THE CROSSOVER EFFECTS OF MORPHOLOGICAL AWARENESS ON LITERACY OUTCOMES AMONG CHILDREN IN FRENCH IMMERSION

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
Department of Applied Psychology and Human Development
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Abstract

This dissertation comprised three studies examining the cross-language effects of morphological awareness on literacy outcomes among early elementary school children in a French immersion program. Two aspects of morphological awareness were investigated: inflectional awareness and derivational awareness. Study 1 explored the bidirectional cross-language effects between morphological awareness and vocabulary development in English and French over one year. Participants included 156 students in Grades 1 and 2. Regression analyses revealed that English inflectional awareness predicted unique variance in French vocabulary among Grade 1 students. Among Grade 2 students, cross-lagged analyses showed that both English inflectional and English derivational awareness predicted gains in French vocabulary between Grades 2 and 3. Moreover, French derivational awareness measured at Grade 2 was associated with Grade 3 English vocabulary.

Study 2 examined the role of cognates in mediating the relations between English morphological awareness and French vocabulary. Participants included 108 first and second grade students. Results indicated that English morphological awareness was a unique predictor of French cognate but not non-cognate vocabulary. This suggests that the transfer of morphological awareness across languages is facilitated when the words to be learned in the
children’s additional language bear similarities to words in their primary language. Finally, Study 3 evaluated the longitudinal contributions of English morphological awareness to French reading comprehension skills among the sample from Study 1. The effects of children’s knowledge of the systematic relations between English and French derivational suffix pairs on their French reading comprehension skills were additionally explored. Results showed that English inflectional awareness significantly predicted French reading comprehension among the Grade 1 students, whereas English derivational awareness predicted variance in French reading comprehension among the Grade 2 students. Children’s awareness of the systematic relations between English and French derivational suffix pairs predicted changes in French reading comprehension from Grades 2 to 3.

Taken together, these results add to the extant corpus of research to substantiate that children can leverage morphological awareness from their primary language to facilitate their vocabulary learning as well as reading comprehension in their additional language. These results are discussed in light of current reading and transfer models.
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Chapter 1. Introduction

Overview

Reading is an essential component of academic learning and a key to children’s academic success. Accordingly, there has been a plethora of research worldwide seeking to identify metalinguistic, cognitive, and socio-contextual factors that can promote reading development among children from diverse language backgrounds. *Morphological awareness* refers to the understanding of and access to both the structure and meaning of morphemes in words and the ability to manipulate these morphemic units (Carlisle, 1995; Kieffer & Leseaux, 2008; Kuo & Anderson, 2006). After more than two decades of research, it is now well established that morphological awareness plays a significant role in monolingual children’s literacy development (e.g., Carlisle, 2000; Casalis & Louis-Alexandre, 2000; Ku & Anderson, 2003; McBride-Chang, Cheung, Chow, Chow, & Choi, 2006; McBride-Chang, Shu, Zhou, Wat, & Wagner, 2003). The demonstrated relation between morphological awareness and reading development amongst monolinguuals gives reason to believe that morphological awareness may likewise play a crucial role in second language (L2) reading acquisition. Nevertheless, only a small number of empirical studies have been carried out to date to examine these associations among young children who are in the process of learning to read in their first and second languages. In view of this gap in the research, the intent of the present thesis was to examine the cross-language relations between morphological awareness and reading among early elementary school children who were enrolled in a French immersion program.

This thesis consists of eight chapters. In Chapter 1, the rationale of the current work is laid out. Existing studies on morphological awareness and reading development that are relevant to the present research are then reviewed in Chapter 2. In Chapter 3, I discuss some of the
theories that have been proposed on the subject of cross-language transfer of cognitive and metalinguistic skills. Chapter 4 provides a description of French immersion programs in Canada, from which the present study sample was drawn. Three studies are then reported in Chapters 5, 6, and 7, respectively. In Study 1, the bidirectional cross-language effects between morphological awareness and vocabulary development in English and French were explored among Grades 1 and 2 students in a longitudinal study. Study 2 focused on examining the role of cognates in mediating the relations between English morphological awareness and French vocabulary acquisition. In Study 3, the longitudinal contributions of English morphological awareness to the development of French reading comprehension skills were explored. Following the three studies, Chapter 8 presents a general discussion of the studies, their educational and theoretical implications, and directions for future research.

Rationale of the Research

Practical and theoretical reasons underpin the undertaking of the present research. Rapid globalization and increases in immigration over the recent decades have led to a surge in the number of bilingual and multilingual children, with many of them being educated in their second language (e.g., August, 2006; Paradis, 2010; UNESCO, 2002, 2003; United Nations, 2013). These trends have also created an impetus for governments and parents to encourage the learning of more than one language among all children alike to ensure that they remain competitive in the growing global economy. In Canada, the bilingual status of the country renders it all the more important for children to be proficient in both English and French, for reasons that will be discussed further in Chapter 4. As educators continually strive to improve instruction in order to promote French and English development among children enrolled in French immersion programs, research uncovering processes and skills that children can draw on from their primary
language (i.e., English) to facilitate the acquisition of their additional language (i.e., French) and vice versa will be valuable in informing pedagogical practices.

From a theoretical standpoint, the present research contributes to the ongoing discussion concerning the interactions between the cognitive processes and metalinguistic skills involved in learning to read in an individual’s primary language, and their acquisition of reading skills in their additional language. As will be reviewed in Chapter 3, theories postulating the nature and process of cross-language transfer of linguistic and metalinguistic skills have proliferated since the 1980s, and have evolved over the years as a result of new research findings. Yet, while much advancement has been made in our understanding of cross-language transfer over the last few decades, most of the research has focused on the study of phonological awareness. Therefore, studies examining metalinguistic skills other than phonological awareness are necessary to more carefully scrutinize the generalizability of existing cross-language transfer theories to other aspects of metalinguistic skills. Accordingly, the present research sought to further our understanding of cross-language transfer processes by examining the transfer of children’s morphological awareness from their primary to their additional language.
Chapter 2. Review of the Literature

It has long been recognized that learning to read is “fundamentally metalinguistic”, involving children’s ability to reflect on and manipulate the structural features of spoken language, and to map these linguistic elements onto the graphic symbols that encode them (e.g., Fowler & Liberman, 1995; Goswami & Bryant, 1992; Kuo & Anderson, 2008; Nagy & Anderson, 1999). A facet of metalinguistic awareness that has received extensive attention is phonological awareness (i.e., the awareness of units of sound). There is now a substantial body of research documenting the role of phonological awareness in the development of children’s early reading competence in alphabetic orthographies (e.g., Adams, 1990; Bradley & Bryant, 1983; Bruck & Treiman, 1990; Goswami & Bryant, 1990; Wagner & Torgesen, 1987), as well as in logographic languages such as Chinese (e.g., Chow, McBride-Chang, & Burgess, 2005; Li, Shu, McBride-Chang, Liu, & Peng, 2012; McBride-Chang et al., 2008; Shu, McBride-Chang, Wu, & Liu, 2006). However, in addition to parsing sounds, a child must learn to map phonological forms onto semantic information in order for comprehension to be achieved (Carlisle, 2003; Kuo & Anderson, 2006). Morphemes are the smallest semantic units in language. As briefly mentioned in Chapter 1, morphological awareness is now argued to also play a critical part in reading development among children of diverse language backgrounds (e.g., Kuo & Anderson, 2006; Verhoeven & Perfetti, 2011). In this chapter, I will review in general some of the research that has been conducted to investigate the within-language relations between morphological awareness and reading in English and French. More specific research concerning
the cross-language relations between morphological awareness and reading will be reviewed in their respective studies later on in this thesis.

**Morphological Systems in English and French**

Across languages, three types of morphology are common: inflectional, derivational, and compounding. *Inflectional morphemes* are word endings that denote meanings such as case, number, verb tense, gender, or syntax. More specifically, they mark syntactic or semantic relations between different words in a sentence without altering the meaning or the part of speech of the root word (Kuo & Anderson, 2006; McBride-Chang, 2004). For example, *house* is a monomorphemic root word. The addition of an –*s* to the end of the root word produces the inflection *houses* which conveys the meaning that more than one house is being referred to in the present context.

*Derivations* involve forming new words through the application of prefixes and suffixes. Derivational prefixes tend to alter the meaning of the base to which they are attached within the same grammatical category (e.g., *kind* → *unkind*); on the other hand, derivational suffixes usually change the syntactic property of the word by changing the word-class to which a base belongs (e.g., *kind* → *kindness*). However, it is also possible for derivational suffixes to only cause a shift in the grammatical sub-class of a word (e.g., *friend* → *friendship*; Katamba, 1993). In comparison to inflectional morphemes, derivational morphemes are usually more restrictive with regards to the types of base morphemes with which they can combine (Kuo & Anderson, 2006).

Finally, *compounds* involve the combination of two or more words in forming new words (McBride-Chang, 2004). This combination may be formed by words from the same part of speech (e.g., *policeman* = noun + noun), or words from different categories (e.g., *forward-*)
looking = adverb + verb). Compounds differ in their degree of semantic transparency, i.e., the consistency between the meaning of a compound word and its constituent morphemes. For example, class and room in classroom are transparent constituents from which one can easily infer the meaning of the word classroom; by contrast, the word stalemate is opaque, as one cannot readily infer its meaning from its constituent stale and mate.

The current thesis focused on examining children’s awareness and understanding of inflections and derivations, which are the two main word formation methods in English and French (Deacon, Desrochers, & Levesque, 2013; Nagy & Anderson, 1984; Roy & Labelle, 2007). Therefore, I will focus on inflectional and derivational morphology in my discussion henceforth.

Modern English is considered a weakly inflected language. Its regular verbs have four inflected forms: past indicative and subjunctive (showed), third-person-singular present indicative (shows), present participle (showing), and past participle (shown)\(^1\). Its nouns have two inflected forms, i.e., plural (dog/dogs) and possessive (dog’s). Lastly, two inflected forms are used for adjectives: comparative (quicker) and superlative (quickest). In contrast, the inflectional system in French is considerably more complex, especially with respect to verb conjugation. French verbs are traditionally divided into three groups: 1) verbs with infinitives ending in “-er”; 2) verbs with infinitives ending in “-ir”; and 3) all other verbs, including irregular “-er” and “-ir” ending verbs. Each group of verbs has a distinct pattern of inflectional morphemes to mark for tense and aspect, mood, person, and number. These various combinations of grammatical categories can result in as many as 30 different inflected forms for a verb (Bescherelle, 1998).

Nouns in French have two inflected forms reflecting number (chanteur/chanteurs) and,

\(^1\) Instead of using inflectional morphemes, the majority of tenses, aspects, moods and voices in English are expressed using constructions of auxiliary verbs and modal verbs (Matsumoto, 2008).
occasionally, gender\(^2\), e.g., *chanteur/chanteuse* (“singer”). Its adjectives have four forms, corresponding to the gender and number of the noun that is being described: masculine singular (*petit*), masculine plural (*petits*), feminine singular (*petite*), and feminine plural (*petites*). Unlike English, there are no inflectional morphemes that regularly mark comparative and superlative forms in French (Fagyal, Kibbee, & Jenkins, 2006; Huot, 2005).

To the extent that both English and French have a large corpus of derivational morphemes to form words across word classes (e.g., nouns, adjectives, verbs), there are clear differences between the derivational systems of the two languages. Because of English’s Germanic roots, derivation is less prevalent and productive in English than in French. Whereas only approximately 50 suffixes are in common use in English, French has approximately 170 suffixes, though their productivity varies widely (Crystal, 2003; Duncan, Casalis, & Colé, 2009). A distinctive feature of the English derivational system is its morphophonological change. That is, because many English suffixes have been imported from French or Latin, the addition of these suffixes typically imposes a phonological change on the root word (e.g., *captive/captivity*). As a result, the relation between the root word and its derived form is rendered phonologically “opaque” (Duncan et al., 2009; Lieber, 2010). Phonological changes of root words are relatively less common in French. Finally, a subtle but perhaps significant difference for learners of the two languages is that whereas in English the final syllable of words is rarely stressed, there is a fixed pattern of stressing the last syllable in French words. Given that derivational suffixes are placed at the end of the word, the stress pattern in French may serve to accentuate the derivational suffixes and facilitate their acquisition (Delattre, 1965; Duncan et al., 2009).

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\(^2\) Most of the inflectional morphemes in French that mark gender are used for human and animals, e.g., chien/chienne (“dog”). For inanimate objects, the gender of the nouns is usually fixed, and can be predicted with some accuracy from noun endings, which typically take the form of suffixes (Deacon et al., 2013).
Development of morphological awareness in English. Monolingual speakers of English experience substantial growth in their awareness of inflections and derivations, beginning at a very young age. Studies have consistently reported that children demonstrate incipient understanding of inflectional morphemes by age 2, and acquire most of the regular inflectional principles by the early elementary grades (e.g., Akhtar & Tomasello, 1997; Anisfeld & Tucker, 1968; Berko, 1958; Carlisle, 1995; Derwing & Baker, 1979).

In comparison to inflectional morphemes, the developmental trajectory of derivational morphemes extends over a longer period of time, possibly into adulthood (Derwing & Baker, 1979, 1986; Windsor, 1994). There is some evidence suggesting that 3- to 5-year-old children are proficient in generating words with highly productive derivational suffixes such as the agentive –er and the instrumental –er (Clark & Hecht, 1982). More considerable growth in derivational awareness takes place over the elementary years. In Grade 1, children’s awareness of the morphological structure of derivations is largely limited to phonetically transparent and common forms (e.g., quiet → quietly); by Grade 3, their awareness extends to derivations that are less transparent or that contain less familiar suffixes (e.g., long → length; Carlisle & Fleming, 2003; Carlisle & Nomanbhoy, 1993). Children achieve high accuracy in decomposing derived words by Grade 3 and show decelerated improvements thereafter. By contrast, their ability to produce derived words appears to develop more slowly and shows a linear developmental trajectory until at least Grade 6 (Berninger, Abbott, Nagy, & Carlisle, 2010; Carlisle, 2000). Children’s awareness of the morphological relations between two words (i.e., relational knowledge) increases with grade level and approaches ceiling by Grade 8 (e.g., Berninger et al., 2010; Ku & Anderson, 2003; Mahony, Singson, & Mann, 2000; Tyler & Nagy, 1989). Conversely, their knowledge that derivational suffixes usually mark words for parts of speech
(i.e., syntactic knowledge) and the realization that derivational affixes are generally constrained to specific stems to which they attach (i.e., distributional knowledge) are not fully mastered even by Grade 8 (Tyler & Nagy, 1989).

**Development of morphological awareness in French.** Only a small body of research examines the development of children’s morphological awareness in French. Similar to English speakers, correct use of some of the most common inflectional verb markers first emerges around the age of 2 among French native speakers, with the repertoire of inflections expanding between 2 and 6 years of age (e.g., Bassano, 2000; Bassano, Laaha, Maillochon, & Dressler, 2004; Nicoladis, Palmer, & Marentette, 2007; Thordardottir, 2005). In studies that have examined the development of inflectional awareness through the administration of empirical tasks (Casalis & Colé, 2009; Casalis & Louis-Alexandre, 2000), results also indicate that children’s proficiency in generating appropriate inflected forms of nouns, adjectives, and verbs rapidly improves over the early elementary years.

Research on derivational awareness has primarily focused on children in the early elementary grades, though it is widely acknowledged that development of derivational awareness is far from being completed by this time (e.g., Casalis & Louis-Alexandre, 2000; Duncan et al., 2009; Kuo & Anderson, 2006). The extant studies indicate that children demonstrate some awareness of derivational morphemes by kindergarten (e.g., Casalis & Colé, 2009; Casalis & Louis-Alexandre, 2000; Marec-Breton, Gombert, & Colé, 2005), and display well-developed relational knowledge by Grade 3 (Colé, Royer, Leuwers, & Casalis, 2004; Duncan et al., 2009). In contrast, their ability to produce appropriately derived words within a sentence context tends to trail behind, especially when it involves words that undergo phonological shifts during derivation (Casalis, Colé, & Sopo, 2004). This is not surprising, given that in addition to
relational knowledge, production tasks demand syntactic knowledge of derivations. Indeed, in studies of English-speaking children, it has similarly been found that children typically take longer to achieve proficiency in completing production tasks (e.g., Tyler & Nagy, 1989).

While it is clear that monolingual English- and French-speaking children make marked gains in their morphological awareness during the early elementary years, the different measures used across studies largely excludes the possibility of comparing the rate of progress across monolingual speakers of the two languages. In an innovative effort to evaluate, cross-linguistically, children’s development of derivational awareness between ages 5 and 8, Duncan et al. (2009) administered parallel measures of derivational awareness (with words matching on frequency) to monolingual English-speaking children in the United Kingdom and to monolingual French-speaking children in France. Results revealed that the two groups progressed similarly in acquiring relational knowledge of derivations. Children in France, however, showed quicker growth than children in the UK in the more challenging production task that taps both relational knowledge and syntactic knowledge. The researchers concluded that the higher prevalence of derivations and earlier exposure to a wide variety of derivational suffixes in French may have accelerated the French children’s development of derivational awareness. To date, no cross-language study has been conducted comparing the development of inflectional awareness between monolingual speakers of English and French.

The current research focused on children who were learning French as an additional language. Among children who have been learning French as an L2 since kindergarten or Grade 1, some studies have observed the production of French inflectional morphemes in natural speech among these children in the early elementary grades (e.g., Paradis & Crago, 2000; Paradis, Le Corre, & Genesee, 1998; Prévost, 2009). However, the developmental trajectory of
inflectional awareness was assessed neither directly nor systematically in these studies. Roy and Labelle (2007) compared the development of derivational awareness between first- and second-grade Francophone and Allophone students studying in a French-speaking school in Québec, Canada. They focused on four aspects of derivational awareness: receptive (i.e., knowledge of whether a given spelling pattern forms a suffix currently used in French), relational, syntactic and distributional (as defined by Tyler & Nagy, 1989). They found that while the Allophones scored significantly lower on receptive and distributional knowledge than their Francophone peers, the two groups did not differ significantly in their relational and syntactic knowledge. Thus, while children who are learning French as a second language may not demonstrate French morphological awareness at the same level as their native French-speaking counterparts, it appears that they are able to develop some understanding of French morphology within the first two years of receiving formal instruction in French.

Morphological Awareness and Reading in English and French

Across languages, there are reasons for which morphological awareness will have a strong relationship with learning to read. Morphemes communicate not only semantic but also phonological, syntactic and relational information that could facilitate decoding and reading comprehension (Mahony et al., 2000; Tyler & Nagy, 1990). Further, psycholinguistic studies of native speakers of English (e.g., Feldman, Rueckl, DiLiberto, Pastizzo, & Vellutino, 2002; Nagy, Anderson, Schommer, Scott, & Stallman, 1989; Napps, 1989; Niswander, Pollatsek, & Rayner, 2000; Rabin & Deacon, 2008; Sandra, 1994) and French (e.g., Meunier & Segui, 2002; Royle, Drury, Bourguignon, & Steinhauer, 2012) have consistently shown that mental lexicons are morphologically organized among young as well as mature readers. Thus, for both languages,
children’s emerging morphological awareness may function as a mechanism to facilitate efficient storage, retrieval and processing of words, all of which support advancements in reading abilities.

In addition, specific characteristics of the English and French orthographies are believed to render morphological awareness to be closely related to reading development in these languages. English orthography is morphophonemic, i.e., the spelling system encodes both phonemes and morphemes. Notably, English is a “deep” orthography, wherein grapheme-phoneme correspondences are often equivocal because spelling rules are not directly governed by the phonological syllable structure on a consistent basis. For instance, the spelling pattern ch can be pronounced as /tʃ/ as in chance, or /k/ as in chemical, while the phoneme /k/ can have the following spellings: c in cat, k in kind, ck in check, ch in character, q in quit, or cc in account (Carlisle, 2003; Fowler & Liberman, 1995; Koda, 2000). As a result, English readers cannot rely solely on phonology in word recognition (Durgunoğlu & Öney, 1999; Verhoeven & Perfetti, 2003). Conversely, English orthography tends to preserve the identity of morphemes, even in the face of semantic and phonetic variation (Mattingly, 1984); for example, in words sign, signal and signature, the base form undergoes shifts in pronunciation in the derived forms while its orthography remains unchanged. Therefore, morphological awareness can facilitate a child’s English reading acquisition beyond that of phonological awareness by allowing the child to appreciate the semantic relations between words, despite their distinct phonological structures (Carlisle, 1995, 2003; Elbro & Arnbak, 1996; Fowler & Liberman, 1995; Kuo & Anderson, 2006; Verhoeven & Perfetti, 2003).

Similar to English, French orthography is morphophonemic. While French spelling is more regular than that of English, it is nonetheless considered a deep orthography, where the application of sound-to-spelling transcription rules only enables one to correctly spell
approximately one-half of all French words (Casalis & Louis-Alexandre, 2000; Véronis, 1988). As in English, many phonemes in French can be spelt in more than one way, whereas the morphological representation is usually preserved. For example, in French, the sound /ɛt/ can be spelled *ette*, *aite*, *ête*, or *ète*, but /ɛt/ is always spelled *ette* when it corresponds to a diminutive suffix, as in *fillette* (“little girl”) or *vachette* (“little cow”; Pacton & Fayol, 2004). Another important feature of the French language is that many words in written French end with *morphograms*, or letters or groups of letters that represent aspects of morphology that are not represented phonologically. For instance, the silent final letter *t* in the word *lait* (“milk”) denotes a morphological link with derived words such as *laitier* (“milkman”), *laiteux* (“milky”), and *allaiter* (“to nurse/breastfeed”). Thus, the silent morphology (i.e., written markers that have no corresponding pronunciation) accentuates the relation between words of the same morphological family that may not be obvious in spoken language. This suggests that morphological awareness may aid children in deciphering and acquiring the meanings of words when reading in French because the morphology of the words provides more information than phonology alone (Casalis & Colé, 2009; Colé et al., 2004; Sénéchal, Basque, & Leclaire, 2006).

**Morphological awareness, vocabulary, and reading comprehension in English.** Many researchers have hypothesized that morphological awareness is a critical metalinguistic skill that contributes to vocabulary growth in children because the understanding of morphemes and morphological structures enables children to decompose and analyze morphologically complex words (e.g., Anglin, 1993; Carlisle, 1995; Sandra, 1994). It has been estimated that approximately 60% to 80% of the new vocabulary words encountered by school-aged children each year in English are morphologically complex (Nagy & Anderson, 1984). Therefore, the strategic application of morphological analysis to an unfamiliar morphologically complex word
can likely help a child deduce the word’s meaning based on its morphemic constituents (McCutchen & Logan, 2011). For example, when a child encounters the word discomfort for the first time, the child may be able to speculate its meaning by extracting the morphemes dis-, and comfort. Over time, with multiple exposures to the word as well as encountering its morphological constituents through learning other related words (e.g., disagree, disrespect, comfortable), the child may be able to develop higher quality lexical representations and a more extensive vocabulary (Perfetti, 2007; Perfetti & Hart, 2002; Reichle & Perfetti, 2003).

Extant studies suggest that indeed, coinciding with their increased exposure to and knowledge of morphologically complex words, school-aged monolingual English-speaking children display a growing ability over the elementary and middle school years in deriving word meanings through morphological analysis (e.g., Anglin, 1993; McCutchen & Logan, 2011; Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). In a recent study, Kieffer and Lesaux (2012a) used latent growth models to demonstrate a strong, positive relation between the growth rates of morphological awareness and vocabulary knowledge among Spanish-speaking English Language Learners (ELLs) from the fourth to seventh grade, even after taking into account the effects of phonological awareness and word reading. Taken together, these studies support a strong interrelationship between children’s morphological awareness and vocabulary skills development in English.

Correlational research among native English speakers (EL1s) and ELLs confirms the importance of morphological awareness in children’s vocabulary learning, starting from the early elementary grades. A number of studies have reported that morphological awareness accounts for unique variance in children’s vocabulary after controlling for other reading-related skills such as non-verbal reasoning skills, phonological awareness, and word reading (e.g., Carlisle, 2000;
Carlisle & Fleming, 2003; Chen, Ramírez, Luo, Geva, & Ku, 2012; Lam, Chen, Geva, Luo, & Hong, 2012; McBride-Chang, Wagner, Muse, Chow, & Shu, 2005; Nagy, Berninger, & Abbott, 2006; Sparks & Deacon, 2013). For example, McBride-Chang et al. (2005) assessed monolingual English children’s abilities to distinguish the different meanings of homophones and to produce multimorphemic words for novel objects or concepts. They found that performance on these morphological awareness tasks explained a unique proportion of variance in kindergarten and Grade 2 students’ expressive vocabulary, above and beyond other reading-related skills. In a longitudinal study, Lam et al. (2012) measured first grade Chinese-speaking ELL children’s morphological (derivational) awareness using a word production task. Children’s performance on the task in Grade 1 predicted unique variance in vocabulary test scores a year later, after controlling for age, phonological awareness and initial vocabulary skills. Sparks and Deacon (2013) administered a word analogy task to assess monolingual English-speaking children’s ability to recognize and manipulate morphological relationships. Using a series of longitudinal cross-lagged regression analyses, they demonstrated that morphological awareness at Grade 2 predicted gains in vocabulary between Grades 2 and 3, whereas vocabulary did not predict changes in morphological awareness. This last finding highlights the critical role that morphological awareness plays in facilitating vocabulary learning over time, in English, during the early elementary grades.

In recent years, a growing corpus of intervention studies has established the effectiveness of using morphological instruction to enhance EL1 and ELL children’s vocabulary acquisition across all reading levels (e.g., Carlo et al., 2004; Goodwin & Ahn, 2010; Lesaux, Kieffer, Faller, & Kelley, 2010; see Bowers, Kirby, & Deacon, 2010; Goodwin & Ahn, 2013 for meta-analyses, and Carlisle, 2010 for a review). These studies shed light on the causal connection between
morphological awareness and vocabulary, and provide some of the most robust evidence for the distinctive role of morphological awareness in facilitating children’s vocabulary gains in the elementary years. The similar results found among EL1s and ELLs further point to the universality of this relation that is independent of the child’s language background (Geva, 2008).

Another prominent aspect of literacy development that has been associated with morphological awareness is reading comprehension, i.e., children’s ability to derive meaning from the text they read (National Institute of Child Health and Human Development, 2000). Indeed, text comprehension has been considered as the aspect of reading that is most likely to benefit from morphological awareness (Kirby et al., 2012; Mahony et al., 2000). Carlisle and her colleague (Carlisle 1995; Carlisle, 2000; Carlisle & Fleming, 2003) carried out some of the first studies examining the relation between morphological awareness and reading comprehension. Their findings confirmed that among EL1 children, the association between morphological awareness and reading comprehension strengthens over the elementary years. However, because these studies included few (if any) control variables in their regression equations, it is not clear from these findings whether morphological awareness is directly linked with reading comprehension, or whether their association is mediated by lexical level reading skills such as vocabulary and word reading.

Subsequent studies have since demonstrated that morphological awareness independently predicts variance in reading comprehension for children (e.g., Apel, Diehm, & Apel, 2013; Deacon & Kirby, 2004; Kirby et al., 2012; Kruk & Bergman, 2013; Ku & Anderson, 2003; Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003; Nagy et al., 2006; but see McCutchen, Green, & Abbott, 2008 for an exception). For instance, in a study of early elementary students, Kirby and colleagues (2012) reported that children’s morphological awareness assessed in Grades 2
and 3 explained unique variance in reading comprehension measured in Grade 3, after taking into account variances attributable to children’s non-verbal reasoning ability, vocabulary, and phonological awareness. Kruk and Bergman (2013) examined the relations between children’s morphological awareness and reading skills over Grades 1 to 3 using multilevel modeling. In that study, morphological awareness was operationalized as children’s ability to decompose and compose morphologically complex words. Results revealed that children’s ability to compose morphologically complex words in Grade 1 accounted for significant variance in passage comprehension measured in Grade 3, above and beyond that the variance explained by Grade 1 phonological awareness, word reading, vocabulary, and reading comprehension.

A small body of research has found similar associations between morphological awareness and English reading comprehension among ELL children and adolescents of varied language backgrounds (e.g., Jeon, 2011; Kieffer & Lesaux 2008, 2012b; Lam et al., 2012; Lipka & Siegel, 2012; Wang, Ko, & Choi, 2009). In Lam et al.’s (2012) study of Chinese-speaking ELL children, morphological (derivational) awareness measured in Grade 1 predicted scores on a reading comprehension task one year later, after taking into account the contributions of receptive vocabulary, word reading, and phonological awareness. Kieffer and Lesaux (2012b) compared three different groups of Grade 6 ELL students (Spanish-speaking, Vietnamese-speaking, and Filipino-speaking) with a group of EL1 children. Using structural equation modeling, the researchers demonstrated that morphological awareness was directly and indirectly (via reading vocabulary) related to reading comprehension for the three groups of ELL students as well as the EL1 control group. Together, research with EL1s and ELLs converges to suggest that morphological awareness uniquely contributes to reading comprehension in English from as early as Grade 1. This is further confirmed by intervention studies demonstrating that children
who received morphological training significantly improved in reading comprehension (e.g., Arnbak & Elbro, 2000; Bowers et al., 2010).

There are several reasons to believe that there may be a direct association between morphological awareness and reading comprehension. One reason is that because morphology represents an integration of phonology, syntax, and semantics, measuring morphological awareness provides a more general, integrated index of the metalinguistic capability involved in reading comprehension than tasks tapping phonological or syntactic awareness alone (Carlisle, 1995). It is also possible that morphological awareness enables readers to extract and analyze the syntactic information represented in morphemes that cannot be accessed otherwise (Bowers et al., 2010; Carlisle & Fleming, 2003; Kirby et al., 2012; Nagy et al., 2006). At the passage level, awareness of the syntactic and semantic properties of morphemes provides important clues to readers about the syntactic and semantic relations between different words in the sentence, thus facilitating the readers’ understanding of the sentence as a whole (Kuo & Anderson, 2006; Mahony et al., 2000; Nagy, 2007).

Morphological awareness, vocabulary, and reading comprehension in French. In contrast to the wealth of research conducted in English, relatively few studies have focused on investigating the relation between children’s morphological awareness and reading abilities in French. Colé, Bouton, Leuwers, Casalis, and Sprenger-Charolles (2012) and Marec-Breton et al. (2005) compared the speed and accuracy at which early elementary students decode pseudowords made up of illegal combinations of real French morphemes versus pseudowords composed of pseudostems and/or pseudoaffixes. The two studies were consistent in showing that, overall, the presence of identifiable morphological units (stems and/or derivational affixes) improved children’s efficiency in “word” decoding, with children performing best when both
stem and affix are morphemes available in French. This suggests that children accessed the morphological information embedded within the pseudowords to assist their reading. In a longitudinal study, Colé et al. (2004) tracked children’s morphological awareness and reading skills from Grade 1 to Grade 3. They found that across grades, children who demonstrated stronger morphological awareness generally exhibited more advanced vocabulary and reading comprehension skills compared to peers with weaker morphological awareness. Taken together, these studies offered preliminary evidence of a link between morphological awareness and reading among native French-speaking children.

Casalis and Louis-Alexandre (2000) conducted a longitudinal study to investigate the role of morphological awareness in reading among native French-speaking children from kindergarten to Grade 2. In their study, morphological awareness was assessed using tasks that tapped inflectional and derivational awareness. They reported that whereas neither type of morphological awareness measured in kindergarten predicted variance in reading comprehension in Grade 1, inflectional awareness in kindergarten predicted reading comprehension in Grade 2, after controlling for age, non-verbal reasoning skills, and vocabulary. Their study was the first to demonstrate a direct relation between morphological awareness and reading comprehension among French-speaking children. To my knowledge, no study has directly examined the role of morphological awareness in French vocabulary acquisition. However given that, similar to English, a majority of the words commonly used in French are multimorphemic\(^3\), such a link is plausible and should be explored in future research.

Casalis and Colé (2009) published the only study to date that examined the effects of morphological awareness training on word reading and text comprehension skills among native-

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\(^3\) According to Rey-Debove (1984), 80% of the French words in the Robert Méthodique dictionary are morphologically complex (as cited in Roy & Labelle, 2007).
speakers of French. Targeting their intervention on kindergarten children in northern France, the researchers found that while morphological awareness training enhanced children’s morphological (inflectional and derivational) awareness, it did not appear to benefit their reading skills measured one year later, when compared to a control group. However, given that the children received the training when they were preliterate and exposure to print was not part of the training program, this might have reduced the effects of the training on their subsequent reading skills. More intervention studies will be necessary to clarify the impact of morphological awareness training on reading skills among native French-speakers.

In summary, there is clear evidence substantiating the importance of morphological awareness in reading in English. On the other hand, empirical studies examining the contribution of morphological awareness to reading outcomes in French is relatively sparse. Nevertheless, a review of the morphological system of French and the available research provides theoretical and empirical support for a link between these two skills. Building on the foundation of prior theoretical postulations and established empirical evidence demonstrating the within-language role of morphological awareness in the development of English and French reading skills, the current research sought to determine whether and how morphological awareness may transfer across these two languages to influence reading development.
Chapter 3. Cross-Language Transfer

From a psycholinguistic perspective, learning to read a second language (L2) is influenced by two sets of linguistic resources and knowledge. On the one hand, it is associated with skills within the learner’s L2, i.e., the development of L2 language proficiency and L2 processing skills, L2 language exposure, and L2 print exposure. On the other hand, it involves cross-linguistic interactions with the learner’s first language (L1), whereby L1 resources can facilitate and/or interfere with L2 reading (Grabe, 2009). As Koda (2004, 2005, 2008) remarked, learning to read an L2 is a process distinct from and more complex than reading acquisition in an L1, since L2 learners bring with them their L1 linguistic knowledge, and possibly literacy skills, into their L2 learning. In this chapter, I will review briefly some of the ongoing theoretical discussions pertaining to the issue of cross-language transfer.

The notion of transfer has long been a central concern for researchers in second-language acquisition (SLA) and second-language reading, possibly dating back to the 1940s (Gass & Selinker, 1994). In general, researchers in the field have been consistent in acknowledging that L1 plays a role in L2 acquisition. What remains controversial, however, is what “transfer” entails with respect to the mechanism and the conditions under which cross-language effects occur. For instance, Dechert and Raupach (1989) provided a list containing 17 different definitions of the term “transfer” that have been adopted by various researchers. A quick survey of the literature indicates that conceptualizations of transfer range widely from purely linguistic to cognitive perspectives, and from considering transfer as a direct application of specific linguistic

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4 Researchers interested in language transfer have used a number of terms and phrases in referring to the phenomenon, including: cross-linguistic influence, borrowing, interference, and language mixing. For the purpose of the current thesis, the term “(cross-language) transfer” is used since it is one of the most commonly employed terms in contemporary second language research (Odlin, 2003).
knowledge (e.g., Cummins, 1979; Lado, 1964) to regarding L1 as a broad reservoir of resources available to L2 learners in learning a new language (e.g., Bransford & Schwartz, 1999; Genesee, Geva, Dressler, & Kamil, 2006; Riches & Genesee, 2006). Clearly, despite decades of research on language transfer, there remains a lack of consensus on a well-articulated theory describing the transfer process. Indeed, Odlin (2003) remarked that “problems relating to cross-linguistic influence are so varied and so complex that there does not exist any really detailed theory of language transfer” (p. 475).

The long history of examining transfer by SLA researchers has resulted in a number of theoretical frameworks that have in turn laid the foundation for theory development in second-language reading. The earliest transfer theories placed much emphasis on the concept of “negative transfer”, i.e., how one language “interferes” with the acquisition of another (e.g., Fries, 1945; Lado, 1957; Weinreich, 1953). This theoretical orientation is best represented by the Contrastive Analysis Hypothesis, which attributes learners’ difficulty or errors in their L2 learning to structural (e.g., phonological, morphological, syntactic, lexical) differences between the target language and the native language. Under this view, the learners’ native language is considered a major obstacle to successful mastery of the L2. More recently, attention has shifted towards the effects of “positive transfer” (e.g., Cummins, 1979, 1981; Genesee et al., 2006; Koda & Zehler, 2008; Ringbom, 1987, 1992), which contends that a child’s L1 can facilitate their L2 learning by providing a basis for establishing an additional linguistic system. There is preliminary empirical evidence in areas such as morphosyntax, phonology, and metalinguistic awareness substantiating this perspective (see Genesee et al., 2006; Koda, 2004).

Transfer theories and research diverge based on a second dimension – the holistic versus the componential view of reading. Theories of L2 reading development in the 1970s and 1980s
reflect top-down views of reading, which conceptualize reading as a holistic process of text-meaning construction that is invariant across languages (e.g., Goodman, 1967; Smith, 1982). Accordingly, reading skills are assumed to transfer automatically across languages (e.g., Goodman, 1973). Extending from this notion are research and theories focusing on two primary issues: the interrelationship between first-language and second-language reading achievement (e.g., *Linguistic Interdependence Hypothesis*, Cummins, 1979); and the conditions that either inhibit or facilitate reading skill transfer from one language to another (e.g., *Linguistic Threshold Hypothesis*, Clarke, 1979; see Koda, 2008).

The holistic view of reading has since been challenged by a componential view of reading, which argues that rather than a unitary construct, reading comprises a constellation of closely related yet separate cognitive processes that includes components such as decoding, morphological analysis, syntactic parsing, and working memory (e.g., Carr & Levy, 1990). Under this framework, the cross-language transfer of phonological awareness to reading skills has been studied most extensively across a number of language pairs (e.g., Cisero & Royer, 1995; Comeau, Cormier, Grandmaison, & Lacroix, 1999; Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Gottardo, Yan, Siegel, & Wade-Woolley, 2001; see Geva & Genesee, 2006; Lipka, Siegel, & Vukovic, 2005 for reviews). In recent years, however, there has been growing evidence to substantiate cross-language transfer of other metalinguistic skills to reading outcomes. These include morphological awareness (e.g., Deacon, Wade-Woolley, & Kirby, 2007; Ramírez, Chen, Geva, & Luo, 2011), orthographic awareness (e.g., Deacon, Chen, Luo, & Ramírez, 2013; Deacon, Wade-Woolley, & Kirby, 2009; Sun-Alperin & Wang, 2011), and syntactic awareness (e.g., Da Fontoura & Siegel, 1995; Durgunoğlu, Mir, & Ariño-Martí, 2002). Evidence for cross-language transfer of cognitive skills such as working memory (e.g., Gholamain & Geva, 1999;
Swanson, Sáez, & Gerber, 2006), and rapid naming speed (e.g., Gholamain & Geva, 1999; Jared, Cormier, Levy, & Wade-Woolley, 2011; Li, Kirby, Cheng, Wade-Woolley, & Qiang, 2012; Li, Kirby, & Georgiou, 2011) to reading outcomes has also been found.

A central issue for researchers investigating cross-language transfer within the componential view of reading is the language-general versus language-specific nature of the different component processes involved in L2 literacy development. Language-general skills are processes that are common to all languages and can facilitate reading across languages (e.g., Central Processing Hypothesis, Durgunoğlu et al., 1993; Geva & Siegel, 2000). By contrast, language-specific skills need to be learned separately for each script because they are influenced by the unique features of the specific language/writing systems (e.g., Orthographic Depth Hypothesis, Katz & Frost, 1992; Morphological Transparency Hypothesis, Saiegh-Haddad & Geva, 2008). While the corpus of research examining cross-language transfer is still fairly small, preliminary evidence suggests that learning to read a second language may involve both language-general and language-specific processes, and that these processes may be complementary rather than contradictory (e.g., Geva, 2013; Geva & Siegel, 2000; Perfetti, Cao, & Booth, 2013; Ramírez et al., 2011; Saiegh-Haddad & Geva, 2008; Wang & Koda, 2007). For instance, in a study conducted by Ramírez et al. (2011), it was found that English monolinguals and Spanish-speaking ELLs in Grades 4 and 7 outperformed Chinese-speaking ELLs on English derivational awareness tasks. Yet, English derivational awareness similarly predicted English word reading across all three groups. Thus, morphological awareness appears to be language-specific in that differentiated performance levels on the derivational awareness task reflected the ELLs’ L1 structural features. At the same time, it is language-general, seen in the similar predictive relationship with word reading across groups, regardless of language backgrounds.
The effects of language-general versus language-specific skills in second-language reading acquisition are summarized in the *Transfer Facilitation Model* recently proposed by Koda (2005). In this model, Koda suggests that those aspects of metalinguistic awareness that are critical to reading in both L1 and L2 would be more easily transferred from one language to facilitate reading in another language. By contrast, facets that are more language-specific would be less readily transferable, and would require a substantial amount of exposure to the second language before one could develop such language-specific insights. In applying this model to the transfer of morphological awareness, this implies that the transfer of morphological awareness is predicated upon the shared morphological structures between the two languages. Specifically, the aspects of morphological awareness that pertain to morphological structures typical of both languages (e.g., inflections in English and French) should be easily transferable across languages to facilitate reading development. Conversely, when the structural feature is only typical in one language but not in the other (e.g., derivations are common in English but not in Chinese), less transfer would be expected.

The current research investigated cross-language transfer between English and French. Specifically, operating within the componential view of reading, I investigated the cross-language transfer of morphological awareness to two literacy skills, namely, vocabulary and reading comprehension. Given that morphological awareness is a strong predictor of reading skills within English and French, it appears to be a good candidate that may transfer cross-linguistically between the two languages to facilitate reading. Based on Koda’s (2005) *Transfer Facilitation Model* and the fact that inflectional and derivational morphology are the two main word formation processes in both English and French, I focused on two specific aspects of morphological awareness in my research: inflectional and derivational awareness.
Chapter 4. French Immersion Programs in Canada

The current thesis explored the cross-language transfer of morphological awareness by examining a sample of early elementary school children who were being educated in a French immersion program. Below, I will briefly describe French immersion programs in Canada, with some specific details pertaining to the sample of the current research.

There is a long tradition of French immersion programs in Canada. It began in 1965, when a group of English-speaking Canadian parents living in French-speaking Québec realized that the existing French instructional programs did not prepare their English-speaking children to communicate adequately in French. As a result, these parents persuaded their local school board to conduct a one-year trial with a kindergarten curriculum that was based on a language immersion model, through which their English-speaking children were to be instructed entirely in French. Since then, French immersion programs proliferated in Canada: whereas there were merely 45,000 French immersion students in 1977, in 2011, there were 342,000 students enrolled in a wide variety of elementary and secondary immersion programs across Canada, constituting approximately 14% of the total student population in the country (Canadian Parents for French, 2012; Lepage & Corbeil, 2013). In a report published in 2007, the Canadian Council on Learning (CCL) expressed unequivocal support for French immersion programs, citing the cognitive, economic and cultural benefits of being bilingual in Canada. For parents, a major motivation to enrol their children in French immersion is often an economic one. Indeed, it has been shown that Canadians who speak both official languages (i.e., English and French) have higher employment rates and a higher average income compared to those who speak only one of the two languages (Jedwab, 2003; Statistics Canada, 2006). The growing globalization of
business and commerce and the need to stay competitive in the international market further adds to the value of being proficient in two (or more) languages (Genesee, 2004).

The aim of Canadian French immersion programs is additive bilingualism, meaning that children are to develop high level of proficiency in French while maintaining proficiency in the majority societal language, namely, English (Swain & Johnson, 1997). Studies conducted over the past 40 years attest that indeed, children enrolled in French immersion programs are relatively proficient in speaking and reading in both English and French by the end of elementary school (see Genesee & Jared, 2008 for a review). The pedagogical approach taken by French immersion programs is one that integrates language and academic instruction, taking advantage of children’s natural ability to learn language within authentic and meaningful contexts (Genesee, 2004; Wesche, 2002).

There are three major variants of French immersion programs in Canada: early immersion that starts in kindergarten or Grade 1; middle immersion that starts in Grade 4 or 5; and late immersion that starts in Grade 7. The participants of the current studies were Grade 1 and 2 students enrolled in an early immersion program that starts in Grade 1. An early immersion program starting in Grade 1 typically provides instruction in French 100% of the time until Grade 3 or 4, when students begin to receive instruction in English in one subject (i.e., English language arts). By the end of Grade 8, students may receive up to 50% of their instruction in English. In total, French immersion programs are required to provide a minimum of 3,800 hours of instruction in French by the end of Grade 8 (CCL, 2007; Ontario Ministry of Education, 2013). Accordingly, at the time of the current research, participants were receiving instruction entirely in French at school, and were exposed to English only through interacting with others external to the classroom (e.g., interacting with classmates at recess, reading with family, participating in
extracurricular activities in the community). Studying these students therefore allowed me to assess the possible cross-language influences between English and French among emergent bilinguals who were at an early stage in acquiring language and literacy skills in both languages.

It is worth noting that whereas in the past, students enrolled in French immersion programs were almost exclusively native English speakers, the language profile of the student body has become significantly more diverse in the recent years as a result of increased enrollment of immigrant children. This is especially the case for urban centres such as Vancouver and Toronto, where immigrants make up close to 25% of the total school-age population (McMullen, 2004). For instance, in Toronto, over 30% of the students enrolled in French immersion programs in the public school system speak a language other than English at home as their primary language (Sinay, 2010). Indeed, in the current study, more than half of the participants were exposed to a language other than English at home to varying extents, thus further testifying to the changing demographics of the children enrolled in French immersion programs.
Chapter 5. Study One

Cross-Language Contribution of Morphological Awareness to French Immersion

Children’s Vocabulary

As reviewed in Chapter 2, there is now considerable evidence that morphological awareness contributes to within-language vocabulary learning in English and French. Conversely, research examining the cross-language effects of morphological awareness on vocabulary involving English and French is relatively sparse, despite their many shared morphological features that may facilitate transfer. The present study was designed to contribute to this body of research by exploring longitudinally the cross-language relations between morphological awareness and vocabulary among early elementary French immersion students.

Cross-Language Transfer of Morphological Awareness

In recent years, transfer of metalinguistic awareness has generated increasing interest among researchers in their attempt to understand the processes involved in second-language acquisition. Researchers are particularly concerned about whether and how metalinguistic insights gained from one language can be transferred to facilitate the development of reading and its related abilities in another language (Koda & Zehler, 2008; Zhang & Koda, 2014). As reviewed in Chapter 3, aspects of metalinguistic awareness that have been explored under the componential view of reading include phonological awareness, morphological awareness, orthographic awareness, and syntactic awareness.

Among the facets of metalinguistic awareness examined, phonological awareness has garnered the most attention. Cross-language relations between phonological awareness and word-level reading skills have now been established in a number of language combinations.
These include language pairs that are closely related, e.g., French and English (e.g., Comeau et al., 1999; Jared et al., 2011; Lafrance & Gottardo, 2005; MacCoubrey, Wade-Woolley, Klinger, & Kirby, 2004), and Spanish and English (e.g., Cisero & Royer, 1995; Durgunoğlu et al., 1993), as well as more distant language pairs such as Hebrew and English (Wade-Woolley & Geva, 2000), Persian and English (e.g., Gholamain & Geva, 1999), and Chinese and English (e.g., Chen, Xu, Nguyen, Hong, & Wang, 2010; Gottardo et al., 2001; Gottardo, Chiappe, Yan, Siegel, & Gu, 2006; Marinova-Todd, Zhao, & Bernhardt, 2010). Viewed collectively, results from this line of research underscore the universality of phonological awareness, as phonological awareness appears to develop independent of specific language experiences and can support word reading across languages (e.g., Genesee et al., 2006; Koda, 2007).

Relatively less is known about the transfer of morphological awareness. Contrary to earlier proposals that knowledge of morphology is virtually non-transferable (e.g., Dulay, Burt, & Krashen, 1982), recent studies have shown that a child’s experiences with morphology in their first language influence their second language learning (e.g., Hayashi & Murphy, 2013; Jarvis & Odlin, 2000; Koda, 2000; Zhang et al., 2010). For example, Jarvis and Odlin (2000) reported that, when asked to express spatial relations in English, Finnish-speaking adolescent ELLs chose spatial prepositions (e.g., in, on) that reflected the bound morphology system used to mark spatial relationships in Finnish. Koda (2000) compared Chinese- and Korean-speaking ELLs on three aspects of morphological awareness in English: intraword analysis efficiency, intraword structural sensitivity, and morphological and contextual information integration ability. Results revealed that the Korean- and Chinese-speaking ELLs performed best on the aspect of English morphological awareness that they had the most experience with in their respective native
languages, thus confirming that L1 processing experiences influence L2 morphological awareness development in “specific and predictable ways” (Koda, 2000, p.317).

There is a small but growing corpus of research examining the transfer of morphological awareness to reading skills (Chung & Ho, 2010; Deacon et al., 2007; Hipfner-Boucher, Lam, & Chen, 2014; Pasquarella, Chen, Lam, Luo, & Ramírez, 2011; Ramírez, Chen, Geva, & Kiefer, 2010; Ramírez, Chen, & Pasquarella, 2013; Saiegh-Haddad & Geva, 2008; Schiff & Calif, 2007; Wang, Cheng, & Chen, 2006; Wang, Ko, et al., 2009; Wang, Yang, & Cheng, 2009; Zhang & Koda, 2014). These studies converge in supporting the transfer of morphological awareness to reading, and suggest that transfer is in part contingent upon the shared morphological structures between a child’s first and second language (Koda, 2005; Zhang & Koda, 2014). For instance, in studies of Chinese and English bilingual children (Chung & Ho, 2010; Pasquarella et al., 2011; Wang et al., 2006; Wang, Yang et al., 2009; Zhang & Koda, 2014), it was found that compound awareness, but not derivational awareness, transferred across languages to facilitate reading. On the other hand, inflectional awareness and derivational awareness have been observed to transfer between English and Latin-based languages (e.g., French-English in Deacon et al., 2007; Spanish-English in Ramírez et al., 2010, 2013), as well as between English and Semitic languages (e.g., Hebrew-English in Schiff & Calif, 2007; Arabic-English in Saiegh-Haddad & Geva, 2008) – notably, these are all alphabetic languages that are rich in inflectional and derivational morphology.

The majority of studies have focused on examining the transfer of morphological awareness to facilitate word reading across languages (Chung & Ho, 2010; Deacon et al., 2007; Ramírez et al., 2010; Saiegh-Haddad & Geva, 2008; Schiff & Calif, 2007; Wang et al., 2006; Wang, Ko et al., 2009; Wang, Yang et al, 2009). Remarkably, while the direction of transfer
found varied across the studies\textsuperscript{5}, all have consistently reported significant cross-language associations between morphological awareness and word reading skills. Among these studies, the one reported by Deacon et al. (2007) is the only one that has focused on English-speaking children enrolled in a French immersion program. In this study, past tense analogy tasks were used to measure English and French inflectional awareness among a group of French immersion students every year from Grade 1 to Grade 3. Results revealed a bidirectional transfer: while English inflectional awareness in Grades 1 and 2 explained unique variance in French word reading, French inflectional awareness in Grades 2 and 3 accounted for unique variance in English word reading. These relations persisted even after controlling for English phonological awareness, vocabulary, and non-verbal reasoning abilities. To date, this is the only study that has demonstrated bidirectional transfer of morphological awareness.

There are three studies to my knowledge that have investigated cross-language relations between morphological awareness and vocabulary in bilingual children (Hipsner-Boucher et al., 2014; Pasquarella et al., 2011; Ramírez et al., 2013). Ramírez et al. (2013) found that among fourth and seventh grade Spanish-speaking ELLs, Spanish derivational awareness explained unique variance in English cognate vocabulary, over and above the effects of English derivational awareness. Pasquarella et al. (2011) investigated transfer among first to fourth grade Chinese-English bilinguals in Canada. Results indicated that English compound awareness accounted for a unique proportion of the variance in Chinese receptive vocabulary; conversely, Chinese compound awareness was not related to English vocabulary. In examining Grade 1

\textsuperscript{5}Some studies have reported transfer from children’s stronger to weaker language (e.g., Chung & Ho, 2010; Ramírez et al., 2010; Schiff & Calif, 2007; Wang et al., 2006), whereas other studies have reported transfer from children’s weaker to stronger language (e.g., Saiegh-Haddad & Geva, 2008). Researchers have proposed that the direction of transfer may be influenced by children’s language proficiency levels (e.g., Chung & Ho, 2010), aspect of morphological awareness under investigation (e.g., Wang et al., 2006), and the morphological complexity of the languages (e.g., Saiegh-Haddad & Geva, 2008). However, it remains unclear how these different factors interact with each other in determining the transfer process (Ramírez et al., 2010).
French immersion children with Chinese-speaking family backgrounds, Hipfner-Boucher et al. (2014) reported that French derivational awareness explained additional variance in English vocabulary, after taking into account the effects of phonological awareness. While these studies substantiate cross-language links between morphological awareness and vocabulary, it is worth noting that all adopted a cross-sectional design, which provides no information on the temporal relationship between these two variables. Longitudinal research is clearly necessary to determine whether morphological awareness contributes to gains in vocabulary knowledge over time.

In summary, besides word reading skills, there is preliminary evidence from several language pairs supporting the cross-language effects of morphological awareness on vocabulary. In particular, the study conducted by Hipfner-Boucher et al. (2014) has laid important foundations for the present study, as it substantiates a cross-language association between morphological awareness and vocabulary within the English-French language pair. At the same time, the study by Hipfner-Boucher et al. has several limitations. First, it considered the effects of only one aspect of morphological awareness, namely, derivational awareness. In other words, transfer of different types of morphological awareness was not simultaneously examined and compared within the same group of children. While inflectional and derivational morphology are common in both English and French, they diverge with respect to their complexity within each language, and have different developmental trajectories. Therefore, it is possible that they demonstrate different patterns of cross-language relations with reading outcomes.

Second, insofar as Hipfner-Boucher et al. (2014) showed a link between morphological awareness and vocabulary, their sample size was small; consequently, they included only two control variables (i.e., maternal education, phonological awareness) in their regression model. The limited number of control variables increases the possibility that the discovered links
between morphological awareness and vocabulary were due to a spurious third variable. It would be important to conduct further research with more stringent controls to confirm the cross-linguistic associations between morphological awareness and vocabulary. Finally, given that Hipfner-Boucher et al. only examined transfer from French to English, it remains to be determined whether morphological awareness also transfers from English to French to support vocabulary learning.

The Present Study

The present study was designed to investigate the cross-language relations between morphological awareness and vocabulary over one year by following a group of Grade 1 and Grade 2 students who were enrolled in a French immersion program. Two aspects of morphological awareness were examined: inflectional and derivational awareness. My research question was two-fold. The first part concerned the longitudinal cross-language relations between morphological awareness and vocabulary. Specifically, I sought to determine whether English morphological awareness assessed at Time 1 is related to Time 2 French vocabulary, and whether there is a corresponding relation between Time 1 French morphological awareness and Time 2 English vocabulary. Further, to stringently evaluate the temporal relationship between morphological awareness and vocabulary knowledge, for the Grade 2 students, I conducted additional longitudinal cross-lagged analyses that included an autoregressive control (i.e., Time 1 vocabulary). Including Time 1 vocabulary as the autoregressor enabled me to determine whether initial morphological awareness is uniquely associated with vocabulary gains over time, which can provide affirmative evidence supporting the temporal priority of morphological awareness relative to vocabulary development. This approach to analysis has been used in language and reading research to investigate the direction of relationships between various variables (e.g.,
Caravolas et al., 2012; Wagner et al., 1997), including research on the relationship between morphological awareness and vocabulary development (e.g., McBride-Chang et al., 2008; Sparks & Deacon, 2013).

In order to isolate the cross-language contributions of morphological awareness to vocabulary, several reading-related variables were included in my regression models as control variables. I first controlled for age and non-verbal reasoning skills to ensure that the relations found between morphological awareness and vocabulary were not merely a function of general reasoning ability. I then controlled for three reading-related variables (i.e., phonological awareness, within-language word reading and within-language morphological awareness), all of which have been shown to contribute to vocabulary acquisition (e.g., McBride-Chang et al., 2005; Verhoeven, van Leeuwe, & Vermeer, 2011). Cross-language morphological measures were entered last into the regression models to estimate their effects on vocabulary beyond that which could be accounted for by the child’s general ability and within-language abilities.

In the Transfer Facilitation Model, Koda (2005) posits that shared aspects of metalinguistic awareness facilitate transfer from one language to another. Given the morphophonemic nature of both English and French as well as the prevalence of inflections and derivations in the two languages, it was predicted that there would be a transfer of morphological awareness to vocabulary across languages. More specifically, considering that participants in the current study were beginning learners of French who were more proficient in English, the direction of transfer was hypothesized to be predominantly from English to French. At the same time, based on the findings reported by Deacon et al. (2007), it was expected that cross-language relations between French morphological awareness and English vocabulary would emerge in the later grades as a result of children’s increased proficiency in French.
The second part of my research question asked whether distinct aspects of morphological awareness relate differently to vocabulary across English and French. Within the framework of the Transfer Facilitation Model, Koda (2005) posits that in order for a first-language competency to transfer across languages, it must first be well-developed in the first language. Based on the pattern of morphological awareness development established among monolingual speakers of English, I expected that there would be a transfer of English inflectional awareness in all grades, whereas transfer of derivational awareness would emerge only in the later grades.

Given that the French inflectional system is more complex than the English one, I expected that French inflectional awareness would facilitate English vocabulary learning beyond that which could be accounted for by English inflectional awareness because it enhances the children’s sensitivity to inflectional morphemes. Similarly, I hypothesized that French derivational awareness would transfer to predict variance in English vocabulary. Derivational awareness has been found to develop more quickly among monolingual French speakers than monolingual English speakers, likely because derivations are more commonly used in French (Duncan et al., 2009). Therefore, while students in our sample may be relatively less proficient in French than in English, they may be able to develop levels of French derivational awareness comparable to their English derivational awareness, and use this newly developed metalinguistic ability to support their English vocabulary learning.

Method

Participants. Participants of the present study included 156 children who were enrolled in a French immersion program in a large English-speaking metropolitan area in Canada. They were part of a larger longitudinal project that tracked students’ English and French language development from early Grade 1 until the end of Grade 3. Information gathered informally from
teachers indicated that most of the students had attended English-speaking kindergarten programs before entering the French immersion program. At the time of recruitment, 81 of the participants were in Grade 1 (53.1% males) and 75 were in Grade 2 (49.3% males). Because this was a longitudinal study, we refer to the children recruited in Grade 1 as the “younger cohort”, and those recruited in the second grade as the “older cohort”. The average age of the younger cohort was 6.32 years ($SD = 0.29$ years) at the time when they were recruited; the average age of the older cohort was 7.59 years ($SD = 0.32$ years).

Participants’ demographic information was collected through a family questionnaire completed by the parents at the time of the initial recruitment. Close to 90% of the younger cohort and 95% of the older cohort were born in Canada or in another English-speaking country (e.g., the United States). For those who were born in a non-English speaking country outside of Canada, the average age of immigration was 26 months ($SD = 14.14$ months) for the younger cohort and 5.7 months ($SD = 4.68$ months) for the older cohort. In the older cohort, 53% of the students were English monolingual speakers (i.e., EL1s), whereas 47% of the children were exposed to and spoke another language in addition to English at home (i.e., ELLs). In the younger cohort, 35% of the children were EL1s and 65% of the children were ELLs. Sixty percent of the ELLs in the older cohort and 72% of the ELLs in the younger cohort reported that they spoke English more than 50% of the time at home. Only four children in the older cohort and seven children in the younger cohort reported speaking English less than 25% of the time at home. Nevertheless, their English word reading and receptive vocabulary levels were within the average range based on standardized norms.

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6 The ELL group was linguistically diverse, comprised of speakers of Russian, Chinese, Korean, Hebrew, Spanish, Romanian, Farsi, Serbian, Hindi, Hungarian, Tagalog, Albanian, Amharic, Filipino, Georgian, Italian, or Punjabi.

7 The four children in the older cohort had a mean standard score on the Letter-Word Identification subtest in the Woodcock Language Proficiency Battery of 116.00 ($SD = 22.23$), and a mean standard score of 93.75 ($SD = 21.73$).
most children enrolled in this program, ELL children were also exposed to English at school through informal discussion (such as on the playground) with other students. According to parents’ reports on the family questionnaires, none of the participants were native speakers of French. The average level of maternal education for both cohorts of students was a university degree.

**Measures.** Participants were tested at two measurement points. The younger cohort was assessed in the Fall (Time 1) and Spring (Time 2) terms of Grade 1; the older cohort was assessed in the Spring terms of Grade 2 (Time 1) and Grade 3 (Time 2). The younger cohort, which had only been instructed in French for approximately two months when first assessed at Time 1, was tested only in English at this testing point but received tests in both English and French at Time 2. The older cohort was assessed in English and French at both time-points. The battery of standardized and experimental measures of language and literacy skills administered is described in detail below. In addition to language and literacy tasks, a non-verbal reasoning task was administered as a measure of general reasoning ability.

Instructions for the non-verbal reasoning task and all English measures were given in English. For the French tasks, instructions were given first in French and then in English to ensure that the students understood the instructions. A questionnaire on family background and home literacy activities was filled out by parents of the participating children.

**English Language and Literacy Measures.**

**Phonological awareness.** English phonological awareness was measured using the Complete Test of Phonological Processing (CTOPP) Elision subtest (Wagner, Torgesen, & Rashotte, 1999). The task contained 20 items. For the first three items, children were asked to
delete a syllable from a compound word (e.g., popcorn without pop is corn). For the remaining 17 items, children were asked to delete a single phoneme from each word (e.g., cat without /k/ is at). Six practice items with feedback were administered to ensure that the children had understood the task. Testing was discontinued when the child had failed three consecutive items.

*Morphological awareness.* English morphological awareness was assessed with two production tasks following the format designed by Carlisle (2000). The two tasks tapped different aspects of morphology: inflections and derivations. The tasks assessed a wide range of inflections and derivations (see Appendices A and B for the items). Each measure contained three practice items and 16 test items. In each measure, children were presented with stimulus words orally followed by sentences with a missing word. The children’s task was to modify the stimulus word to complete the sentence. For half of the items, the stimulus word was a root word and the children were required to produce an inflected/derived form of the root word to complete the sentence. For example, *Write: I like your writing.* For the other half of the items, children were presented with an inflected/derived word and were asked to produce its root form to complete a sentence. For example, *Roses: I gave my mother a rose.* Students attempted all items on both subtests. The total score was the sum of correct items from the subtests.

*Word reading.* English decoding skills were measured using the Letter-Word Identification subtest from the Woodcock Language Proficiency Battery (WLPB; Woodcock, 1984). This test required children to identify 14 letters and to read 62 words of increasing difficulty. Testing stopped after six consecutive errors at the end of a page. The score was the total number of words read correctly.

*Receptive vocabulary.* To measure children’s English receptive vocabulary, we administered the Peabody Picture Vocabulary Test, Fourth Edition, Form A (PPVT-IV A; Dunn
In this task, words were presented orally and children were asked to choose from four choices the best picture representing the presented word. Testing was discontinued when the child had failed more than 8 items within a set of 12 words.

**French language and literacy measures.**

*Phonological awareness.* The French phonological awareness task was an experimental task designed by the researchers using the test structure of the CTOPP Elision subtest (Wagner et al., 1999). In this task, children were asked to delete a syllable from a multi-syllable word in the first three items (e.g., *souris* sans dire *sou* fait *ris*), and to delete a single phoneme from each word in the remaining 17 items (e.g., *cou* sans dire /k/ fait *ou*). The task contained a total of 20 items. Six practice items with feedback were administered to ensure that the children had understood the task. Testing was discontinued when the child had failed three consecutive items.

*Morphological awareness.* As in English, French morphological awareness was assessed using two tasks adapted from Carlisle (2000), tapping inflectional and derivational awareness. The items included in these tasks are listed in Appendices C and D, respectively. The inflectional task comprised three practice items and 16 test items, whereas the derivational task contained three practice items and 17 test items. The testing format was the same as the English morphological awareness tasks, in which children were asked to produce the inflected/derived form of a root word or the root form of an inflected/derived word to complete the sentences presented. Children attempted all items on both subtests. The total score was the sum of correct items from the subtests.

*Receptive vocabulary.* Form A of the Échelle de Vocabulaire en Images Peabody (Dunn, Theriault-Whalen, & Dunn, 1993) was used to assess children’s French receptive vocabulary. In this task, the experimenter read a word and asked the children to point to one of the four pictures.
that best reflected the meaning of the word just read. Children were given three practice items prior to the testing items to ensure understanding of the task. The task was discontinued when the child had made six errors on the last eight consecutive items.

**Word reading.** French word identification was measured using an experimental task that included a list of single words of increasing difficulty. There was a total of 120 items, arranged in sets of eight words. The words were selected by teachers in the French immersion program to ensure that the words included in the task corresponded with those introduced in the French immersion curriculum. The child was asked to read each word accurately and fluently. The task was discontinued at the last item of a set in which the child had fewer than 5 correct items.

**Non-verbal reasoning.** Non-verbal reasoning ability was assessed using the Matrix Analogies Test (Naglieri, 1985). It was administered to all participants when they were first recruited in Grade 1. This measure included four subtests: Pattern Completion, Reasoning by Analogy, Serial Reasoning, and Spatial Visualization. Each subtest was composed of 16 items, with an increasing level of difficulty. For each item, children were asked to complete a standard progressive matrix by choosing the missing piece from six patterned segments. A subtest was discontinued when a child made four consecutive errors. The total score was the sum of correct items from each subtest.

**Procedure.** Participants were assessed individually in a quiet room at their schools within school hours by trained undergraduate and graduate research assistants. For each data collection phase, testing was divided into two sessions of approximately 60 minutes each (with breaks). The order of the language in which the participants were tested was counterbalanced across participants.
Results

The descriptive statistics and reliability coefficients of each measure relevant to this study are presented in Table 1. There were no univariate or multivariate outliers in the sample. Measures with skewness and kurtosis values falling outside the acceptable range (i.e., statistic/SE < ± 2.00) were transformed following the guidelines set out by Tabachnick and Fidell (2007). Specifically, for the younger cohort, Time 1 English inflectional awareness and Time 2 French derivational awareness were significantly negatively skewed. A reflection, square root transformation, and rereflection were performed to remove the skews. Additionally, scores on the Time 2 French word reading and French receptive vocabulary tasks were positively skewed, and required square root transformations to be performed to bring the skewness and kurtosis values to within acceptable limits. For the older cohort, a sequence of reflection, log transformation, and rereflection was performed with the scores on Time 1 English inflectional awareness, given that it was significantly negatively skewed. Time 1 and Time 2 English receptive vocabulary, and Time 2 French receptive vocabulary were also significantly negatively skewed, and required reflection, square root transformation, and rereflection to remove the skews. Raw scores are reported in the descriptive table, whereas the transformed values were used in the correlational and linear regression analyses.
Table 1.

Mean Raw Scores, Standard Deviations, and Reliability Coefficients for All Variables for the Younger and Older Cohorts in Study 1

<table>
<thead>
<tr>
<th></th>
<th>α</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Younger Cohort (n = 81)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-verbal reasoning</td>
<td>.86</td>
<td>23.41</td>
<td>11.12</td>
<td>4-45</td>
</tr>
<tr>
<td>T1 English phonological awareness</td>
<td>.92</td>
<td>10.52</td>
<td>4.99</td>
<td>1-20</td>
</tr>
<tr>
<td>T1 English inflectional awareness</td>
<td>.78</td>
<td>11.01</td>
<td>3.53</td>
<td>0-16</td>
</tr>
<tr>
<td>T1 English derivational awareness</td>
<td>.71</td>
<td>5.35</td>
<td>2.32</td>
<td>0-11</td>
</tr>
<tr>
<td>T2 French inflectional awareness</td>
<td>.45</td>
<td>5.62</td>
<td>2.08</td>
<td>1-10</td>
</tr>
<tr>
<td>T2 French derivational awareness</td>
<td>.80</td>
<td>7.55</td>
<td>3.46</td>
<td>0-14</td>
</tr>
<tr>
<td>T2 French word reading</td>
<td>.98</td>
<td>45.50</td>
<td>20.56</td>
<td>3-115</td>
</tr>
<tr>
<td>T2 French receptive vocabulary</td>
<td>.94</td>
<td>36.84</td>
<td>12.28</td>
<td>14-71</td>
</tr>
<tr>
<td><strong>Older Cohort (n = 75)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-verbal reasoning</td>
<td>.86</td>
<td>19.96</td>
<td>12.10</td>
<td>1-48</td>
</tr>
<tr>
<td>T1 English phonological awareness</td>
<td>.91</td>
<td>14.04</td>
<td>4.79</td>
<td>6-20</td>
</tr>
<tr>
<td>T1 English inflectional awareness</td>
<td>.70</td>
<td>14.21</td>
<td>2.10</td>
<td>5-16</td>
</tr>
<tr>
<td>T1 English derivational awareness</td>
<td>.56</td>
<td>8.73</td>
<td>2.11</td>
<td>4-15</td>
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<tr>
<td>T1 English word reading</td>
<td>.93</td>
<td>46.01</td>
<td>9.10</td>
<td>22-70</td>
</tr>
<tr>
<td>T1 English receptive vocabulary</td>
<td>.96</td>
<td>129.35</td>
<td>18.12</td>
<td>80-158</td>
</tr>
<tr>
<td>T1 French phonological awareness</td>
<td>.90</td>
<td>14.23</td>
<td>5.16</td>
<td>5-20</td>
</tr>
<tr>
<td>T1 French inflectional awareness</td>
<td>.49</td>
<td>8.41</td>
<td>2.19</td>
<td>3-14</td>
</tr>
<tr>
<td>T1 French derivational awareness</td>
<td>.64</td>
<td>9.88</td>
<td>2.44</td>
<td>3-15</td>
</tr>
<tr>
<td>T1 French word reading</td>
<td>.98</td>
<td>64.87</td>
<td>21.06</td>
<td>18-113</td>
</tr>
<tr>
<td>T1 French receptive vocabulary</td>
<td>.97</td>
<td>59.57</td>
<td>24.36</td>
<td>12-106</td>
</tr>
<tr>
<td>T2 English receptive vocabulary</td>
<td>.95</td>
<td>141.79</td>
<td>15.00</td>
<td>94-164</td>
</tr>
<tr>
<td>T2 French receptive vocabulary</td>
<td>.96</td>
<td>81.93</td>
<td>25.02</td>
<td>32-121</td>
</tr>
</tbody>
</table>

Correlations among measures are displayed in Tables 2 and 3 for the younger and older cohorts, respectively. For the younger cohort, as indicated in Table 2, within-language correlations between measures of morphological awareness in English and French were significant ($p$’s < .01). Morphological awareness assessed in English at Time 1 was significantly correlated with Time 2 French morphological measures (ranging from .27 to .32). English morphological awareness tasks at Time 1 were significantly associated with French receptive vocabulary at Time 2 ($p$’s < .01). The concurrent correlations between French morphological awareness and receptive vocabulary at Time 2 were also significant ($p$’s < .01).
Table 2.

**Correlation Matrix of All Variables for the Younger Cohort in Study 1 (n = 81)**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Non-verbal reasoning</td>
<td>.07</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. T1 Eng. phonological awareness</td>
<td>.04</td>
<td>.30**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. T1 Eng. inflectional awareness</td>
<td>.14</td>
<td>.29**</td>
<td>.36**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. T1 Eng. derivational awareness</td>
<td>.18</td>
<td>.38**</td>
<td>.30**</td>
<td>.64**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6. T2 Fr. inflectional awareness</td>
<td>.13</td>
<td>.27*</td>
<td>.41**</td>
<td>.30**</td>
<td>.27*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7. T2 Fr. derivational awareness</td>
<td>.10</td>
<td>.21</td>
<td>.28*</td>
<td>.29*</td>
<td>.32**</td>
<td>.45**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8. T2 Fr. word reading</td>
<td>.02</td>
<td>.34**</td>
<td>.53**</td>
<td>.27*</td>
<td>.30**</td>
<td>.38**</td>
<td>.47**</td>
<td>-</td>
</tr>
<tr>
<td>9. T2 Fr. receptive vocabulary</td>
<td>.04</td>
<td>.25**</td>
<td>.40**</td>
<td>.39**</td>
<td>.30**</td>
<td>.30**</td>
<td>.52**</td>
<td>.44**</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

For the older cohort, as shown in Table 3, within-language correlations between measures of morphological awareness were significant in English and in French (p’s < .01). Concurrent cross-language relations of morphological awareness variables were weak to modest (ranging from .07 to .27); none of these correlations were statistically significant, with the exception of a positive association between English inflectional awareness and French derivational awareness. English inflectional and derivational awareness measured at Time 1 were significantly associated with English and French vocabulary at Time 2 (p’s < .01). French morphological awareness measured at Time 1 was significantly associated with French receptive vocabulary at Time 2 (p’s < .05). Across languages, Time 1 French derivational awareness was significantly correlated with English receptive vocabulary at Time 2. Conversely, the correlation between Time 1 French inflectional awareness and Time 2 English receptive vocabulary was not significant.
Table 3.

*Correlation Matrix of all Variables for the Older Cohort in Study 1 (n = 75)*

<table>
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</table>

* p < .05, ** p < .01
Cross-language effects of morphological awareness on vocabulary. A series of hierarchical linear regression analyses were conducted to examine the cross-language contribution of morphological awareness to vocabulary in the two cohorts. In each cohort, separate regressions were used to examine the independent contributions of inflectional and derivational awareness. For the younger cohort, given that French language abilities were not assessed at Time 1, only the longitudinal contributions of Time 1 English morphological awareness to Time 2 French vocabulary were examined. For the older cohort, the bidirectional effects of morphological awareness on vocabulary over time were evaluated (i.e., English to French and French to English). In each set of hierarchical regression analysis, children’s age and non-verbal reasoning abilities were entered in the first step, followed by phonological awareness in the second step. Within-language word reading and morphological awareness measures were then entered in the third and fourth steps, respectively. The cross-language morphological awareness measure was entered in the final step.

Cross-language effects of English morphological awareness on French vocabulary. I first examined the longitudinal associations between Time 1 English inflectional and derivational awareness and Time 2 French receptive vocabulary among the younger cohort. Given that the younger cohort was not assessed in French at Time 1, French language and literacy skills measured at Time 2 were entered as within-language controls. Results from the regression analyses are presented in Table 4. The table reports the variance added at each step when the predictors were first entered into the model as well as the final standardized beta coefficients.
Table 4.

**Time 1 English Inflectional and Derivational Awareness Predicting Time 2 French Vocabulary in the Younger Cohort**

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>$\Delta R^2$</th>
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<th>$\Delta R^2$</th>
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<td>2. T1 Eng. phonological awareness</td>
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<td>.117**</td>
<td>.183</td>
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<td></td>
<td></td>
<td>.004</td>
<td>.072</td>
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</tbody>
</table>

*p < .05, **p < .01

As shown in Table 4, English phonological awareness measured at Time 1 accounted for approximately 12% of unique variance in French vocabulary when entered in the second step. French word reading added a further 6% of variance. Whereas French inflectional awareness did not explain a significant proportion of the variance in French vocabulary, English inflectional awareness contributed cross-linguistically to explain close to 5% of the unique variance in French vocabulary when entered in the last step. Final beta weights in this first model suggested that in addition to French word reading, English inflectional awareness was a unique predictor of French vocabulary. A reverse pattern was found in the second model, which examined the contributions of derivational awareness: whereas French derivational awareness made a significant contribution to French vocabulary (approximately 11%), English derivational awareness did not account for a significant proportion of the unique variance in French vocabulary. In this model, final beta weights indicated that French derivational awareness was the only unique predictor of French vocabulary.
In view of the fact that there were a large number of ELLs in the present sample, follow-up analyses with interaction terms were carried out to determine whether the results of the above analyses differed by children’s language status. Following the procedure outlined by Pedhazur (1997), children’s language status (EL1 vs. ELL, coded by an effect vector) was entered into the regression models, followed by the interaction terms computed as the product of each English morphological awareness measure and language status. The interaction terms did not contribute significantly to French vocabulary beyond the other predictors. Beta values of the interaction terms were .458 (t = 1.144; p = .257) and .036 (t = 0.129; p = .897), respectively, for the two regression models reported above. In other words, the effects of the English morphological awareness measures did not differ between the EL1s and ELLs in both models among the younger cohort.

Hierarchical linear regression analyses were then performed with the data for the older cohort to determine the longitudinal associations between Time 1 English inflectional and derivational awareness and Time 2 French vocabulary. The results of these analyses are summarized in Table 5. As indicated in the Table, age and non-verbal reasoning ability accounted for approximately 30% of the variance in Time 2 French vocabulary when first entered into the regression models, whereas French word reading explained 11% of unique variance when entered in the third step. With respect to the morphological awareness measures, across the two models, neither French inflectional awareness nor French derivational awareness measured at Time 1 contributed to explain a significant proportion of the unique variance in Time 2 French vocabulary. By contrast, English inflectional awareness explained 6.8% of the variance when entered in the last step, whereas English derivational awareness explained over 10% of the variance. Final beta weights suggested that in addition to age and French word reading,
both types of English morphological awareness measured at Time 1 were unique predictors of
Time 2 French vocabulary.

Table 5.

*Time 1 English Inflectional and Derivational Awareness Predicting Time 2 French Vocabulary
in the Older Cohort*

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
<th>$\Delta R^2$</th>
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<td>2. T1 Fr. phonological awareness</td>
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<td>3. T1 Fr. word reading</td>
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<td></td>
<td>.101**</td>
<td>.376**</td>
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</tbody>
</table>

*p < .05, **p < .01, ***p < .001

Having confirmed the associations between Time 1 English morphological awareness and
Time 2 French vocabulary, a second set of longitudinal cross-lagged analyses were carried out to
evaluate the temporal relationship between early measures of English morphological awareness
and later French vocabulary knowledge. To this end, the autoregressor (i.e., Time 1 French
vocabulary) was added to the regression model in the second step. Within-language phonological
awareness, word reading, and morphological awareness measures were then entered as controls
in steps 3 through 5 before the cross-language morphological awareness measure was entered in
the final step. The results from these analyses are presented in Table 6.

When the autoregressor was added into the model, as shown in Table 6, it accounted for 8%
of the variance in Time 2 French vocabulary. The contribution of French word reading decreased
slightly (i.e., 7%) but were nevertheless significant. Remarkably, the contributions of English
inflectional and derivational awareness remained significant, accounting for 6.5% and 8%,
respectively, of the unique variance in French vocabulary. Final beta weights suggested that age, Time 1 French word reading, as well as Time 1 English inflectional and derivational awareness tasks were all unique predictors of Time 2 French vocabulary. In contrast, Time 1 French vocabulary (i.e., the autoregressor) was not a unique predictor of Time 2 French vocabulary.

Table 6.

*Time 1 English Inflectional and Derivational Awareness Predicting Change in French Vocabulary between Time 1 and 2 in the Older Cohort*

<table>
<thead>
<tr>
<th>Step and predictors</th>
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<th>$\Delta R^2$</th>
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<td>.080**</td>
<td>.116</td>
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*p < .05, **p < .01, ***p < .001

Finally, follow-up analyses with interaction terms were carried out to determine whether the cross-language effects of English morphological awareness on French vocabulary differed by children’s language status in the older cohort. This was done by calculating interaction terms for each English morphological awareness measure with language status (EL1 vs. ELL, coded by an effect vector; Pedhazur, 1997). None of the interaction terms contributed significantly to French vocabulary beyond the other predictors. Beta values of the interaction terms ranged from -.061 to .821, with all $r$’s $\leq |1.485|$ and all $p$’s $\geq .143$. These results suggested that the effects of the English morphological awareness measures did not differ between the EL1s and ELLs in any of the models reported above for the older cohort.
Cross-language effects of French morphological awareness on English vocabulary.

Given that French language abilities of the older cohort were assessed at Time 1, I was able to examine the transfer of French inflectional and derivational awareness to English vocabulary knowledge in this group of children. Similar to the analyses conducted to examine the transfer of English morphological awareness to French vocabulary, two sets of analyses were carried out to evaluate the contribution of French morphological awareness to English vocabulary. The first set of analyses aimed to establish the longitudinal associations between French morphological awareness and English vocabulary without the autoregressive controls. In the second set of analyses, autoregressive controls were added to evaluate the temporal relationships between French morphological awareness and English vocabulary. The results of these two sets of analyses are presented in Tables 7 and 8, respectively.

As shown in Table 7, children’s age and non-verbal reasoning abilities together accounted for approximately 30% of the unique variance in Time 2 English vocabulary. Time 1 English word reading, as well as Time 1 English inflectional awareness and derivational awareness all made significant additional contributions to English vocabulary measured at Time 2 (9.9%, 8.8%, and 5.6%, respectively). Notably, when entered in the last step, Time 1 French derivational awareness additionally explained 3.6% of the unique variance in Time 2 English vocabulary. In contrast, Time 1 French inflectional awareness did not predict additional variance in English vocabulary. Final beta weights revealed that in addition to non-verbal reasoning, English inflectional and derivational awareness, and French derivational awareness measured at Time 1 were significant predictors of Time 2 English vocabulary.
Table 7.

Time 1 French Inflectional and Derivational Awareness Predicting Time 2 English Vocabulary in the Older Cohort

<table>
<thead>
<tr>
<th>Step and predictors</th>
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<th>$\Delta R^2$</th>
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<td>.231*</td>
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</table>

* $p < .05$, ** $p < .01$, *** $p < .001$

When the autoregressor was included in the regression model, as reported in Table 8, it accounted for close to 43% of the variance when entered in the second step. English phonological awareness and English word reading each accounted for slightly more than 2% of additional variance when entered in the subsequent two steps. Having 74% of the variance accounted for by these initial predictors, English inflectional awareness made a small but significant contribution (1.7%) to English vocabulary, whereas English derivational awareness did not. In terms of cross-linguistic transfer, neither aspect of French morphological awareness explained a significant proportion of the unique variance in English vocabulary. Final beta weights indicated that the autoregressor, Time 1 word reading, as well as Time 1 English inflectional awareness were unique predictors of English vocabulary at Time 2.
Table 8.

*Time 1 French Inflectional and Derivational Awareness Predicting Change in English Vocabulary between Time 1 and 2 in the Older Cohort*

<table>
<thead>
<tr>
<th>Step and predictors</th>
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<th>$\Delta R^2$</th>
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</table>

* $p < .05$, ** $p < .01$, *** $p < .001$

To determine whether the cross-language effects of French morphological awareness on English vocabulary differed by children’s language status (i.e., EL1 vs. ELL), follow-up analyses were performed with interaction terms (Pedhazur, 1997). The interaction terms were computed as the product of each French morphological awareness measure and children’s language status. None of the interaction terms contributed significantly to English vocabulary beyond the other predictors, thus indicating the effects of French morphological awareness on English vocabulary did not differ between the EL1 and ELL children in all the models. Beta values of the interaction terms ranged from .135 to .286, with all $t$’s $\leq 1.006$ and all $p$’s $\geq .408$.

**Discussion**

The present study fills in several gaps in our understanding of the role of morphological awareness in vocabulary development among English-speaking children enrolled in a French immersion program. Previous cross-sectional studies have provided initial evidence
substantiating links between morphological awareness and vocabulary (Hipfner-Boucher et al., 2014; Pasquarella et al., 2011; Ramírez et al., 2010). By adopting a longitudinal design with substantive controls in the present study, I aimed to evaluate the cross-language associations between early morphological awareness and later vocabulary across English and French, while accounting for the maximum amount of spurious variance. Moreover, I sought to address the temporal relations between morphological awareness and vocabulary by including the autoregressors in the cross-lagged analyses conducted among the older cohort. The present study also included separate measures of inflectional and derivational awareness measures, thereby permitting a more fine-grained investigation of their independent contributions to vocabulary. Considering the differences in the developmental trajectories and complexities of these two morphological systems in English and French, examining these aspects of morphological awareness separately within the same sample is important for delineating the developmental pattern of morphological awareness transfer.

In the present study, I found that among the younger cohort who were in their first year of learning French, English inflectional awareness measured in the Fall term of Grade 1 predicted children’s French vocabulary achievement in the Spring term (that is, 7 months later), after controlling for age, non-verbal reasoning, English phonological awareness, French word reading, and French inflectional awareness. The evidence of transfer was even more robust among the older cohort, who have already been exposed to French language and literacy instructions for two years when they were first assessed in Grade 2. I found that English inflectional as well as derivational awareness in Grade 2 explained significant proportions of the variance in Grade 3 French vocabulary, after taking into account the effects of several within-language language skills. Most remarkably, the contributions by English inflectional and derivational awareness to
French vocabulary remained significant after the autoregressor was added to the analysis. This suggests that Grade 1 English morphological awareness was uniquely associated with gains in French vocabulary between Grades 2 and 3. With respect to the relations between French morphological awareness and English vocabulary, I found that French derivational awareness measured in Grade 2 significantly explained 3.6% of the variance in Grade 3 English vocabulary. However, once the autoregressor was added to the regression model, both French morphological awareness measures failed to predict unique variances in English vocabulary beyond that which were explained by the within-language variables.

Taken together, the current pattern of results is consistent with the hypothesis that there would be significant cross-language associations between morphological awareness and vocabulary in English and French, beyond substantial controls. The association appears to be bidirectional: children’s early English morphological awareness transferred to predict variance in later French vocabulary; at the same time, early French derivational awareness predicted significant variance in later English vocabulary among the older cohort. However, when regressions analyses among the older cohort took into account the autoregressive effects of the outcome variable, results revealed that whereas English morphological awareness was associated with change in French vocabulary between Grades 2 and 3, French morphological awareness did not predict change in English vocabulary. This provides evidence suggesting that early English morphological awareness contributes to subsequent French vocabulary development. In contrast, the temporal relationship between French morphological awareness and English vocabulary is not substantiated.

The Transfer Facilitation Model (Koda, 2005) suggests that the transfer of a first-language competency to facilitate second-language reading is an automatic process that is
premised upon children’s successful attainment of that skill in their first (i.e., stronger) language. In the same vein, it is likely that children require some minimal amount of linguistic proficiency in their second language in order to be able to represent and manipulate the morphemic structures within that language and later, to transfer this metalinguistic ability to their first language (Deacon et al., 2007; Geva, Wade-Woolley, & Shany, 1997; Hayashi & Murphy, 2013). Although previous research among English native speakers has demonstrated that morphological awareness continues to develop till possibly adulthood (Derwing & Baker, 1979, 1986; Windsor, 1994), results from the present study suggests that by the early elementary years, children had developed sufficient morphological awareness in English to apply this metalinguistic skill to their French vocabulary learning. This is probable since they were living in an English-dominant community and had enrolled in English-speaking kindergarten programs, and thus their stronger language at this point would be English. On the contrary, these students only had two years of experience or less in learning French at school, and had minimal exposure to French outside the classroom setting. It appears that they had not had enough time to attain the critical level of language proficiency and morphological awareness in French that would promote transfer and make an impact on English vocabulary learning. Previous studies have cited language proficiency as one of the factors that influences the direction of transfer (e.g., Deacon et al., 2007; Schiff & Calif, 2007; Zhang et al., 2010).

Another critical finding in the present study pertains to the independent contributions of inflectional and derivational awareness, which sheds light on the changing pattern of morphological awareness transfer over time. It was found that across the two cohorts, English but not French inflectional awareness predicted unique variance in the French vocabulary task. In fact, French inflectional awareness accounted for less than 1% of the variance in French
vocabulary for both cohorts, whereas English inflectional awareness explained approximately 5 to 6% of the variance after controlling for the effects of French inflectional awareness. These results underscore the unique effects of English inflectional awareness that is beyond its shared variance with French inflectional awareness.

One factor that could contribute to the finding that English but not French inflectional awareness was a significant predictor of French vocabulary is that the participants demonstrated high levels of inflectional awareness in English. In fact, they approached ceiling on this task by Grade 2. This is consonant with previous findings among English monolingual children, which reported that inflectional awareness is generally mastered in the early elementary grades (e.g., Berko, 1958; Carlisle, 1995; Derwing & Baker, 1977). The children’s well-established ability to reflect on and manipulate inflectional morphemes in English likely predisposed them to draw on this metalinguistic skill when learning French. The fact that English and French have some inflectional forms that tap similar conceptual understandings may facilitate such transfer (e.g., Deacon et al., 2007). For example, across both languages, a large majority of plural nouns are denoted by affixing the morpheme “s” at the end of singular nouns. Children who have a more solid grasp of this concept of the plural suffix in English may be able to more readily understand and apply this insight in their French learning. Similarly, although English has only a few verb conjugations denoting tense and person (e.g., past tense “-ed”, third person singular “s”), they nonetheless heighten children’s sensitivity to the concept of verb forms, which may in turn aid them in navigating through the much more complex verb system in French.

Another possible reason is that reliabilities for the French inflectional awareness task were relatively low. This is an important limitation of the present study; low reliabilities reduce the possibility of discovering statistical relations between variables. Alternatively, it is possible
that students were quite weak in their French inflectional awareness such that they may have been limited in their ability to utilize this aspect of morphological awareness to decompose words within the language that would facilitate vocabulary development. As a result, they automatically drew on their understanding of inflectional structures developed in English. The students’ low level of French inflectional awareness is not surprising. Given that French has a more complex inflectional system than English, it can be expected that despite the students’ prior experience with inflections in English, more exposure to French will be needed before they can fully appreciate its unique properties and principles concerning inflectional morphemes (Koda, 2005). Indeed, Paradis et al. (1998) have compared monolingual French-speaking children with English native speakers acquiring French as a second language. They observed that whereas students with English-speaking backgrounds were similar to their same-age French monolingual peers in their use of past tense after four years of French education, they lagged behind the French monolinguals in their use of third person plural and future tense. Future research should aim at tracking the development of French inflectional awareness over an extensive period of time among students who learn French as an additional language. This can help determine whether it will contribute to vocabulary learning as students become more proficient in the language.

Results from the present study indicated that English derivational awareness transferred to predict variance in French vocabulary in the older but not the younger cohort. The later emergence of cross-language transfer of English derivational awareness, compared to that of inflectional awareness, is in line with research indicating that derivational awareness tends to develop later in age and take a longer time to develop (e.g., Kuo & Anderson, 2006). This is seen in the present study through the finding that on the English derivational awareness task, the
Grade 2 students performed significantly better than the Grade 1 students. Past research among monolingual children suggests that derivational awareness accounts for an increasing proportion of variance in predicting monolingual children’s vocabulary knowledge over the elementary years (e.g., Anglin, 1993; Carlisle, 2000). The present results suggest that a similar developmental pattern can be established regarding the cross-language effects of derivational awareness to vocabulary development. More research with upper grade level students will be necessary to confirm this hypothesis. The relatively later emergence of the transfer of derivational awareness to vocabulary may additionally be explained by differences between inflections and derivations. While both aspects of morphological awareness include a language-general component (i.e., recognizing the function of affixes), in contrast to inflectional awareness, derivational awareness draws on knowledge of a much wider range of suffixes and principles that are unique to each language. The language-specific knowledge may therefore have prevented young students from recognizing the corresponding derivational morphemes across the two languages until they had gained more experience with English and French.

Whereas there was evidence of transfer of English morphological awareness to French vocabulary development, neither aspect of French morphological awareness predicted gains in English vocabulary in the current study. This is not entirely surprising, considering that French morphological awareness measures also did not predict change in French (i.e., within-language) vocabulary, which suggests that students have not attained the level of morphological awareness necessary to be able to make use of it in vocabulary learning. Other researchers have proposed that morphological awareness would be transferred from the language with a more complex morphological system to one that is less complex (e.g., Ramírez et al., 2010; Saiegh-Haddad & Geva, 2008). If that is the case, then French morphological awareness would be expected to have
cross-language effects on English vocabulary learning. However, findings from the present study seem to suggest that the child’s language competence may play a more crucial role in determining the direction of transfer at this early stage of language learning.

It is worth noting that a longitudinal association was demonstrated between Grade 2 French derivational awareness and Grade 3 English vocabulary among the older cohort; it only disappeared once the autoregressive effects were controlled for. This is an interesting finding, as it suggests that there is a link between French derivational awareness and English vocabulary. Since results from the present study did not suggest that early French derivational awareness is associated with gains in English vocabulary over time, this points to the possibility that the temporal relation between these two variables is in the reverse direction: that is, that English vocabulary contributes to change in French derivational awareness. This is especially plausible given that English is the children’s stronger language at this point in their language development. By encountering morphologically complex words in English in their daily living, children may gain awareness of morphemes and morphological structures in English that can then be transferred to foster their development of French morphological awareness. Studies exploring the within-language contributions of vocabulary knowledge to subsequent morphological awareness have reported mixed results (e.g., Kieffer & Lesaux, 2012a; McBride-Chang et al., 2008; Sparks & Deacon, 2013). However, it can be expected that these relations will be different when examined across languages as a result of discrepancies in proficiency between the child’s two languages. More studies should be designed to investigate the bidirectional cross-language relations between morphological awareness and vocabulary.

In sum, this study demonstrated that among English-speaking children who are at the early stages in acquiring French as their additional language, English morphological awareness
plays a role in helping these children analyze and acquire novel French words. Specifically, those children who are better at manipulating morphemes and reflecting on morphological structures in English are also able to learn French vocabulary words more efficiently. The present results indicated that the pattern of cross-language transfer mirrors the developmental trajectory of morphological awareness established among monolingual children, namely, that inflectional awareness was first to transfer from the primary to the additional language, followed by derivational awareness. Koda (2007) has posited that in the initial stages of acquiring a second language, morphological awareness from the learner’s first language is activated to serve as a filter through which one begins to analyze, organize, and understand input from the second language. The present study demonstrated that this could be the case. In particular, given the similarities in the morphological structures of English and French, the transfer of morphological understanding from English proves to be beneficial for the children in their French vocabulary learning.
Chapter 6. Study Two

The Role of Cognates in the Cross-Language Relations between Morphological Awareness and Vocabulary

Study 1 showed that morphological awareness can be transferred from English (i.e., children’s stronger language) to predict gains in French vocabulary (i.e., children’s weaker language) among children enrolled in French immersion. In other words, it appears that children’s relative proficiency in the two languages is a factor that influences the likelihood and the directionality of the transfer of morphological awareness. In the present study, I examined another variable that can possibly contribute to morphological awareness transfer to vocabulary across languages – children’s knowledge of cognates. Although cognates are prevalent in many alphabetic languages including English and French due to their shared historical roots, relatively few studies have examined how these shared vocabularies can facilitate children in their second-language acquisition. The present study intends to add to this body of research by examining the role of cognates in the cross-language transfer of morphological awareness among first- and second-grade French immersion children.

Cognates

*Cognates* are words in different languages that are of a common historical origin with similar meaning, spelling and pronunciation (Whitley, 2002). For instance, the English word *salad* corresponds to *salade* in French, whereas the word *vocabulary* in English corresponds to *vocabulaire* in French. Though English and French belong to different language families, a significant number of words in these two languages have common Latin or Greek origins, which has led to the emergence of many English-French cognates with identical meanings and
considerable levels of form overlap (i.e., shared phonemes and/or letters; Voga & Grainger, 2007). Repeated geographical, historical, and cultural encounters between England and France over the many centuries further increased the number of similar vocabularies shared across English and French (Frunza & Inkpen, 2009). In an earlier report, Finkenstäedt and Wolff (1973) estimated that close to 30% of English words originated from French or its variants. Notably, as a consequence of historical cultural traditions, many English-French cognate pairs consist of a low-frequency academic or literate word in English and a high-frequency conversational word in French; for example, *amorous/amoureux, fatigued/fatigué*, and *to dine/diner* (Bravo, Hiebert, & Pearson, 2007).

Studies of adult bilinguals of different language pairs (e.g., Dutch-English, Spanish-English, Greek-French) have revealed notable differences in their processing of cognate words and matched control words. In reaction time tasks such as lexical decisions, cognate words are responded to more quickly and accurately than non-cognate words of comparable word length, difficulty, or frequency (e.g., Dijkstra, Miwa, Brummelhuis, Sappelli, & Baayen, 2010; Peeters, Dijkstra, & Grainger, 2013; Sánchez-Casas, Davis, & García-Albea, 1992; Voga & Grainger, 2007). Cognates have also been shown to be translated with greater accuracy and speed than non-cognates (e.g., de Groot, Dannenberg, & van Hell 1994; Sánchez-Casas et al., 1992; Yudes, Macizo, & Bajo, 2010). To account for these observed *cognate facilitation effects*, various theorists have postulated that cognates are represented in the mental lexicon in a distinct fashion from non-cognates such that their overlapping orthographic, phonological, and/or semantic features across languages facilitate their storage, processing, and/or retrieval (e.g., Davis et al., 2010; Dijkstra et al., 2010; Midgley, Holcomb, & Grainger, 2011; Sánchez-Casas & García-Albea, 2005; Voga & Grainger, 2007). While these theories remain to be confirmed with more
empirical evidence, the existing behavioural studies clearly demonstrate that the cognate status of a word makes an impact on how it might be perceived and processed by bilingual individuals.

There is a small but growing body of research investigating the role of cognate knowledge in children’s L2 vocabulary acquisition (Chen et al., 2012; Kelley & Kohnert, 2012; Malabonga, Kenyon, Carlo, August, & Louguet, 2008; Nagy, García, Durgunoğlu, & Hancin-Bhatt, 1993; Proctor & Mo, 2009; Tonzar, Lotto, & Job, 2009). These studies converge to substantiate a cognate advantage in second-language vocabulary learning. On vocabulary tests, bilingual children tend to score higher on cognate than on non-cognate items of comparable difficulty in their L2 (e.g., Kelley & Kohnert, 2012; Proctor & Mo, 2009). Tonzar et al. (2009) provided instructional sessions to fourth and eighth grade Italian native speakers during which Italian-English and Italian-German word pairs were presented. Following the learning phase, it was found that English and German words with an Italian cognate were recalled with significantly higher accuracy than English and German words without an Italian cognate, even one month after the initial instruction. Nagy et al. (1993) examined fourth to sixth grade Spanish-English bilingual students’ ability to recognize English-Spanish cognate relationships by asking the students to identify cognate words within written English passages. Students’ accuracy in identifying cognates was strongly correlated with their performance on an English multiple-choice vocabulary test. This last study suggests that in addition to the cognate status of the words, students’ awareness of such status contributes to their L2 vocabulary acquisition.

Some studies explored more specifically how cognates may facilitate children’s development of morphological awareness in their L2. Hancin-Bhatt and Nagy (1994) asked Grades 4, 6 and 8 Spanish-English bilingual students to provide Spanish translations for different types of English words: cognate root words and their associated inflected/derived forms (e.g.,
facile/facility), and non-cognate root words and their inflected/derived forms (e.g., short/shortly). Children demonstrated much poorer performance in translating non-cognate derived words than non-cognate root words. In contrast, they showed comparable competence in translating both types of cognate words. In a study of early elementary French immersion children, Hipfner-Boucher, Lam, Chen, and Deacon (accepted) found that children’s ability to extract corresponding suffixes from English and French morphologically complex words was facilitated by the presence of cognate stems. Dressler, Carlo, Snow, August, and White (2011) examined fifth grade Spanish-English bilinguals in a qualitative study. They reported that students who were able to extract English cognate roots from their derived forms could more accurately infer the meaning of the derived words than those who did not recognize the cognate roots. Taken together, these studies provide strong evidence pointing to the facilitative role of cognates in children’s developing ability to conduct morphological analysis and to extract meaning from morphologically complex words in their second language. The focus of these studies, however, was not on the cross-language transfer of morphological awareness. Thus, the role of cognates in the transfer of morphological awareness cannot be determined from these studies.

To my knowledge, only one published study considered the role of cognates in the cross-language transfer of morphological awareness to vocabulary. Ramírez et al. (2013) asked Spanish-speaking ELLs in Grades 4 and 7 to complete a battery of language measures that included tasks assessing English and Spanish derivational awareness, as well as an English vocabulary task that included cognate and non-cognate words selected from the PPVT. Structural equation modeling (SEM) revealed that students’ Spanish derivational awareness explained unique variance in English cognate vocabulary, over and above variance accounted for by age, non-verbal reasoning, English phonological awareness and English derivational awareness. By
contrast, the contribution of Spanish derivational awareness to English non-cognate vocabulary was minimal. Thus, it appears that to the extent that Spanish-speaking ELL children could leverage their morphological awareness from their first language (i.e., Spanish) to help them learn new English words, the transfer took place mostly through the shared vocabulary between the two languages.

The Present Study

Building on previous research, the present study investigated the role of cognates in the cross-language relations between morphological awareness and vocabulary among first and second grade students studying in a French immersion program. The effects of cognate status were examined from two interrelated perspectives. First, I asked whether English morphological awareness relates differentially to French cognate versus non-cognate vocabulary. It is possible that students could leverage their English morphological awareness to facilitate vocabulary learning in French insofar as the new words encountered resemble the ones they have seen in English. Conversely, a cross-language relation between English morphological awareness and French non-cognate vocabulary would signify that children are able to apply their abstract understanding of English morphological structures to learning broadly all types of vocabularies in French.

Second, I examined whether the transfer of English morphological awareness to French vocabulary was influenced by the cognate status of the words in English (i.e., the children’s primary language). To explore this question, students completed tests of English inflectional and derivational awareness that included both cognate and non-cognate stems. Should the transfer be driven by shared vocabularies alone, then performance on the English morphological awareness task cognate stem items, but not the non-cognate stem items, would predict variance in French
vocabulary. Conversely, if scores on the English morphological awareness non-cognate stem items contribute to French vocabulary, that would imply that the transfer of English morphological awareness is fundamentally metalinguistic – i.e., it is the general understanding of morphemes and morphological structure that is being transferred.

From a theoretical perspective, results from the present study can help determine whether the transfer of morphological awareness from English to French occurs at the skill and/or at the knowledge level – the two levels of cross-language transfer previously distinguished by Koda (2000). Previous research has found that Chinese-English bilingual children are able to utilize their understanding of compound structures in English to facilitate their Chinese vocabulary acquisition despite the typological differences and the lack of common vocabulary between the two languages (e.g., Pasquarella et al., 2011). This suggests that children transfer their general understanding of morphological structures from one language to the other (i.e., the skill level). In contrast, studies with Spanish-English students have clearly shown a transfer of morphological awareness via specific knowledge of the common words shared between the two languages (e.g., Ramírez et al., 2013), thereby pointing to a transfer at the knowledge level.

The study of Spanish-speaking ELLs conducted by Ramírez et al. (2013) offered preliminary evidence that awareness of cognates may be considered as one of the mediating factors through which morphological awareness is transferred across languages. The current study extended their research in several ways. Participants in the Ramírez et al. study were middle and upper elementary students who had exposure to Spanish and English for extensive periods of time at home and in school, respectively, and can therefore be considered quite proficient in both languages. In the present study, the effects of cognates were examined among early elementary students who were in their first two years of French acquisition and had not
received specific instructions on cognate relationships (N. Wise, personal communication, August 4, 2013). The examination of this sample can therefore add to our understanding of the mechanisms through which morphological awareness transfers across languages among novice learners of a language that is orthographically linked with their primary language.

Results from Study 1 indicated that among early elementary French immersion children, both inflectional and derivational awareness could transfer from English to predict vocabulary acquisition in French. Therefore, the current study considered the transfer of inflectional awareness as well as derivational awareness. Finally, almost all existing studies of cognate and morphological awareness have focused on Spanish-English ELLs (i.e., Dressler et al., 2011; Hancin-Bhatt & Nagy, 1994; Ramírez et al., 2013). In order to construct a more comprehensive understanding of the relations between cognates and morphological awareness, more studies of other language pairs that have a large number of cognates (e.g., English and French, English and German) are indispensable (Proctor & Mo, 2009). The present study focused on children who spoke English and French. Results from the present study therefore shed light on the generalizability of findings from Spanish-English bilinguals to bilinguals from other language backgrounds.

In keeping with Ramírez et al. (2013), it was expected that morphological awareness would explain a significant amount of the variance in cognate vocabulary but not in non-cognate vocabulary. With respect to the second research question, given that previous studies have demonstrated transfer of morphological awareness at both the knowledge and skill level among bilingual children, it was predicted that the transfer of English morphological awareness would be evident with cognate as well as non-cognate English stem words.
Method

Participants. Participants of the present study included 108 children who were enrolled in a French immersion program and were part of the larger research project mentioned in Study 1. Sixty-six of the participants were in Grade 1 (54.5% males) and 42 were in Grade 2 (50.0% males). Due to a test administration error, only a subsample of the Grade 2 children from Study 1 was included in the current study. None of the Grade 1 children participated in Study 1. The average age of the Grade 1 students was 6.86 years ($SD = 0.28$ years); the average age of the Grade 2 students was 7.61 years ($SD = 0.35$ years). Both groups of children were evaluated in the Spring term of their academic year.

Participants’ demographic information was collected through a family questionnaire completed by the parents at the time of the initial recruitment. This information indicated that 89.4% of the Grade 1 children and 95.2% of the Grade 2 children were born in Canada or in another English-speaking country (e.g., the United States). For the Grade 1 students who were born in a non-English speaking country outside of Canada, the average age of immigration was 32.14 months ($SD = 17.82$ months). The age of immigration of one of the two Grade 2 students born in a non-English speaking country outside of Canada was 12 months. Seventy-nine percent of the Grade 1 students and 55% of the Grade 2 students were ELLs with diverse language backgrounds. Seventy-two percent of the Grade 1 ELL students and 63% of the Grade 2 ELL students spoke English at home more than 50% of the time. Only six Grade 1 students and two Grade 2 students spoke English less than 25% of the time at home; however, their English word reading and receptive vocabulary levels were within the average range based on standardized

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8 There was another Grade 2 student who was born in a non-English speaking country outside of Canada but the student’s age of immigration was missing from the demographic data. However, the parents of this student reported that English is the language most often spoken at home for both parents and the student.

9 The languages spoken at home by the ELL group included Russian, Chinese, Korean, Hebrew, Spanish, Farsi, Serbian, Hindi, Hungarian, Bulgarian, Filipino, Tagalog, and Punjabi.
According to parents’ reports on the family questionnaires, none of the participants were native speakers of French. The average level of maternal education for both cohorts of students was a university degree.

**Measures.** In the present study, children received measures of non-verbal reasoning, French phonological awareness, and French word reading that were the same as the ones described in Study 1. In addition, children completed modified versions of the English and French morphological awareness tasks administered in Study 1. They also received a French receptive vocabulary task that was designed specifically for this study. The last three tasks will be described in detail below.

**English morphological awareness.** English morphological awareness was assessed using two production tasks adapted from Carlisle (2000), tapping inflectional and derivational awareness. They followed the same format as the ones described in Study 1. For each task, three practice items were administered prior to the test items to ensure that the students understood the task. Students attempted all items on both tasks. The inflectional measure contained 11 items whereas the derivational measure had 12 items. In each measure, half of the items required the children to produce an inflected/derived form of a given root word to complete a sentence. For the other half of the items, children were asked to produce the root form of an inflected/derived word to complete the sentence. Items in each task were selected according to their cognate status. For the inflectional task, six items had cognate root forms (e.g., rose), while five items had non-cognate root forms (e.g., jacket). The cognate and non-cognate root forms were matched on base frequency using the Educator’s Word Frequency Guide (Zeno, Ivens, Millard, & Duvvuri, 1995);

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10 The mean standard scores on the Letter-Word Identification subtest in the Woodcock Language Proficiency Battery and the Peabody Picture Vocabulary Test for the six Grade 1 students were 121.40 ($SD = 16.77$) and 95.50 ($SD = 20.07$), respectively. The mean standard scores on the Letter-Word Identification subtest and the Peabody Picture Vocabulary Test for the two Grade 2 students were 124.50 ($SD = 13.44$) and 89.50 ($SD = 23.34$), respectively.
an independent sample $t$-test revealed no significant difference between the base frequency of the cognate and non-cognate root forms, $t(9) = -0.238, p = .817$. The derivational task had six cognate root forms and six non-cognate root forms that were also matched on base frequency; an independent $t$-test revealed no significant difference between the base frequency of the two types of root words, $t(10) = 0.218, p = .831$.

**French morphological awareness.** French morphological awareness was assessed using two production tasks wherein the structure and format of the tests paralleled the corresponding tasks in English. The inflectional task comprised 16 test items including eight cognate root forms and eight non-cognate root forms. The derivational task comprised eight cognate root forms and nine non-cognate root forms, for a total of 17 test items. The cognate and non-cognate root words were matched on base frequency using the database Manulex (Lété, Sprenger-Charolles, & Colé, 2004). Independent sample $t$-tests were conducted to compare the base frequency of the cognate and non-cognate root words in each morphological awareness task. For both tasks, $t$-test results revealed no significant difference in the base frequency of the two types of root words, $t(14) = 0.368, p = .718$ for the inflectional task; $t(15) = 0.917, p = .374$ for the derivational task. Each task was preceded by three practice items. Students attempted all items on both tasks.

**French receptive vocabulary.** A French receptive vocabulary task was designed by the research team for the purpose of this study. To construct the task, ten cognate and ten non-cognate words were selected from Form A of the EVIP (Dunn et al., 1993) at the age-appropriate level. In consultation with the teachers in the French immersion school from which our sample was drawn, ten other cognate words and ten other non-cognate words matched on surface frequency were added to the task, for a total of 40 words (20 cognates and 20 non-cognates). An
independent samples $t$-test comparing the surface frequency of the two categories of words (cognate vs. non-cognate) revealed no significant group difference, $t(38) = 0.099$, $p = .922$.

The experimental receptive vocabulary task followed the format of the EVIP. Thus, the experimenter read each word aloud and asked the student to point to one of the four pictures that best reflected the meaning of the word just read. Children completed all 40 items regardless of their performance. Two items were removed from each word list (i.e., cognates and non-cognates) to increase the reliability of the task for the final analyses. The reliability coefficients for the final lists of cognate words and non-cognate words are reported in Table 9.

**Procedure.** The test administration procedure for this study was the same as for Study 1.

**Results**

Table 9 displays the descriptive statistics and reliability coefficients of all the measures for each grade and for the overall sample. For the purpose of the current analyses, a French morphological awareness composite score was calculated by combining the $z$-scores of the French inflectional and derivational tasks. The composite scores as well as the separate scores for the two morphological awareness tasks are presented below. There were no univariate or multivariate outliers in the sample. Measures with skewness and kurtosis values for the overall sample falling outside the acceptable range (i.e., statistic/SE < ± 2.00) were transformed following the guidelines set out by Tabachnick and Fidell (2007). Accordingly, square root transformations were performed for French cognate vocabulary and English morphological awareness cognate roots. All further analyses were performed with the transformed variables.

To determine whether children’s performance on the English morphological awareness items differed as a function of the cognate status of the stimulus words, paired sample $t$-tests were conducted in each grade to compare children’s performance on the English morphological
awareness cognate root items versus non-cognate root items. Results revealed that children in Grade 1 performed significantly better on the English morphological awareness cognate root items than the non-cognate root items, \( t(65) = 2.82, p = .006 \). For children in Grade 2, the difference between their performance on the cognate and the non-cognate root items approached significance, \( t(41) = 1.73, p = .092 \). Paired sample \( t \)-tests were also conducted to compare children’s scores on the French cognate vocabulary items versus the non-cognate vocabulary items so as to determine the effects of cognate status on their vocabulary performance. Results indicated that in both grades, children performed significantly better on the cognate vocabulary than the non-cognate vocabulary, \( t(65) = 14.00, p < .001 \) for Grade 1; and \( t(41) = 6.53, p < .001 \) for Grade 2.

Preliminary analyses examining the contributions of cognate and non-cognate root items separately from the English inflectional awareness and derivational awareness tasks, versus combining the two types of items across the two morphological awareness tasks, revealed consistent patterns of results in predicting French cognate and non-cognate vocabularies. Steiger’s \( z \)-tests (1980)\(^\text{11} \) were subsequently performed to test the equality of the correlation coefficients between the two types of cognate roots (i.e., inflectional cognate and derivational cognate) and the other variables in the regression models. Results indicated that the correlations between the inflectional cognate roots and the other variables were not significantly different from the correlations between the derivational cognate roots and the other variables. Specifically, \( z \)-scores ranged from -0.272 to 0.360 for the Grade 1 students, and from -0.624 to 1.701 for the Grade 2 students. Likewise, Steiger’s \( z \)-tests revealed that the correlations between the

\(^{11}\) The present calculations were performed using a software program by Lee and Preacher (2013). According to the program developer, the software was developed based on equations outlined by Steiger (1980). This procedure yields a \( z \)-score for each pair of correlation coefficients compared. By convention, a \( z \)-score that is greater than \(|1.96|\) is considered significant for a 2-tailed test (i.e., \( p < .05 \)), and suggests that the correlation coefficients are significantly different from one another.
inflectional non-cognate roots and the other variables were not significantly different from those between the derivational non-cognate roots and the other variables. Z-scores ranged from -1.118 to 1.165 for the Grade 1 students, and from -1.492 to 0.675 for the Grade 2 students. In view of the similar correlational patterns, the final regression analyses combined the cognate and non-cognate root items from the two English morphological awareness tasks, and are present below.

In conducting the preliminary analyses, it was also found that the unique predictors of French cognate and non-cognate vocabularies were very similar for the two grades. The only difference was that French word reading was a unique predictor of French non-cognate vocabulary in Grade 1, but a marginally significant predictor of French non-cognate vocabulary in Grade 2. I performed a test of the covariance matrices (Box’s M) to compare the correlational patterns among the English and French measures between children in Grade 1 and Grade 2. Results confirmed that the covariance matrices for the two grades did not differ significantly from one another, Box’s M = 51.68, F(45, 25363) = 1.037, p = .404. Because the relationships among the variables were similar across the two grades, to increase power for statistical analyses, I pooled the data from the two grades for the final correlation and regression analyses. The non-significant grade differences were confirmed by follow-up analyses with interaction terms (Pedhazur, 1997), which are described below.
Table 9.

Mean Raw Scores and Standard Deviations of All Variables by Grade and for the Overall Sample in Study 2

<table>
<thead>
<tr>
<th></th>
<th>Grade 1 (n = 66)</th>
<th></th>
<th>Grade 2 (n = 42)</th>
<th></th>
<th>Overall (n = 108)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α</td>
<td>M</td>
<td>SD</td>
<td>Range</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>.86</td>
<td>6.86</td>
<td>0.28</td>
<td>6.42-7.33</td>
<td>7.61</td>
<td>0.35</td>
</tr>
<tr>
<td>Non-verbal reasoning</td>
<td>.91</td>
<td>12.00</td>
<td>4.92</td>
<td>6-20</td>
<td>15.14</td>
<td>4.81</td>
</tr>
<tr>
<td>Fr. phonological awareness</td>
<td>.63</td>
<td>5.39</td>
<td>1.81</td>
<td>0-8</td>
<td>8.95</td>
<td>1.91</td>
</tr>
<tr>
<td>Fr. inflectional awareness</td>
<td>.73</td>
<td>7.45</td>
<td>2.93</td>
<td>0-13</td>
<td>10.55</td>
<td>2.26</td>
</tr>
<tr>
<td>Fr. derivational awareness</td>
<td>.73</td>
<td>7.45</td>
<td>2.93</td>
<td>0-13</td>
<td>10.55</td>
<td>2.26</td>
</tr>
<tr>
<td>Fr. morphological awareness composite</td>
<td>--</td>
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<td>--</td>
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<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Fr. word reading</td>
<td>.98</td>
<td>49.24</td>
<td>21.84</td>
<td>4-105</td>
<td>67.88</td>
<td>20.54</td>
</tr>
<tr>
<td>Fr. cognate vocabulary</td>
<td>.52</td>
<td>13.94</td>
<td>2.44</td>
<td>7-18</td>
<td>14.88</td>
<td>1.85</td>
</tr>
<tr>
<td>Fr. non-cognate vocabulary</td>
<td>.53</td>
<td>9.70</td>
<td>2.16</td>
<td>5-15</td>
<td>11.81</td>
<td>2.72</td>
</tr>
</tbody>
</table>

French Tasks

Eng. inflectional awareness | .65              | 9.02     | 1.73             | 4-11     | 9.83             | 1.53     | 4-11     | 9.33     | 1.70     | 4-11     |
Eng. derivational awareness | .56              | 6.82     | 1.75             | 3-12     | 8.17             | 1.62     | 4-12     | 7.34     | 1.82     | 3-12     |
Eng. morphological awareness cognate roots | .59              | 7.79     | 1.63             | 3-11     | 8.81             | 1.44     | 3-11     | 8.19     | 1.63     | 3-11     |
Eng. morphological awareness non-cognate roots | .53              | 7.24     | 1.58             | 4-11     | 8.45             | 1.66     | 4-11     | 7.71     | 1.71     | 4-11     |
Table 10.

*Correlation Matrix of All Variables for the Overall Sample Partialling Out Age in Study 2 (n = 108)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<tbody>
<tr>
<td>1. Non-verbal reasoning</td>
<td></td>
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<td><strong>French tasks</strong></td>
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<tr>
<td>2. Fr. phonological awareness</td>
<td>.18</td>
<td></td>
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<td></td>
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<tr>
<td>3. Fr. inflectional awareness</td>
<td>-.03</td>
<td>.34**</td>
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<tr>
<td>4. Fr. derivational awareness</td>
<td>.03</td>
<td>.30**</td>
<td>.27**</td>
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<td></td>
<td></td>
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<tr>
<td>5. Fr. morphological awareness composite</td>
<td>.00</td>
<td>.40**</td>
<td>.78**</td>
<td>.81**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6. Fr. word reading</td>
<td>.05</td>
<td>.48**</td>
<td>.26**</td>
<td>.33**</td>
<td>.37**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Fr. cognate vocabulary</td>
<td>.24*</td>
<td>.28**</td>
<td>.06</td>
<td>.11</td>
<td>.11</td>
<td>.21*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Fr. non-cognate vocabulary</td>
<td>-.06</td>
<td>.18</td>
<td>.19</td>
<td>.34**</td>
<td>.34**</td>
<td>.40**</td>
<td>.29**</td>
<td></td>
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</tr>
<tr>
<td><strong>English tasks</strong></td>
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<tr>
<td>9. Eng. inflectional awareness</td>
<td>.14</td>
<td>.18</td>
<td>.17</td>
<td>.16</td>
<td>.21*</td>
<td>.11</td>
<td>.43**</td>
<td>.19*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Eng. derivational awareness</td>
<td>.23*</td>
<td>.17</td>
<td>.18</td>
<td>.05</td>
<td>.14</td>
<td>.17</td>
<td>.44**</td>
<td>.17</td>
<td>.37**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Eng. morphological awareness cognate roots</td>
<td>.22*</td>
<td>.16</td>
<td>.13</td>
<td>.12</td>
<td>.16</td>
<td>.23*</td>
<td>.47**</td>
<td>.19**</td>
<td>.70**</td>
<td>.74**</td>
<td></td>
</tr>
<tr>
<td>12. Eng. morphological awareness non-cognate roots</td>
<td>.24*</td>
<td>.24*</td>
<td>.27**</td>
<td>.03</td>
<td>.18</td>
<td>.09</td>
<td>.44**</td>
<td>.15</td>
<td>.65**</td>
<td>.78**</td>
<td>.55**</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01
Correlations among measures are displayed in Table 10 for the overall sample, partialling out the influence of age. As indicated in Table 10, French inflectional awareness, derivational awareness, and the morphological awareness composite were more strongly correlated with French non-cognate vocabulary than with cognate vocabulary, after partialling out the effects of age. Cross-linguistically, the total score of the English morphological awareness cognate root items was significantly associated with French cognate and non-cognate vocabularies. Finally, the total score of the English morphological awareness non-cognate root items was significantly related to French cognate but not non-cognate vocabulary.

**Effects of cognate status on the cross-language transfer of morphological awareness.** Hierarchical linear regressions were conducted to determine the unique effects of cognate status on the cross-language transfer of English morphological awareness. Specifically, separate regression models were set up with French cognate and non-cognate vocabulary as the outcome variables. For all the regression analyses, age and non-verbal reasoning were entered into step 1 to take into account of children’s general cognitive ability. French phonological awareness was entered into step 2, followed by French word reading in step 3. The French morphological awareness composite score was entered into the regression model in step 4 to take into account the contribution of within-language morphological awareness. Finally, total scores of the cognate and non-cognate items from English morphological awareness were entered into separate regressions to examine their independent contribution to French cognate and non-cognate vocabularies. Results of the final regression models with French cognate vocabulary as the outcome variable are displayed in Table 11. Table 12 summarized the results of the regression models wherein French non-cognate vocabulary was the outcome variable.
Table 11.

*English Morphological Awareness Predicting French Cognate Vocabulary*

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>.114**</td>
<td>.030</td>
<td>.114**</td>
<td>.020</td>
</tr>
<tr>
<td>1. Non-verbal reasoning</td>
<td>.112</td>
<td></td>
<td>.117</td>
<td></td>
</tr>
<tr>
<td>2. Fr. phonological awareness</td>
<td>.053*</td>
<td>.201</td>
<td>.053*</td>
<td>.129</td>
</tr>
<tr>
<td>3. Fr. word reading</td>
<td>.008</td>
<td>.003</td>
<td>.008</td>
<td>.130</td>
</tr>
<tr>
<td>4. Fr. morphological awareness composite</td>
<td>.000</td>
<td>-.066</td>
<td>.000</td>
<td>-.078</td>
</tr>
<tr>
<td>5. Eng. morphological awareness cognate</td>
<td>.143***</td>
<td>.434***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 11, age and non-verbal reasoning abilities contributed to explain approximately 11% of the variance in French cognate vocabulary. French phonological awareness explained an additional 5.3% of the variance when entered in the second step. French word reading and French morphological awareness made a minimal contribution to French cognate vocabulary once children’s general ability and phonological awareness were taken into account. By contrast, when entered into the last step, the total score of the English morphological...
awareness cognate root items explained over 14% of the variance in French cognate vocabulary. Similarly, the total score of the English morphological awareness non-cognate root items explained approximately 12% of the variance in French cognate vocabulary when entered into the last step of the regression model. Final beta weights further suggest that total scores of the English morphological awareness cognate and non-cognate root items were the only unique predictors of French cognate vocabulary in their respective regression models.

With respect to French non-cognate vocabulary, as illustrated in Table 12, age and non-verbal reasoning accounted for 21.5% of its variance. French phonological awareness explained an additional 3% of the variance in step 2, while French word reading made a significant contribution quantified at over 10% when entered in step 3. The French morphological awareness composite was also a significant predictor of French non-cognate vocabulary; it made a significant contribution of 3% to the outcome variable. Conversely, neither the total score of the English morphological awareness cognate items nor the non-cognate items was a significant predictor of French non-cognate vocabulary. Final beta weights suggest that French word reading as well as French morphological awareness were the two unique predictors of French non-cognate vocabulary.

Follow-up analyses confirmed that the results of the regression analyses did not differ by grade. This was established by calculating interaction terms for each type of morphological awareness items (i.e., cognate and non-cognate root forms) with grade (Pedhazur, 1997). Results revealed that none of the interaction terms contributed significantly to French cognate or non-cognate vocabulary beyond the other predictors. Beta values ranged from -.259 to .744, with all t’s $\leq |1.504|$ and all p’s $\geq .136$. Lastly, similar to Study 1, follow-up analyses using interaction terms (Pedhazur, 1997) were carried out to determine whether the results of the regression
analyses differed by children’s language status. Accordingly, children’s language status (EL1 vs. ELL, coded by an effect vector) was entered into second last step of the regression models, followed by the interaction terms computed as the product of each type of morphological awareness items and language status. The interaction terms did not contribute significantly to either French cognate or non-cognate vocabulary beyond the other predictors. Beta-values ranged from -.779 to .127, with all $t$’s $\leq |1.563|$ and all $p$’s $\geq .121$. Thus, results of the above analyses did not appear to differ between the EL1 children and their ELL counterparts.

**Discussion**

The present study explored the effects of cognate status on the transfer of morphological awareness across languages among early elementary French immersion children who were in their first two years of learning French as an additional language. The research question was two-fold: first, whether the cognate status of the French vocabulary words affected the transfer of English morphological awareness; and second, whether the cognate status of the English morphologically complex words that students were asked to compose/decompose influenced the transfer of English morphological awareness. Results revealed that after taking into account the effects of children’s general ability and several French language and literacy skills (i.e., phonological awareness, word reading, and morphological awareness), English morphological awareness remained a significant contributor to French cognate vocabulary, regardless of the cognate status of the English word stem or the type of morphology assessed (i.e., inflectional or derivational). By contrast, there was no evidence of a significant cross-language relation between English morphological awareness and French non-cognate vocabulary, after controlling for the effects of the within-language variables. Taken together, these findings refine our current understanding of the cross-language relations between morphological awareness and vocabulary.
among emerging English-French bilingual children. They provide evidence underscoring that, while the young French immersion students are able to apply their morphological awareness developed in English to facilitate their vocabulary acquisition in French, their demonstration of this ability is conditioned by the cognate status of the words that are being learned.

Consistent with Ramírez et al. (2013), the present study found that English morphological awareness accounted for unique proportions of variance in French cognate but not non-cognate vocabulary. Remarkably, the contribution of English morphological awareness to French cognate vocabulary was much greater than that of French morphological awareness, thus suggesting that for the incipient French learners, morphological awareness acquired in their primary language (i.e., English) is playing a greater role in the learning of cognate words in their additional language (i.e., French). These results converge with findings from Study 1, but more precisely suggest that children are better at transferring their insights about morphemes and morphological structures across languages when the words in their additional language bear similarities with words in their primary language with respect to orthography and/or phonology, in addition to semantics. Notably, the inclusion of French cognate and non-cognate words matched on surface frequency rules out the possibility that the current findings were due to more frequent exposures to French cognate words than to non-cognate words. Further, since children were not explicitly taught about cognates in their classroom (N. Wise, personal communication, August 3, 2013), the effects of cognate status could not be attributed to explicit instruction; rather, it appears to reflect children’s intrinsic ability to recognize the cognate forms, which likely has developed as a result of their exposure to the two languages.

Previous research (Dressler et al., 2011; Hancin-Bhatt & Nagy, 1994) has demonstrated that bilingual children’s awareness of the cognate stems embedded within morphologically
complex words presented in their L2 is positively associated with their ability to access the
meaning of suffixed cognate words. Thus, a plausible explanation for the significant link
between English morphological awareness and French cognate vocabulary observed in the
present study is that when children encounter French suffixed cognate words, the presence of
cognates helps the children detect the root words due to their overlapping lexical features with
words in English. Recognizing the root words, in turn, aid the children in applying their
understanding of morphological structures developed in English to analyze the morphological
components and deduce the meaning of the French words. In other words, it appears that
children are better able to leverage their awareness of morphological structures acquired in their
primary language to decompose morphologically complex words in their additional language
when they are familiar with the root word. This is consonant with studies conducted among
English monolingual children, which have shown that children’s sensitivity towards the
morphological structure of suffixed words is influenced by their knowledge of the root words
(Carlisle & Katz, 2006; Carlisle & Stone, 2005; Deacon, Whalen, & Kirby, 2011; Mann &
Singson, 2003).

The inclusion of cognate and non-cognate stems in the English morphological awareness
tasks provided the opportunity to probe further into the nature of the cross-language transfer.
Although children’s performance on the English morphological awareness cognate and non-
cognate items both contributed significantly to French cognate vocabulary, regression weights
indicated that scores on the cognate items accounted for a slightly greater amount of variance in
French cognate vocabulary than scores on the non-cognate items (14.3% vs. 12.1%). This is not
a surprising finding, considering that both the English morphological awareness cognate items
and the French cognate vocabularies tapped children’s knowledge of English-French cognates, in
addition to their morphological awareness. This substantiates the importance of shared vocabulary in the transfer of morphological awareness. From a theoretical perspective, this suggests that a transfer has taken place at the knowledge level (Koda, 2000) among the English-French bilingual children, which is similar to the finding reported by Ramírez et al. (2013) among Spanish-speaking ELL children, whose two languages (i.e., Spanish and English) also share a large number of cognate words.

Perhaps the more remarkable finding was that children’s performance on the English morphological awareness non-cognate items explained a unique proportion of variance in French cognate vocabulary, over and above several within-language variables. The absence of shared vocabulary in the English morphological awareness items reinforces that the cross-language relation was not merely a reflection of word knowledge transfer – children were indeed able to draw on their abstract understanding of morphological structures of words acquired through their experience with English to analyze and learn novel French words. In other words, it seems that the transfer was at the skill level that was suggested by Koda (2000). This is consistent with findings from the study by Pasquarella et al. (2011), which showed that among Chinese-English bilingual children, English compound awareness transferred to Chinese vocabulary despite the lack of cognates across the two languages. It is worth noting that Pasquarella et al. reported no transfer of English derivational awareness in their sample. The researchers reasoned that this was due to the low prevalence of derivations in Chinese, since most Chinese words are formed by compounding. In both English and French, inflections and derivations are the two most common word formation processes, and are the two types of morphology tapped in the present study. Therefore, it is likely that the similar morphological structures along with similarities in other
structural properties (alphabetic script, concatenative morphology) shared between the two languages have facilitated the transfer of skills in the present sample (Koda, 2007).

My results showed no evidence of cross-language relations between English morphological awareness and French non-cognate vocabulary. In contrast, French phonological awareness, word reading, and morphological awareness did make significant contributions to French non-cognate vocabulary. Together, these within-language variables accounted for close to 17% of the variance in French non-cognate vocabulary after controlling for children’s general ability. Thus, for children who are in the early stages of learning French, the transfer of English morphological awareness is constrained by the cognate status of the vocabulary words. When it comes to learning new words unique to the French language, children rely on insights about morphological structures gained from their French learning experiences in preference to insights developed in English, their primary language. According to Koda (2007), while first-language competencies maybe helpful in the early stages of second-language acquisition, second-language competencies that are more language-specific must be developed over time to accommodate the distinct linguistic properties of the second language. The within-language relations observed in the current study suggest that the young French learners were beginning to develop this type of language-specific metalinguistic ability: for French words that do not share similarities with any English words with respect to structural properties and semantics, children opted for their incipient French morphological awareness to help them analyze the words.

The finding that children’s performance on the English morphological awareness non-cognate items did not explain variances in French non-cognate vocabulary provided the strongest evidence that the transfer of morphological awareness was not exclusively at the metalinguistic level. Nevertheless, one cannot eliminate the possibility that as children become more proficient
in English and French, they will be able to generalize their understanding of morphological structures in a way that transcends shared vocabulary (Ramírez et al., 2013). More research focusing on older children with stronger morphological awareness is necessary to explore this issue.

In summary, the present study provided preliminary evidence suggesting that the transfer of English morphological awareness occurs simultaneously at the knowledge and skill level for emerging English-French bilingual children (Koda, 2000). On the one hand, English morphological awareness only transferred to explain variances in French cognate but not non-cognate vocabulary, substantiating the role of shared vocabulary. On the other hand, children’s performance on the English morphological awareness non-cognate items contributed significantly to French cognate vocabulary, indicating that children were able to leverage abstract morphological awareness from their first language in analyzing French words – i.e., the transfer is metalinguistic. It seems that the level of transfer is not an “either-or” question; rather, the two levels of transfer work in tandem at this juncture of development. An important question that could not be answered with the current study design is the relative contributions of knowledge and skills transfer. Future studies should compare language pairs differing in typological distances, structural properties and the presence of shared vocabulary within the same study (e.g., English-Chinese vs. English-Korean vs. English-French) to investigate this question.
Chapter 7. Study Three

Cross-Language Contribution of Morphological Awareness to French Immersion

Children’s Reading Comprehension

Results from the first two studies provided strong evidence substantiating cross-language relations between English morphological awareness and French vocabulary among young French immersion children. Yet morphemes do not only carry semantic information that aids language processing at the lexical level (e.g., vocabulary, word reading); they also convey syntactic and relational information which could facilitate children’s processing of oral or written language at the supralexical level (e.g., reading comprehension; Bowers et al., 2010; Mahony et al., 2000; Tyler & Nagy, 1990). More precisely, inflectional morphemes convey morphosyntactic information such as case, number, and tense (Aronoff & Fudeman, 2005), whereas derivational suffixes often explicitly mark parts of speech (e.g., -ness often denotes a noun while -ful usually signifies an adjective). Accordingly, both types of morphemes can provide clues to the readers about the syntactic structure of a given sentence. As reviewed in Chapter 2, previous research among monolingual English and ELL school-age children has shown that morphological awareness is a strong within-language predictor of reading comprehension. Relatively little is known, however, about the cross-language contribution of morphological awareness to reading comprehension abilities. The present study was designed to explore the cross-language relations between English morphological awareness and French reading comprehension among Grades 1 and 2 French immersion students over a one-year period.

In addition, there is preliminary evidence that bilingual children’s ability to recognize the corresponding derivational suffixes in their L1 and L2 is correlated with their ability to define morphologically complex words in their L2 (i.e., Hancin-Bhatt & Nagy, 1994). This points to the
possibility that children can access the semantic and syntactic information contained in the derivational suffixes in their additional language through their knowledge of the matching suffixes in their primary language. Accordingly, I explored in this study whether recognizing the systematic relationships between English and French derivational suffixes can also play a part in children’s development of French reading comprehension skills.

Cross-Language Relations between Morphological Awareness and Reading Comprehension

Several studies have documented cross-language relations between morphological awareness and reading comprehension among school-age bilingual children (Pasquarella et al., 2011; Ramírez et al., 2013; Wang et al., 2006; Zhang & Koda, 2014). Both Pasquarella et al. (2011) and Wang et al. (2006) reported that English compound awareness explained unique variance in Chinese reading comprehension among school-age Chinese-English bilingual children living in North America, after accounting for the effects of other reading-related skills such as phonological awareness and vocabulary. Zhang and Koda (2014) examined Grade 6 Chinese-English bilingual children in Mainland China for whom Chinese is the stronger language. They found that Chinese compound awareness explained a unique proportion of the variance in English reading comprehension, over and above the contributions of non-verbal reasoning abilities, English vocabulary knowledge, and English compound awareness. Lastly, Ramírez et al. (2013) showed that Spanish derivational awareness contributed indirectly to English reading comprehension via word reading and cognate vocabulary among upper elementary Spanish-speaking ELLs.

The findings of these studies are noteworthy in at least three ways. First, studies of Chinese-English bilingual children underscored that there are cross-language relations between
morphological awareness and reading comprehension, even when the two languages involved are orthographically and syntactically distant (i.e., Chinese and English). This provides strong evidence suggesting that the transfer of morphological awareness is not merely based on shared morphemes between the two languages. Rather, the transfer takes place at the skill level (Koda, 2000), where children apply their general understanding of morphemes and morphological structures acquired from L1 experiences to facilitate text comprehension in their L2.

Second, cross-language associations between morphological awareness and reading comprehension appear to be strongest when the aspect of morphological awareness examined is common across the language pair. This is most clearly demonstrated in Pasquarella et al.’s study (2011). In that study, English compound awareness but not derivational awareness was found to be a significant predictor of Chinese reading comprehension when the two variables were entered together into a structural equation model (SEM). The authors interpreted these results as that the transfer was based on the shared compounding structure between Chinese and English. In contrast, given that there are few derivations in Chinese, English derivational awareness was understandably less useful in facilitating text comprehension in Chinese. As a result, there was minimal transfer from English derivational awareness to facilitate Chinese reading comprehension.

Lastly, a comparison of the results reported by Pasquarella et al. (2011) and Zhang and Koda (2014) suggests that children’s relative competence in their two languages may play a role in influencing the direction of transfer. Specifically, Pasquarella et al. reported transfer from English morphological awareness to Chinese reading comprehension among Chinese-English

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12 Although compounding is more prominent in Chinese, Chinese and English are rather similar in terms of rules for the formation and meaning of compound morphology. Specifically, compounds in both languages are right-headed, which means that the right morpheme specifies the category and the left morpheme modifies the meaning and identifies the subcategory (Clark, Gelman, & Lane, 1985).
bilingual children for whom English is their stronger language (despite their first language being Chinese). By contrast, Zhang and Koda demonstrated transfer from Chinese morphological awareness to English reading comprehension among Chinese-English bilingual children for whom Chinese is their stronger language. Thus transfer appears to be unidirectional, with morphological awareness transferring from the more proficient language to facilitate reading in the less proficient language. In sum, the studies described above (i.e., Pasquarella et al., 2011; Ramírez et al., 2013; Wang et al., 2006; Zhang & Koda, 2014) uniformly substantiate a positive cross-language relation between morphological awareness and reading comprehension. However, the strength of the relations and the direction of transfer may vary depending on factors such as the morphological structures of each language and children’s relative proficiency in their two languages.

**Knowledge of Systematic Relationships between English and French Derivational Suffixes**

The second query of the present study relates to students’ recognition of the systematic relationships between English and French derivational suffixes and their effects on their French reading comprehension. As noted previously, derivations are one of the primary mechanisms by which morphologically complex words are formed in both English and French (Deacon et al., 2013; Nagy & Anderson, 1984; Roy & Labelle, 2007). Notably, there is a systematic correspondence between a number of derivational suffixes in the two languages, such as the adverbial -ly/-ment, adjectival -ous/-eux, agentive -orf-eur, and nominal -ity/-ité. There is preliminary evidence suggesting that bilingual children’s knowledge of the corresponding derivational suffixes between their two languages emerges early and increases over time. In a study conducted by Hipfner-Boucher et al. (accepted), French immersion students from Grades 1 to 3 completed a matching task in which they were presented with multimorphemic French
cognate words. For each French word, students were asked to choose the correct English translation from among three derivationally related English words that differed only in their derivational suffixes. Results revealed that over time, the French immersion students demonstrated increasing ability to accurately match the morphologically complex French words with their English translations. Hancin-Bhatt and Nagy (1994) asked Spanish-English bilingual students in Grades 4, 6, and 8 to complete a word matching task similar to the one used by Hipfner-Boucher et al. In the task students were asked to identify, from several derivationally related choices, the correct Spanish translation of the English morphologically complex words presented. In keeping with findings by Hipfner-Boucher et al., Hancin-Bhatt & Nagy reported significant increases in Spanish-English bilingual children’s scores on the matching task between Grades 4 and 8.

In the same study, Hancin-Bhatt and Nagy (1994) also documented a significant correlation between students’ knowledge of Spanish-English suffix relations and their ability to define morphologically complex words in English (i.e., their L2). This suggests that knowledge of the cross-language correspondence of suffixes may help children to decompose and access the meaning of morphologically complex words in their L2 by enabling them to draw on their knowledge of the matching suffix in their L1. The findings of Hancin-Bhatt and Nagy provide preliminary grounds to predict a link between students’ recognition of L1-L2 suffix correspondences and their L2 reading comprehension abilities. First, it is plausible that knowledge of suffix relations may help students break down and understand the unfamiliar, morphologically complex words they encounter in reading longer passages in their L2. Second, given that derivational suffixes often explicitly mark parts of speech, recognizing the suffix correspondences may provide clues to the students in determining the syntactic structure of a
written sentence in their L2 based on their knowledge of the grammatical function of the suffixes in their L1\textsuperscript{13}. In other words, the increased access to unfamiliar vocabularies and to the sentence structures can jointly contribute to stronger reading comprehension abilities in students’ L2.

**The Present Study**

In sum, previous research has shown that aspects of morphological awareness are transferable across languages to facilitate reading comprehension among bilingual children. However, it is important to note that while Pasquarella et al. (2011) and Wang et al. (2006) included a group of early elementary bilingual children in their respective studies, both studies pooled together children from several grades across the elementary years in their analyses. Previous research has suggested that the association between morphological awareness and reading changes as a function of age and/or language proficiency (Kuo & Anderson, 2006). Therefore, it is difficult to determine clearly from the Pasquarella et al. and Wang et al. studies whether there are indeed cross-language relations between morphological awareness and reading comprehension among children who are in the early stages of their language and literacy acquisitions. Moreover, all of the studies conducted to date have adopted a cross-sectional design. Thus, the extent to which morphological awareness can cross-linguistically contribute to bilingual children’s development of reading comprehension skills over time remains unclear.

The present study intended to add to the existing body of research by examining longitudinally the cross-language relations between morphological awareness and reading comprehension among first and second grade French immersion children. Considering the children’s limited French oral and reading proficiency in their initial years of French learning,

\textsuperscript{13} Tyler and Nagy (1990) have indeed demonstrated among monolingual English-speaking high school students that syntactic information embedded within derivationally suffixed words influenced the students’ interpretation of the sentences containing the suffixed words.
morphological awareness in English (i.e., their primary language) may be a particularly important contributor to French reading comprehension during this unique period of development. The establishment of a longitudinal relation between English morphological awareness and French reading comprehension will confirm this hypothesis. A second goal in conducting longitudinal analyses was to explore the temporal relationship between morphological awareness and reading comprehension. Specifically, to examine whether early English morphological awareness predicts gains in French reading comprehension skills over time, I conducted additional cross-lagged analyses with the inclusion of an autoregressive control (i.e., Time 1 reading comprehension) for the Grade 2 students.

Relatedly, I was interested in discovering the changing pattern of the cross-language relations between morphological awareness and reading comprehension as children gain skills in their two languages over the early elementary years. In the present study, the contributions of two aspects of morphological awareness (i.e., inflectional and derivational awareness) were investigated separately to determine their independent cross-language effects. Based on findings reported in published research and in the first two studies of this thesis, and in keeping with the Transfer Facilitation Model (Koda, 2005), it was expected that strong relations between English morphological awareness and French reading comprehension would be observed among the students, particularly in Grade 2. It was also hypothesized that English inflectional awareness would be a significant predictor of French reading comprehension by Grade 1, whereas the effects of English derivational awareness would not emerge till Grade 2.

The final goal of the present study was to determine, among the Grade 2 students, the unique contribution of children’s knowledge of suffix correspondences to their reading comprehension. To assess children’s ability to identify suffix correspondences across English
and French, I developed a word matching task based on the one described in Hancin-Bhatt and Nagy (1994). The full description of this adapted task is presented below. Based on the findings by Hancin-Bhatt and Nagy, it was hypothesized that in the present study, children’s ability to recognize suffix correspondences across English and French would be a significant longitudinal predictor of their French reading comprehension achievement.

Several reading-related skills were included in my analyses as control variables to minimize the possibility of finding associations among morphological awareness, knowledge of suffix correspondences, and reading comprehension as a result of extraneous variables. Similar to Studies 1 and 2, I first controlled for age and non-verbal reasoning skills to increase my confidence that any uncovered effects were not a function of general reasoning ability. Measures of within-language skills with well-documented links to reading comprehension – namely, phonological awareness, receptive vocabulary, word reading, and morphological awareness – were entered into the subsequent steps of the regression models (e.g., Carlisle 1995, 2000; Carlisle, Beeman, Davis, & Spharim, 1999; Carlisle & Fleming, 2003; Deacon & Kirby, 2004; Hoover & Gough, 1990; Low & Siegel, 2005; McKeown, Beck, Omanson, & Perfetti, 1983; Nagy et al., 2006). It is worth noting that past within-language research (e.g., Gilbert, Goodwin, Compton, & Kearns, 2014; Kieffer & Lesaux, 2012b) supports the possibility that morphological awareness contributes to reading comprehension across languages indirectly via its effects on vocabulary and word reading, i.e., literacy skills that are at the lexical level. However, I was primarily interested in determining the direct role that English morphological awareness plays in French reading comprehension. Therefore, I included the two lexical-level skills (i.e., vocabulary and word reading) as control variables in my current analyses.
Method

Participants. The participants of the current study involved the same 156 first and second graders described in Study 1. As in Study 1, because the present study was a longitudinal study, the children recruited in Grade 1 will be referred to as the “younger cohort”, and those recruited in the second grade as the “older cohort”.

Measures. Participants were tested at two measurement points. The younger cohort was assessed in the Fall (Time 1) and Spring (Time 2) terms of Grade 1; the older cohort was assessed in the Spring term of Grades 2 (Time 1) and 3 (Time 2). The younger cohort was tested only in English at the first testing point but received tests in both English and French at Time 2. For the older cohort, they were assessed in English and French at both time points. In the present study, both cohorts of children completed measures of non-verbal reasoning, French phonological awareness, word reading, and vocabulary, as well as English and French morphological awareness identical to the measures described in Study 1. The younger cohort additionally completed one French reading comprehension task, whereas children in the older cohort completed two reading comprehension tasks and a morphologically complex word matching task. The descriptions of the French reading comprehension tasks and the morphologically complex word matching task are presented below.

French reading comprehension. The younger cohort’s French reading comprehension skills was assessed using the Alpha-jeunes whereas the older cohort was assessed using a translated version of the Gates-MacGinitie Reading Test, in addition to the Alpha-jeunes. These two tasks are described in detail below.

The Alpha-jeunes (Barrett, Littleford, & Watson, 2004) is a standardized French reading comprehension task administered by school teachers. Its administration is similar to that of the PM Benchmark Kit (Nelley & Smith, 2001). To begin, teachers identified an appropriate entry
level for each child in their class based upon previous school records. Each child was tested independently and was asked to read the selected text aloud as his/her teacher recorded observable indicators of reading behaviour. Following reading, the child was encouraged to respond orally to four comprehension questions that tap both literal and inferential understanding.

The instructional reading level was identified if the oral reading accuracy level was between 90% and 95% and the student correctly responded to all of the questions. Otherwise, the teacher repeated the steps with more difficult or easier texts depending on the child’s performance, until an instructional reading level was established. The range of instructional reading levels that a child can achieve is 1 to 24.

Because there is no standardized paper-and-pencil reading comprehension test available in French, children in the older cohort completed translated versions of the Gates-MacGinitie Reading Test (MacGinitie & MacGinitie, 1992). Specifically, Test Level B, Form 4, and Test Level C, Form 4 from the Gates-MacGinitie were translated to be administered in Grades 2 and 3, respectively. For this task, each child received a booklet containing sentences and short paragraphs of increasing difficulty, along with stimulus pictures. Children were asked to silently read each sentence or short paragraph. They were then required to select, from three stimulus pictures, the one that best represented the sentence or short paragraph read, and to mark their answers on the booklet. There were two practice items and 46 items on the test in the second grade, and 48 test items in the third grade. Children were given 20 minutes to complete the task.

*Morphologically complex cognate task (MCCT).* This task was administered only to children in the older cohort. Adapted from the Matching Task developed by Hancin-Bhatt and Nagy (1994), this task tapped children’s ability to recognize the suffix correspondences between English and French. For each item of the task, children were first given a derived French word
and were then asked to choose its translation among three derivationally related English words by circling their choice on a response sheet. The only difference among the choices in English was in the derivational suffixes. For example, the children were presented with the French word *activité* and were asked to choose its correct translation from among the following three choices: *activity*, *active*, *actively* (correct answer: *activity*; see Appendix E for the items). Derivationally related words were used exclusively so that it was necessary for children to attend to the relationships between English and French derivational morphology. The English words were selected to ensure that across choices, there was no significant difference in the number of letters overlapping with the French stimulus, $F(2, 63) = 0.727, p = .488$. This was intended to reduce the possibility of children recognizing the correct response based on the extent of shared orthography alone.

Using the database Manulex (Lété et al., 2004), we identified 22 French derived words for the task, covering nine English-French suffix pairs: -*ité/-*ity, -*eur/-*or, -*ment/-*ly, -*eux/-*ous, -*el/-*al, -*er/-*y, -*ien/-*ian, -*ique/-*ic, and -*if/-*ive. All children completed all items on the task. The task was presented to the children in print as well as orally to minimize the possibility of reading skills confounding children’s performance.

**Procedure.** Participants were assessed in quiet rooms at their school within school hours. School teachers administered the Alpha-jeunes individually to students in their classrooms as part of the French immersion program requirements instituted by the local school board. Children in the older cohort completed the MCCT and the French translation of the Gates-MacGinitie Reading Test in small groups. The remaining tasks were administered individually by trained undergraduate and graduate research assistants who were fluent in English and/or
Results

Table 13 presents the descriptive statistics and reliability coefficients of the measures for each grade at each time point. There were no univariate or multivariate outliers in the sample. Measures with skewness and kurtosis values falling outside the acceptable range (i.e., statistic/SE < ± 2.00) were transformed following the guidelines set out by Tabachnick and Fidell (2007). Transformations performed on measures administered to the younger cohort were documented in Study 1 (i.e., Time 1 English inflectional awareness, and Time 2 French word reading, French receptive vocabulary, and French derivational awareness). For the older cohort, in addition to the transformations of Time 1 English inflectional awareness described in Study 1, transformations were performed for both French reading comprehension tasks at Time 2. Specifically, scores on the French Gates-MacGinitie task were significantly positively skewed and a square root transformation was performed to remove the skew. Conversely, scores on the Alpha-jeunes were significantly negatively skewed, and required reflection, log transformation, and rereflection to remove the skew. Raw scores are reported in the descriptive statistics table, whereas all correlational and linear regression analyses were performed with the transformed variables\textsuperscript{14}. It is worth noting that there was likely a ceiling effect on the Alpha-jeunes task at Time 2 for the older cohort, given that over 60% of the students achieved an instructional reading level of 21 or above – in fact, approximately 40% of the students achieved the highest reading level (i.e., level 24) at Time 2.

\textsuperscript{14} An alternative set of correlational and regression analyses were performed using the bootstrapping method, which is a nonparametric approach to statistical inference that does not require the assumption of normality (Fox, 2008). Given that analyses using the bootstrapping method revealed an identical pattern of results to the analyses conducted with transformed variables, only the results generated from the latter statistical approach are reported here.
Table 13.

Mean Raw Scores and Standard Deviations of All Measures for the Younger and Older Cohorts in Study 3

<table>
<thead>
<tr>
<th></th>
<th>α</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td><strong>Younger Cohort (n= 81)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-verbal reasoning</td>
<td>.86</td>
<td>23.41</td>
<td>11.12</td>
<td>4-45</td>
</tr>
<tr>
<td>T1 English phonological awareness</td>
<td>.92</td>
<td>10.52</td>
<td>4.99</td>
<td>0-20</td>
</tr>
<tr>
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<td>.78</td>
<td>11.01</td>
<td>3.53</td>
<td>0-16</td>
</tr>
<tr>
<td>T1 English derivational awareness</td>
<td>.71</td>
<td>5.35</td>
<td>2.32</td>
<td>0-11</td>
</tr>
<tr>
<td>T2 French inflectional awareness</td>
<td>.45</td>
<td>5.62</td>
<td>2.08</td>
<td>1-10</td>
</tr>
<tr>
<td>T2 French derivational awareness</td>
<td>.80</td>
<td>7.55</td>
<td>3.46</td>
<td>0-14</td>
</tr>
<tr>
<td>T2 French word reading</td>
<td>.98</td>
<td>45.50</td>
<td>20.56</td>
<td>3-115</td>
</tr>
<tr>
<td>T2 French receptive vocabulary</td>
<td>.94</td>
<td>36.84</td>
<td>12.28</td>
<td>14-71</td>
</tr>
<tr>
<td>T2 French reading comprehension (Alpha-jeunes)</td>
<td>8.10</td>
<td>3.39</td>
<td>1-16</td>
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<tr>
<td><strong>Older Cohort (n = 75)</strong></td>
<td></td>
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<tr>
<td>Non-verbal reasoning</td>
<td>.86</td>
<td>19.96</td>
<td>12.10</td>
<td>1-48</td>
</tr>
<tr>
<td>T1 English inflectional awareness</td>
<td>.70</td>
<td>14.21</td>
<td>2.10</td>
<td>5-16</td>
</tr>
<tr>
<td>T1 English derivational awareness</td>
<td>.56</td>
<td>8.73</td>
<td>2.11</td>
<td>4-15</td>
</tr>
<tr>
<td>T1 French phonological awareness</td>
<td>.90</td>
<td>14.23</td>
<td>5.16</td>
<td>5-20</td>
</tr>
<tr>
<td>T1 French inflectional awareness</td>
<td>.49</td>
<td>8.41</td>
<td>2.19</td>
<td>3-14</td>
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<tr>
<td>T1 French derivational awareness</td>
<td>.64</td>
<td>9.88</td>
<td>2.44</td>
<td>3-15</td>
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<tr>
<td>T1 Morphologically Complex Word Matching Task</td>
<td>.77</td>
<td>13.27</td>
<td>3.46</td>
<td>5-21</td>
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<tr>
<td>T1 French word reading</td>
<td>.98</td>
<td>64.87</td>
<td>21.06</td>
<td>18-113</td>
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<tr>
<td>T1 French receptive vocabulary</td>
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<td>24.36</td>
<td>12-106</td>
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<tr>
<td>T1 French reading comprehension (Alpha-jeunes)</td>
<td>14.00</td>
<td>4.87</td>
<td>4-24</td>
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</tr>
<tr>
<td>T1 French reading comprehension (Gates-MacGinitie)</td>
<td>.84</td>
<td>28.87</td>
<td>7.09</td>
<td>13-44</td>
</tr>
<tr>
<td>T2 French reading comprehension (Alpha-jeunes)</td>
<td>20.47</td>
<td>4.71</td>
<td>7-24</td>
<td></td>
</tr>
<tr>
<td>T2 French reading comprehension (Gates-MacGinitie)</td>
<td>.85</td>
<td>20.26</td>
<td>7.55</td>
<td>9-45</td>
</tr>
</tbody>
</table>

Correlations among measures are displayed in Tables 14 and 15 for the younger and older cohorts, respectively. For the younger cohort, as indicated in Table 14, within-language correlations between measures of morphological awareness in English and in French were significant (p ’s < .01). Cross-linguistically, English morphological awareness assessed at Time 1 was significantly correlated with performance on the French morphological awareness tasks at Time 2 (ranging from .27 to .32). Correlations between Time 1 English inflectional and
derivational awareness and Time 2 French reading comprehension (Alpha-jeunes) were significant (both p’s < .01). The concurrent correlations between French inflectional and derivational awareness and reading comprehension at Time 2 were also significant (both p’s < .01).

For the older cohort, as shown in Table 15, within-language correlations between measures of morphological awareness were significant for both English and in French at Time 1. The concurrent cross-language associations of morphological awareness measures were weak to modest (ranging from .07 to .27). Longitudinally, French inflectional awareness measured at Time 1 was significantly associated with the two measures of French reading comprehension at Time 2 (both p’s < .01). Time 1 French derivational awareness was significantly correlated with the Time 2 French Gates-MacGinitie measure but not with the Alpha-jeunes. With respect to cross-language relations, English inflectional and derivational awareness measured at Time 1 were significantly associated with the two measures of French reading comprehension at Time 2 (ranging from .33 to .37). The MCCT administered at Time 1 was significantly correlated with both Time 2 French reading comprehension measures (both p’s < .01).
Table 14.

*Correlation Matrix of All Variables for the Younger Cohort in Study 3 (n = 81)*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>9</th>
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<td>Age</td>
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<td></td>
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<tr>
<td>2. Non-verbal reasoning</td>
<td>.07</td>
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<td></td>
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<tr>
<td>3. T1 Eng. phonological awareness</td>
<td>.04</td>
<td>.30**</td>
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<td>4. T1 Eng. inflectional awareness</td>
<td>.14</td>
<td>.29**</td>
<td>.36**</td>
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<td>5. T1 Eng. derivational awareness</td>
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<td>.38**</td>
<td>.30**</td>
<td>.64**</td>
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<tr>
<td>6. T2 Fr. inflectional awareness</td>
<td>.13</td>
<td>.27*</td>
<td>.41**</td>
<td>.30**</td>
<td>.27*</td>
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<td>.21</td>
<td>.28*</td>
<td>.29*</td>
<td>.32**</td>
<td>.45**</td>
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<td>8. T2 Fr. word reading</td>
<td>.02</td>
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<td>.53**</td>
<td>.27*</td>
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<td>.30**</td>
<td>.30**</td>
<td>.52**</td>
<td>.44**</td>
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<tr>
<td>10. T2 Fr. RC (Alpha-jeunes)</td>
<td>.05</td>
<td>.36**</td>
<td>.64**</td>
<td>.50**</td>
<td>.38**</td>
<td>.41**</td>
<td>.33**</td>
<td>.76**</td>
<td>.52**</td>
</tr>
</tbody>
</table>

*Note.* RC = Reading Comprehension.

*p < .05, **p < .01*
Table 15.

Correlation Matrix of All Variables for the Older Cohort in Study 3 (n = 75)

<table>
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<tr>
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<th>13</th>
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<tbody>
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<tr>
<td>2.</td>
<td>Non-verbal reasoning</td>
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<tr>
<td>3.</td>
<td>T1 Eng. inflectional awareness</td>
<td>.26*</td>
<td>.29*</td>
<td>-</td>
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<tr>
<td>4.</td>
<td>T1 Eng. derivational awareness</td>
<td>.36**</td>
<td>.38**</td>
<td>.42**</td>
<td>-</td>
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<tr>
<td>5.</td>
<td>T1 Fr. phonological awareness</td>
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<td>.38**</td>
<td>.19</td>
<td>.24*</td>
<td>-</td>
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</tr>
<tr>
<td>6.</td>
<td>T1 Fr. inflectional awareness</td>
<td>.09</td>
<td>.34**</td>
<td>.20*</td>
<td>.07</td>
<td>.38**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>T1 Fr. derivational awareness</td>
<td>.38**</td>
<td>.28*</td>
<td>.27*</td>
<td>.08</td>
<td>.48**</td>
<td>.38**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>T1 MCCT</td>
<td>.09</td>
<td>.30**</td>
<td>.29*</td>
<td>.30*</td>
<td>.35**</td>
<td>.35**</td>
<td>.27*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>T1 Fr. word reading</td>
<td>-.05</td>
<td>.17</td>
<td>.26*</td>
<td>.13</td>
<td>.32**</td>
<td>.35**</td>
<td>.24*</td>
<td>.55**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>T1 Fr. receptive vocabulary</td>
<td>.12</td>
<td>.29*</td>
<td>.25*</td>
<td>.34**</td>
<td>.27*</td>
<td>.27*</td>
<td>.37**</td>
<td>.26*</td>
<td>.33**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>T1 Fr. RC (Alpha-jeunes)</td>
<td>.20</td>
<td>.35**</td>
<td>.43**</td>
<td>.39**</td>
<td>.38**</td>
<td>.44**</td>
<td>.28*</td>
<td>.59**</td>
<td>.71**</td>
<td>.44**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>T1 Fr. RC (Gates-MacGinitie)</td>
<td>.21</td>
<td>.44**</td>
<td>.32**</td>
<td>.38**</td>
<td>.45**</td>
<td>.43**</td>
<td>.37**</td>
<td>.51**</td>
<td>.63**</td>
<td>.46**</td>
<td>.69**</td>
<td>-</td>
</tr>
<tr>
<td>13.</td>
<td>T2 Fr. RC (Alpha-jeunes)</td>
<td>.17</td>
<td>.28*</td>
<td>.33**</td>
<td>.37**</td>
<td>.30*</td>
<td>.39**</td>
<td>.18</td>
<td>.58**</td>
<td>.70**</td>
<td>.28*</td>
<td>.77**</td>
<td>.68**</td>
</tr>
<tr>
<td>14.</td>
<td>T2 Fr. RC (Gates-MacGinitie)</td>
<td>.08</td>
<td>.28*</td>
<td>.37**</td>
<td>.35**</td>
<td>.34**</td>
<td>.54**</td>
<td>.24*</td>
<td>.55**</td>
<td>.51**</td>
<td>.23</td>
<td>.70**</td>
<td>.65**</td>
</tr>
</tbody>
</table>

*Note. RC = Reading Comprehension.

*p < .05, **p < .01
Cross-language effects of English morphological awareness on French reading comprehension in the younger cohort. A series of hierarchical linear regression analyses were conducted to examine the cross-language contribution of English morphological awareness to French reading comprehension in the younger cohort. Separate regressions were used to determine the independent contributions of English inflectional and derivational awareness. In each set of hierarchical regression analyses, child’s age and non-verbal reasoning abilities were entered in the first step. Measures of English phonological awareness, French receptive vocabulary, French word reading, and French morphological awareness were subsequently entered in the second to fifth steps, respectively. English morphological awareness measures were entered in the final step to estimate their cross-language effects on French reading comprehension, beyond that which could be accounted for by children’s general ability and within-language abilities. Results from the final regression analyses are presented in Table 16. The table reports the variance added at each step when the predictors were first entered into the regression model, as well as the final standardized beta coefficients.

As displayed in Table 16, consistent with the findings from previous research, English phonological awareness, French receptive vocabulary and French word reading explained significant proportions of the variance in French reading comprehension, accounting for 30.6%, 7.1%, and 17.1% of the variance, respectively. French inflectional awareness did not account for any unique variance in French reading comprehension. Conversely, when entered into the final step, English inflectional awareness measured at Time 1 explained an additional 4% of the unique variance in French reading comprehension measured at Time 2 after taking into account the effects of the within-language variables. Altogether, the model accounted for over 71% of the variance in Time 2 French reading comprehension. Final beta weights revealed that English
phonological awareness and French word reading, as well as English inflectional awareness, were unique predictors of French reading comprehension.

In examining the contributions of derivational awareness, the regression results indicated that neither French nor English derivational awareness predicted unique proportions of variance in French reading comprehension after taking into consideration the effects of the control variables. In this model, final beta weights suggested that English phonological awareness, French word reading, and French vocabulary were unique predictors of French reading comprehension.

Table 16.

*Time 1 English Inflectional and Derivational Awareness Predicting Time 2 French Reading Comprehension (Alpha-jeunes) in the Younger Cohort*

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>( \Delta R^2 )</th>
<th>( \beta )</th>
<th>( \Delta R^2 )</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age at T1</td>
<td>.126**</td>
<td>-.017</td>
<td>.126**</td>
<td>.005</td>
</tr>
<tr>
<td>1. Non-verbal reasoning</td>
<td>.019</td>
<td>.032</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. T1 Eng. phonological awareness</td>
<td>.306***</td>
<td>.220**</td>
<td>.306***</td>
<td>.258**</td>
</tr>
<tr>
<td>3. T2 Fr. receptive vocabulary</td>
<td>.071**</td>
<td>.100</td>
<td>.071**</td>
<td>.203*</td>
</tr>
<tr>
<td>4. T2 Fr. word reading</td>
<td>.171***</td>
<td>.524***</td>
<td>.171***</td>
<td>.558***</td>
</tr>
<tr>
<td>5. T2 Fr. inflectional awareness</td>
<td>.001</td>
<td>.016</td>
<td>.039**</td>
<td>.226**</td>
</tr>
<tr>
<td>6. T1 Eng. inflectional awareness</td>
<td>.092**</td>
<td>.264**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 5. T2 Fr. derivational awareness | .010 | -.143 |
| 6. T1 Eng. derivational awareness | .008 | .100 |

\( p < .05, **p < .01, ***p < .001 \)

To determine if the cross-language effects of English morphological awareness on French reading comprehension skills differed by children’s language status (i.e., EL1 vs. ELL), follow-up analyses were performed by calculating interaction terms for each English morphological awareness measure with language status (coded by an effect vector; Pedhazur, 1997). The interaction terms did not contribute significantly to French reading comprehension beyond the
other predictors in the regression models, suggesting that the results of the above analyses for the younger cohort did not differ by language status. Beta values of the interaction terms for the two regression models were .105 (t = 0.402; p = .689) and .002 (t = 0.009; p = .993), respectively.

**Cross-language effects of English morphological awareness on French reading comprehension in the older cohort.** Hierarchical linear regressions were conducted in the older cohort first to examine separately the cross-language contributions of English inflectional awareness to the two French reading comprehension measures (i.e., Alpha-jeunes and Gates-MacGinitie). For each regression model, the child’s age and non-verbal reasoning abilities were entered in the first step. French phonological awareness was then entered in the second step, followed by French receptive vocabulary and word reading in the third and fourth steps, respectively. French inflectional awareness was entered in the fifth step. Finally, English inflectional awareness was entered as the last step in the regression. Results of these analyses can be seen in Table 17.

Table 17.

*Time 1 English Inflectional Awareness Predicting Time 2 French Reading Comprehension in the Older Cohort*

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>Alpha-jeunes</th>
<th>Gates-MacGinitie</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>∆R²</td>
<td>β</td>
</tr>
<tr>
<td>1. Age at T1</td>
<td>.093*</td>
<td>.175</td>
</tr>
<tr>
<td>1. Non-verbal reasoning</td>
<td>.080</td>
<td>-.024</td>
</tr>
<tr>
<td>2. T1 Fr. phonological awareness</td>
<td>.041</td>
<td>-.024</td>
</tr>
<tr>
<td>3. T1 Fr. receptive vocabulary</td>
<td>.031</td>
<td>-.041</td>
</tr>
<tr>
<td>4. T1 Fr. word reading</td>
<td>.373***</td>
<td>.653***</td>
</tr>
<tr>
<td>5. T1 Fr. inflectional awareness</td>
<td>.010</td>
<td>.114</td>
</tr>
<tr>
<td>6. T1 Eng. inflectional awareness</td>
<td>.003</td>
<td>.065</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001
As shown in the first and second columns in Table 17, the strongest predictor of children’s performance on the Alpha-jeunes at Time 2 was French word reading, which explained over 37% of the unique variance in the outcome measure. Neither French nor English inflectional awareness measured in Time 1 longitudinally predicted variance in Time 2 Alpha-jeunes scores when entered into the final two steps of the regression. Final beta weights revealed that the autoregressor as well as Time 1 French word reading are the unique predictors of children’s performance on the Alpha-jeunes at Time 2.

The third and fourth columns in Table 17 summarize the results of the analyses conducted with Time 2 Gates-MacGinitie scores as the outcome variable. Similar to findings for the Alpha-jeunes, the strongest predictor of Time 2 Gates-MacGinitie results was French word reading, which accounted for close to 16% of the unique variance in the outcome variable. French inflectional awareness also emerged as a significant predictor (10%) of Time 2 Gates-MacGinitie. Conversely, Time 1 English inflectional awareness did not cross-linguistically predict significant proportions of variance in Time 2 Gates-MacGinitie scores. Final beta weights revealed that the autoregressor and French inflectional awareness measured at Time 1 were unique predictors of Time 2 French Gates-MacGinitie scores.

Although the first set of analyses indicated that Time 1 English inflectional awareness was not a significant predictor of Time 2 French reading comprehension, to examine the effects of within-language skills and English inflectional awareness on the development of French reading comprehension skills between Time 1 and Time 2, a second set of analyses were conducted with the autoregressor (i.e., French reading comprehension scores at Time 1) being entered into the second step of the model. Results from these analyses are summarized in Table 18.
Table 18.

Time 1 English Inflectional Awareness Predicting Change in French Reading Comprehension between Time 1 and 2 in the Older Cohort

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>Alpha-jeunes</th>
<th>Gates-MacGinitie</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>1. Age at T1</td>
<td>.093*</td>
<td>.103</td>
</tr>
<tr>
<td>1. Non-verbal reasoning</td>
<td>.050</td>
<td>-.045</td>
</tr>
<tr>
<td>2. T1 Fr. reading comprehension</td>
<td>.508***</td>
<td>.547***</td>
</tr>
<tr>
<td>3. T1 Fr. phonological awareness</td>
<td>.000</td>
<td>-.045</td>
</tr>
<tr>
<td>4. T1 Fr. receptive vocabulary</td>
<td>.004</td>
<td>-.102</td>
</tr>
<tr>
<td>5. T1 Fr. word reading</td>
<td>.050**</td>
<td>.343**</td>
</tr>
<tr>
<td>6. T1 Fr. inflectional awareness</td>
<td>.001</td>
<td>.029</td>
</tr>
<tr>
<td>7. T1 Eng. inflectional awareness</td>
<td>.000</td>
<td>-.021</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, *** $p < .001$

As shown in the first two columns in Table 18, the strongest predictor of children’s performance on the Alpha-jeunes at Time 2 was the autoregressor (i.e., Time 1 Alpha-jeunes), which explained close to 51% of the variance. Beyond the autoregressive effects, Time 1 French word reading explained 5% of the unique variance in the outcome measure. Neither French nor English inflectional awareness measured in Time 1 longitudinally predicted variance in Time 2 Alpha-jeunes scores when entered into the final two steps of the regression. Final beta weights revealed that the autoregressor as well as Time 1 French word reading were the unique predictors of children’s performance on the Alpha-jeunes at Time 2.

The third and fourth columns in Table 18 show that, similar to findings for the Alpha-jeunes, the strongest predictor of Time 2 Gates-MacGinitie performance was the autoregressor (i.e., Time 1 Gates-MacGinitie), which accounted for 35% of the variance. The within-language control variables (i.e., French phonological awareness, receptive vocabulary, and word reading)
explained minimal amounts of unique variance in Time 2 Gates-MacGinitie scores once the autoregressor had been taken into consideration. The one exception was French inflectional awareness, which contributed significantly (6.8%) to Time 2 Gates-MacGinitie results when entered into the second last step of the regression. Not surprisingly, Time 1 English inflectional awareness did not cross-linguistically predict significant proportions of variance in Time 2 Gates-MacGinitie scores. Final beta weights revealed that the autoregressor and French inflectional awareness measured at Time 1 were unique predictors of Time 2 French Gates-MacGinitie scores.

Next, hierarchical linear regressions were performed to determine the cross-language contribution of English derivational awareness to the two French reading comprehension measures. In addition, the MCCT was entered into the same regressions in order to determine its contribution to French reading comprehension relative to the derivational awareness measures. In the first set of analyses, the autoregressors (i.e., French reading comprehension at Time 1) were not included in the regression models; they were added in the second set of analyses. In each model, the control variables entered in the initial steps were the same ones as those included in the models exploring the effects of inflectional awareness. French and English derivational awareness, respectively, were then entered in the two steps subsequent to the control variables. The MCCT was entered into the final step of the regression model. In an alternative model, the order of entrance was switched between English derivational awareness and MCCT. The results of the regressions conducted without and with the autoregressors are presented in Tables 19 and 20, respectively.
As indicated in the first two columns of Table 19, regression analyses without taking into account autoregressive effects revealed that none of French derivational awareness, English derivational awareness and MCCT (i.e., knowledge of suffix correspondences) explained a significant amount of variance in Time 2 Alpha-jeunes scores. Final beta weights revealed that Time 1 French word reading was the only unique predictor of Time 2 Alpha-jeunes scores. The third and fourth columns of Table 19 show that French derivational awareness was also not a significant predictor of Time 2 Gates-MacGinitie results. By contrast, both English derivational awareness and MCCT were unique predictors of Time 2 Gates-MacGinitie scores when entered last into the equation.
Table 20.

Time 1 English Derivational Awareness and MCCT Tasks Predicting Change in French Reading Comprehension between Time 1 and 2 in the Older Cohort

<table>
<thead>
<tr>
<th>Step and predictors</th>
<th>Alpha-jeunes</th>
<th>Gates-MacGinitie</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>1. Age at T1</td>
<td>.093*</td>
<td>.073</td>
</tr>
<tr>
<td>1. Non-verbal reasoning</td>
<td>.019</td>
<td></td>
</tr>
<tr>
<td>2. T1 Fr. reading comprehension</td>
<td>.508***</td>
<td>.483***</td>
</tr>
<tr>
<td>3. T1 Fr. phonological awareness</td>
<td>.000</td>
<td>-.036</td>
</tr>
<tr>
<td>4. T1 Fr. receptive vocabulary</td>
<td>.004</td>
<td>-.109</td>
</tr>
<tr>
<td>5. T1 Fr. word reading</td>
<td>.050**</td>
<td>.321**</td>
</tr>
<tr>
<td>6. T1 Fr. derivational awareness</td>
<td>.002</td>
<td>-.022</td>
</tr>
<tr>
<td>7. T1 Eng. derivational awareness</td>
<td>.011</td>
<td>.120</td>
</tr>
<tr>
<td>8. T1 MCCT</td>
<td>.006</td>
<td>.104</td>
</tr>
<tr>
<td>7. T1 MCCT</td>
<td>.008</td>
<td>.104</td>
</tr>
<tr>
<td>8. T1 Eng. derivational awareness</td>
<td>.009</td>
<td>.120</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001

As mentioned above, in order to examine the effects of English derivational awareness and children’s awareness of English-French suffix correspondences (i.e., MCCT) on the development of French reading comprehension skills over time, the autoregressors of the two reading comprehension measures were added into the regression models in the second set of analyses. Results of these models are summarized in Table 20. As displayed in the first and second columns of the Table, beyond the autoregressive effects, neither French nor English derivational awareness emerged as a significant predictor of children’s performance on the Alpha-jeunes administered at Time 2. Similarly, the MCCT did not explain any additional variance in Time 2 Alpha-jeunes scores. Indeed, an examination of the final beta weights...
suggested that similar to findings in the regression models with inflectional awareness, only the autoregressor and French word reading were unique predictors of Time 2 Alpha-jeunes scores.

The third and fourth columns of regression coefficients in Table 20 indicate that once the autoregressor had been added to the regression model, English derivational awareness scores at Time 1 no longer explained a significant proportion of the variance in Gates-MacGinitie scores administered in Time 2. By contrast, the MCCT remained as a significant predictor of Time 2 French Gates-MacGinitie scores, explaining over 4% of its unique variance when entered last in the regression model. Final beta weights revealed that in addition to the autoregressor, MCCT is a unique predictor of Time 2 French Gates-MacGinitie results.

Similar to the younger cohort, follow-up analyses were carried out to determine whether the results of the regression analyses conducted with the data of the older cohort differed by children’s language status. Accordingly, interaction terms were calculated for each English morphological awareness measure with children’s language status (i.e., EL1 vs. ELL, coded by an effect vector; Pedhazur, 1997). Interaction terms were also calculated for the MCCT task with children’s language status. When the interaction terms were entered into the final step of the regression models, none of them contributed significantly to the French reading comprehension measures beyond the other predictors. Beta values of these interaction terms ranged from -.678 to .325, with all $t$’s $\leq |1.685|$ and all $p$’s $\geq .097$. This suggests that the results of the above analyses for the older cohort did not differ by children’s language status.

**Discussion**

The present study was designed to address two main questions. First, it asked whether early elementary French immersion children’s awareness of inflectional and derivational morphemes in English is associated with their French reading comprehension skills over time.
Regression analyses revealed that English inflectional awareness explained unique variance in French reading comprehension (Alpha-jeunes) among the younger cohort, after taking into account the effects of age and non-verbal reasoning ability, as well as English phonological awareness, French word reading, vocabulary, and inflectional awareness. For the older cohort, early measures of English derivational but not inflectional awareness predicted unique variance in French reading comprehension (Gates-MacGinitie). Taken together, these results are consistent with previous research (e.g., Pasquarella et al., 2011; Ramírez et al., 2013) in substantiating positive longitudinal associations between English morphological awareness and French reading comprehension in the current sample of bilingual children. Remarkably, the pattern of relations appeared to change across the early elementary grades, thus suggesting that the interplay between children’s metalinguistic and linguistic skills in their primary and additional languages may evolve over time as their proficiency in the two languages increased (albeit at different rates). That being said, English derivational awareness failed to predict significant variance in French reading comprehension once the autoregressive effects were taken into account in the cross-lagged analyses. Thus, the temporal relationship between early English morphological awareness and later French reading comprehension was not substantiated in the present study.

The second key query of the present study concerned the extent to which children’s recognition of the systematic relations between English and French derivational suffix pairs may play a role in their development of French reading comprehension skills. The current analyses of the older cohort indicated that children’s knowledge of suffix correspondences accounted for unique variance in French reading comprehension (Gates-MacGinitie), beyond the effects of several cognitive and within-language reading-related skills. More remarkably, cross-lagged
analyses including the autoregressor revealed that children’s knowledge of suffix correspondences was associated with change in French reading comprehension skills between Time 1 and Time 2. This provides evidence that there is a temporal relationship between children’s early recognition of English-French suffix correspondences and later French reading comprehension. Although children’s knowledge of corresponding suffix pairs between languages has previously been demonstrated to facilitate vocabulary acquisition among Spanish-English bilingual children (i.e., Hancin-Bhatt & Nagy, 1994), the current study is one of the first to uncover its contribution to reading comprehension. Taken together, findings from the present study underscore the role that children’s primary language morphological awareness plays in the reading comprehension development of their additional language.

In keeping with my predictions, I found that English inflectional awareness but not derivational awareness contributed to subsequent measures of French reading comprehension among the younger cohort, after taking into account the effects of several other within-language reading-related variables. By contrast, neither aspect of French morphological awareness examined explained a significant amount of variance in French reading comprehension at this time. This is consistent with the pattern of relations between morphological awareness and receptive vocabulary revealed in Study 1 among the younger cohort. Thus, results from the two studies (i.e., Study 1 and the current study) converge to substantiate a strong cross-language connection between English inflectional awareness and French learning among Grade 1 French immersion children, over and above substantial within-language controls. The present findings also parallel those reported by Deacon et al. (2007), who established a cross-language link between English inflectional awareness and French word reading among Grade 1 French immersion children. As proposed earlier in Study 1, the significant contribution of early English
Inflectional awareness to later French reading comprehension can be attributed to children’s well-developed English inflectional awareness in contrast with their relatively weak French inflectional awareness at this stage of their development. In other words, it may be that before the French immersion children have developed sufficient inflectional awareness in French to support their reading comprehension, they rely heavily on the corresponding metalinguistic ability developed in English to help them gain insights into the morphological and syntactic structures of French text.

For the older cohort, English inflectional awareness measured in Grade 2 failed to predict a significant amount of variance in either of the two French reading comprehension measures administered in Grade 3. Conversely, English derivational awareness emerged as a significant predictor of one of the French reading comprehension tasks, namely, the Gates-MacGinitie, when the autoregressive effects of previous reading skills were not taken into account. It is worth noting that there were consistent, notable differences in the parameter estimates in the regression models predicting Alpha-jeunes and Gates-MacGinitie scores. This is likely due to the ceiling effect on the Alpha-jeunes task at Time 2. As a result, despite the data transformation performed on this measure, the insufficient range of reading levels attained by the students may have led to biased parameter estimates because the measure was not able to discriminate between students at the highest reading level\textsuperscript{15} (Cox & Oakes, 1984; McBee, 2010). In contrast, ceiling effects were not observed in the Gates-MacGinitie task. Therefore, the discussion of the relations between morphological awareness and reading comprehension below will focus on the results obtained from models in which the Gates-MacGinitie task was the outcome measure.

\textsuperscript{15} Cox and Oakes (1984) referred to this process as censoring, whereby as a result of ceiling or floor effects, partial information about the scores of the individuals at the highest or lowest possible value, respectively, is lost due to limits of the instrument.
By Grade 2, French inflectional awareness emerged as a significant predictor of the change in French reading comprehension skills between Grades 2 and 3. Indeed, it explained close to 7% of the variance of scores on the Gates-MacGinitie administered in Grade 3, even after taking into account the autoregressive effects (35%). Conversely, English inflectional awareness was not a significant predictor of Gates-MacGinitie scores, with or without consideration of the autoregressive effects. This contrasts the findings among the younger cohort, in which English inflectional awareness was a significant predictor of French reading comprehension as measured by the Alpha-jeunes. One possible explanation for this changing pattern of associations between English inflectional awareness and French reading comprehension from the younger cohort to the older cohort is that there was a change in the reading comprehension task used across the two cohorts. However, the correlation between the two reading comprehension tasks at Time 1 (i.e., when there were no ceiling effects in either task) was strong ($r = .69, p < .01$) for the older cohort and both measures correlated similarly to other reading-related skills at Time 1. Therefore, it is reasonable to argue that the parameter estimates in models predicting Time 2 Alpha-jeunes and Gates-MacGinitie scores would have been substantially similar were there not a ceiling effect on the Alpha-jeunes. Nevertheless, this is a clear limitation of the present study and future studies should include reading comprehension measures that comprise items from a wide range of reading levels.

An alternative explanation for the changing relations from Grade 1 to Grade 2 is that the current results exemplify the “teeter-totter” relationship between morphological awareness and reading described by Deacon et al. (2007), who suggests that “as contributions from the first language decrease, those from the second language increase” (p. 741). The rapid development of French language skills over the early elementary years may have enabled the children to achieve
the critical level of language proficiency necessary for them to successfully represent and manipulate the morphemic structures within the French language, which in turn facilitates the development of their reading skills by Grades 2 and 3 (Deacon et al., 2007; Geva et al., 1997; Hayashi & Murphy, 2013). As a result, morphological awareness from the primary language (i.e., English) becomes less critical in supporting children’s reading in French. The current findings converge with the study by Deacon et al. (2007), who reported that, among a group of Grade 2 French immersion children, French inflectional awareness emerged as a stronger longitudinal predictor of Grade 3 French word reading skills than did English inflectional awareness.

With respect to the cross-language transfer of derivational awareness to reading comprehension, results from the present study indicated that English derivational awareness measured in Grade 2 emerged as a unique predictor of Gates-MacGinitie scores one year later, after taking into account the effects of several within-language variables. These results should be considered within the context of the fact that French derivational awareness did not predict a unique amount of variance in Gates-MacGinitie scores. Accordingly, it can be concluded that at this stage of the French immersion children’s reading development, English derivational awareness exerts a stronger influence on their French reading comprehension than French derivational awareness. Nevertheless, English derivational awareness in Grade 2 did not predict change in French reading comprehension between Grades 2 and 3. In other words, a temporal relationship between early English derivational awareness and later French reading comprehension was not confirmed. Remarkably, all within-language reading-related skills included in the cross-lagged analyses (e.g., word reading, vocabulary) also failed to predict change in French reading comprehension between Grades 2 and 3. Thus, an indirect path where
English derivational awareness contributes to the development of French reading comprehension via vocabulary or word reading also seems unlikely, according to the current analyses.

The current findings provide evidence that compared to inflectional awareness, the cross-language associations between English derivational awareness and French reading comprehension emerge later in children’s language development. This is consistent with previous research demonstrating that children’s inflectional awareness develops relatively more quickly than derivational awareness in English, due to the greater complexity of the derivation morphological system (e.g., Kuo & Anderson, 2006). The slower development of English derivational awareness in comparison to inflectional awareness likely prevents children from using this metalinguistic ability across languages at an earlier age. However, once the children have gained sufficient English derivational awareness, the present investigation suggests that this metalinguistic skill may transfer across languages to support children’s understanding of French texts. An attribute of English derivational suffixes that could have supported this transfer is that a number of these suffixes have been imported from French (Duncan et al., 2009). Accordingly, children may, to some extent, be able to “map on” the English derivational suffixes to the French words that they encounter in their reading. Indeed, as discussed below, results from the present study suggest that children’s recognition of the systematic relationships between English and French derivational suffixes plays an important role in facilitating their French reading development, over and above the contributions of English and French derivational awareness.

The longitudinal regression analyses conducted for the older cohort revealed that, children’s scores on the Morphologically Complex Cognate Task (i.e., MCCT) in Grade 2 significantly predicted their performance on the Gates-MacGinitie one year later, explaining even more variance than that accounted for by English derivational awareness. Remarkably, the
contributions of the MCCT remained significant after the autoregressor had been added to the regression model. The present results suggest that after a mere two years of French instruction, children who use English as their primary language outside of school not only have incipient knowledge of the corresponding relationships between the derivational suffixes in their two languages, but they are also able to capitalize on this knowledge to facilitate the development of reading comprehension in their additional language. More importantly, it appears that the specific ability to recognize the systematic relations between English-French suffix pairs is more beneficial to children’s French reading comprehension skills development over time than a general knowledge of English derivations. This is among the first studies to demonstrate an association between bilingual children’s knowledge of the corresponding suffix pairs across their two languages and reading comprehension in their additional language. The current findings are in line with those reported by Hipfner et al. (accepted) who found that French immersion children in the early elementary grades demonstrated increasing ability to recognize the matching French and English words with corresponding derivational suffixes. The current study also extends the research previously conducted by Hancin-Bhatt and Nagy (1994), who showed that Spanish-English bilinguals’ awareness of corresponding Spanish-English suffixes facilitated their L2 (i.e., English) vocabulary acquisition.

Among monolingual children, it has been maintained that once children have developed sufficient knowledge of derivational suffixes, they can use this information to determine the syntactic structure of a written sentence as derivational suffixes often explicitly mark parts of speech (Kuo & Anderson, 2003; Mahony et al., 2000; Tyler & Nagy, 1990). In the present study, it did not appear that the French immersion children were yet able to leverage their French derivational awareness to support their French reading comprehension, which is not surprising
given their limited exposure to the language. The recognition of the systematic relationships
between the English and French derivational suffixes thus provides a mechanism through which
children can transfer their derivational awareness developed in English to facilitate their French
reading comprehension. More precisely, given that the corresponding English and French
suffixes denote the identical parts of speech in their respective languages, once the children
identify a suffix in French, they can deduce its part of speech based on the grammatical function
of its English counterpart. As a result, the children may be able to gain some insights into the
structure of the entire sentence. Over time, this may help the children learn more broadly about
the common sentence structures in French.

In conclusion, findings from the present study suggest that among early elementary
French immersion children, English inflectional and derivational awareness contribute cross-
linguistically to French reading comprehension, albeit at different points in time. This changing
pattern of contribution corresponds with the developmental trajectory of English morphological
awareness. With the exception of Ramírez et al. (2013), research centering on the cross-language
relations between morphological awareness and reading comprehension has predominantly
focused on children’s learning of the Chinese-English language pair (i.e., Pasquarella et al., 2011;
Wang et al., 2006; Zhang & Koda, 2014). Therefore, the current examination of English-French
bilingual children adds to our knowledge about the cross-language relations between
morphological awareness and reading comprehension involving two alphabetic languages.
Moreover, the current research focused on early elementary children, for whom research
examining cross-language relations between reading comprehension and reading component
skills has been sparse. In the present study, I also found that children’s knowledge of the
corresponding English-French suffix pairs is more helpful for their French reading
comprehension development than derivational awareness acquired within either language, at least in the initial stages of their French learning. Given that this is one of the first studies that has explored these relations, future studies will be necessary to determine whether children’s knowledge of the corresponding suffix pairs across their primary and additional languages will continue to play an important role in helping them read in their additional language as they become more proficient in that language.
Chapter 8. Conclusion

General Discussion

Bilingual and multilingual children are increasing rapidly around the world, and a high percentage of these children are being educated through a second or a later-acquired language (UNESCO, 2003). These children must develop reading skills in their second or additional language quickly in order to succeed academically. Empirical research uncovering metalinguistic processes that transfer from these children’s L1 to facilitate their L2 reading acquisition are therefore invaluable in informing literacy instruction practices for bilingual children. Moreover, the examination of metalinguistic skills transfer to reading outcomes can advance our theoretical understanding of the language-general versus language-specific nature of the different metalinguistic processes involved in L2 literacy development. Whereas the transfer of phonological awareness to reading across languages has been well-documented for a number of language pairs, comparatively fewer studies have evaluated the transfer of morphological awareness to language and literacy outcomes, especially among children in the early elementary years. The current investigation extends the existing corpus of research by exploring the cross-language effects of morphological awareness (i.e., inflectional and derivational awareness) on vocabulary and reading comprehension across English and French among a sample of early elementary school children enrolled in a French immersion program in an English-speaking urban centre in Canada.

To recapitulate, results from Study 1 indicated that early English morphological awareness transferred to predict variance in later French receptive vocabulary across the two cohorts of children. The order in which the two aspects of English morphological awareness (i.e., inflectional and derivational awareness) transferred to French vocabulary appeared to follow the
developmental path of morphological awareness in the children’s primary language. That is, a link between English inflectional awareness and French vocabulary was first established among the younger cohort, followed by a connection between English derivational awareness and French vocabulary. Most remarkably, analyses conducted among the older cohort revealed that English inflectional and derivational awareness contributed to gains in French vocabulary over time, therefore providing evidence that there is a temporal relation between early English morphological awareness and later French vocabulary development. Building on the findings of Study 1, Study 2 was an exploratory study examining the role of cognates in the cross-language transfer of English morphological awareness to French vocabulary. Results indicated that the cognate status of the French vocabulary words does matter: English morphological awareness only transferred to explain variances in French cognate but not non-cognate vocabulary. Conversely, the cognate status of the English words does not seem to matter: children’s performance on the English morphological awareness cognate and non-cognate items both contributed significantly to French cognate vocabulary.

Finally, Study 3 sought to determine the longitudinal relations between English morphological awareness and French reading comprehension. In addition, the contributions of children’s recognition of the systematic relations between English and French derivational suffixes to French reading comprehension were explored among the older cohort. Consistent with Study 1, an association was first demonstrated between English inflectional awareness and French reading comprehension, followed by English derivational awareness and French reading comprehension. However, a temporal relationship between early measures of English morphological awareness and later French reading comprehension was not confirmed. In contrast, children’s ability to recognize the systematic relations between English and French suffixes
explained change in French reading comprehension between Grades 2 and 3, over and above the contributions of other within-language (i.e., French) variables and English derivational awareness.

Taken together, findings from the current research corroborate previous cross-sectional studies (e.g., Hipfner-Boucher et al., 2014; Pasquarella et al., 2011; Wang et al., 2006) in substantiating significant cross-language associations between morphological awareness and reading outcomes. The current results advance our knowledge of the cross-language transfer of morphological awareness to vocabulary and reading comprehension in several notable ways. First, recent studies have explored the temporal relations between morphological awareness and vocabulary among monolingual speakers (e.g., McBride-Chang et al., 2008; Sparks & Deacon, 2013). Study 1 provided some of the first evidence establishing the temporal relations between early morphological awareness and later reading outcomes across languages. Second, Study 2 highlighted that at the early stage of language development, morphological awareness in a child’s primary language enhances the learning of cognate words in the additional language to a greater extent than words that are non-cognates. Finally, Study 3 is one of the first studies to show that perhaps morphological awareness within each of the child’s languages is not sufficient to facilitate reading comprehension development in their additional language. Rather, it is the child’s recognition of the corresponding morphemes and morphological features between their two languages that may play a more substantial role in developing comprehension skills. Overall, the results suggest that transfer of morphological awareness is a complex cognitive process determined by a combination of factors such as children’s experience in their primary language, shared features between the primary and additional languages, and the literacy outcome that is
The theoretical and educational implications of my findings are discussed next.

**Theoretical Implications**

Adopting a componential view of reading, the current thesis focused on the transfer of one aspect of metalinguistic skills – namely, morphological awareness. In particular, the current thesis was guided by the *Transfer Facilitation Model*, which was developed by Koda (2005) to explain cross-language transfer in the area of reading development. Results from the current research lend support to two central claims made in the Model. The Model posits that shared aspects of metalinguistic awareness facilitate transfer from one language to another. Inflections and derivations are the two main word formation methods in English and French (Deacon et al., 2013; Nagy & Anderson, 1984; Roy & Labelle, 2007). The Model’s premise is therefore supported by the current findings that English inflectional and derivational awareness transferred to predict variance in French vocabulary and reading comprehension skills. Second, the Model maintains that in order for cross-language transfer to occur, elements to be transferred “must be well-rehearsed and established in the first language” (Koda, 2005, p. 317). The cross-language transfer of morphological awareness in the present thesis first emerged with English inflectional awareness followed by derivational awareness, which is consistent with previous empirical work demonstrating that children tend to acquire inflectional awareness more quickly in the early elementary school years than derivational awareness (Kuo & Anderson, 2006).

In previous discussions, Koda (2000) differentiated between two levels of transfer, namely, the skill level and the knowledge level. Results from Study 2 offered evidence that the cross-language transfer of morphological awareness to vocabulary may occur at both levels simultaneously. More precisely, English morphological awareness transferred to predict French
cognate but not non-cognate vocabulary, therefore emphasizing that transfer is facilitated by the presence of cognates. Yet, children’s performance on both the English cognate and non-cognate morphological awareness task items predicted scores on the French cognate vocabulary task, thus suggesting that the transfer of morphological awareness is not based on shared vocabulary alone.

The present finding that the transfer of morphological awareness to vocabulary occurred at both skill and knowledge levels, rather than at the skill level alone, highlights the characteristics of the construct of morphological awareness in relation to its transfer across languages. Specifically, in comparison to phonological awareness, the development of morphological awareness in a given language may be more strongly connected with one’s proficiency in that language. This is not entirely surprising, since unlike phonological awareness which does not tap into the semantics of language, morphological awareness involves knowledge about the pairings of sound and meaning in the language, as well as knowledge about how meanings are organized in the language (i.e., semantic awareness; Kuo & Anderson, 2006). In other words, any morphological awareness task inadvertently measures both children’s metalinguistic ability to manipulate morphemes and their knowledge of that language to some degree. Accordingly, it can be speculated that to the extent that morphological awareness (i.e., the ability to manipulate morphemic units) is a metalinguistic skill that can be transferred across languages, it is predicated upon some incipient knowledge of the additional language. Without this knowledge, it is likely difficult for one to identify the morphemic units in the additional language and in turn, to leverage morphological awareness from the primary language to manipulate these units. Results from the present study demonstrated that the shared vocabulary (i.e., cognates) between children’s primary and additional languages may be one of the catalysts
that can help the children access the morphemic units in the additional language. More studies will be needed to further explore the language-specific versus language-general aspects of morphological awareness.

**Educational Implications**

Overall, the results of this set of studies suggest that morphological awareness developed in English facilitates their French vocabulary and reading development. These findings have important implications for the design of reading instruction for children studying in French immersion programs. First, the cross-language relations between morphological awareness and vocabulary and reading outcomes emerged among students who were in their first year of studying French. This suggests that it might be worthwhile to draw the students’ attention to the morphological structure of their language(s), in addition to their phonological structure, starting from the earliest stages of instruction. In particular, French language instruction should include the explicit instruction of corresponding suffixes between English and French. As demonstrated in Study 3, children’s ability to recognize matching suffixes across English and French appears to enhance their French reading comprehension abilities over time.

Second, the present study revealed that morphological awareness developed in English transfers quite readily to support French learning among children who speak English as their first or primarily language. The evidence of cross-language relationships in children learning two languages with similar morphological structures suggests that learning an additional language might be easier for children whose primary language shares morphological structures with the additional language, over those whose primary language does not. Conversely, this implies that children from language backgrounds other than English who are enrolled in French immersion programs may need additional teaching of morphemes and morphological structures in French.
Given that the linguistic backgrounds of the children enrolled in French immersion programs are becoming increasingly diverse, their instructional needs will have to be addressed through future research.

**Limitations and Future Directions**

Insofar as the results of the present research increase our understanding of cross-language relations among morphological awareness, vocabulary and reading comprehension, several limitations are to be noted as a guide for future research. One limitation lies in the reliability of the French inflectional awareness measure, which was just below standard limits for reasonable reliability. Low reliabilities set an upper limit on the discovery of statistical relationships between variables. The low reliability reflects, at least in part, the challenge of developing measures appropriate for testing second-language learning samples. In particular, given the complex inflectional system in French, the challenge was to choose from a wide range of morphological forms ones that children may be exposed to within their first two years of French instruction. Accordingly, a critical next step lies in the careful construction of a longer task that taps a wide range of morphological forms while including items of varying degrees of difficulty.

In the present study, children’s morphological awareness was measured using production tasks where children were asked to produce words that fit in specific sentence contexts by applying morphological rules. Children in the study achieved scores that approximated a normal distribution on these tasks in both English and French, and there were no observable floor effects. Nevertheless, given that these children were only in their first years of learning English and French, and thus were limited in their language proficiency, their morphological awareness may be better captured by tasks that demand less general language skills. For instance, judgment tasks are receptive tasks that ask children to make a decision about the relationship of words without
the need to manipulate the structure of a word; for example, by responding to questions such as “Are teach and teacher related?” and “Are corn and corner related?” (e.g., Carlisle & Nomanbhoy, 1993). Thus, these tasks tap children’s knowledge of morphological relations while minimizing the possibility that poor performance is due to children’s limited sentence comprehension abilities or expressive language skills. Alternatively, the production tasks in the present study could be modified by increasing the number of decomposition items, which ask children to identify the correct root word of a given inflection or derivation. In contrast to tasks that require the production of appropriately inflected or derived words, decomposition tasks are conceivably easier as they require less syntactic and distributional knowledge of suffixes that children will not have fully attained at this point of their language development (Tyler & Nagy, 1993).

The present study employed two standardized tasks to assess children’s vocabulary knowledge, namely PPVT (English) and EVIP (French). The advantage of using standardized tasks is that they have good psychometric properties with respect to reliability and validity. The drawback of using these vocabulary tasks for the present study, however, is that these tasks contain a large number of root words and relatively few morphologically complex words, especially in the earlier parts of the tests. Given that morphological awareness is considered most useful in facilitating children’s learning of multimorphemic words through morphological analysis (e.g., Anglin, 1993), stronger relations between morphological awareness and vocabulary may be observed in the present study if the vocabulary tasks contained more morphologically complex words. Future studies should consider using both standardized vocabulary tasks that assess more general vocabulary knowledge, and experimental tasks that assess specifically children’s knowledge of morphologically complex words. By comparing the
relations between morphological awareness and performance on these two types of tasks, it can help elucidate the role of morphological awareness in the development of general vocabulary knowledge versus knowledge of morphologically complex words.

Due to a test administration error, only the data of a subsample of Grade 2 students could be included in the analyses in Study 2. A biased sample may lead to results that are not generalizable to the full sample. However, preliminary analyses revealed a similar pattern of results for the full, unbiased sample of the Grade 1 children and the Grade 2 students. Follow-up analyses using interaction terms also indicated that the results found did not differ by grade. These lend some confidence that findings from Study 2 are not spurious as a result of the biased sample, and that the associations established between the variables in the study are generalizable to the full sample of students. Nevertheless, this is a clear limitation of Study 2. Replicating the current study with an unbiased sample of Grade 2 students will be necessary in future research.

The correlational nature of the present research must be taken into consideration when interpreting the current results. Notwithstanding the number of control variables that were included in the current analyses, one cannot rule out the possibility that the effects observed in the present studies are due to extraneous variables. Relatedly, although the use of autoregressive controls used in the present study brought us one step closer in establishing the temporal relations between morphological awareness and vocabulary and reading outcomes, causal relationships cannot be assumed. To confirm the temporal relations found in the present research, it behoves us to implement intervention studies. Intervention studies have demonstrated benefits of within-language morphological instruction in enhancing children’s vocabulary development and reading acquisition (e.g., Bowers et al., 2010; Carlo et al., 2004; Goodwin & Ahn, 2010, 2013; Lesaux et al., 2010). A logical next step stemming from the current research will be to
examine whether morphological training in English, with an emphasis on drawing students’ attention to the commonalities across the languages, can foster language and literacy skills development in French.

Finally, it is important to note that more than half of the participants in the current research are exposed to another language at home in addition to English, which reflects the reality of an increasingly diverse student population enrolled in French immersion programs in Canada. For these students, French is therefore their third (rather than second) language. These students were included in the present study as most of them identified English as their primary language (i.e., the language they speak most), and they demonstrated levels of English reading skills compatible with their English monolingual counterparts. Further, follow-up analyses using interaction terms also indicated that in all three studies, the cross-language effects of morphological awareness did not differ as a function of language status. Nevertheless, it is to be kept in mind that while third language acquisition shares many characteristics with second language acquisition, it also presents differences. Specifically, third language learners have more language experience than second language learners, are influenced by the general effects of bilingualism on cognition, and have access to two linguistic systems when acquiring a third language (Cenoz, 2003). Therefore, future studies should explore whether cross-language relations demonstrated between English and French in the present research are the same among English monolingual children and their ELL counterparts.
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Appendices
Appendix A

English Inflectional Awareness Task

Practice items:

A. Eyebrow  She raised both her ___________. (eyebrows)
B. Running  She loves to ________________. (run)
C. Tall  He is tall, but his brother is even _________________. (taller)

Test items:

<table>
<thead>
<tr>
<th>Target</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacket</td>
<td>Millie has three ___________. (jackets)</td>
</tr>
<tr>
<td>Skip</td>
<td>Yesterday at recess, the girls ___________. (skipped)</td>
</tr>
<tr>
<td>Roses</td>
<td>For my grandmother’s birthday, I bought her a purple ___________. (rose)</td>
</tr>
<tr>
<td>Entering</td>
<td>This is the race that all my friends want to ___________. (enter)</td>
</tr>
<tr>
<td>Shorter</td>
<td>For us, the summer is always too ___________. (short)</td>
</tr>
<tr>
<td>Pays</td>
<td>At the store, we saw a lot of people lining up to ___________. (pay)</td>
</tr>
<tr>
<td>Chirp</td>
<td>The bird in the cage is ___________. (chirping)</td>
</tr>
<tr>
<td>Long</td>
<td>Among the three sisters, her hair is the ___________. (longest)</td>
</tr>
<tr>
<td>Cousin</td>
<td>This summer, I lived with my five ___________. (cousins)</td>
</tr>
<tr>
<td>Repair</td>
<td>Since she was little, she has loved to ___________. (sing)</td>
</tr>
<tr>
<td>Exercise</td>
<td>This is the bicycle that my dad is ___________. (repairing)</td>
</tr>
<tr>
<td>Catching</td>
<td>Last night, my brother and I ___________. (exercised)</td>
</tr>
<tr>
<td>Large</td>
<td>There were many fish in the river for us to ___________. (catch)</td>
</tr>
<tr>
<td>Wishes</td>
<td>Among the neighbourhood, this house is the ___________. (largest)</td>
</tr>
<tr>
<td>Wishes</td>
<td>When you see a shooting star, you should make a ___________. (wish)</td>
</tr>
<tr>
<td>Simpler</td>
<td>The activity that our teacher has asked us to do is very ___________. (simple)</td>
</tr>
</tbody>
</table>
# Appendix B

## English Derivational Awareness Task

### Practice items:

A. **Beauty**  
   This drawing is ____________. (beautiful)

B. **Runner**  
   She loves to ________________. (run)

C. **Curl**  
   His hair is very ________________. (curly)

### Test items:

<table>
<thead>
<tr>
<th>Target</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baker</td>
<td>Mom put the bread in the oven to __________. (bake)</td>
</tr>
<tr>
<td>2. Compare</td>
<td>The prices of these two balls are quite __________. (comparable)</td>
</tr>
<tr>
<td>3. Five</td>
<td>The horse came in __________. (fifth)</td>
</tr>
<tr>
<td>4. Calculator</td>
<td>The answer to this math question is easy to __________. (calculate)</td>
</tr>
<tr>
<td>5. Dangerously</td>
<td>Swimming in this river would be too __________. (dangerous)</td>
</tr>
<tr>
<td>6. Grow</td>
<td>I measured the plant’s __________. (growth)</td>
</tr>
<tr>
<td>7. Mystery</td>
<td>The dark glasses made the man look __________. (mysterious)</td>
</tr>
<tr>
<td>8. Profitable</td>
<td>In summer selling ice cream makes a __________. (profit)</td>
</tr>
<tr>
<td>9. Dancer</td>
<td>Both my sister and I love to __________. (dance)</td>
</tr>
<tr>
<td>10. Boldly</td>
<td>These people are so __________. (bold)</td>
</tr>
<tr>
<td>11. Glory</td>
<td>The view from the hilltop was __________. (glorious)</td>
</tr>
<tr>
<td>12. Strong</td>
<td>He wanted to show off his __________. (strength)</td>
</tr>
<tr>
<td>13. Six</td>
<td>This hamburger is his __________. (sixth)</td>
</tr>
<tr>
<td>14. Rely</td>
<td>His friend thinks he is __________. (reliable)</td>
</tr>
<tr>
<td>15. Dryer</td>
<td>Put the laundry out to __________. (dry)</td>
</tr>
<tr>
<td>16. Width</td>
<td>The mouth of the river is very __________. (wide)</td>
</tr>
</tbody>
</table>
Appendix C

French Inflectional Awareness Task

Practice items:

A. Étudier Maintenant, l’enfant ________. (étudie)
B. Musicien Ma sœur est une _________. (musicienne)
C. Heureuse Aujourd’hui, Paul a l’air très ________. (heureux)

Test items:

<table>
<thead>
<tr>
<th>Target</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Écouter</td>
<td>Quand je lui parle, Chantal …(écoute).</td>
</tr>
<tr>
<td>Trouver</td>
<td>Voici le livre que j’ai … (trouvé).</td>
</tr>
<tr>
<td>Briller</td>
<td>Le soleil … (brille).</td>
</tr>
<tr>
<td>Animaux</td>
<td>Le chien est un … (animal).</td>
</tr>
<tr>
<td>Actif</td>
<td>Depuis qu’elle a reçu une bicyclette, Marie est très... (active).</td>
</tr>
<tr>
<td>Entières</td>
<td>Pour finir ce travail, il me faut un jour… (entier)</td>
</tr>
<tr>
<td>Obéir</td>
<td>Quand Maman me dit de ranger, je… (obéis).</td>
</tr>
<tr>
<td>Arriver</td>
<td>Le voyage était long, mais enfin je... (suis arrivé).</td>
</tr>
<tr>
<td>Danseur</td>
<td>Claire et Anne sont toutes les deux... (danseuses).</td>
</tr>
<tr>
<td>Répondre</td>
<td>L’enseignante pose des questions et nous … (répondons).</td>
</tr>
<tr>
<td>Téléphoner</td>
<td>Quand mon amie veut me parler, elle me … (téléphone).</td>
</tr>
<tr>
<td>Vif</td>
<td>Manon est une élève... (vive).</td>
</tr>
<tr>
<td>Chères</td>
<td>Il n’a pas acheté le manteau parce qu’il était trop... (cher).</td>
</tr>
<tr>
<td>Entendre</td>
<td>Même s’ils sont loin, les avions qui passent font un bruit que nous ... (entendons).</td>
</tr>
<tr>
<td>Chevaux</td>
<td>Il habite à la ferme où il a un … (cheval).</td>
</tr>
<tr>
<td>Chanteur</td>
<td>Une des sœurs est pianiste mais les deux autres sont ... (chanteuses).</td>
</tr>
</tbody>
</table>
Appendix D

French Derivational Awareness Task

Practice items:

A. Confort  Ma nouvelle chaise est très ________. (confortable)
B. Joueur  Tous les enfants aiment ________. (jouer)
C. Rapide  Quand la cloche sonne, les élèves sortent de la classe ________. (rapidement)

Test items:

<table>
<thead>
<tr>
<th>Target</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vitesse</td>
<td>Il parle toujours trop … (vite).</td>
</tr>
<tr>
<td>2. Difficulté</td>
<td>À mon avis, la science n’est pas un sujet… (difficile).</td>
</tr>
<tr>
<td>3. Fierté</td>
<td>Aux Olympiques, les athlètes participent … (fièrement)</td>
</tr>
<tr>
<td>4. Dessiner</td>
<td>Sarah a fini son … (dessin).</td>
</tr>
<tr>
<td>5. Curiosité</td>
<td>Le singe est un animal très… (curieux)</td>
</tr>
<tr>
<td>6. Seulement</td>
<td>Quand ses amis sont partis, Marc était… (seul).</td>
</tr>
<tr>
<td>7. Rêver</td>
<td>Cette nuit en dormant, j’ai fait un … (rêve).</td>
</tr>
<tr>
<td>8. Finir</td>
<td>Nous avons tant mangé de pommes qu’elles sont… (finies)</td>
</tr>
<tr>
<td>9. Afficher</td>
<td>Regarde la grande … ! (affiche)</td>
</tr>
<tr>
<td>10. Courageux</td>
<td>Pour éteindre le feu, les pompiers ont travaillé… (courageusement)</td>
</tr>
<tr>
<td>11. Liberté</td>
<td>L’été en vacances, je me sens… (libre)</td>
</tr>
<tr>
<td>13. Choisir</td>
<td>Monsieur Simard a fait son … (choix).</td>
</tr>
<tr>
<td>14. Tristesse</td>
<td>Quand il a cassé son jouet, Michel était… (triste).</td>
</tr>
<tr>
<td>15. Simplement</td>
<td>C’est une tâche… (simple).</td>
</tr>
<tr>
<td>16. Photographier</td>
<td>Tout le monde sourit sur la… (photo).</td>
</tr>
<tr>
<td>17. Défendre</td>
<td>Au hockey, Manuel joue en… (défense).</td>
</tr>
</tbody>
</table>
Appendix E

Morphologically Complex Cognate Task

1. Personnel
   1. Personally
   2. Personal
   3. Person

2. Poreux
   1. Porosity
   2. Porous
   3. Porousness

3. Vainqueur
   1. Victory
   2. Victoriously
   3. Victor

4. Complètement
   1. Completely
   2. Completeness
   3. Completion

5. Acteur
   1. Actor
   2. Acting
   3. Action

6. Vérifier
   1. Verifiable
   2. Verify
   3. Verification

7. Activité
   1. Activity
   2. Active
   3. Actively

8. Soupçonneux
   1. Suspicious
   2. Suspicion
   3. Suspiciously

9. Furieux
   1. Furious
   2. Furiously
   3. Furiousness

10. Attentif
    1. Attentively
    2. Attention
    3. Attentive

11. Simplifier
    1. Simplify
    2. Simplification
    3. Simply

12. Historien
    1. Historic
    2. Historian
    3. Historical

13. Fantastique
    1. Fantastic
    2. Fantasy
    3. Fantastical

14. Adversité
    1. Adverse
    2. Adversely
    3. Adversity

15. Eternellement
    1. Eternal
    2. Eternally
    3. Eternity

16. Fécondité
    1. Fertilize
    2. Fertility
    3. Fertile

17. Sensationnel
    1. Sensation
    2. Sensationally
    3. Sensational

18. Offensif
    1. Offense
    2. Offensive
    3. Offensively

19. Magicien
    1. Magician
    2. Magical
    3. Magically

20. Tragique
    1. Tragedy
    2. Tragically
    3. Tragic

21. Gouverneur
    1. Governing
    2. Government
    3. Governor

22. Couramment
    1. Fluency
    2. Fluently
    3. Fluent