confounding effects of vocabulary knowledge, the remaining half of the test offered pseudo word options consisting of a fake root with a real suffix (e.g., luminous) to complete the sentence, for example, What a completely __________ (tribacious, tribaism, tribacize, tribation) idea. A total of 20 items were administered; 10 for each part of the test. The test was administered in an oral plus written format and under a group condition. Children received a booklet containing instructions, two practice items, and 20 test items. An experimenter read each sentence four times, each time with one of the choices, while children read silently along with the experimenter. Children were then asked to circle the
letter that corresponded to the word that best completed the sentence. The correct answers represented a balanced distribution of nouns, adjectives, and verbal morphemes. The inter-item reliability of this test was .77.

Parallel versions of the two English derivational tests were created and administered in Spanish (see Appendices D and E). The Spanish derivational tests had an inter-item reliability of .91 for the Test of Morphological Structure and of .84 for the Test of Morphological Sensitivity.

**Compound awareness.** This test (see Appendix F) was adapted from Nagy et al. (2003). It required the child to identify the head of a compound noun in English. The child heard a description of an animal or object that does not exist in real life, and was asked to select between several options the combination of words that made the most sense. The test had 16 items; 12 of them involved two-word combinations, for example, “Which is a better name for a fish that wears a dress? A fish dress or a dress fish?” The remaining four items involved three-or four-word combinations; for example, “There is a drawer in my dresser where we keep books and I have a key that locks it. What would be the best name for the key? Drawer book key, book key drawer, book drawer key, or key book drawer.” To ease memory burden, each item was accompanied by a picture depicting the object or animal being described in the current version of the test. The inter-item reliability was .68 for English monolinguals, .77 for the Chinese ELLs, and .75 for the Spanish-speaking ELLs.

**Reading**

**Word reading** was assessed in both English and Spanish. The English measure was the Letter-Word Identification Subtest from the Woodcock Language Proficiency Battery
(Woodcock, 1984). This test requires children to identify 14 letters and to read 62 words of increasing difficulty. The test is discontinued if the child incorrectly reads 6 words in a row. The total number of words read correctly was the score used. Spanish word reading was assessed using a standardized measure parallel to the English Letter-Word Identification Subtest (Woodcock & Muñoz-Sandoval, 1995). The score used was the total number of words read correctly out of 47.

**Reading comprehension.** The ability to read and understand sentences was assessed with a modified version of the Peabody Achievement Test (Markwardt, 1989). In this test, children silently read a sentence and select from four choices a picture that best represents the sentence. A shorter version of the original test was created for the purpose of this study by selecting every other sentence. There were 36 sentences in the abridged version. Sentences not selected for the English test were translated into Spanish to produce a Spanish version of this test. Each child received booklets with sentences and stimulus pictures along with scoring sheets. Inter-item reliabilities were .71 for the English test and .83 for the Spanish test.

**Procedure**

Participants were assessed in a quiet room at their schools within school hours. Phonological awareness, compound morphological structure, morphological production, and working memory tests were administered individually in sessions of 45 to 60 minutes, while non-verbal ability, vocabulary, compound morphology, and derivational morphology were administered in groups of 15 to 20 children. The group testing sessions were supervised by two to three testers at a time and were completed in two sessions of about 60 minutes each.
The tests were administered by trained research assistants with majors in psychology, linguistics, or human biology.

Testing at each school was completed within a period of two to three weeks from November, 2006 to May, 2007. All testers were required to strictly adhere to instruction scripts provided for each test. Instructions to the participants were given in English. Practice items were administered before each test and feedback was provided, but no feedback was given for the actual test items. To reduce any tester effect, the working memory and the phonological awareness tests were administered using a pre-recording of an English native speaker reading the stimulus items.

Table 2

*List of Variables Used in Each Study*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Item Range</th>
<th>Statistics used</th>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
<th>Study 4</th>
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<td>Age in months/ grade</td>
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<td>x</td>
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<td>x</td>
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<td><strong>English Variables</strong></td>
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<tr>
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<td>x</td>
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<tr>
<td>Morphological Structure</td>
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<td>x</td>
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<td>x</td>
</tr>
<tr>
<td>Vocabulary</td>
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<td>Percentage</td>
<td>_______</td>
<td>x</td>
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<td>x</td>
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<td>Reading Comprehension</td>
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</table>
CHAPTER 5. STUDY ONE

The Effect of L1 Background, Mother’s Education and Exposure to L2 on Morphological Awareness across Chinese and Spanish Ells

The present study examined the effect of L1 background and extent of exposure to English in the development of English morphological awareness in Chinese-speaking and Spanish-speaking ELLs. The monolingual sample was used as a comparison group. Two aspects of morphological awareness were examined, derivational and compound skills. The research question was: what are the effects of native language and length of exposure to English on derivational and compound awareness?

It was hypothesized that the English morphological awareness of ELLs is influenced by the morphological features of their native language. Given the prominent role that compound morphology plays in Chinese word formation, children who are native speakers of Chinese may develop compound awareness at an earlier age than Spanish-speaking children do. Since Chinese and English share many compounding rules, Chinese-speaking ELLs should be able to apply the compound awareness developed in their native language to learn English words. In contrast, Spanish-speaking ELLs face double challenges when it comes to English compound awareness. First, they have relatively little experience with compounds in their native language. Second, Spanish compound words are left-headed, which may cause confusion when they learn right-headed English compounds. For these reasons, it was hypothesized that Chinese-speaking children would develop more advanced compound awareness in English than Spanish-speaking children would. On the other hand, it was hypothesized that Spanish-speaking children would develop more advanced awareness of derivational morphology in English than would Chinese-speaking children, due to the greater
importance of derivational morphology in Spanish, as well as the similarities in derivational morphology between Spanish and English. Finally, I also predicted that the ELLs’ extent of exposure to English would have an effect on their compound and derivational awareness. A serious challenge in comparing the language development of different groups of ELLs is that these children tend to be systematically different in more than one dimension. ELLs from different language backgrounds often have different immigration experiences. Most Chinese families from Mainland China immigrated to Canada in the past two decades. As such, most seventh graders participating in this study were born in China and had some schooling in Chinese before they moved to Canada, whereas a larger proportion of the Chinese background fourth graders were born in Canada and had been in Canada longer than the seventh graders. Spanish-speaking families in general came to Canada earlier than Chinese families, and the Spanish-speaking children in this sample had lived in Canada longer than their Chinese peers. Since grade (chronological age) does not always correspond to exposure to English for ELLs, I examined the impact of both factors on the development of morphological awareness in the present study.

Besides immigration experience, different groups of ELLs also tend to differ in parents’ education level, social economic status, and home literacy environment. In the Canadian context, Chinese children typically come from more educated families than Spanish-speaking children, and Chinese children’s SES is also higher. To rule out the possibility that any significant group effects were caused by differences in these areas, or by individual differences in ability, the analyses were controlled for non-verbal ability and mother’s education, a proxy for SES and home literacy activities.
Method

Participants

Data for this study were collected from a total of 260 fourth graders and seventh graders who were English monolinguals and Spanish-English or Chinese-English bilinguals. Eight children were excluded from the sample because they scored below the 10th percentile on non-verbal reasoning or had a known learning disability. Eight children were excluded because they had resided in Canada for less than two years. The final sample included 244 children, of which 42% were boys and 58% were girls. There were 90 Spanish-speaking ELLs (39 fourth graders and 51 seventh graders), 76 Chinese-speaking ELLs (36 fourth graders and 40 seventh graders), and 78 monolingual English-speaking children (39 in each grade). The demographic characteristics of the participants were described in the previous chapter.

Measures

Only English measures were used in this study. The measures were: non-verbal ability, level of mother’s education, extent of exposure to English, compound awareness (α = .68, .77, and .75 for the English monolinguals, the Chinese ELLs, and the Spanish-speaking ELLs, respectively), and derivational awareness as measured by the morphological structure test (α = .75, .94, and .84 for the English monolinguals, the Chinese ELLs, and the Spanish-speaking ELLs, respectively). Detailed descriptions of these measures were provided in the previous chapter.
Results

The means and standard deviations of all the measures pertinent to Study 1 are displayed in Table 3. Non-verbal ability is reported in percentile ranks, children’s age and length of stay in Canada are reported in months, and mother’s education is reported on a six-point scale. Scores for all the other tests are reported in percentages. The adjusted means for the morphological measures and vocabulary after controlling for nonverbal skills and mother’s education are presented in Table 4.

On average, the Spanish-speaking children had lived in Canada for 105 months ($M = 95$ months for the fourth graders and $M = 114$ months for the seventh graders). The Chinese children had lived in Canada for 71 months ($M = 75$ months for the fourth graders and $M = 67$ months for the seventh graders). The ELLs’ mean age of arrival in Canada ranged from 2 months to 138 months for the Spanish-speaking children ($M = 31$ months, $SD = 43.1$) and from 14 months to 132 months for the Chinese children ($M = 60$ months, $SD = 39.9$).

Several two-way ANOVAs, with grade and home language as the between-subject factors, followed by between-language planned contrasts, were performed. These ANOVAs examined whether there were significant mean differences in vocabulary, non-verbal ability, level of mother’s education, and derivational and compound awareness, across the groups. A significant main effect was found for home language but not for grade. The ANOVA on vocabulary confirmed the ELL status of the Chinese- and Spanish-speaking children. Planned contrasts showed that both language groups scored significantly lower than the monolinguals did, Mean Difference ($MD$) = 9.78, $p < .001$, for the Chinese-speaking children, and $MD = 9.26$, $p < .001$, for the Spanish-speaking children. There was no difference between the two ELL groups.
There were differences in derivational and compound awareness across the three language groups. The Chinese-speaking ELLs performed similarly to the English native speakers on the compound awareness test, and both language groups did better than the Spanish-speaking children, $MD = 16.37, p < .001$ between the Chinese and the Spanish, and $MD = 13.89, p < .001$ between the English native speakers and the Spanish. The English native speakers outperformed both the Chinese ($MD = 14.26, p < .001$) and the Spanish ($MD = 12.06, p < .001$) students on the derivational awareness test. The Spanish children performed better than the Chinese on derivational awareness, but the difference was not significant.
Differences were also found in mother’s education and nonverbal ability among the three groups of children. The average mother’s education was college for the monolinguals and the Chinese-speaking children but high school for the Spanish-speaking children. With respect to nonverbal ability, the Chinese-speaking children scored the highest, followed by the monolinguals, $MD = 7.79$, who in turn scored higher than the Spanish-speaking children, $MD = 15.65$, all $ps<.001$.

Because of significant group differences in non-verbal ability and mother’s education, these variables were used as covariates in subsequent analyses. After verifying that all assumptions were met, a multivariate analysis of covariance (MANCOVA) was performed on the two measures of morphological awareness, with grade (4 and 7) and the home language (English, Chinese, and Spanish) as the between-subject factors. Results showed that the Chinese-speaking ELLs performed similarly to the native speakers on the compound awareness test, but the Spanish ELLs performed significantly lower than the English native speakers, $MD = 5.92$, $p<.05$. The difference between the Chinese and Spanish children, however, was not significant. The Spanish-speaking ELLs performed similarly to the native speakers on the derivational awareness test, and both groups outperformed the Chinese-speaking ELLs, $MD = 18.06$, $p<.001$, and $MD = 20.74$, $p<.001$, respectively. Neither the main effect of grade nor the grade by home language interaction was significant.
Table 4

Means Adjusted for Non-verbal Ability and Mother’s Education

<table>
<thead>
<tr>
<th></th>
<th>Grade 4</th>
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<th>Grade 7</th>
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<th>Combined</th>
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<tr>
<td></td>
<td>M</td>
<td>SE</td>
<td>M</td>
<td>SE</td>
<td>M</td>
<td>SE</td>
</tr>
<tr>
<td>English Monolinguals</td>
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<tr>
<td>Vocabulary (%)</td>
<td>73.19</td>
<td>1.53</td>
<td>76.84</td>
<td>1.49</td>
<td>75.01</td>
<td>1.05</td>
</tr>
<tr>
<td>Derivational Awareness (%)</td>
<td>72.96</td>
<td>2.89</td>
<td>80.45</td>
<td>2.81</td>
<td>76.70</td>
<td>1.98</td>
</tr>
<tr>
<td>Compound Awareness (%)</td>
<td>70.56</td>
<td>2.49</td>
<td>73.50</td>
<td>2.42</td>
<td>72.03</td>
<td>1.71</td>
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<tr>
<td>Chinese-speaking ELLs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary (%)</td>
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<td>1.57</td>
<td>61.00</td>
<td>1.57</td>
<td>62.54</td>
<td>1.15</td>
</tr>
<tr>
<td>Derivational Awareness (%)</td>
<td>58.70</td>
<td>2.96</td>
<td>53.21</td>
<td>2.97</td>
<td>55.96</td>
<td>2.18</td>
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<tr>
<td>Compound Awareness (%)</td>
<td>67.08</td>
<td>2.55</td>
<td>71.33</td>
<td>2.56</td>
<td>69.20</td>
<td>1.88</td>
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<tr>
<td>Spanish-speaking ELLs</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary (%)</td>
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<td>1.66</td>
<td>71.70</td>
<td>1.35</td>
<td>69.71</td>
<td>1.09</td>
</tr>
<tr>
<td>Derivational Awareness (%)</td>
<td>73.47</td>
<td>3.13</td>
<td>74.57</td>
<td>2.55</td>
<td>74.02</td>
<td>2.07</td>
</tr>
<tr>
<td>Compound Awareness (%)</td>
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<td>2.69</td>
<td>66.19</td>
<td>2.19</td>
<td>66.11</td>
<td>1.78</td>
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</tbody>
</table>

A second set of analyses was performed to identify the role of extent of exposure to English on the development of compound and derivational awareness among these Chinese-speaking and Spanish-speaking ELLs. Bivariate correlations for the Chinese-speaking ELLs and Spanish-speaking ELLs are presented in Tables 5 and 6, respectively. As a result of differences in age of immigration grade is not an exact reflection of schooling in English for ELLs (e.g., some 7th graders have only been schooled in Canada for 2 or 3 years). For ease of interpretation correlations are given for the 4th and 7th graders combined sample. Moderate to high correlations were found between the two morphological awareness measures across the two language groups, $r = .65$ for the Chinese-speaking ELLs, and $r = .53$ for the Spanish-speaking ELLs, all $ps < .001$. Length of stay in Canada was associated with scores on the derivational awareness test for both the Chinese-speaking ELLs, $r = .46, p < .001$, and the Spanish-speaking ELLs, $r = .22, p < .05$, but not with the compound awareness test.
Table 5

Correlations among All Measures for the Chinese-speaking ELLs

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age in months</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Non-verbal Ability</td>
<td>.26*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Mother Education</td>
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<td>.35**</td>
<td>.46***</td>
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<td>6. Compound Awareness</td>
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<td>.53***</td>
<td>.47***</td>
<td>.06</td>
<td>.65***</td>
<td>1</td>
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</table>

***Correlation is significant at the .001 level (2-tailed); **Correlation is significant at the .01 level (2-tailed); *Correlation is significant at the .05 level (2-tailed).

Table 6

Correlations among All Measures for the Spanish-speaking ELLs

<table>
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<th>5</th>
<th>6</th>
</tr>
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<tr>
<td>1. Age in months</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Non-verbal Ability</td>
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</tr>
<tr>
<td>3. Mother Education</td>
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<td>-.06</td>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Months in Canada</td>
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<td>.13</td>
<td>-.08</td>
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<td></td>
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</tr>
<tr>
<td>5. Derivational Awareness</td>
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<td>.33**</td>
<td>.20</td>
<td>.22*</td>
<td>1</td>
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<tr>
<td>6. Compound Awareness</td>
<td>.15</td>
<td>.36**</td>
<td>.20</td>
<td>.06</td>
<td>.53***</td>
<td>1</td>
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</table>

***Correlation is significant at the .001 level (2-tailed); **Correlation is significant at the .01 level (2-tailed); *Correlation is significant at the .05 level (2-tailed).

To examine the relative importance of grade/age, length of exposure to English and home language in the development of English compound and derivational morphological awareness, two sets of hierarchical regressions were performed on data from the two groups of ELLs. Non-verbal ability and mother’s education were entered first in each regression as controls, followed by grade and length of stay in Canada. A language membership vector, with Chinese coded as 1 and Spanish coded as -1, was created to examine the home language effect. This vector was entered in the fourth step. The two-way interaction between exposure to English and language membership was entered in the fifth step. Interactions of exposure to English, language membership, and grade effect were examined in the last step in the initial analyses. Because this three-way interaction was not significant in either model, it was excluded from the final models. An alternative analysis, in which age, rather than the
grade vector, was entered in the first step, was also carried out. The alternative analysis produced the same significant predictors for all the models.

The left panel of Table 7 shows that for derivational awareness, length of exposure to English contributed about 19% of the variance, \( F(1,147) = 39.43, p < .001 \), and the home language effect contributed an additional 3% of the variance, \( F(1,146) = 6.05, p < .05 \). As expected, there was a significant interaction between exposure to English and home language, \( F(1, 45) = 9.80, p < .01 \). Following the significant interaction, separate regressions were performed on the derivational awareness test for each language group. These analyses showed that while length of exposure to English explained a significant amount of variance in derivational awareness for both ELL groups, the contribution was larger for the Chinese-speaking children (17%), \( F(1,65) = 21.41, p < .001 \), than for the Spanish-speaking children (5%), \( F(1,77) = 4.30, p < .05 \). An examination of βs indicated that non-verbal ability, mother’s level of education, length of exposure to English, and home language were all unique predictors of derivational awareness. As for compound awareness (see Table 7, right panel), the only significant predictors were non-verbal ability and mother’s education. Grade was not a significant predictor in either model.
Table 7
Regression Examining L1 Effect and Time in Canada on Derivational and Compound Awareness

<table>
<thead>
<tr>
<th>Step and predictor</th>
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<th></th>
<th>Compound Awareness</th>
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<td></td>
<td>General Model Summary</td>
<td>Coefficients</td>
<td>General Model Summary</td>
<td>Coefficients</td>
</tr>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
<td>$\beta$</td>
<td>$t$</td>
</tr>
<tr>
<td>1. Non-verbal ability</td>
<td>.09</td>
<td>7.69**</td>
<td>.39</td>
<td>4.27***</td>
</tr>
<tr>
<td>Mother’s Education</td>
<td></td>
<td>.24</td>
<td>3.26**</td>
<td></td>
</tr>
<tr>
<td>2. Grade effect (G4=1, G7=1)</td>
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<td>.20</td>
<td>-.02</td>
<td>-.27</td>
</tr>
<tr>
<td>3. Months in Canada</td>
<td>.19</td>
<td>39.43***</td>
<td>.41</td>
<td>5.14***</td>
</tr>
<tr>
<td>4. First Language (Chinese = 1, Spanish = -1)</td>
<td>.03</td>
<td>6.05*</td>
<td>-.67</td>
<td>-4.03***</td>
</tr>
<tr>
<td>5. Interaction between months in Canada and first language</td>
<td>.04</td>
<td>9.80**</td>
<td>.52</td>
<td>3.14**</td>
</tr>
</tbody>
</table>

*Significant at the .05 level (2-tailed); **Significant at the .01 level (2-tailed); ***Significant at the .001 level (2-tailed).

Discussion

This study systematically examined the development of morphological awareness in ELLs from different home language backgrounds. In particular, I examined how the morphological structure of children’s first language, grade, and amount of English exposure (measured by the length of stay in Canada) affected English morphological awareness among Chinese- and Spanish-speaking ELLs. The results showed that the impact of these factors varied between derivational and compound awareness. While home language morphological structure was related to both derivational awareness and compound awareness, extent of exposure to English was only related to derivational awareness. Grade was not related to either aspect of morphological awareness. These findings are discussed in more detail below.
Derivational and Compound Awareness in Chinese-speaking and Spanish-speaking ELLs vs. English Monolinguals

Two sets of analyses were carried out to examine the development of morphological awareness among ELLs. The first set of analyses compared performance on the derivational and compound awareness tests in the two groups of ELLs and the native English-speaking children. It was observed that after controlling for nonverbal ability and mother’s education level, the Spanish-speaking ELLs performed similarly to native speakers on the derivational awareness test, and the Chinese-speaking ELLs performed significantly lower than both groups. This test requires several aspects of derivational awareness. In addition to choosing a suffix that conveys the correct meaning, children have to make sure that the suffix belongs to the syntactic category appropriate for the sentence and combines legally with the target word. These aspects of derivational morphology are similar in English and Spanish, which may explain why the Spanish-speaking ELLs performed similarly to native speakers after controlling for nonverbal skills and mother’s education. In contrast, Chinese-speaking ELLs have few opportunities to develop relevant derivational morphological skills in their native language due to the small number of derivational morphemes in Chinese. They may require more experience with English in order to master this skill.

The reverse patterns were found with compound awareness. While there was no difference between the Chinese-speaking ELLs and the English native speakers, the Spanish-speaking ELLs performed significantly more poorly than the English native speakers. These results indicate that ELLs’ compound awareness in English is affected by their native language experience. Chinese children are exposed to similar compounding rules in their home language and in English. Spanish-speaking children, on the other hand, have less
experience with compounds in their native language, and have to overcome left-headedness when learning English compounds. The effects of native language characteristics, however, were somewhat smaller than expected, as the difference between the two groups of ELLs was not statistically significant. The reason for this may be that identifying the head morpheme is a relatively easy task, one that has been mastered by most native speakers when they reach kindergarten (Clark, 2001). Chinese-speaking children may outperform Spanish-speaking children on more difficult compound awareness tests. To explore this possibility a more demanding task should be used in future studies. The similar performance between the Chinese children and English monolinguals in compound awareness and between the Spanish children and the English monolinguals in derivational awareness support the hypothesis that native language characteristics impact in specific ways the development of morphological awareness in the L2.

Factors that Influence the Development of Derivational and Compound Morphological Awareness in Chinese-speaking and Spanish-speaking ELLs

Grade was used as a between-subjects factor in the first set of analyses to explore any possible differences between fourth and seventh graders across the language groups. This analysis did not yield a significant grade effect due to a confounding of age and exposure to English in Canada, with the younger Chinese children having the same vocabulary level as their older counterparts. That is, grade and chronological age are not always sensitive indicators of language proficiency in ELLs. Because of variability in immigration, extent of exposure to the newly acquired societal language may be a more relevant indicator. Thus, the second set of analyses was carried out to evaluate the relative importance of grade, exposure
to English, and home language as predictors for morphological awareness in the two groups of ELLs.

As expected, grade was not significantly related to either derivational or compound awareness in this analysis. By contrast, extent of exposure to English, conceptualized as time in Canada, contributed significantly to derivational awareness, after controlling for the effects of nonverbal skills, mother’s education, and grade. Interestingly, extent of exposure to English was important in the performance on derivational awareness for the Chinese-speaking ELLs and not for the Spanish-speaking ELLs. There are at least two possible ways of interpreting these results. First, because Chinese children have few opportunities to become familiar with derivational morphology before learning English they develop this skill through exposure to English, whereas the Spanish-speaking ELLs can draw on relevant L1 derivation skills and may not need as much exposure to English as the Chinese children. This interpretation although plausible on theoretical grounds, is compromised by the fact that on average the Spanish children have been in Canada longer than the Chinese. An alternative explanation is that there is a threshold beyond which extent of exposure to English ceases to contribute to the performance of derivational awareness. It is possible that this threshold has been already reached by the Spanish children, but not for the Chinese children who have been in Canada for a shorter period of time.

Extent of exposure to English was not related to performance on the compound awareness test in ELLs. The fact that exposure to English predicted derivational awareness, but did not predict compound awareness, may reflect the differences between these two aspects of morphological awareness. Derivational awareness is a complex, multi-faceted skill that continues to develop from elementary to high school years (Carlisle, 2003). It is
therefore not surprising that mastery of this skill requires a fair amount of English language experience. In contrast, the ability to identify the head of a compound, the aspect of compound awareness measured in the present study, is a relatively simple skill and may not require as much language exposure. Since the participants in the present study were in middle and high primary grades and had stayed in Canada for at least two years, English exposure did not predict compound awareness for these children.

Because of systematic significant differences found in nonverbal skills and mother’s education among the three groups of children, the effects of these variables were controlled for in the analyses. It should be pointed out, however, that statistically leveling these variables does not eliminate the actual gaps that exist between different groups of children. Analyses without any covariates showed that both groups of ELLs scored significantly lower than native speakers on vocabulary. Also, English native speakers had an advantage over the Spanish-speaking ELLs only in compound awareness, but they had an advantage over both groups of ELLs in derivational awareness, perhaps because the derivational morphology tests addressed a broader range of skills and required more sophisticated morphological awareness.

Study 1 extends previous research on the development of morphological awareness in L2 learners in several respects. First, two groups of ELLs with typologically different native languages were included. Contrasting the two languages allowed for the identification of differentiating effects of home language in the development of English compound and derivational morphology. It also allowed for the examination of how home language experience interacts with English experience in the development of these morphological skills. Second, distinctive aspects of morphological awareness, compound and derivational,
were examined separately, and the ability level of each group of ELLs was compared with an aged-matched sample of English native speakers. This comparison provided insights into specific areas of strengths and weaknesses of different groups of ELLs, with respect to morphological awareness. Third, the relative contribution of factors such as native language, mother’s education and extent of exposure to English, rarely controlled for in studies of ELL effects, were taken into account. Results from Study 1 highlight the importance of controlling for the effects of nonverbal intelligence and SES when studying factors affecting the language and literacy development of different groups of ELLs, as systematic differences often exist among different groups of ELLs and native speakers in these areas.
CHAPTER 6. STUDY TWO

Within and Cross-Linguistic Contributions of Morphological Awareness to Word Reading

Study 2 was designed to investigate the within and cross-language effects of morphological awareness on word reading within the Spanish-speaking ELLs sub-sample. Three research questions were raised. The first question was whether Spanish morphological awareness is related to reading in Spanish, a shallow orthography with a transparent grapheme and phoneme correspondence. The second question focused on the within-language contribution of morphological awareness to reading in English. The aim was to assess whether the significant contribution uncovered among native speakers of English also exists among Spanish-speaking ELLs. The third question examined cross-linguistic transfer of morphological awareness between Spanish and English. It sought to determine whether morphological awareness measured in Spanish is associated with reading in English, and vice versa.

The existing literature highlights the importance of morphological awareness in reading deep orthographies such as English and French (e.g., Carlisle, 2000; Singson et al., 2000). In contrast, morphological awareness has received little attention in studies involving shallow orthographies such as Spanish, perhaps due to the assumption that phonological awareness is the predominant factor in literacy development in these orthographies. Nevertheless, morphological awareness may play an important role in reading Spanish, a language with a highly complex morphological system. This association has been found in other shallow orthographies such as Italian (e.g., Burani et al., 2002), Finnish (e.g., Müller & Brady, 2001) and Hebrew (Berman, 2003; Levin, Ravid, & Rapaport, 2001; Ravid, 2003).
Given the morphological features of Spanish and findings of previous studies involving other shallow orthographies, I anticipated that morphological analysis would be beneficial for reading Spanish words. In regards to cross-linguistic transfer, I expected to observe transfer from Spanish to English because Spanish has a more complex morphological system than English, and because “transfer is more likely to occur from the minority to the majority language because of the generally greater exposure to literacy in the majority language outside of school and the strong social pressure to learn it” (Cummins, 1996, p. 111). It remained to be seen whether transfer also occurs from English morphological awareness to Spanish word reading.

**Method**

**Participants**

This study focused on the sub-sample of Spanish-speaking ELLs only. The analyses were based on the same 90 Spanish-speaking ELLs (39 fourth graders and 51 seventh graders) who participated in Study 1.

**Measures**

Because English and Spanish have more overlapping characteristics in derivational morphology than compound morphology, this study focused on the relationship between derivational morphological awareness and word reading within and across languages. There were two derivational awareness tests; the Test of Morphological Structure (modified version of Carlisle, 2000) and the Test of Morphological Sensitivity (Mahony et al., 2000). Non-verbal ability, memory, phonological awareness, and vocabulary were used as control
measures. Word reading was the outcome measure. Vocabulary, derivational awareness, and word reading were measured in both English and Spanish, while cognitive abilities and phonological awareness were measured in English only.

Results

Table 8 summarizes the means and standard deviations for the test battery in grade 4, grade 7, and for the two grades combined. Inter-item reliability is given for the combined sample. The results for the experimental measures are reported in raw scores, and the results for the standardized measures are reported in both raw scores and percentile ranks. There was no grade difference in the percentile rank in any of the standardized measures. To examine grade differences in the performance on both Spanish and English morphological awareness measures and vocabulary, a MANOVA with grade as a between-subjects factor revealed that seventh graders were significantly better than fourth graders on all the morphological awareness measures including English morphological sensitivity, $F(1, 95) = 7.1, p < .01$, English morphological structure, $F(1, 95) = 3.9, p < .05$, Spanish morphological sensitivity, $F(1, 95) = 16.7, p < .001$, and Spanish morphological structure, $F(1, 95) = 16.3, p < .001$. Seventh graders also outperformed fourth graders on English and Spanish vocabulary, $F(1, 95) = 16.1, p < .001$, and $F(1, 95) = 13.8, p < .001$, respectively.

To identify patterns of association among all the measures, correlations were examined (see Table 9). Modest to high correlations were found between morphological awareness and reading measures within and across languages. In Spanish, word reading was strongly correlated with morphological sensitivity, $r = .75$ and with morphological structure, $r = .67$. The correlations were more modest in English, $r = .52$, and $r = .47$, respectively. The
two morphological awareness measures were also closely associated within each language, \( r = .76 \) in Spanish, and \( r = .58 \) in English.

Table 8

*Summary of Observed Performance on All Measures (Percentile Scores in Parentheses)*

<table>
<thead>
<tr>
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<th>Grade 4</th>
<th>Grade 7</th>
<th>Combined</th>
</tr>
</thead>
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<tr>
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<td>((n=51))</td>
<td>((n=90))</td>
</tr>
<tr>
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<td>(\cdots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
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<td>Age (months)</td>
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<td>136</td>
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<tr>
<td></td>
<td>3.8</td>
<td>5.53</td>
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<td></td>
<td>(50\textsuperscript{th})</td>
<td>(27.5)</td>
<td>(50\textsuperscript{th})</td>
</tr>
<tr>
<td>Memory</td>
<td>(\cdots)</td>
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<td>42</td>
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<tr>
<td></td>
<td>7.3</td>
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</tr>
<tr>
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</tr>
<tr>
<td></td>
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<td>(33.4)</td>
<td>(39\textsuperscript{th})</td>
</tr>
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<td>.63</td>
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<td></td>
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<td></td>
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<td>.57</td>
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<td></td>
<td>47</td>
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<td>23.5</td>
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<td>(56\textsuperscript{th})</td>
<td>(25.6)</td>
<td>(60\textsuperscript{th})</td>
</tr>
<tr>
<td>S-Word Reading</td>
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<td>.77</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>22.1</td>
<td>21.6</td>
</tr>
</tbody>
</table>


Note: Scores for all measures but PA and age in months are given in percentages. Percentile rank scores are given in parentheses for non-verbal ability, PA, and English word reading. Cronbach’s \(\alpha\) reliability is given for the combined sample.

Most cross-linguistic correlations were significant. English word reading was significantly correlated with Spanish morphological sensitivity, \( r = .47 \), and with Spanish morphological structure, \( r = .56 \). Spanish word reading had lower but still significant correlations with the English morphological measures, \( r = .20 \) with English morphological sensitivity, and \( r = .33 \) with English morphological structure. Significant associations were also found among most of the morphological awareness measures across English and Spanish, with correlations ranging from .30 to .52. The only non-significant correlation was between the English and
Spanish morphological sensitivity tests. An additional analysis, using only the cognate items (words common to English and Spanish) in these tests, yielded a significant correlation, \( r = .25 \). Note the high correlation between Spanish and English word reading, \( r = .74 \).

Table 9

*Correlations between All English and Spanish Measures for Spanish-English Bilinguals (n = 90)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>4</th>
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<tr>
<td>Age in Months</td>
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<tr>
<td>Non-verbal Ability</td>
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<td></td>
</tr>
<tr>
<td>Memory</td>
<td>.14</td>
<td>.29</td>
<td></td>
<td></td>
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<tr>
<td>Phonological Awareness</td>
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<td>.14</td>
<td>.27</td>
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<tr>
<td>E-Vocabulary</td>
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<td>.14</td>
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<td>.24</td>
<td>-.04</td>
<td>.04</td>
<td>.37</td>
<td></td>
<td></td>
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<tr>
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<td>.39</td>
<td>.40</td>
<td>.26</td>
<td>.58</td>
<td>.19</td>
<td></td>
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</tr>
<tr>
<td>S-Morph. Sensitivity</td>
<td>.42</td>
<td>.23</td>
<td>.04</td>
<td>.03</td>
<td>.31</td>
<td>.85</td>
<td>.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Morph. Structure</td>
<td>.23</td>
<td>.30</td>
<td>.35</td>
<td>.25</td>
<td>.44</td>
<td>.27</td>
<td>.58</td>
<td>.31</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>S-Morph. Structure</td>
<td>.40</td>
<td>.24</td>
<td>.10</td>
<td>.13</td>
<td>.46</td>
<td>.74</td>
<td>.30</td>
<td>.76</td>
<td>.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Word Reading</td>
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<td>.33</td>
<td>.33</td>
<td>.36</td>
<td>.45</td>
<td>.40</td>
<td>.52</td>
<td>.47</td>
<td>.47</td>
<td>.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-Word Reading</td>
<td>.39</td>
<td>.21</td>
<td>.17</td>
<td>.25</td>
<td>.27</td>
<td>.66</td>
<td>.20</td>
<td>.75</td>
<td>.33</td>
<td>.67</td>
<td>.74</td>
<td></td>
</tr>
</tbody>
</table>

Correlation greater than .32 is significant at the .001 level (2-tailed); greater than .26 is significant at the .01 level (2-tailed), and greater than .20 is significant at the .05 level (2-tailed); E-Morph. Structure = English Morphological Structure; S-Morph. Structure = Spanish Morphological Structure; E-Morph. Sensitivity = English Morphological Sensitivity; S-Morph. Sensitivity = Spanish Morphological Sensitivity.

A series of hierarchical regression analyses was carried out to examine the within and cross-language effects of morphological awareness on word reading. The grade 4 and grade 7 participants were put in the same regression analyses, and the procedure outlined in Pedhazur (1997, pp. 646-654) was followed to examine whether the morphological awareness measures had the same effects on word reading across the two grades. In the initial analysis, the continuous variables and grade (coded by an effect vector) were entered into the regression model, followed by the interaction terms. The initial analyses revealed that none of the interaction terms were statistically significant, suggesting that the effects of the continuous variables (in particular, the effects of morphological awareness measures) were the same across the two grades in all the models. Consequently, the dependent variable was regressed only on the grade vector and the continuous variables in the final analyses. I also
carried out an alternative analysis in which age, rather than the grade vector, was entered in the first step. The alternative analysis produced the same significant predictors for all the models.

**Within-language Contributions of Morphological Awareness to Word Reading**

The English within-language model is displayed in the upper half of Table 10. Entered in step 1, the effect of the grade vector was significant, $F(1, 93) = 35.61, p < .001$, indicating that seventh graders outperformed fourth graders on English word reading. English vocabulary, entered in step 4 after the grade vector, non-verbal ability, and memory, predicted an additional 6% of the variance, $F(1, 90) = 9.30, p < .01$. Phonological awareness predicted an additional 13% of the variance in step 5, $F(1, 89) = 24.09, p < .001$. Most importantly, the two English morphological awareness measures in combination explained an additional 5% of the unique variance in English word reading, when entered in the last step after all the control variables, $F(1, 87) = 5.25, p < .01$. The final beta weights revealed that only grade, $t = -5.85, p < .001$, and phonological awareness, $t = 4.50, p < .001$, were unique predictors of English word reading. The contribution of English morphological awareness reached significance only when the two measures, morphological sensitivity and morphological structure, were considered together. Neither measure, however, was a unique predictor by itself, because of the high correlation between the two measures ($r = .58$).

The Spanish within-language model is displayed in the upper half of Table 11. The effect of the grade vector was significant for Spanish word reading, $F(1, 92) = 14.23, p < .001$. Children in grade 7 outperformed children in grade 4. Spanish vocabulary explained 34% of the variance in Spanish word reading at step 4, $F(1, 89) = 60.52, p < .001$, after controlling for the effects of the grade vector, non-verbal ability, and memory. In step 5,
phonological awareness explained an additional 5% of the variance, \(F(1, 88) = 9.18, p < .01\).

Finally, the two Spanish morphological awareness measures combined accounted for an additional 9% of the variance in Spanish word reading, when both were entered in the last step, \(F(1, 86) = 10.45, p < .001\). The final beta weights suggest that only phonological awareness, \(t = 2.86, p < .01\), and the Spanish morphological sensitivity test, \(t = 3.45, p < .01\), were unique predictors of Spanish word reading.

Table 10

*Within and Cross-language Hierarchical Regression Analyses on English Word Reading (n = 90)*

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within language</th>
<th>Across-language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(R^2) (\Delta R^2) (\Delta F)</td>
<td>(\beta)</td>
<td>(t)</td>
</tr>
<tr>
<td><strong>Within English</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Grade</td>
<td>.28</td>
<td>.28</td>
<td>35.61***</td>
</tr>
<tr>
<td>2. Non-verbal Ability</td>
<td>.28</td>
<td>.00</td>
<td>.59</td>
</tr>
<tr>
<td>3. Memory</td>
<td>.34</td>
<td>.06</td>
<td>7.01**</td>
</tr>
<tr>
<td>4. E-Vocabulary</td>
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<td>.06</td>
<td>9.30**</td>
</tr>
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<td>5. PA</td>
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<td>.13</td>
<td>24.09***</td>
</tr>
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<td>6. E-Morph. Sensiti.</td>
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<td>.05</td>
<td>5.25**</td>
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<td>E-Morph. Structure</td>
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<td>.05</td>
<td>5.74**</td>
</tr>
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<td><strong>Cross-language</strong></td>
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<tr>
<td>7. S-Morph. Sensiti.</td>
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<td>.05</td>
<td>5.74**</td>
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<tr>
<td>S-Morph. Structure</td>
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<td></td>
</tr>
</tbody>
</table>

***Significant at the .001 level (2-tailed), **Significant at the .01 level (2-tailed), *Significant at the .05 level (2-tailed).

Table 11  
**Within and Cross-language Hierarchical Regression Analyses on Spanish Word Reading**

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within language</th>
<th>Across-language</th>
</tr>
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<tr>
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<tr>
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<td>.49</td>
<td>.34</td>
<td>60.52***</td>
</tr>
<tr>
<td>5. PA</td>
<td>.54</td>
<td>.05</td>
<td>9.18**</td>
</tr>
<tr>
<td>6. S-Morph. Sensiti.</td>
<td>.63</td>
<td>.09</td>
<td>10.45***</td>
</tr>
<tr>
<td>S-Morph. Structure</td>
<td>.18</td>
<td>.40</td>
<td></td>
</tr>
</tbody>
</table>

**Cross-language**

7. E-Morph. Sensiti. | .63   | .00           | .40      |       |       |       |     
8. E-Morph. Structure |       |               |          |       |       |       |     

***Significant at the .001 level (2-tailed), **Significant at the .01 level (2-tailed), *Significant at the .05 level (2-tailed). S-Vocabulary = Spanish Vocabulary; PA = Phonological Awareness; S-Morph. Sensiti. = Spanish Morphological Sensitivity; S-Morph. Structure = Spanish Morphological Structure; E-Morph. Sensiti. = English Morphological Sensitivity; E-Morph. Structure = English Morphological Structure.

**Cross-linguistic Contribution of Morphological Sensitivity to Word Reading**

The cross-language contribution of morphological awareness to reading was examined in the regression models shown in the lower halves as well as the last two panels of Tables 10 and 11. To test the cross-linguistic contribution of morphological awareness to word reading, within language morphological awareness measures were entered before cross-linguistic measures. This will allow examining whether beyond shared variance between morphological awareness across English and Spanish, the measure in one language would capture skills important for word reading that would not be captured by a parallel measure in the other language. This is an important test of cross-linguistic transfer for Spanish-speaking ELLs given their different levels of proficiency in each language. As shown in Table 10, the two Spanish morphological awareness measures in combination contributed an additional 5% to the variance in English word reading, when entered after all the variables in the English within language model, $F(1, 84) = 5.74$, $p < .01$. Neither measure, however, was a unique
predictor by itself, because of the high correlation between the two measures \( r = .76 \). I further tested the strength of the relation between each Spanish morphological awareness measure and English word reading by entering each measure in a separate step. Morphological structure entered before morphological sensitivity explained 3% of the unique variance, \( F(1, 85) = 7.55, p < .01 \), and morphological sensitivity did not explain any additional variance. On the other hand, morphological sensitivity entered before morphological structure explained 5% of the unique variance, \( F(1, 85) = 10.88, p < .01 \), and morphological structure did not add any additional variance. This shows that there is 3% shared variance between the two morphological awareness tests, and that whichever is entered first takes it.

English and Spanish share cognates. Therefore, the scores of the Spanish morphological sensitivity test using only the non-cognate items were recalculated to confirm that the observed contribution was not just the effect of shared vocabulary. Fifteen out of the 27 items in this test were non-cognates (see Appendix G). These non-cognate items predicted 3% of the unique variance in English word reading, \( F(1, 88) = 7.59, p < .01 \). Similarly, the independent contributions of real word and pseudo-word items in the Spanish morphological structure test were analyzed further. The real word items explained an additional 4% of the variance in English word reading, \( F(1, 88) = 9.47, p < .01 \); the pseudo-word items also explained 4% of the unique variance, \( F(1, 88) = 8.54, p < .01 \). Finally, as displayed in Table 11, the English morphological awareness measures did not explain additional variance in Spanish word reading after controlling for the variables in the Spanish within-language model.
Discussion

*The Contribution of Morphological Awareness to Spanish and English Word Reading*

Because Spanish has a shallow orthography, most previous studies have highlighted the importance of grapheme-phoneme recoding strategies in Spanish word reading (e.g., Goswami et al., 1998; Signorini, 1997; Ziegler & Goswami, 2006). This study demonstrated that Spanish morphological awareness also plays an essential role in Spanish word reading among ELLs in grade 4 and grade 7. The two Spanish morphological awareness measures together explained approximately 9% of the unique variance in Spanish word reading after controlling for age, non-verbal ability, working memory, vocabulary, and phonological awareness. This was a substantial contribution, especially considering the number of control variables included in the model. There are similarities and differences in the nature of the relationship between morphological awareness and word reading in Spanish and in English. English has a deep orthography. Morphological awareness provides insights about the mapping between print and speech in addition to the alphabetic principle (Kuo & Anderson, 2006; Nagy et al., 2003, 2006). The same cannot be said of Spanish, as most Spanish words are phonologically transparent. However, both languages have morphologically complex words, and that is another reason that morphological awareness facilitates reading in Spanish as well. In fact, it was found that morphological awareness makes a larger within-language contribution to word reading in Spanish (9%) than in English (5%), probably because Spanish has a more complex morphological system. The current study, together with previous studies involving Italian- and Finnish- speaking children (e.g., Burani et al., 1999; 2002), suggest that awareness of derivational morphology is related to word reading in shallow orthographies. To explore this further, the hypothesis tested in the current study
should be tested with Spanish monolingual children. The current study also extends the previous research by demonstrating a direct link between morphological awareness and word reading, even after controlling for other reading-related variables.

Findings from the current study regarding the role of morphological awareness in Spanish word reading are consistent with those of studies examining morphological processing in visual word recognition in adult readers. According to the Augmented Addressed Morphology model (AAM) proposed by Caramazza, Laudanna, and Romani (1988), morphologically complex words are accessed in two different ways, through whole word representations for familiar words and through representations of constituent morphemes for unfamiliar words and nonwords. Taft (e.g. 1979, 2004), taking an even stronger position, proposed that morphological decomposition is obligatory for all polymorphemic words in the early stages of lexical processing. Despite differences in when and how morphological decomposition occurs, all major models of word recognition maintain that morphological structure is crucial for lexical access (e.g. Alvarez et al., 2001; Caramazza et al., 1988; Taft, 2004). The influence of morphological structure applies to both regular and irregular words, as evidenced in studies involving deep orthographies such as English (e.g., Taft, 2004) and shallow orthographies such as Spanish and Italian (see Dominguez et al., 2000 for a review). This may explain why in the current study morphological awareness contributed to reading regular Spanish words that are morphologically complex.

I examined the role of phonological awareness in Spanish reading to provide a baseline for understanding the impact of morphological awareness (see Deacon et al., 2007). While phonological awareness and morphological awareness were the only two unique
predictors of Spanish word reading in the regression model, the phonological awareness measure explained a smaller amount of variance (about 5%) than the morphological awareness measures when it was entered in the previous step. This is probably due to the fact that phonological awareness only requires manipulation of sound units, whereas morphological awareness involves manipulation of morphemes, which possess both phonological and semantic properties. These results are consistent with studies reporting weak associations between phonological awareness and reading in other regular orthographies such as German (e.g., Wimmer, 1993), Dutch (e.g., de Jong & van der Leij, 1999; 2003), and Hebrew (Share, 2008). Because in orthographies with consistent letter-sound mapping, word and non-word reading are mastered by the end of grade 1 (for a comparison of 14 languages see Seymour, Aro, & Erskine, 2003), the role of phonological awareness may decrease along the developmental continuum (for a critical discussion see Share, 2008). This may explain why in the current study the contribution of morphological awareness surpassed that of phonological awareness, as the participants were upper elementary and middle school children.

One of the research questions asked at the outset of the study is whether morphological awareness plays a part in the English word reading of Spanish-speaking ELLs. Results indicated that the English morphological awareness measures explained unique variance (5%) in English word reading after controlling for other reading related variables. A group of studies (e.g., Chiappe & Siegel, 2006; Lesaux et al., 2007; Lesaux & Siegel, 2003) has shown that phonological awareness is related to reading success for both native English speakers and ELLs (see Geva, 2006 for a review). The current study suggests that in addition to phonological awareness, morphological awareness contributes to word reading in Spanish-
speaking ELLs. In fact, it appears that the relationship between morphological awareness and reading among Spanish-speaking ELLs is similar to what has been previously demonstrated for monolingual children (e.g., Carlisle, 1995, 2000; Mahony, 1994; Nagy et al., 2003, 2006; Singson et al., 2000).

**Cross-linguistic Effect of Morphological Awareness on Word Reading**

This study provides strong evidence for cross-linguistic transfer of morphological awareness on word reading for Spanish-speaking ELLs. The two Spanish morphological awareness measures in combination explained a significant amount of variance (about 5%) in English word reading. Interestingly, the amount of variance accounted for by the Spanish measures in English word reading was the same as the amount accounted for by the English measures (about 5%). Thus, for Spanish-speaking ELLs, morphological awareness developed in their first language is just as important for English word reading as English morphological awareness. While the small number of studies examining transfer of morphological awareness has focused on children in early grades (Bindman, 2004; Deacon et al., 2007; Schiff & Calif, 2007), results from the current study indicate that this transfer also occurs in late primary and middle school years.

Why does Spanish morphological awareness contribute to English word reading? It is likely that part of the transfer is mediated by verbal ability, as both the Spanish morphological sensitivity test and the Spanish morphological structure test were positively correlated with English vocabulary ($r = .31$ and $.46$, respectively). However, verbal ability alone cannot explain the cross-linguistic relationship. Spanish morphological awareness remained a significant predictor of English word reading after controlling for English vocabulary. Furthermore, the non-cognate items in the morphological sensitivity test and the
pseudo-word items in the morphological structure test each explained unique variance in English word reading after controlling for English vocabulary. These findings demonstrate that Spanish morphological awareness contributes to English word reading over and beyond the shared variance with English vocabulary. The unique contribution is based on the understanding of common morphological principles across the two languages, such as the semantic and syntactic properties of morphemes and the morphological structure of complex words.

It is worth noting that transfer of morphological awareness was only observed from Spanish to English, but not from English to Spanish. Although the English morphological awareness measures were significantly correlated with Spanish word reading, they failed to make any unique contribution after controlling for Spanish morphological awareness. This unidirectional transfer is in line with several previous studies showing that morphological awareness tends to transfer from languages with more complex morphological systems to English (Bindman, 2004; Saiegh-Haddad & Geva, 2008; Schiff & Calif, 2007). Thus, the dynamic of transfer may be jointly determined by the morphological features of children’s first and second languages.

In the context of the present study, it is likely that Spanish-speaking ELLs were able to draw on the sensitivity that they developed through experience with the sophisticated Spanish morphological system in order to learn English words. To illustrate, derivational and inflectional morphemes are often intertwined in Spanish words; children need to activate both systems when performing morphological analysis in Spanish. For example, in the morphological sensitivity test, children were asked to transform the word *carta* (letter) to complete the sentence *Esta mañana trajo las cartas el _______. (This morning the letters*
were brought by the ________). To produce the correct answer *cartero (postman)*, they need not only to attach the agentive *-er*, but also to select the appropriate gender marker (*-o, -a*), which is determined by the gender of the preceding article (*el, he*). A further consideration involves whether to attach a plural marker (*-s, -es*) as Spanish morphosyntactic rules require gender and number agreement between various parts of speech (article, noun, adjective). Morphological awareness developed in English, on the other hand, did not offer additional help for Spanish word reading.

Transfer of morphological awareness may also be affected by the aspect of morphology under investigation. The only study that I am aware of that has observed bidirectional transfer of morphological awareness is one by Deacon et al. (2007). This study focused on past tense analogy among young French immersion children. There are important differences between inflectional morphology (e.g., past tense and plural forms), and derivational morphology. The former involves only a small number of highly frequent suffixes, whereas the latter consists of a larger number of less frequent derivational prefixes and suffixes. Moreover, the derivational process typically involves complicated alterations in phonology and meaning. It is possible, then, that some aspects of inflectional morphological awareness in closely related languages operate under a common construct and transfer in both directions. Awareness of derivational morphology, on the other hand, encodes both language-common and language-specific knowledge, and its transfer may be more subject to the relative complexity of the two morphological systems involved. To clarify this issue, future studies need to examine transfer of different aspects of inflectional and derivational morphology in closely related languages.
Previous research failed to yield a consistent pattern concerning the effect of language proficiency on the direction of transfer. Transfer was found from children’s stronger language (Hebrew) to their weaker language (English) by Schiff and Calif (2007), but from a weaker language (Arabic) to a stronger language (English) by Saiegh-Haddad and Geva (2008). Nevertheless, it is possible that bidirectional transfer requires similar proficiency levels across the two languages. So far evidence for bidirectional transfer of morphological awareness (Deacon et al., 2007), as well as phonological awareness (e.g., Comeau et al., 1999), has mostly come from studies involving French immersion children, who develop strong proficiency in both French and English. In fact, bidirectional transfer of morphological awareness was only observed by Deacon et al. (2007) in grade 2, when children had reached a certain level of French proficiency but had not reached the ceiling of the English morphological awareness test. By contrast, the Spanish-speaking ELLs in the current study varied greatly in terms of first/second language instruction, exposure, support, and as a result, language proficiency.

Additional evidence of transfer comes from the cross-linguistic correlations among the morphological awareness measures. The morphological structure tests in Spanish and English were significantly correlated. There were also cross-linguistic correlations between the morphological structure tests and the morphological sensitivity tests. These findings suggest that some aspects of morphological awareness are associated across Spanish and English. No significant correlations, however, were found between the morphological sensitivity tests across English and Spanish. A possible explanation is that productive morphological awareness (as measured by the morphological sensitivity test) requires more language specific knowledge. For example, language specific vocabulary knowledge is
necessary to understand the meaning of derived forms. To examine this possibility, an additional analysis using only the cognate items was carried out. This analysis yielded a significant correlation \((r = .25)\) between the Spanish and English morphological sensitivity tests, whereas the correlation between non-cognate items was not significant, suggesting that vocabulary knowledge enhances cross-linguistic association of productive morphological knowledge.

To conclude, the current study provided evidence that morphological awareness is important in Spanish and English word reading, and that Spanish morphological awareness skills facilitate English word reading. However, it is not clear whether cross-linguistic transfer is mediated by general metalinguistic skills or by lexical units shared across languages. To disentangle the mechanisms of cross-linguistic transfer of morphological awareness, the nature of the association between morphological awareness and vocabulary among Spanish-speaking ELLs was further examined in Study 3.
CHAPTER 7. STUDY THREE

The Contribution of Morphological Awareness to Vocabulary among Spanish-Speaking ELLs

Results from Study 2 indicated that morphological awareness predicts word reading for Spanish-speaking ELLs. Given the empirical evidence reporting strong associations between vocabulary and literacy skills (see Wagner et al., 2007), it is important to examine whether morphological awareness also predicts vocabulary development for Spanish-speaking ELLs.

Study 3 investigated the within and cross-linguistic contributions of morphological awareness to vocabulary: The aim of this study was to clarify whether morphological awareness skills, developed in both languages, facilitate vocabulary development for Spanish-speaking ELLs. The impetus for examining the role of morphological awareness in Spanish-speaking ELLs’ vocabulary knowledge emerged from research with monolingual learners, mainly English speakers (see Beck, McKeown, & Kucan, 2002; Carlisle, 2007; Nagy et al., 2006). This body of research suggests that native-English speakers learn new words by extensive incidental exposure, explicit teaching, and morphological word analysis. ELLs have less exposure to English than their English monolingual peers, reducing their opportunities for incidental word learning. Because of this, ELLs may need to rely more on morphological analysis to learn vocabulary. Therefore, I expected morphological awareness to play a unique role in the vocabulary performance of Spanish-speaking ELLs, both within Spanish and within English. In Study 2, Spanish morphological skills predicted word reading in English. Based on results from Study 2, I also expected morphological awareness to make an independent cross-linguistic contribution to vocabulary. It remained uncertain
whether the cross-linguistic associations would be bidirectional or, as observed in Study 2, only from the L1, Spanish, to the L2, English.

**Method**

*Participants*

Ninety Spanish-speaking ELLs (39 fourth graders and 51 seventh graders) participated in this study. They were the same participants as in Study 2.

*Measures*

As in Study 2, the measures used were non-verbal ability, memory, phonological awareness, word reading, vocabulary, and the two measures of derivational morphology: morphological structure and morphological sensitivity. However, in the present analysis vocabulary was the outcome variable.

*Results*

The descriptive statistics for the measures included in the current study and the patterns of correlation can be found in Tables 8 and 9 of Study 2. Because neither working memory nor phonological awareness correlated with any of the vocabulary measures, they were not included in the regression equation. For the final regression models, grade was always entered in the first step, non-verbal ability in the second step, word reading in the third step, the within-language morphological awareness measures in the fourth step and the cross-linguistic morphological awareness measures in the final step.

Before pooling together the 4th and the 7th graders in the same regression model, it was verified that the relationship between each of the predictors considered in the model with
vocabulary was the same for the grade 4 and grade 7 children. Hierarchical regression analyses were conducted to assess whether English and Spanish derivational awareness predicted vocabulary in Spanish-speaking ELLs. The results of the regression on English vocabulary are displayed in Table 12. After controlling for grade, nonverbal skills, and word reading, the two English derivational awareness measures accounted for an additional 15% of the variance, $F(2,88) = 11.30, p < .001$, and the two Spanish derivational measures accounted for an additional 5% of the variance, $F(2,86) = 3.57, p < .05$, in English vocabulary.

Table 12
Hierarchical Regression Analyses Summary Table for Predictors of English Vocabulary

<table>
<thead>
<tr>
<th>Step and Predictor</th>
<th>General Model Summary</th>
<th>Within Language</th>
<th>Across Language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td>Within English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Grade</td>
<td>.15</td>
<td>.15</td>
<td>15.62***</td>
</tr>
<tr>
<td>2. Non-Verbal Ability</td>
<td>.18</td>
<td>.03</td>
<td>4.31*</td>
</tr>
<tr>
<td>3. E-Word Reading</td>
<td>.26</td>
<td>.08</td>
<td>9.15**</td>
</tr>
<tr>
<td>4. E-Morph. Sensiti.</td>
<td>.41</td>
<td>.15</td>
<td>11.30***</td>
</tr>
<tr>
<td>E-Morph. Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. S-Morph. Sensiti.</td>
<td>.46</td>
<td>.05</td>
<td>3.57*</td>
</tr>
<tr>
<td>S-Morph. Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***Significant at the .001 level (2-tailed); **Significant at the .01 level (2-tailed); *Significant at the .05 level (2-tailed). E-Morph. Sensiti. = English Morphological Sensitivity; E-Morph. Structure = English Morphological Structure; S-Morph. Sensiti. = Spanish Morphological Sensitivity; S-Morph. Structure = Spanish Morphological Structure.

A regression analysis following parallel steps was conducted on Spanish vocabulary (see Table 13). The two measures of Spanish morphological awareness explained 26% of the variance, $F(2, 88) = 11.30, p < .001$, in Spanish vocabulary over and above grade, non-verbal ability, and Spanish word reading. An examination of $\beta$s revealed that each Spanish morphological awareness measure made an independent contribution to vocabulary, $t = 5.92, p < .001$ and $t = 3.36, p < .01$ for Spanish morphological sensitivity and morphological
structure, respectively. The English morphological awareness measures did not explain any additional variance.

Table 13

Hierarchical Regression Analyses Summary Table for Predictors of Spanish Vocabulary

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within Language</th>
<th>Across Language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td>Within English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Grade</td>
<td>.13</td>
<td>.13</td>
<td>13.45***</td>
</tr>
<tr>
<td>2. Non-Verbal ability</td>
<td>.13</td>
<td>.00</td>
<td>.02</td>
</tr>
<tr>
<td>3. S-Word Reading</td>
<td>.46</td>
<td>.33</td>
<td>54.08***</td>
</tr>
<tr>
<td>4. S-Morph. Sensiti.</td>
<td>.72</td>
<td>.26</td>
<td>41.00***</td>
</tr>
<tr>
<td>S-Morph. Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Across-languages</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. E-Morph. Sensiti.</td>
<td>.73</td>
<td>.01</td>
<td>1.70</td>
</tr>
<tr>
<td>E-Morph. Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***Significant at the .001 level (2-tailed); **Significant at the .01 level (2-tailed); *Significant at the .05 level (2-tailed).


In sum, morphological awareness made unique contributions to vocabulary knowledge both within English and within Spanish. The proportion of variance explained by morphological awareness was large in English but even larger in Spanish. Cross-linguistic analyses indicated that Spanish morphological awareness contributed to English vocabulary, while English morphological awareness did not predict Spanish vocabulary.

To examine whether the association between morphological awareness and vocabulary in Spanish-speaking ELLs was mediated by cognates, further analyses were performed on the vocabulary test by cognate vs. non-cognate classification. Because in the previous analyses a significant contribution was only observed from Spanish morphological awareness to English vocabulary, the fine-grained examinations focused on this cross-linguistic relationship only. An item on the English vocabulary test was categorized as cognate if the word had the same meanings and similar spellings across the two languages. A
total of 36 words (60%) from the English vocabulary test were identified as cognates ($\alpha = .70$) and 24 words (40%) were identified as non-cognates ($\alpha = .59$).

Because word frequency is generally strongly related to vocabulary learning (Wagner et al., 2007), the English vocabulary items within the cognate and non-cognate domains were further classified into low frequency vs. high frequency according to the number of occurrences in the American Heritage Intermediate Corpus (for more details see Carroll, Davies, & Richman, 1971). The index of dispersion, which can take values from .0000 to 1.0000, based on the dispersion of the frequencies over 17 subject categories, was the statistic used. Of the cognate words, 24 (66%) were low frequency ($\alpha = .63$), that is, the index of dispersion was at or below .4900, and 12 (34%) were high frequency ($\alpha = .559$), that is, the index of dispersion was above .5000. Of the non-cognate words, 5 (21%) were low frequency ($\alpha = .13$) and 19 (79%) were high frequency ($\alpha = .60$). Means and standard deviations of performance in each of these categories are shown in Table 1.

At first sight, the apparent better performance on non-cognates than cognates may be confusing and counterintuitive. An examination of the frequency distribution within each category resolves this by showing that most of the non-cognates are high frequency, while most of the cognates are low frequency. The means within the further categorization (cognates: high vs. low frequency; non-cognates: high vs. low frequency) provide further clarification. Paired sample $t$ tests within frequency category by cognate status confirmed that performance was better on cognates than on non-cognates for both high-frequency, $t(96) = 7.89$, $p < .001$, and low-frequency items, $t(96) = 4.33$, $p < .001$. Performance was also

\footnote{Although $D = \text{Index of Dispersion}$, is not a direct measure of frequency, it was chosen over other frequency indexes (e.g., $F, SFI, U$) because it reflects the occurrence of a word across subject categories. However for ease of interpretation in future analyses the use of $U$ is recommended.}
better on the high frequency than on the low frequency items for both cognates, \( t(96) = 12.73, p < .001 \), and non-cognates, \( t(96) = 12.73, p < .001 \).

**Table 14**

Summary of Observed Performance on Vocabulary by Cognate and Frequency Status

<table>
<thead>
<tr>
<th>Variables</th>
<th>Grade 4 ((n=39))</th>
<th>Grade 7 ((n=51))</th>
<th>Combined ((n=90))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\alpha) (M) SD</td>
<td>(M)SD</td>
<td>(M)SD</td>
</tr>
<tr>
<td>E-Voc-Low Frequency</td>
<td>.67</td>
<td>439.96</td>
<td>5213.34</td>
</tr>
<tr>
<td>E-Voc-High Frequency</td>
<td>.67</td>
<td>836.80</td>
<td>879.08</td>
</tr>
<tr>
<td>E-Voc-cognate (35 = 58%)</td>
<td>.70</td>
<td>579.92</td>
<td>6511.42</td>
</tr>
<tr>
<td>E-Voc-non-cognate (25 = 42%)</td>
<td>.59</td>
<td>716.52</td>
<td>779.79</td>
</tr>
<tr>
<td>E-Voc-Cognate Low Frequency (25 = 42%)</td>
<td>.63</td>
<td>429.97</td>
<td>5013.37</td>
</tr>
<tr>
<td>E-Voc-Cognate High Frequency (11 = 18%)</td>
<td>.55</td>
<td>9013.47</td>
<td>9713.35</td>
</tr>
<tr>
<td>E-Voc-Non Cognate Low Frequency (5 = 8%)</td>
<td>.13</td>
<td>3414.68</td>
<td>4417.57</td>
</tr>
<tr>
<td>E-Voc-Non Cognate High Frequency (19 = 32%)</td>
<td>.60</td>
<td>817.13</td>
<td>8610.40</td>
</tr>
</tbody>
</table>

Note: means and standard deviations are reported in percentage scores.

Correlations were examined between the Spanish morphological awareness tasks and English vocabulary by cognate status (see Table 15). Overall, correlations were higher with cognate than with non-cognate vocabulary. Significant correlations were found for English cognates with Spanish morphological sensitivity, \( r = .52, p < .001 \), and with Spanish morphological structure, \( r = .39, p < .001 \). Correlations with English non-cognates were not significant.

Regressions were carried out to examine the effect of Spanish morphological awareness on English vocabulary by cognate status. Table 16 shows summary statistics of the regression models and the corresponding coefficients. Cross-linguistic results revealed that Spanish morphological awareness made unique contributions to English cognate vocabulary (9%), while there were no unique contributions to non-cognates.
Table 15

Correlations among All Measures with English Vocabulary by Cognate and Frequency Classification

<table>
<thead>
<tr>
<th>Variable</th>
<th>English Cognates</th>
<th>E-Non-cognates</th>
<th>Cognates</th>
<th>Non-cognates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E-Low Frequency</td>
<td>E-High Frequency</td>
<td>E-Low Frequency</td>
<td>E-High Frequency</td>
</tr>
<tr>
<td>Age in months</td>
<td>.37**</td>
<td>.35**</td>
<td>.27*</td>
<td>.33**</td>
</tr>
<tr>
<td>Non-verbal ability</td>
<td>.35***</td>
<td>.30**</td>
<td>.26*</td>
<td>.41***</td>
</tr>
<tr>
<td>Memory</td>
<td>.05</td>
<td>.24*</td>
<td>.01</td>
<td>.17</td>
</tr>
<tr>
<td>PA</td>
<td>.09</td>
<td>.12</td>
<td>.03</td>
<td>.19</td>
</tr>
<tr>
<td>E-Word Reading</td>
<td>.43***</td>
<td>.31**</td>
<td>.39***</td>
<td>.37***</td>
</tr>
<tr>
<td>S-Word Reading</td>
<td>.35**</td>
<td>.02</td>
<td>.37***</td>
<td>.17</td>
</tr>
<tr>
<td>E-Morph. Sensitivity</td>
<td>.37***</td>
<td>.40***</td>
<td>.32**</td>
<td>.57***</td>
</tr>
<tr>
<td>S-Morph. Sensitivity</td>
<td>.52***</td>
<td>.19</td>
<td>.41***</td>
<td>.21*</td>
</tr>
<tr>
<td>E-Morph. Structure</td>
<td>.45***</td>
<td>.63***</td>
<td>.26**</td>
<td>.47***</td>
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<tr>
<td>S-Morph. Structure</td>
<td>.39***</td>
<td>.07</td>
<td>.50***</td>
<td>.36***</td>
</tr>
<tr>
<td>S-Vocabulary</td>
<td>.44***</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***Significant at the 0.001 level (2-tailed); **Significant at the 0.01 level (2-tailed); *Significant at the 0.05 level (2-tailed).

To clarify whether the unique contribution of Spanish morphological awareness to English cognate vocabulary was affected by word frequency, further regressions were performed on the vocabulary items by cognate and frequency status. Tables 18 and 19 provide summary statistics from these regression analyses. Spanish morphological awareness made a unique contribution of 11% in English cognate-low-frequency vocabulary over and above the English measures. On the other hand, Spanish morphological awareness did not explain an additional amount of variance on English cognate-high-frequency vocabulary (see Table 17).
Table 16

Cross-language Hierarchical Regression Analyses on English Vocabulary Cognates

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>On English Cognate Vocabulary</th>
<th>On Non-cognate English Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(R^2)</td>
<td>(\Delta R^2)</td>
</tr>
<tr>
<td>Within English</td>
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<td></td>
</tr>
<tr>
<td>1. Grade</td>
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<td>.12</td>
</tr>
<tr>
<td>2. Non-verbal</td>
<td>.15</td>
<td>.03</td>
</tr>
<tr>
<td>Ability</td>
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<td></td>
</tr>
<tr>
<td>3. E-Word Reading</td>
<td>.23</td>
<td>.08</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.29</td>
<td>.06</td>
</tr>
<tr>
<td>E-Morph. Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-language</td>
<td>.38</td>
<td>.09</td>
</tr>
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<td>Sensitivity</td>
<td></td>
<td></td>
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<tr>
<td>S-Morph. Structure</td>
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</tr>
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</table>

***Significant at the .001 level (2-tailed); **Significant at the .01 level (2-tailed); *Significant at the .05 level (2-tailed). E-Morph. Sensitivity = English Morphological sensitivity; E-Morph. Structure = English Morphological Structure; S-Morph. Sensitivity = Spanish Morphological sensitivity; S-Morph. Structure = Spanish Morphological Structure.

Table 17

Cross-language Hierarchical Regression Analyses on English Vocabulary Cognates, Low Frequency and High Frequency

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>Vocabulary Cognates Low Frequency</th>
<th>Vocabulary Cognates High Frequency</th>
</tr>
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<tbody>
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<td></td>
<td>(R^2)</td>
<td>(\Delta R^2)</td>
</tr>
<tr>
<td>Within English</td>
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<td></td>
</tr>
<tr>
<td>1. Grade</td>
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<td>2. Non-verbal</td>
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<td>.00</td>
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<tr>
<td>Ability</td>
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<td></td>
</tr>
<tr>
<td>3. E-Word Reading</td>
<td>.17</td>
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<td>4. E-Morph.</td>
<td>.19</td>
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<td>E-Morph. Structure</td>
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<td>S-Morph. Structure</td>
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</table>

***Significant at the .001 level (2-tailed); **Significant at the .01 level (2-tailed); *Significant at the .05 level (2-tailed). E-Morph. Sensitivity = English Morphological Sensitivity; E-Morph. Structure = English Morphological Structure; S-Morph. Sensitivity = Spanish Morphological Sensitivity; S-Morph. Structure = Spanish Morphological Structure.
Table 18

Within and Cross-language Hierarchical Regression Analyses on English Vocabulary Non-Cognates, High Frequency

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within language</th>
<th>Across-language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td><strong>Within English</strong></td>
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</tr>
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<td>3. E-Word Reading</td>
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<td>1.23</td>
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<td>4. E-Morph. Sensitivity</td>
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<td>22.96***</td>
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<tr>
<td>E-Morph. Structure</td>
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<td></td>
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<tr>
<td><strong>Cross-language</strong></td>
<td></td>
<td></td>
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<tr>
<td>5. S-Morph. Sensitivity</td>
<td>.44</td>
<td>.02</td>
<td>2.00</td>
</tr>
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<td>S-Morph. Structure</td>
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</tbody>
</table>

***Significant at the .001 level (2-tailed); **Significant at the .01 level (2-tailed); *Significant at the .05 level (2-tailed). E-Morph. Sensitivity = English Morphological Sensitivity; E-Morph. Structure = English Morphological Structure; S-Morph. Sensitivity = Spanish Morphological Sensitivity; S-Morph. Structure = Spanish Morphological Structure.

**Discussion**

The Role of Morphological Awareness in the Vocabulary Development of Spanish-speaking ELLs

The main goal of Study 3 was to investigate the contribution of morphological awareness to vocabulary knowledge within and across English and Spanish. The results provide strong evidence that morphological awareness is associated with vocabulary for Spanish-speaking ELLs. Morphological awareness made a unique contribution to vocabulary within each language after controlling for grade, nonverbal skills, and word reading. Although the unique contribution of morphological awareness to vocabulary has been consistently demonstrated for monolingual English-speaking children (e.g., McBride-Chang et al., 2005), the present study is the first to provide this evidence for ELLs. Results from the current study indicated that morphological awareness contributes a large proportion of the variance in Spanish (26%) and in English (15%) vocabulary knowledge. This key finding suggests that morphological strategies may play an important role in the vocabulary learning of ELLs.
To understand why morphological awareness plays such a strong role in the vocabulary development of ELLs, it is necessary to reflect on how vocabulary is learned. There are several ways in which children acquire new vocabulary: through extensive exposure to oral and written language, which typically applies to high-frequency words; through morphological analysis, which applies to low-frequency complex words (Bybee, 1995); and by deducing meaning from clues provided by surrounding words (Carlo, 2007).

Compared to native speakers, ELLs have less exposure to English, thus limiting their opportunities to learn new words through exposure to English. Furthermore, the low levels of both breath and depth of vocabulary knowledge in ELLs may prevent them from being able to acquire vocabulary by deducing the meaning of new words through interpretation of contextual clues provided by surrounding words. If a text contains too many unknown or superficially known words, deriving meaning from context would not be a feasible strategy. This may explain why morphological awareness explained such a large amount of variance in the two languages of Spanish-speaking ELLs.

Similar to the findings of Study 2 in which Spanish morphological awareness contributed to English word reading over and above the contribution of English morphological awareness, in Study 3, Spanish morphological awareness contributed to English vocabulary after accounting for the variance explained by English morphological awareness. Also consistent with Study 2, in the current study no unique contribution was observed from English morphological awareness to Spanish vocabulary. As discussed in Study 2, it is possible that transfer occurs from a language with a more complex morphological system to one with a relatively less complex system, and one in which the learners are schooled.
The Mediating Role of Cognates and Word Frequency in the Contribution of Morphological Awareness to English Vocabulary

In the cross-linguistic regressions it was found that Spanish morphological awareness contributed only to English cognate vocabulary. The fact that the cross-over was limited to words shared between English and Spanish suggests that the cross-linguistic association between morphological awareness and vocabulary knowledge is language specific. An alternative explanation is that the results are confounded by word frequency. In other words, the observed lack of contribution of Spanish morphological awareness to English non-cognate vocabulary could have been due to an unbalanced frequency distribution in the cognate vs. non-cognate vocabulary items rather than a cognate factor. The further classification of cognate by frequency status and the regressions performed on these categorizations were undertaken precisely to exclude this possibility.

If frequency, and not cognate status, was in fact responsible for the transfer effect of Spanish morphological awareness on English vocabulary knowledge, a significant contribution would have been obtained on both high-frequency cognates, and high frequency non-cognates. In fact, the results were the opposite; Spanish morphological awareness did not explain an additional amount of variance on either cognate or non-cognate high frequency items. A significant contribution was only found on cognate low-frequency words. This finding suggests that Spanish morphological awareness plays a role in English vocabulary through cognate facilitation, and that this contribution is particularly important for low frequency vocabulary. It seems that to be able to use morphological skills developed in L1 to learn low-frequency words in L2 children need to be familiar with at least part of the word (the root) in either language. Although in theory this is a plausible explanation, the low reliability of the non-cognate low frequency subtest (α = .13) compromises the validity of this
interpretation. It is possible that the low reliability of the non-cognate low frequency subtest was the reason for the lack of significant contribution of morphological awareness. Therefore, it remains to be clarified if the cross-linguistic contribution of Spanish morphological awareness to English vocabulary is entirely mediated by cognates or whether frequency has a stronger effect than what was observed in this study.

Results indicating that Spanish morphological awareness does not contribute to English high-frequency words, regardless of their cognate status, are consistent with the hypothesis that familiar words are processed as a whole while the meaning of unfamiliar words is accessed through the activation of morphological skills (e.g., Alvarez et al., 2001; Anglin, 1993). Furthermore, the unique contribution of Spanish morphological awareness to English cognate-low-frequency vocabulary items was larger (11%) than the contribution of English morphological awareness (2%), making the cross-linguistic tests better predictors that the within-language ones. These results are intriguing and require further exploration in future studies.

To summarize, Study 3 yielded several important findings. First, it confirmed the strong link between vocabulary knowledge and morphological awareness. Second, it underscored the importance of developing cognate awareness in ELLs. A large proportion of English academic vocabulary consists of cognate words that are low-frequency in English but more common in Spanish, or related to a word of high frequency (e.g., *coniferous*-*conífero*, which in Spanish can be deduced from the high frequency word *cono*). Therefore, Spanish-speaking ELLs would greatly benefit from using cognate identification strategies while reading. While the contribution of cognates to the vocabulary development of Spanish-speaking ELLs has received increasing research attention in recent years (Bravo et al., 2007;
Jimenez et al., 1996; Malabonga et al., 2008), this study is the first to suggest that cognates also play an important role in enhancing the transfer of morphological awareness between English and Spanish.
CHAPTER 8. STUDY FOUR

Within and Cross-Linguistic Contributions of Morphological Awareness to Reading Comprehension

The ultimate goal of reading instruction for all students is to become skilled at comprehending text, so they can independently learn from what they read. Therefore in the current study the cross-linguistic transfer of morphological awareness to reading comprehension was examined.

Results from Study 2 and Study 3 confirmed the within and cross-linguistic contribution of morphological awareness to word reading and vocabulary. The purpose of the present study was to examine whether the same findings could be replicated when the focus was on reading comprehension. First, I examined the within-language contribution of morphological awareness to reading comprehension in Spanish, as well as in English. Based on the results of Study 2 and Study 3, it was expected that morphological awareness would play an important role in both Spanish and English reading comprehension. Second, I investigated whether morphological awareness developed in one language predicted reading comprehension in the other language. Cross-over effects of morphological awareness on reading comprehension were expected.

Method

Participants

The analyses were based on the same 90 Spanish-speaking ELLs (39 fourth graders and 51 seventh graders) who participated in Study 2 and Study 3.
Measures

Grade, non-verbal ability, working memory, phonological awareness, word reading, and vocabulary were used as control variables. The same measures of derivational awareness used in the previous two studies were also used here. Reading comprehension was the outcome variable. Word reading, vocabulary, derivational awareness, and reading comprehension were measured in both Spanish and English; the remaining tests were given in English only.

Results

Table 19 shows means and standard deviations for reading comprehension in English and Spanish. Performances on all other measures were shown in Table 8 in Study 2.

Table 19

Summary of Observed Performance on Reading Comprehension

<table>
<thead>
<tr>
<th>Variables</th>
<th>Grade 4 (n=39)</th>
<th>Grade 7 (n=51)</th>
<th>Combined (n=90)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α M SD</td>
<td>M SD</td>
<td>M SD</td>
</tr>
<tr>
<td>Spanish Reading</td>
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<td>57 15.25</td>
<td>51 16.15</td>
</tr>
<tr>
<td>Comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Reading</td>
<td>.71 59 11.29</td>
<td>66 12.09</td>
<td>63 12.31</td>
</tr>
<tr>
<td>Comprehension</td>
<td></td>
<td></td>
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</tbody>
</table>

It was observed that performance on reading comprehension was better in English than in Spanish. A paired-sample t-test revealed that this difference was significant, \( t(89) = 7.41 = p < .001 \). Correlations are presented in Table 20.

To examine the strength of the association between reading comprehension and all other measures, correlation analyses were performed. The correlations between measures of morphological awareness, vocabulary and reading comprehension were all positive and
within English and positive and high within Spanish. Within English, a similar pattern of association of reading comprehension with morphological structure, vocabulary, and word reading was observed, while reading comprehension correlated highly with morphological sensitivity. Within Spanish, an identical pattern of association was observed between reading comprehension and each of the morphological tasks. Note the particularly high correlation between reading comprehension and word reading within Spanish ($r = .80$) in contrast to a moderate correlation between parallel measures within English ($r = .55$).

By contrast to the within-language correlations, cross-linguistic associations between measures of reading comprehension and morphological awareness were modest, although still statistically significant. The lowest correlation observed was between Spanish reading comprehension and English morphological sensitivity, $r = .23$, and the highest correlation between English reading comprehension and Spanish morphological structure, $r = .37$. Note the high correlation between Spanish reading comprehension and English word reading ($r = .61$). Particularly noteworthy is the high correlation between Spanish reading comprehension and Spanish word reading ($r = .80$).

**Within-language Contributions of Morphological Sensitivity to Reading Comprehension**

Hierarchical linear regression models were calculated to identify the unique contribution of morphological sensitivity to reading and reading comprehension within each language. Before pooling together grade 4 and grade 7 children in the same regression analysis, it was verified that the relationship between each of the predictors considered in the model with reading comprehension was the same for grade 4 and grade 7 children. As can be seen in the upper part of Table 21 and Table 22, after controlling for age, non-verbal intelligence, phonological awareness, word reading, and vocabulary, the two morphological awareness
measures in combination explained about 5% of the variance in English, \( F(2, 88) = 4.72, p < .01 \) (see Table 21) and about 2% of the unique variance in reading comprehension in Spanish, \( F(2, 88) = 3.64, p < .05 \) (see Table 22). With all the within-language variables included, the models explained 53% of the variance in English, and 73% of the variance in reading comprehension in Spanish. Examination of the beta weights (see within-language columns in Tables 21 and 22) indicates that the morphological sensitivity test was a unique predictor of English reading comprehension, whereas the morphological structure test was a unique predictor of Spanish reading comprehension.

Table 20

<table>
<thead>
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<td>.33</td>
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<td>.67</td>
<td>.74</td>
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<tr>
<td>13. E-Reading Comprehension</td>
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<td>.55</td>
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<td>14. S-Reading Comprehension</td>
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<td>.28</td>
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<td>.18</td>
<td>.34</td>
<td>.69</td>
<td>.23</td>
<td>.73</td>
<td>.34</td>
<td>.73</td>
<td>.62</td>
<td>.80</td>
<td>.40</td>
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</tbody>
</table>

Correlation greater than .32 is significant at the .001 level (2-tailed); greater than .26 is significant at the .01 level (2-tailed); and greater than .20 is significant at the .05 level (2-tailed). E-Morph. Structure = English Morphological Structure; S-Morph. Structure = Spanish Morphological Structure; E-Morph. Sensitivity = English Morphological Sensitivity; S-Morph. Sensitivity = Spanish Morphological Sensitivity.
Table 21

**Within and Cross-language Hierarchical Regression Analyses on English Reading Comprehension**

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within-language</th>
<th>Across-language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td><strong>Within English</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Grade Effect V.</td>
<td>.08</td>
<td>.08</td>
<td>8.56**</td>
</tr>
<tr>
<td>2. Non-Verbal</td>
<td>.21</td>
<td>.13</td>
<td>14.93***</td>
</tr>
<tr>
<td>3. Memory</td>
<td>.21</td>
<td>.00</td>
<td>.50</td>
</tr>
<tr>
<td>4. E-Word Reading</td>
<td>.36</td>
<td>.15</td>
<td>21.62***</td>
</tr>
<tr>
<td>5. E-Vocabulary</td>
<td>.44</td>
<td>.08</td>
<td>12.70**</td>
</tr>
<tr>
<td>6. PA</td>
<td>.45</td>
<td>.01</td>
<td>1.13</td>
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<tr>
<td>7. E-Morph. Sensiti.</td>
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<td>.05</td>
<td>4.72**</td>
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<tr>
<td>E-Morph. Struc.</td>
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<tr>
<td><strong>Cross-language</strong></td>
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<tr>
<td>S-Morph. Struc.</td>
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</table>

*** Significant at the .001 level (2-tailed); ** Significant at the .01 level (2-tailed); * Significant at the .05 level (2-tailed). PA = Phonological Awareness; E-Morph. Sensiti. = English Morphological Sensitivity; E-Morph. Struc. = English Morphological Structure; S-Morph. Sensiti. = Spanish Morphological Sensitivity; S-Morph. Struc. = Spanish Morphological Structure.

Table 22

**Within and Cross-language Hierarchical Regression Analyses on Spanish Reading Comprehension**

<table>
<thead>
<tr>
<th>Step and predictor</th>
<th>General Model Summary</th>
<th>Within-language</th>
<th>Across-language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
<td>$\Delta F$</td>
</tr>
<tr>
<td><strong>Within Spanish</strong></td>
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<td>2. Non-Verbal</td>
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<td>3. Memory</td>
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<td>4. S-Word Reading</td>
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<td>5. S-Vocabulary</td>
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<td>6. PA</td>
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<td>7. S-Morph. Sensiti.</td>
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<td>8. E-Morph. Sensiti.</td>
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*** Significant at the .001 level (2-tailed); ** Significant at the .01 level (2-tailed); * Significant at the .05 level (2-tailed). PA = Phonological Awareness; S-Morph. Sensiti. = Spanish Morphological Sensitivity; S- Moph. Struc. = Spanish Morphological Structure; E-Morph. Sensiti. = English Morphological Sensitivity; E-Morph. Struc. = English Morphological Structure.
Cross-linguistic Contribution of Morphological Sensitivity to Reading Comprehension

The cross-language contribution of morphological awareness to reading comprehension was examined in a series of hierarchical linear regression models (shown in the lower halves of Table 21 and Table 22). Contrary to expectation, cross-linguistic effects of morphological awareness on reading comprehension were not significant. As reported in the lower halves of Table 21 and Table 22, adding word reading and morphological awareness measures in another language to the within-language models did not explain any additional variance in either English or Spanish reading comprehension. Thus, although the morphological awareness measures in one language were significantly correlated with reading comprehension in the other language, they did not contribute any unique variance after the within-language reading related factors were taken into account.

Discussion

The Contribution of Morphological Awareness to Reading Comprehension within English and Spanish

This study found that age, Spanish word reading, Spanish vocabulary, and Spanish morphological awareness each explained a significant amount of variance in Spanish reading comprehension. These findings suggest that the variables that are related to reading comprehension in Spanish are similar to those observed in English (e.g. Kieffer & Lesaux, 2007; Nagy et al., 2006). Notably, word reading and vocabulary in combination explained 53% of the variance in reading comprehension after controlling for age, non-verbal ability, and memory. Further analysis showed that the two variables shared as much as 29% of the variance. Because the morphological awareness measures were highly correlated with both word reading ($r = .75$ for morphological sensitivity, $r = .67$ for morphological structure) and
with vocabulary ($r = .85$ for morphological sensitivity, $r = .74$ for morphological structure), it seems that much of the contribution of morphological awareness to reading comprehension is mediated through its impact on word reading and vocabulary.

Besides the shared variance, Spanish morphological awareness also accounted for a small but significant amount of unique variance (2%) in Spanish reading comprehension. In particular, the morphological structure test was a significant predictor of Spanish reading comprehension. This test examined knowledge of the syntactic category of derivational suffixes (Mahony, 1994). Several researchers have proposed that the syntactic property of morphemes is important for reading comprehension as syntactic parsing is required in comprehending text (Mahony, 1994; Nagy et al. 2003; 2006; Tyler & Nagy, 1989). The current study lends support to this hypothesis. Interestingly, Spanish morphological structure made a unique contribution to Spanish reading comprehension, while English morphological structure did not make an independent contribution to English. This result seems to indicate that morpho-syntactic parsing plays a bigger role in Spanish than in English, probably because Spanish has a more complex morpho-syntactic system. This result, however, needs to be confirmed in future research. In contrast, the morphological sensitivity test was not uniquely associated with Spanish reading comprehension despite a strong correlation ($r = .73$).

One of the questions asked in this study was whether morphological awareness is important for English reading comprehension among Spanish-speaking ELLs. Only one study (Kieffer & Lesaux, 2007) has directly examined this issue in this population. The results of the present study are consistent with the results found by Kieffer and Lesaux, showing that morphological awareness plays a significant role in the reading comprehension
of ELLs, over and above non-verbal ability, memory, phonological awareness, word reading and vocabulary. Kieffer and Lesaux investigated fourth and fifth graders; the present study replicates the findings for children in grade four and extends them to children in grade seven.

By examining performance in both Spanish and English, this study also provided an opportunity to compare reading development in each of the Spanish-speaking ELLs’ languages. I found that the same set of variables, including age, non-verbal ability, word reading, vocabulary, and morphological awareness, explained significant amounts of variance in reading comprehension in both Spanish and English. These results suggest that the underlying processes in reading comprehension are similar in bilingual children’s two languages when these languages are closely related.

Cross-linguistic Examination of Morphological Awareness on Reading Comprehension
Inconsistent with findings obtained in Studies 2 and 3, in the current study no cross-linguistic effects were observed between morphological awareness and reading comprehension. Why was there not cross-linguistic transfer of morphological awareness to reading comprehension? A possible explanation is that sentence processing requires not only decoding and vocabulary, but also additional skills such as syntactic knowledge. English and Spanish vary greatly in their syntactic properties; therefore the differences in this area constrain cross-language contribution of morphological sensitivity. For example, word order rules in English require a modifier to precede the word that it modifies (e.g., I have two good kind friends), while in Spanish it usually follows the modified element (tengo dos amigos buenos y amables). In some special cases (some adjectives) the modifier can precede the noun in Spanish, but this change in location changes the meaning of the phrase (el es mi viejo amigo vs. el es mi amigo viejo) (he is my old friend vs. he is my friend who is old). In
addition, the location of elements that provide anaphoric references (referring back or substituting for a preceding word or groups of words) such as direct and indirect object pronouns differ in the two languages (e.g., she has not met them yet) (todavía no los ha conocido). These syntactic differences likely restricted the extent of cross-language transfer of morphological awareness. It is possible that at the text level, morphological awareness is more language specific and therefore less likely to transfer across languages.

A very conservative test of cross-language transfer has been adopted; a within language measure of morphological awareness was entered before the cross-linguistic measure. This stringency may have prevented observations of cross-language transfer. To clarify this, additional regression analyses were performed removing the within language morphonological awareness test from the equation. Still no cross-linguistic effects were observed. In addition to the within language morphological awareness measures, control variables included vocabulary and word reading, both of which were shown to be closely related to morphological awareness both within and across languages. Therefore, when they are entered before the crosslinguistic measure of morphological awareness they take most of the variance that is shared between these measures. Because the test of cross-language transfer of the effects of morphological awareness on reading comprehension was extremely strict, a negative finding cannot be interpreted as demonstrating the absence of cross-language transfer. It rather suggests that the language crossover is mediated by other factors such as word reading and vocabulary.
CHAPTER 9. GENERAL DISCUSSION

This dissertation had two purposes. The first was to identify factors that affect the development of derivational and compound awareness in ELLs with typologically different L1s (Chinese vs. Spanish). The second was to investigate the within- and cross-language role of derivational awareness in vocabulary, word reading, and reading comprehension in Spanish-speaking ELLs. These questions were examined in four interrelated studies and several insights were gained in relation to the issues investigated. First, it was found that children’s L1 language characteristics and extent of exposure to English affect their performance on L2 morphological awareness. Second, it was observed that morphological awareness is important in the performance of Spanish-speaking ELLs in word reading, vocabulary, and reading comprehension in both Spanish and English. Third, it was found that for Spanish-speaking ELLs, L1 morphological awareness is closely related to parallel skills in L2 and that L1 morphological awareness plays a unique role in L2 word reading and vocabulary. In this chapter, I will discuss these results in light of previous related research with monolinguals and with ELLs.

The Effect of L1 Characteristics and Extent of Exposure to English on L2 Morphological Awareness in ELLs

The purpose of Study 1 was to contribute to the understanding of the effect of L1 (Chinese or Spanish) and extent of exposure to English L2 (measured by the length of stay in Canada) on the development of English derivational and compound awareness. The results show that the effects of these factors vary on different aspects of morphological awareness. While first language morphological structure has a significant effect on derivational awareness and
compound awareness, exposure to English only affects derivational awareness. Specifically, extent of exposure to English contributes to derivational morphology for the Chinese children, but not to compound morphology for either group. Age is not uniquely related to either aspect of morphological awareness. In addition, both groups of learners performed better on compound than on derivational awareness.

In English, compound awareness has been shown to develop earlier than derivational awareness (see Ku & Anderson, 2006). The lack of effect of extent of exposure to English on compound morphological awareness for both Chinese- and Spanish-English speaking ELLs is likely due to differences in the developmental trajectory of these morphological awareness skills. Results from Study 1 suggest that the early development of compound awareness is also the case for ELLs. The results are not so clear for derivational awareness. Derivational morphology is a complex system, and as confirmed by previous research, takes longer to develop than compounding (Mahony et al., 2000; Nagy & Scott, 1990). Accordingly, one would expect length of exposure to English to have an effect on the development of this skill for all learners, and wonder why in the current study exposure to English did not have an effect on derivational morphology for the Spanish-speaking ELLs. One possible explanation is that the Spanish-speaking ELLs are transferring derivational awareness skills from their L1. To complete the derivational awareness test, children need to select a suffix that not only conveys the correct meaning, but also belongs to the syntactic category appropriate for the sentence and combines legally with the target word. There are similarities between English and Spanish in the syntactic and distributional properties of derivational morphology, which may explain why the Spanish-speaking ELLs performed similarly to native speakers. In contrast, Chinese-speaking ELLs have few opportunities to develop these derivational
morphological skills in their native language due to the small number of derivational morphemes in Chinese. It is also possible that there is an exposure threshold for the acquisition of derivational awareness skills, a threshold more likely to have been reached by the Spanish ELLs, who have been in Canada longer.

The current research extends previous knowledge of the development of morphological awareness. It is the first time that within the same study, the performance on compound and derivational awareness was examined in two groups of ELLs with typologically different native languages and compared with an age-matched sample of English native speakers. These contrasts were important in order to clarify issues related to cross-linguistic effects. Similarities in performance found between English native speakers and Chinese children in compound awareness and between English native speakers and Spanish children in derivational awareness may be due to the fact that Chinese is more closely related to English in compound morphology while Spanish is more closely related to English in derivational morphology. These results resonate with hypotheses within the contrastive analysis framework, which predict that similarities and differences between learners’ L1 and L2 either facilitate or interfere with L2 learning. The observed similarity in performance between the Chinese-speaking ELLs and the English monolinguals on compound awareness and between the Spanish-speaking ELLs and the English monolinguals on derivational awareness, as well as the relative advantage for the Spanish children over the Chinese children on derivational awareness suggest that differences exist in the development of each facet of morphological awareness as a function of L1 background.
Morphological Awareness in Spanish-speaking ELLs’ L1 and L2 Vocabulary and Literacy Development

One of the major questions in research with speakers of two or more languages is whether reading processes involve activation of the learner’s two language systems simultaneously or independently. One way to obtain insights into this issue is to examine whether the same underlying skills and predictors are involved in parallel skills across the two languages. To date the question of whether morphological awareness contributes to vocabulary, word reading, and reading comprehension among ELLs has mostly been examined only in the learner’s L2. In the current research, this issue was examined in both languages of Spanish-speaking ELLs. Results indicated that morphological awareness contributes to individual differences in word reading, vocabulary, and reading comprehension in Spanish children’s Spanish L1 and English L2.

The importance of morphological awareness in English word reading, vocabulary knowledge, and reading comprehension is consistent with previous evidence from studies with native speakers of English (e.g., Carlisle, 2000; Mahony, 1994). These results also mirror those obtained by Kieffer and Lesaux (2008) who examined the association of morphological awareness and reading comprehension in Spanish-speaking ELLs and by Siegel (2008) who investigated morphological awareness and word reading in ELLs from a variety of L1 backgrounds. Unlike Kieffer et al. and Siegel et al., who investigated children in grade 4 and grade 5, the current study involved 7th graders, providing evidence that morphological awareness continues to be important in the literacy development of ELLs, at least up to grade 7. Although Siegel et al. showed that morphological awareness is associated with word reading skills among ELLs, their analyses were performed on a sample
that lumped together children from several language backgrounds. Therefore it was not possible to show whether this association would hold for the Spanish-speaking sub-sample in isolation. Furthermore, their analyses did not control for the effects of skills previously shown to be associated with word reading such as individual differences in non-verbal ability, memory, phonological awareness and vocabulary. Results from the current studies add to this body of research and advance knowledge of the unique role of morphological awareness in vocabulary and literacy skills in Spanish-speaking ELLs in upper elementary and middle school.

English is considered to have a deep orthographic structure. That is, there is an obscure and inconsistent relationship between phonemes and graphemes where one sound can be represented at the written level by more than one letter. Take for example the word *thought*; it is represented by 7 letters at the written level, but orally, it is only represented by 3 sounds, /θɔt/. Because of this lack of one-to-one correspondence between phonemes and graphemes, phonemic decoding is not always a sufficient strategy for reading words. Furthermore, the root of some words undergoes a phonological shift after a process of suffixation. For example, *heal* is pronounced /hɪl/ and *health* is pronounced /hɛlθ/. In spite of the phonological shift, the spelling of the root morpheme is preserved. Because morphemes tend to preserve spelling in English, it is believed that morphological awareness facilitates word reading. The contribution of morphological awareness to word reading skill in English was not surprising, given the deeper nature of English orthography.

In comparing the regression models predicting word reading, vocabulary, and reading comprehension in the two languages of Spanish-speaking ELLs, a few observations are worth noting. First, across English and Spanish, the strongest associations were found
between morphological awareness and vocabulary knowledge. Morphological awareness explained unique variance in both Spanish (26%) and English (15%). This suggests that across the two languages, building vocabulary knowledge relies heavily on morphological word analysis skills; reciprocal associations could also be a possibility. In fact, it has been argued that vocabulary knowledge provides the basis for developing abstract understanding of morpheme meaning and word formation processes, and morphological insights, which in turn facilitate vocabulary acquisition further (McBride-Chang, Shu, Ng, Meng, & Penney, 2007). McBride-Chang, et al. (2008) also provide support for the reciprocal relationship in a recent study. They report that for Chinese four-year olds, morphological awareness of L1 4-year old Chinese children predicts vocabulary knowledge a year later, and that in turn vocabulary knowledge at age 4 predicts subsequent morphological awareness. Future research needs to examine this relationship among older children and children who are English language learners.

A second interesting observation across the regression models in each language is that when vocabulary was included in the model as a predictor of word reading and reading comprehension, over and above grade effect, non-verbal ability and memory, in English it explained 6% of the variance on word reading and 8% on reading comprehension. In a parallel regression model in Spanish, vocabulary explained 34% of the variance on word reading and 4% on reading comprehension. However, in both languages, once morphological awareness was entered, vocabulary lost its predictive power. This pattern of results indicates that in both languages morphological awareness and vocabulary share variance and that of the two, morphological awareness is a better predictor. This might reflect the fact that in the absence of automatized vocabulary knowledge, ELLs draw more on analytical strategies to
successfully tackle reading tasks. The variance shared by morphological awareness and vocabulary has been noted by researchers (e.g., Nagy 2007). One explanation that has been offered is that the relationship between these two constructs is reciprocal and the other is that the morphological awareness measures are in part a measure of vocabulary knowledge.

A third observation from the three studies conducted with the Spanish-speaking ELLs subsample is that overall, stronger associations of morphological awareness with word reading, vocabulary and reading comprehension were found within Spanish than within English. At this point no reasonable explanation can be offered, but this is an observation that certainly merits further exploration.

That morphological awareness contributed to English vocabulary and reading comprehension was not surprising either. Given that morphological awareness provides insights into the meaning of new words, and considering that ELLs know fewer English words than native speakers of English, it is likely that ELLs need to rely even more than native speakers of English on morphological analysis strategies to deduce the meaning of unfamiliar words and to comprehend texts. The results suggest that ELLs, like English native speakers, benefit from the use of morphological awareness to learn new vocabulary, read words, and understand passages in English.

More novel are the findings regarding the importance of morphological awareness in developing vocabulary, word reading, and reading comprehension in Spanish, given the shallow nature of the Spanish orthography and the lack of previous research in this area in Spanish. Although phonological awareness is important in Spanish (because of the consistent one-to-one correspondence between letters and sounds), it is clear from the current study that, at least for these participants, morphological awareness plays a greater role than
phonological awareness. It is likely that, similar to English, the number of Spanish morphologically complex words children encounter in their exposure to oral language and reading texts increases progressively (e.g., *extrasensorialmente*, in English *extrasensorial*). Given that morphologically complex words are longer, Spanish readers in later grades may find it more efficient to rely on morphological than on phonological analysis to read them. Similarly, morphological awareness may facilitate vocabulary learning in Spanish because once children know the root, if they are aware of the syntactic and semantic properties of suffixes, the meaning of a new word can easily be deduced. At the text level, in addition to the contribution through vocabulary and word reading, morphological awareness contributes to reading comprehension by providing syntactic clues. At the text level in Spanish, gender, number and tense agreement between different grammatical categories are explicitly indicated through suffixes which convey some of the syntactic information that is carried by word order in English. Therefore, the more aware Spanish readers are of the syntactic clues provided in suffixes, the easier it will be to establish semantic associations between different parts of the text and the better they will be at extracting meaning. Thus, in spite of the phonological transparency of Spanish, the rich and complex morphological system of this language may require that children apply word analysis skills to learn new vocabulary and to efficiently process written material at both the word and at the text level.

The current research is the first to provide empirical evidence on the importance of morphological awareness in vocabulary, word reading, and reading comprehension in the two languages of Spanish-speaking ELLs. These findings help us to understand the role of the specific language combination of ELLs in their language and literacy development. Once similar predictors of literacy development have been identified across the learner’s two
languages, the next question is whether these predictors play cross-linguistic roles, that is, whether precursors of reading in one language predict reading in the other. If this hypothesis is confirmed, one could assume that children are transferring skills from one language to the other. This issue, in relation to the findings of this study, will be discussed in the next section.

**Cross-linguistic Transfer of Morphological Awareness and Literacy-related Skills**

It is important to determine how well ELLs’ skills in their L1 transfer to their L2, and to understand how this transfer occurs. In this research, the term *transfer* was used to describe cross-language relationships of morphological awareness with parallel skills and with literacy related skills. A common goal of Studies 2, 3, and 4 was to examine the role of morphological awareness in word reading, vocabulary, and reading comprehension, respectively, across the two languages of Spanish-speaking ELLs. In general, these studies suggest that the ability of Spanish-speaking ELLs to identify and manipulate morphological units in one language is related to the same skill in their other language and that L1 morphological awareness skills facilitate performance on some L2 literacy skills but not on others. Interestingly, cross-linguistic contributions were found from Spanish to English on word reading and vocabulary, but not on reading comprehension. These findings are discussed in more detail below.

**Transfer of L1 morphological awareness to L2 word reading.** The study of cross-linguistic effects of morphological awareness on word reading in Spanish-speaking ELLs was motivated by inconsistent observations in other language pairs (e.g., Deacon et al., 2007
for English and French; Saiegh-Hadad & Geva, 2008 for Arabic and English; Bindman, 2004 and Schiff & Calif, 2007 for English and Hebrew). Deacon et al. compared two orthographically deep languages that have the same alphabet. Saiegh-Hadad and Geva, and Schiff and Calif compared a shallow with a deep orthography, each having a different alphabetic system. My study compared a shallow with a deep orthography, both having the same alphabetic system. My goal was to examine whether similar or different cross-language effects found in previous studies could be established for Spanish and English. In all these studies cross-linguistic transfer was confirmed by unique associations between morphological awareness in one language and word reading in the other despite differences in orthographic depth and writing systems. The only commonality is that all these languages use alphabetic writing systems. Although more studies with different pairs of languages need to be done before reaching final conclusions, the evidence so far suggests that L1 morphological word analysis skills facilitate English L2 word reading performance across alphabetic languages. The observed transfer effects might also be attributed to shared underlying mechanisms governing morphological processes across each pair of languages. Between Spanish and English, for example, there are overlapping features in the morphological system of each language (e.g., attachment of prefixes and suffixes to root words, and syntactic properties of suffixes).

**Transfer of L1 morphological awareness to L2 vocabulary knowledge.** When the cross-linguistic transfer of morphological awareness to vocabulary was examined in Study 3, it was found that Spanish morphological awareness contributed to cognate- but not to non-cognate vocabulary. These results suggest that the contribution of Spanish morphological awareness to English vocabulary is mediated by cognates. These results also provide
interesting insights into the nature of morphological awareness. They indicate that it involves both a general metalinguistic skill and some level of vocabulary knowledge (see Nagy, 2007).

A close examination of the specific skills involved in successfully performing the morphological awareness tasks used in my studies may help to clarify the mechanisms of cross-linguistic transfer of morphological awareness. At a general level, the tasks involve a metalinguistic skill that requires either explicit or implicit knowledge that words can be divided into small units of meaning, or morphemes. The learner needs to be aware that some words can be divided into smaller meaningful chunks (prefixes, stems, and suffixes) and that there are some restrictions when combining these chunks. However, if the root and the suffix are completely new to the learner, he or she may not be able to derive any meaning from the amalgamation of the two morphemes. The learner needs to have some level of familiarity with the constituent morphemes of a complex word. That is, he or she may need a certain level of vocabulary knowledge in order to take advantage of morphological analyses. The strong correlations observed between morphological awareness and vocabulary suggest that in fact these are two closely related skills. It is possible that one is a prerequisite of the other.

**Transfer of parallel skills.** Significant positive correlations indicated that the better Spanish-speaking ELLs performed in Spanish morphological awareness, word reading, vocabulary, and reading comprehension, the better they performed on parallel tasks in English. Spanish-speaking ELLs transferred vocabulary knowledge from their L1 to their L2. The morphological awareness, word reading, and reading comprehension cross-linguistic associations suggest that similar underlying skills are involved in performing these tasks in
English and Spanish. These skills are general ability, memory, phonological awareness and vocabulary.

Because of radical differences in phonological and orthographic representations across languages, vocabulary knowledge has traditionally not been considered a candidate for cross-linguistic transfer. However the present research shows that in the case of English and Spanish it is. Previously reviewed literature showed that English and Spanish share many cognates at the lexical (stems) and sub-lexical (prefixes and suffixes) levels. It has been speculated by several researchers (Carlisle & Beeman, 2000; Nakamoto, Lindsey, & Manis, 2009; Ordonez, Carlo, Snow, & McLaughlin, 2002) that cognate awareness transfers easily across languages. Sixty percent of the English and fifty five percent of the Spanish vocabulary tasks used in the current research were cognates; this may explain the significant correlation observed between Spanish and English vocabulary.

**Transfer of meta-linguistic awareness.** Based on previous research, it seems that some aspects of meta-linguistic awareness are more universal than others. For example, phonological awareness requires the ability to identify and manipulate the individual sounds in words, a principle common to all languages (Goswami, 2007; McBride-Chang & Kail, 2002). By contrast, morphological awareness requires identification and manipulation of larger orthographic and phonological segments, whose division is governed by rules (distributional and syntactic), that may vary from language to language (Saiegh-Haddad & Geva, 2008). In addition, one needs to take into account the characteristics of the two languages considered in the transfer. It follows that if two languages share specific rules, morphological awareness would transfer from one language to the other. In the case of
English and Spanish, at the general level (combination of prefixes, stems and suffixes), the process of word formation by derivation follows a similar pattern. Therefore, when this knowledge is acquired in Spanish it can be applied to similar tasks in English.

**The direction of skills transfer.** The cross-over effects were only observed from Spanish to English and not from English to Spanish. Several possible explanations for this finding will be discussed in turn. It could be that the direction of transfer of derivational morphological awareness depends on the morphological features of the languages under investigation. In particular, transfer may occur from a language with a more complex morphological system to one with a simpler morphological system. In fact, studies with speakers of other language pairs have demonstrated this (e.g., Saiegh-Haddad & Geva, 2008). It may be that when the L1 morphological system has a richer and more complex morphological structure than English L2, children become aware of more sophisticated morphological rules that allow them to perform relatively simpler morphological transformations in their English L2. An alternative explanation is that factors, such as the specific aspect of morphological awareness under study (e.g., inflection, derivation), and children’s vocabulary knowledge in each language may influence the direction and the extent of transfer. This may explain why Deacon et al., (2007) found bidirectional English-French cross-linguistic effects of morphological awareness of past tense on word reading. The relative contribution of each aspect of morphological skills (inflectional, derivational, and compound) should be examined in future research. Another possible reason for the observed transfer of morphological awareness from Spanish to English vocabulary and word reading skills and not from English to Spanish is that morphological skills transfer from the L1 to
literacy skills in the language of schooling. In the current research these results may reflect the fact that the language of instruction of the participants is English. In Deacon et al., on the other hand, the participants attended French immersion schools, and therefore received literacy instruction in both languages.

**Failure to transfer L1 morphological skills to L2 reading comprehension.** A unique contribution was observed for word reading and vocabulary but not for reading comprehension. This observation is consistent with results from previous studies that have not found cross-linguistic associations of other aspects of oral language such as vocabulary and listening comprehension with reading comprehension (e.g., Cobo-Lewis, Eilers, Pearson, & Umbel, 2002; Nakamoto et al., 2009). It is possible that the involvement of oral language skills (e.g., morphological awareness) in word reading and vocabulary is similar across some pairs of languages (e.g., English and Spanish) while the oral language skills that contribute to reading comprehension are more language specific in nature. Alternatively, it may be that the cross-linguistic contribution of morphological awareness to reading comprehension is fully mediated by word reading and vocabulary. A very conservative test of cross-language transfer has been adopted, and thus failure to find cross-language transfer with such a conservative test does not necessarily constitute evidence for lack of cross-language transfer. Examination of the mediating role of vocabulary and word reading in the contribution of Spanish morphological awareness to English reading comprehension goes beyond the scope of the current research but should be investigated in future studies.
Concluding Remarks

Findings from the current research advance the literature on cross-linguistic-skills transfer in ELLs in several ways. Most previous research provided consistent evidence for cross-linguistic associations between phonological awareness and reading (e.g., Chiappe & Siegel, 2006; Lesaux et al., 2007; see Lipka et al., 2005 for a detailed review). Other aspects of oral language such as listening comprehension and vocabulary have also been investigated (e.g., Nakamoto et al., 2009), but to a lesser extent. The current dissertation extends cross-linguistic transfer to the morphological awareness domain in Spanish-speaking ELLs. Findings from this research add to linguistic and experimental evidence supporting the hypothesis that the more similar the language features, the more positive the cross-linguistic influence (Gass & Selinker, 1983; Kellerman & Sharwood Smith, 1986; Ringbom, 1986; Sajavaara, 1986; Schiff & Calif, 2007). The results suggest that transfer of morphological awareness is a complex cognitive process determined by a combination of factors such as L1-L2 linguistic distance, L1 experience, and L2 literacy outcome measures.

In the published literature two sets of theoretical frameworks have been proposed to explain processes in first and second language reading. The first set, represented by the orthographic depth hypothesis, emphasizes the influence of the structural features of a specific language. The orthographic depth hypothesis states that “the way in which the orthography encodes the phonology influences differentially the degree to which phonological processes are exploited” (Geva & Siegel, 2000, p. 2). This hypothesis is supported by evidence that frequency and lexicality effects are larger in deep orthographies than in shallow orthographies. The second set, represented by the central processing hypothesis (Genesee et al., 2006) stresses the similarities in L1 and L2 reading. The central
processing hypothesis maintains that the same set of cognitive skills including memory, phonological awareness, and phonological recoding predict reading success in any language, whether it is a first or second language.

A number of studies examining phonological processing skills have found support for both sets of frameworks, pointing to the possibility that they are in fact complementary rather than contradictory (Geva & Siegel, 2000; Saiegh-Haddad & Geva, 2008). The current research goes beyond the previous research by focusing on morphological awareness, a construct that has not been directly compared across groups of children from different language backgrounds. Results clearly indicate that for ELLs, the development of morphological awareness is influenced by the characteristics of their first language. On the other hand, there is strong evidence that, as found in previous research with monolinguals, morphological awareness is similarly associated with word reading, vocabulary and reading comprehension in Spanish-speaking ELLs. These results suggest that morphological processing is both language-specific and language-universal for ELLs. It is language-specific in the sense that performance levels on morphological awareness tasks reflect first language structural features, and it is language-universal in terms of the predictive relationship with word reading, vocabulary and reading comprehension.

**Implications**

Results from this research have practical implications for both intervention studies and classroom practice. These results also have implications for the theory of L2 reading and for diagnosis of reading difficulties among ELLs.
**Implications for vocabulary learning.** In this study, morphological awareness made a significant contribution to vocabulary acquisition. Such results suggest that education programs aimed at accelerating ELLs’ vocabulary learning should include developmentally appropriate, explicit and systematic instruction on morphological word analysis.

Study 3 found that Spanish morphological awareness played an important role in English low-frequency cognate vocabulary. As most cognates are low-frequency in English but high-frequency in Spanish, ELLs whose home language is Latin-based would likely benefit from developing cognate identification strategies. Children need to be taught these strategies explicitly and systematically, as the skill of identifying cognates and using that knowledge to learn new English words is not intuitively developed (Garcia & Nagy, 1993) and ELLs often underutilize this strategy in their reading. The ultimate goal of reading for all children is to be able to comprehend text, and vocabulary has been shown to be one of the strongest predictors of reading comprehension. It is very likely that training children on morphological and cognate awareness strategies would lead to reading comprehension gains.

**Implications for reading instruction.** Overall, the results of this research suggest that students’ skills developed in their L1 facilitate their L2 reading development. There are at least two broad approaches to using this information in the design of reading instruction for ELLs. Both approaches need to consider the features of the child’s L1, taking account of what children who speak that language bring and do not bring to the task of learning to read English. The first approach would identify, and then enhance, the L1 skills which transfer to reading English. For example, Spanish speaking children could be encouraged to use derivational knowledge and cognate strategies in learning to read English while Chinese
children could be made aware of the overlapping features in word compounding between English and Chinese. The second approach would be to provide differentiated instruction for different groups of ELLs on skills that children may have not developed through the experience in their first language. For example, Chinese-speaking ELLs may need more extensive training on derivational awareness, while Spanish-speaking ELLs may benefit from a focus on differences in compounding rules between English and Spanish.

**Implications for L2 reading theory and assessment.** In the current research it was observed that morphological awareness is important in the development of Spanish children’s Spanish L1 and English L2 vocabulary, word reading, and reading comprehension. These findings are consistent with research focusing on monolingual English speakers (e.g., Carlisle, 2000; Mahony, 1994). These results also mirror those obtained by Kieffer and Lessaux (2008) who examined the association of morphological awareness and reading comprehension in Spanish-speaking ELLs, and by Siegel (2008) who investigated morphological awareness and word reading in ELLs from a variety of L1 backgrounds. The results highlight the importance of both L1 and L2 morphological awareness in predicting reading performance in ELLs. This suggests that as with English monolinguals (e.g., Siegel, 2008; Tyler & Nagy, 1989, 1990), the efficient use of morphological information during reading may discriminate well between competent and less competent readers in ELL populations.

This convergence in findings emphasizes the importance of including morphological awareness in a model of L2 reading, as already suggested by several researchers (e.g., Deacon & Kirby, 2004) for models of L1 reading. Morphological awareness has been
proposed in research with monolinguals as a reliable predictor of reading and was confirmed for Spanish-speaking ELLs in the current research. If the same predictability power of morphological awareness is confirmed for ELLs with other language backgrounds, it would be sensible to include this skill to assess reading difficulties in both ELLs and English monolinguals. Confirmation of this finding would help to inform teachers as they design reading programs for ELLs. But because L1 characteristics may influence the performance on several predictors (e.g., morphological awareness), extensive research should be conducted with ELLs from several L1 backgrounds before final conclusions are reached.

Limitations

The cross-sectional and correlation design of this investigation poses some limitations. The sample involved a group of fourth graders and another group of seventh graders. However, due to different ages of immigration among ELLs, preliminary analyses revealed that on average the 4th graders had been schooled in Canada longer than the 7th graders. Therefore, for these children neither age nor grade were reliable indicators of their English language and literacy development. Because of this limitation, development from grade four to grade seven cannot be accurately interpreted and an account for developmental changes in the role of morphological awareness in ELLs’ vocabulary and reading development cannot be provided. It is possible that the relationship between morphological awareness and reading skills changes both within and across languages as students develop their L1 and L2 language proficiency. This could be investigated in longitudinal research. Second, causal relationships among the variables cannot be assumed. Whether developing good morphological word analysis skills indeed results in better vocabulary, which in turn leads to better word reading
and reading comprehension, needs to be tested through intervention studies by assessing English reading skills before and after direct instruction on the components of morphological awareness.

The heterogeneous characteristics of the ELL samples place additional limitations on the current study. The ELL samples exhibited hard-to-control differences in their levels of proficiency and amount of formal instruction in each of their languages, in parental level of education, in socio-cultural characteristics, and in age of arrival to Canada. An ideal sample would allow comparisons by level of proficiency in L1 vs. L2. A very large sample size could accommodate the number of control variables required for a valid comparison. It is important to note that this is not a limitation intrinsic only to this study, but rather, to the general study of ELLs and bilingual populations. Challenges related to substantial group differences in numerous aspects including socio-cultural characteristics and values, parental level of education, and language proficiency have been consistently noted by researchers (e.g., Garcia & Baker, 2007).

**Suggestions for Future Research**

This research points to several new directions for examination. As Koda (2007) points out, the interaction between two language systems makes the second language reading process more complex than first language reading. Future studies on morphological awareness in bilingual children must acknowledge this complexity and simultaneously consider a range of factors. Studies need to compare transfer between closely related languages with transfer between more distantly related languages. Studies also need to compare transfer of different aspects of morphological awareness, including inflections, derivations, and compounding,
within each language combination. The relative impact of different linguistic features (morphological, orthographic, semantic, etc.) and instructional characteristics on the transfer process should also be examined. Moreover, future studies should compare bilingual children at different levels of proficiency in each of their respective languages. Such research will clarify how cross-linguistic transfer of morphological skills is constrained by language proficiency, vocabulary knowledge, and morphological complexity. Finally, most studies that investigated morphological awareness among bilingual children have focused on word reading. More research should focus on the effects of morphological awareness on vocabulary and reading comprehension.

The cross-linguistic contribution of morphological awareness to word reading, vocabulary, and reading comprehension was only examined in Spanish-speaking ELLs. The decision was made based on the hypothesis that because of the overlapping characteristics of the two languages in their alphabet, vocabulary, and derivational morphological system, transfer effects would more likely be observed. However, parallel analyses on a Chinese-speaking ELL sample would have allowed contrasts that could help clarify to which groups of ELLs the results from the current investigation can be generalized. Such comparison, however, was beyond the scope of this dissertation and should be addressed in research on a larger scale.

Analysis of the mediating role of cognates in the cross-linguistic contribution of morphological awareness to vocabulary was a post-hoc strategy. The results were highly suggestive, but there was an unbalanced distribution of cognates and non-cognates by word-frequency status. It is possible that the lack of contribution of morphological awareness to low-frequency non-cognate vocabulary was due to the low reliability of the non-cognate low-
frequency subtest. To clarify how cognates facilitate the transfer of morphological awareness and the effect of word frequency, future studies should be conducted with a larger sample size and using a measure that includes a balanced distribution of cognates vs. non-cognates by frequency classification categories. A larger sample size and tests developed specifically to examine this question would also allow for the use of more appropriate analytical strategies such as path analysis and structural equation models.

Overall, the research reported in this dissertation demonstrates that morphological awareness plays a role in the vocabulary development and reading performance of ELLs in grade 4 and grade 7. An expansion of this study would entail following the development of morphological awareness throughout secondary school. Such a study should include a sample of monolingual learners as well as ELLs from different L1 backgrounds. The next step in this line of research will be to implement intervention studies on morphological awareness and to follow the students longitudinally. This would help to identify how the pattern of association between morphological awareness and reading comprehension develops as the students move to higher grades. It would also help to identify appropriate intervention strategies for specific groups of ELLs.


In R. K. Wagner, A. Muse & K. Tannenbaum (Eds.), *Vocabulary acquisition and its implications for reading comprehension* (pp. 52-77). New York: Guilford Press.


Benjamins.


Dear Parents:

Thank you for allowing your child to participate in our study. Please take a few minutes to fill out this questionnaire, as it will greatly assist our research. All the information provided by you will be kept confidential and will NOT be released without your permission. This questionnaire can be returned to the classroom teacher.

1. The name of the child is _______________________, born on _______________________.  
   \[ \text{First name} \quad \text{Last name} \quad \text{year} \quad \text{month} \quad \text{day} \]

2. Gender: M ____ F _____

3. Child’s country of birth: __________ If the child was NOT born in Canada, how old was the child when he/she moved to Canada? ______________

4. In what grade is your child currently enrolled in the public school? Grade _______

5. What is your native language(s)? ___________ What is your native country? ___________ 
   If you were not born in Canada, at what age did you move to Canada? _______________

   How many years have you lived in Canada? _______________

6. What is your partner’s native language(s)? _______ What is his/her native country? _______
   If he/she was not born in Canada, at what age did he/she move to Canada?

   How many years has he/she lived in Canada? _______________

7. Your relationship to the child:
   \[ \begin{array}{ll}
   & \checkmark \text{Mother} \quad & \checkmark \text{Grandparent} \\
   & \checkmark \text{Father} \quad & \checkmark \text{Other (please specify)} \quad \text{__________} \\
   \end{array} \]

8. Your highest education level (completed):
   \[ \begin{array}{ll}
   & \checkmark \text{Primary school graduate} \quad & \checkmark \text{Graduate degree (Master’s or Ph.D.)} \\
   & \checkmark \text{Junior high school graduate} \quad & \checkmark \text{College diploma} \\
   & \checkmark \text{High school graduate} \quad & \checkmark \text{University degree} \\
   \end{array} \]
9. Your spouse’s education level / Parent’s education level:
   - [ ] Primary school graduate
   - [ ] Junior high school graduate
   - [ ] High school graduate
   - [ ] College diploma
   - [ ] University degree
   - [ ] Graduate degree (Master’s or Ph.D.)

10. Which of the following ranges represent your household income?
    - [ ] $25,000 or less
    - [ ] $26,000 to $50,000
    - [ ] $51,000 to $75,000
    - [ ] $76,000 or more

11. What is your occupation?________________ What is your spouse’s occupation?________________

12. For each of the following language skills, rate how well you think YOU can perform on that skill. *(Circle one number per language per skill)*

<table>
<thead>
<tr>
<th>Language</th>
<th>none</th>
<th>intermediate</th>
<th>very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other (specify)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Speaking</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Reading</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Writing</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
13. For each of the following language skills, rate how well you think **YOUR SPOUSE** can perform on that skill. *（Circle one number per language per skill）*

<table>
<thead>
<tr>
<th>Language</th>
<th>none</th>
<th>intermediate</th>
<th>very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Speaking</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Reading</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Writing</td>
<td>English</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

14. How often does the **CHILD** use the following languages at home? *（Check all that applies.）*

<table>
<thead>
<tr>
<th>Language</th>
<th>Never 0</th>
<th>Rarely 25%</th>
<th>Sometimes 50%</th>
<th>Frequently 75%</th>
<th>Always 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. How often do **YOUR FAMILY** speak the following languages **TO** the **CHILD**? *（Circle one number per skill）*

<table>
<thead>
<tr>
<th>Language</th>
<th>Never 0</th>
<th>Rarely 25%</th>
<th>Sometimes 50%</th>
<th>Frequently 75%</th>
<th>Always 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. How often does your child who is participating in this study watch TV or videos in English or in other languages?

<table>
<thead>
<tr>
<th>Language</th>
<th>Never</th>
<th>&lt; 2 hours / week</th>
<th>2-5 hours / week</th>
<th>1-2 hours / day</th>
<th>&gt; 2 hours / day</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. How often does your child read in English and in other languages?

<table>
<thead>
<tr>
<th>Language</th>
<th>Never</th>
<th>&lt; 2 hours / week</th>
<th>2-5 hours / week</th>
<th>1-2 hours / day</th>
<th>&gt; 2 hours / day</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Approximately how many children’s books do you have around the house (including library books) in Chinese and in English?

<table>
<thead>
<tr>
<th>Language</th>
<th>0</th>
<th>1-20</th>
<th>21-40</th>
<th>41-60</th>
<th>61-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The amount of time the child spends in the following activities after school (specify the number of hours)*

- Homework: _____
- Watching TV or videogames: _____
- Playing sports: _____
- Doing house chores: _____
- Using the Internet: _____
- Talking to you: _____

*Others (please specify): ___________________________

*Please list the usual things your child does during the weekend*
APPENDIX B: ENGLISH TEST OF MORPHOLOGICAL STRUCTURE
Production Task Instructions and Items.

“I want you to help me with a word game. I’m going to say a word and I want you to change it to fit the sentence. Let’s try one.”

1. Help. My sister is always _________ How could you change help to fit that sentence? [helpful]
   If they get that, say, ‘Right. My sister is always helpful’
   If they miss the first one, explain that they need to change it to fit the sentence (help has to become helpful) and repeat the complete sentence with the correct answer.
   Give next examples in the same way.

2. Farm. My uncle is a _____. How could you change farm to fit that sentence? [farmer]

3. Improve. His work shows great __________ [improvement]
   “Ok. Do you have any questions? Great. Remember you just have to change the word to fit the sentence.”

Notes to Experimenter: You can repeat the item for a child. Please write down the child’s response (it can later be coded as correct or incorrect).

Appendix C: English Test of Morphological Sensitivity

<table>
<thead>
<tr>
<th>Word</th>
<th>Sentence</th>
<th>Child’s response</th>
<th>Correct?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>music</td>
<td>That lady with the piano is a...</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>popular</td>
<td>The singer enjoys his...</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>growth</td>
<td>She wanted her plant to...</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>slow</td>
<td>I was glad that I wasn’t the...</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>science</td>
<td>I want to grow up to be a...</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>four</td>
<td>The horse came in...</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>local</td>
<td>The birds migrated to a new...</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>produce</td>
<td>The play was a grand...</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>vary</td>
<td>The time of his arrival is...</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>wide</td>
<td>We measured the river’s...</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>assist</td>
<td>The teacher will give...</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>calm</td>
<td>The teacher asked us to walk...</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>magic</td>
<td>He was a very good...</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>strong</td>
<td>He wanted to show off his...</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>discuss</td>
<td>Mum and Dad had a long boring...</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>appear</td>
<td>He cared about his...</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>remark</td>
<td>The speed of the car was...</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>major</td>
<td>He won the vote by a...</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>density</td>
<td>The smoke in the room was very...</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>mystery</td>
<td>The dark glasses made the man look...</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>permit</td>
<td>Father refused to give...</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Jacket</td>
<td>Millie has three...</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>human</td>
<td>The kind man was known for his...</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>skip</td>
<td>Yesterday at recess, the girls...</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>description</td>
<td>The picture is hard to...</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>runner</td>
<td>How fast can she...</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>cloud</td>
<td>I really hope that it’s not...</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL
APPENDIX C: ENGLISH TEST OF MORPHOLOGICAL SENSITIVITY

DST (M. Singson, D. Mahony, V. Mann, 2000)

Oral + Written Form, Real Word Version—GROUP TASK

Directions: “Here are ten sentences. I will read them aloud to you. Follow along on your paper. After you hear the four choices, circle the letter of the word that makes a good sentence.”

Example:A. impressive

B. impressionable

She hoped to make a good____________________

C. impression

D. impressively

A. popular
B. population
1. The census is a count of the _________________.
C. populate
D. popularize

A. electrify
B. electrical
2. The garage has no _________________.
C. electric
D. electricity

A. regulation
B. regulate
3. Does the city _____________ the water?
C. regularity
D. regular

A. colonist
B. colonization
4. He wants to ________________ the moon!
C. colonial
D. colonize
A. gloriousness
B. glorify

5. The sunrise was so _______________.
C. glorification
D. glorious

A. dead
B. deadly

6. She ignored the feeling of _______________ in her feet.
C. deadness
D. deaden

A. activation
B. activity

7. She is not very _______________.
C. active
D. activate

A. critical
B. critically

8. Please don’t be so _______________.
C. criticism
D. criticize

A. conversional
B. conversationalist

9. I like to talk with her. She’s a good _________________.
C. converse
D. conversation

A. diversionary
B. diversity

10. They need to _______________.
C. diversion
D. diversify

Oral + Written Form, Nonsense Word Version

Here are ten more sentences like the ones you just finished. The difference is that this time the words are not real; they are fake words. This time I will also read them aloud to you. Follow along on your paper. After you hear the four choices, circle the letter of the words that makes a good sentence. Do you have any questions? Let’s begin.”
1. Everyone resents Laura’s _______________.
   A. spectitious
   B. spectition
   C. spectionalize
   D. spectitive

2. Have you ever met a _________________?
   A. bantize
   B. bantious
   C. bantify
   D. bantist

3. You must _______________ it on both sides.
   A. ponic
   B. ponicize
   C. ponicity
   D. ponicism

4. Please be as _______________ as possible.
   A. fenious
   B. fenalize
   C. fenament
   D. fenify

5. The old model is too ________________.
   A. tramicize
   B. tramify
   C. lempment
   D. lempivity

6. They were stopped by the ________________.
   A. morious
   B. moration
   C. tramic
   D. tramity

7. She wants to ________________ while she’s young.
   A. morious
   B. moration
   C. morate
   D. morational
8. He wasn’t bothered by the _______.
   A. drighten
   B. drightness
   C. drightly
   D. drightsome

9. That car is too _______.
   A. rendalize
   B. rendify
   C. rendment
   D. rendal

10. He needs to _______his paycheck.
    A. laptable
    B. laptification
    C. laptify
    D. laptian
APPENDIX D: SPANISH TEST OF MORPHOLOGICAL STRUCTURE

Test of Morphological Structure Spanish

Say, “Quiero que me ayudes con un juego de palabras. Voy a decir una palabra y quiero que tú la cambies para que complete bien la oración. Vamos a practicar”

* **Agrícola.** Mi tío es un ____________” ¿Cómo podrías cambiar la palabra agrícola para que complete bien la oración?”

Si la respuesta es correcta di, “muy bien mi tío es un agricultor.”

Si la respuesta es incorrecta, explique “La respuesta correcta es agricultor. Tenemos que cambiar agrícola por agricultor para que quede bien con el resto de la oración”

Presente los siguientes ejemplos de la misma manera:

* **Salir.** Anoche me quedé en la casa, yo no __________

* **Magia.** Disneylandia es un lugar __________

“Muy bien. ¿Tienes alguna pregunta? Recuerda tienes que cambiar la palabra para que quede bien con la oración.”

Notes to experimenter. You can repeat the item for a child. Please write down the child’s response (it can later be coded as correct or incorrect).

<table>
<thead>
<tr>
<th>Word</th>
<th>Sentence</th>
<th>Child’s response</th>
<th>Correct?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Calor.</td>
<td>Esta chaqueta es muy ____________</td>
<td></td>
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<tr>
<td>2. Cocinamos</td>
<td>A mi mamá le gusta ____________</td>
<td></td>
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<tr>
<td>3. Carro</td>
<td>Tengo dos ____________</td>
<td></td>
<td></td>
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<tr>
<td>4. Lindo</td>
<td>María es muy ____________</td>
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<tr>
<td>5. Cantar.</td>
<td>Shakira es una buena ____________</td>
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<td>6. Permitir.</td>
<td>Mi papá se rehusó a darme ____________</td>
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<td>7. Renta.</td>
<td>Vender limonada en el verano es ____________</td>
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<td>8. Aparecer.</td>
<td>Ella se preocupa por su ____________</td>
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<tr>
<td>9. Expresar.</td>
<td>OK es una ____________ común</td>
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<td>10. Cuatro.</td>
<td>El ciclista llegó de ____________</td>
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<tr>
<td>11. Admirar.</td>
<td>La velocidad del carro fue ____________</td>
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<td>12. Proteger.</td>
<td>Ella se puso gafas de sol para ____________</td>
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<tr>
<td>13. Actuar.</td>
<td>Esta noche es la última</td>
<td></td>
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<tr>
<td>14. Correr.</td>
<td>Para alcanzar el bus, esta mañana yo ____________</td>
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<tr>
<td>15. Dormir.</td>
<td>Los niños están ____________</td>
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<tr>
<td>16. Pedir.</td>
<td>Papá compró la muñeca que mi hermana ____________</td>
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<tr>
<td>17. Construir.</td>
<td>Voy a mostrarte la casa que él ha ____________</td>
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<tr>
<td>18. Carta.</td>
<td>Esta mañana trajo las cartas el ____________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td>Sentence</td>
<td>Child’s response</td>
<td>Correct?</td>
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<tr>
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</tr>
<tr>
<td>Deporte.</td>
<td>Juan juega baloncesto y fútbol, él es muy</td>
<td></td>
<td></td>
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<tr>
<td>Popular.</td>
<td>Las estrellas de cine disfrutan de su</td>
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<tr>
<td>Matemáticas.</td>
<td>Cuando sea grande quiero ser un</td>
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<tr>
<td>Ayudar.</td>
<td>Mi amigo me ofreció su</td>
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<tr>
<td>Felizmente</td>
<td>Juan es un niño __________</td>
<td></td>
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<td>amigable</td>
<td>Pedro es mi mejor __________</td>
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<td>Honesto.</td>
<td>Mario se distingue por su</td>
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<td></td>
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<tr>
<td>Peligro.</td>
<td>Conducir rápido es muy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variar.</td>
<td>El espectáculo estuvo muy</td>
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</tbody>
</table>

TOTAL_____
Aquí tenemos 10 oraciones. Las voy a leer en voz alta. Por favor sigan la lectura silenciosamente a medida que yo las voy leyendo. Cuando termine de leer la oración con cada una de las opciones para completarla, circule la palabra que mejor la completa.”

Hagamos este ejemplo:
El éxito de todo el ________________ (operativo, operacional, operación, operacionalizar) dependió totalmente de David.

1. Ella quería dejar una buena _____________ (impresión, impresionable, impresiva, impresionar).

2. La _____________ (sistemático, sistematizar, sistemáticamente, sistematicidad) de su método previno muchos errores.

3. Los agricultores _____________ (fertilización, fertilizar, fertilizan, fertilidad) sus suelos.

4. A él le gusta ________________ (gratificación, gratificar, gratitud, gracias) sus deseos.

5. Ella trabaja duro, ella es muy _____________ (industria, industriosa, industrialización, industrializar).

6. La edad mejoró su _________________ (personificar, personalizar, personalidad, personal).

7. El está demasiado viejo para ser _______________ (productividad, producción, producir, productivo).

8. El profesor enseñó algo ________________ (fundamentación, fundamento, fundamental, fundamentar)


10. Esos dos perros son tan parecidos que son difíciles de _________________ (identificación, identificar, identidad, idénticos).
1. Cada ser vivo tiene su propia ____________ (peticura, peticuramiento, peticuración, peticural).

2. Ella sabe mucho sobre el medio ambiente, es una ____________ (durición, duricar, durioso, durista).

3. Debes ____________ (pulantemente, pulador, pular, pulativo) los dos lados.

4. Mi papá es muy __________ (rinar, rinoso, rinado, rinosamente).

5. La reunión estuvo muy __________ (ludifimado, ludifimar, ludifimes, ludifiva).

6. La Internet nos permite obtener una cantidad enorme de ____________ (ribunar, ribunación, ribunante, ribunador).

7. A María le gusta __________ (senfular, senfulación, senfulando, senfulante) por teléfono.

8. Para que te entienda tienes que hablar ____________ (felulación, felulador, felulamente, felulal).

9. Los perros pertenecen al reino animal y los árboles al reino ____________ (filitación, filital, filitativo, filitativamente).

APPENDIX F: ENGLISH COMPOUND AWARENESS

Compound Structure Task
ORAL/GROUP ACTIVITY

Materials: Individual student score sheets

Directions: “I am going to read you some questions as you follow along. After each question, there are some choices. I would like you to circle the best answer for each question.”

Practice Items: “Let’s try a few together.”
(Examiner will review practice items using an overhead)

1. Which is the better name for a bee who lives in the grass?
   - A. Bee grass
   - B. Grass bee

2. Which is the better name for a type of fish that looks like a hat?
   - A. Hat fish
   - B. Fish hat

3. If you found a lid for a dish to keep candy in, what would it be called?
   - A. dish lid candy
   - B. candy dish lid
   - C. dish candy lid
   - D. candy lid dish

Feedback: Administer practice items one at a time, waiting for everyone to finish. Elicit a response from one of students. If correct, say (1st item) “Yes, ‘grass bee’ is a better name for a bee that lives in the grass.”; (2nd item) “Yes, ‘hat fish’ is a better name for a type of fish that looks like a hat.”; (3rd item) “Yes, ‘candy dish lid’ is the best name for a lid for a dish to keep candy in.” If elicited responses are incorrect, say “That was a good try, but actually (correct response) is a better name for a (repeat item described in practice question).” Provide no feedback for test items.

Test Items: “Now we will do some more. We will go through each question together and I will read the choices two times.” Proceed with test items 1-12 on individual scoring sheet. Ensure that students are following along with you at your pace.

Scoring: Student independently indicates responses on individual scoring sheet.
1. Which is the better name for a box you keep your lizard in?
   A. Box lizard       B. Lizard box       0 / 1

2. Which is the better name for a swamp with lots of flowers in it?
   A. Flower swamp     B. Swamp flower     0 / 1

3. Which is the better name for a doll made out of paper?
   A. Paper doll       B. Doll paper       0 / 1

4. Which is the better name for ants that like to crawl around on rocks?
   A. Ant rock         B. Rock ant         0 / 1

5. Which is the better name for bread you feed to the birds?
   A. Bird bread       B. Bread bird       0 / 1

6. Which is the better name for a snake that hides by trying to look like a stick?
   A. Stick snake      B. Snake stick      0 / 1

7. Which is the better name for a fly that only eats spiders?
   A. Spider fly       B. Fly spider       0 / 1

8. Which is the better name for a turtle that sings songs?
   A. Turtle song      B. Song turtle      0 / 1
9. Which is the better name for a kind of soap you use for washing dishes?
   A. Soap dish  B. Dish soap  0 / 1

10. Which is the better name for a fire that is started in a pit?
    A. Pit fire  B. Fire pit  0 / 1

11. Which is the better name for a pet that lives at school?
    A. School pet  B. Pet school  0 / 1

12. Which is the better name for the hand you use to throw balls?
    A. Hand ball  B. Ball hand  0 / 1

13. You want to buy wood that is especially good for building a table to put a television on. What kind of wood would you ask for?
    A. wood table television
    B. table television wood
    C. table wood television
    D. television table wood
14. There is a drawer in my dresser where we keep books and I have a key that locks it. What would be the best name for the key?

A. drawer book key
B. book key drawer
C. book drawer key
D. key book drawer

0/1

15. An inventor built a vacuum cleaner so strong it could take the old chewing gum off the bottom of chairs. What should it be called?

A. chair bottom gum vacuum
B. bottom chair gum vacuum
C. vacuum chair bottom gum
D. vacuum bottom chair gum

0/1

16. My mother was annoyed because there was always dust on the window where we kept the plants. She would complain about:

A. window dust plant
B. plant window dust
C. dust window plant
D. window plant dust

0/1

Total Score: ____________
## APPENDIX F: CONTINUED

<table>
<thead>
<tr>
<th>Item</th>
<th>Picture</th>
<th>Answer</th>
<th>Item</th>
<th>Picture</th>
<th>Answer</th>
</tr>
</thead>
</table>
| **A** | ![Bee grass](image) | 1. Bee grass  
2. Grass bee | **B** | ![Hat fish](image) | 1. Hat fish  
2. Fish hat |
| **C** | ![Dish lid candy](image) | 1. Dish lid candy  
2. Candy dish lid  
3. Dish candy lid  
4. Candy lid dish | | | |
| **1** | ![Box lizard](image) | 1. Box lizard  
2. Lizard box | **6** | ![Stick snake](image) | 1. Stick snake  
2. Snake stick |
| **2** | ![Flower swamp](image) | 1. Flower swamp  
2. Swamp flower | **7** | ![Spider fly](image) | 1. Spider fly  
2. Fly spider |
| **3** | ![Paper doll](image) | 1. Paper doll  
2. Doll Paper | **8** | ![Turtle song](image) | 1. Turtle song  
2. Song turtle |
| **4** | ![Ant rock](image) | 1. Ant rock  
2. Rock ant | **9** | ![Soap dish](image) | 1. Soap dish  
2. Dish soap |
| **5** | ![Bird bread](image) | 1. Bird bread  
2. Bread bird | **10** | ![Pit fire](image) | 1. Pit fire  
2. Fire pit |
<table>
<thead>
<tr>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="School Pet" /></td>
<td><img src="image2.png" alt="Hand ball" /></td>
<td><img src="image3.png" alt="Wood table television" /></td>
<td><img src="image4.png" alt="Drawer book key" /></td>
<td><img src="image5.png" alt="Chair bottom gum vacuum" /></td>
<td><img src="image6.png" alt="Window dust plant" /></td>
</tr>
</tbody>
</table>
### APPENDIX G: SPANISH TEST OF MORPHOLOGICAL STRUCTURE (NON-COGNATE ITEMS ONLY)

<table>
<thead>
<tr>
<th>Word</th>
<th>Sentence</th>
<th>Child’s response</th>
<th>Correct?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>growth</td>
<td>She wanted her plant to ...</td>
<td></td>
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<tr>
<td>2.</td>
<td>slow</td>
<td>I was glad that I wasn’t the ...</td>
<td></td>
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<td>3.</td>
<td>four</td>
<td>The horse came in ...</td>
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<td>4.</td>
<td>wide</td>
<td>We measured the river’s ...</td>
<td></td>
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<tr>
<td>5.</td>
<td>science</td>
<td>I want to grow up to be a ...</td>
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<tr>
<td>6.</td>
<td>magic</td>
<td>He was a very good ...</td>
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<tr>
<td>7.</td>
<td>strong</td>
<td>He wanted to show off his ...</td>
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<tr>
<td>8.</td>
<td>appear</td>
<td>He cared about his ...</td>
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<tr>
<td>9.</td>
<td>remark</td>
<td>The speed of the car was ...</td>
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<tr>
<td>10.</td>
<td>permit</td>
<td>Father refused to give ...</td>
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<tr>
<td>11.</td>
<td>Jacket</td>
<td>Millie has three ...</td>
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<tr>
<td>12.</td>
<td>skip</td>
<td>Yesterday at recess, the girls ...</td>
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<td>13.</td>
<td>runner</td>
<td>How fast can she ...</td>
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<td>14.</td>
<td>cloud</td>
<td>I really hope that it’s not ...</td>
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<td></td>
<td><strong>TOTAL</strong></td>
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<tr>
<td>Cognate</td>
<td>Non-cognate</td>
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<tr>
<td>Low Frequency</td>
<td>High Frequency</td>
<td>Low Frequency</td>
<td>High Frequency</td>
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<td>penguin</td>
<td>bus</td>
<td>awarding</td>
<td>climbing</td>
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<td>calculator</td>
<td>closet</td>
<td>camcorder</td>
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<td>flamingo</td>
<td>helicopter</td>
<td>replenishing</td>
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<td>castle</td>
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<td>vehicle</td>
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