English or French? How Second Language Learners Discriminate Languages with a Shared Alphabet

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A Thesis

In

The Department

Of

Education

Presented in Partial Fulfillment of the Requirements

For the Degree of Masters of Arts (Child Studies) at

Concordia University

Montreal, Quebec, Canada

January 2018

CONCORDIA UNIVERSITY

School of Graduate Studies

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Entitled: English or French? How Second Language Learners Discriminate Languages with a Shared Alphabet

and submitted in partial fulfillment of the requirements for the degree of

Masters of Arts (Child Studies)

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Abstract

English or French? How Second Language Learners Discriminate

Languages with a Shared Alphabet

Krystina Raymond

The purpose of the study was to examine French language learners' (FLL) and English language learners' (ELL) knowledge of orthographic patterns in English and French, the relationship of orthographic knowledge to word reading, and the strategies participants used to distinguish the patterns. I hypothesized that FLL would score higher than ELL on a measure of orthographic knowledge of French and English (combined), but that orthographic knowledge would predict word reading in both groups. The analysis of strategy use was exploratory, given the lack of research in this area.

Forty-eight first and second graders (31 FLL, 17 ELL) were asked to (a) complete measures of word reading; (b) classify pseudowords as French or English to assess orthographic pattern knowledge; and (c) identify their strategies for classifying pseudowords. Children's responses were then coded as phonological, orthographic, or no strategy. Their use of analogies was also examined.

As expected, the FLL group scored significantly higher than the ELL group on the task of orthographic knowledge, $t(46)$ 2.23, $p < .03$. Orthographic processing predicted word reading in both languages for FLL, and in English for ELL. For strategy types ($n = 48$), both groups used orthographic strategies more frequently than phonological strategies, but FLL used significantly fewer phonological strategies than ELL. The results suggest that orthographic processing contributes to English and French word reading. The study also provides insight into the types of strategies L2 children use to discriminate languages with a shared alphabet.

Acknowledgements

The completion of this thesis would not have been possible without the generous contributions of many individuals. I would like to express my deepest gratitude to my thesis supervisor, Dr. Diane Pesco, who continuously supported me during my Master's degree journey. Thank you for your patience, motivation, enthusiasm, and immense knowledge. Your guidance, invaluable insights, and the time you devoted to me is very much appreciated.

I would also like to express my sincere gratitude to my committee members Dr. Elsa Lo, for her generous input, feedback and guidance, and Dr. Xi Chen, who kindly let me experience research first-hand in her *Multilingualism and Literacy Lab* at OISE. I am grateful to have been given the opportunity to work with you, in an excellent atmosphere. Your advice, encouragement, and acceptance of my ideas have made this thesis possible. Many thanks to all the lab members and friends who helped and encouraged me during my graduate studies. You were all so kind and generous to me. Thank you to all the families, children, and schools who participated in the study and made this research possible, and to Concordia University Graduate Awards for financial support.

Finally, I would like to thank my parents for believing in me and supporting me to pursue my education. You have always been there for me and I am forever indebted to you both, Mommy and Papa. I would also like to thank my close family members and friends for listening, encouraging and being so understanding during this sometimes very difficult, but exciting path. This thesis is my biggest academic achievement and I am thankful for everyone who has taken the time to be a part of this accomplishment.

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List of Abbreviations

ELL: English language learners

FLL: French language learners

L1: First language

L2: Second language

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Introduction

More and more children are being educated in part or entirely through the medium of a second language (Paradis, Genesee, & Crago, 2011). For many, the second language (L2) is English. In fact, there are now more people in the world who speak English as a L2 than people who have English as their first language (L1) (Ricento, 2005). In the Canadian context, where English and French are both official languages, children may be acquiring French as their L2. Canadian-born or immigrant children who speak a minority language (i.e., a language other than English or French) as their first language often begin to learn the L2 only when they start school. Minority language speakers who attend schools in English are commonly referred to as English language learners (ELL). Children who attend school in French are referred to in this study as French language learners (FLL), including children who speak a minority language as a L1 or the majority language of English.

In most provinces in Canada, parents can send their children to an English-only program or enroll them in schools where they are exposed to French through various instructional programs, including French immersion. According to national statistics (Statistics Canada, 2012), the number of students in French immersion increased by 28% from 1991 to 2011. More recently, French immersion schools have also seen a rise in children with diverse linguistic backgrounds, as parents across Canada have shown increasing interest in their children learning French (Au-Yeung, et al., 2014). In the province of Quebec, where French is the majority language, many English-speaking children attend French immersion or French-English bilingual programs, but most children from minority language backgrounds currently attend French-language schools alongside native speakers of the language.

The province of Ontario, where my study took place, has three instructional programs for learning French as a L2: core, extended, and immersion (early or late options). In core French, students start to learn French in Grade 4 and continue to learn it as a subject until Grade 8. In extended French, students learn French as a subject and receive instruction in French for at least one other course until Grade 10. In the early immersion program, students begin receiving instruction in French either in Kindergarten or Grade 1 and continue in French until Grade 4. In late immersion programs, students start French instruction in Grade 7 or in the initial year of secondary school (i.e., high school), and continue to be instructed in French for at least two subject areas at the secondary level (Genesee & Lindholm-Leary, 2007). In the region where this study took place, children often have limited exposure to French outside the school environment.

One of the principal aims of the Canadian French immersion program is for students to achieve advanced levels of written and oral skills in French (Genesee & Lindholm-Leary, 2007). Consistent with this aim, children in the early French immersion program receive all of their early literacy instruction in a L2. This is also the case for minority language speakers attending schools where English is the language of instruction.

The language of instruction influences children's literacy acquisition. According to Katz and Frost's (1992) 'Orthographic Depth Hypothesis', languages differ in how their spelling and pronunciation are mapped out. In some languages, (e.g., Finnish and Italian) grapheme-to-phoneme correspondences are highly consistent and the orthography is thus referred to as "shallow" or "transparent" (Katz & Frost 1992; Lukatela, Feldman, Turvey, Carello, & Katz, 1989). Languages with shallow orthographies are easier to read because graphemes are consistently pronounced the same way in different words. Other languages adhere to a less consistent letter-sound relationship and are described as having a "deep" or "opaque" orthography (e.g., English and French) (Katz & Frost 1992). Rayner, Pollatsek, Ashby, and

Clifton (2012) suggested that orthographic depth influences the skills young children need to decode. They proposed that phonological skills are sufficient to decode languages with shallow orthographies; however, for languages with deep orthographies, readers must rely more heavily on orthographic processing. Orthographic processing has been defined as "the ability to form, store, and access orthographic representations" (Stanovich & West, 1989, p. 404) based on regularities in word spellings and letter sequences in print (Chung, Chen, & Deacon, 2017; Jared, Cormier, Levy, & Wade-Woolley, 2013).

Measures of Orthographic Processing

There are two dimensions of orthographic processing skills: lexical and sub-lexical (Commissaire, Pasquarella, Chen, & Deacon, 2014; Deacon, Benere, & Castles, 2012; Perfetti, 1984). Lexical skills require knowledge about letter patterns that identify whole words (Barker, Torgeson, & Wagner, 1992; Deacon et al., 2012). One task used to assess children's lexical orthographic processing skills is a homophone task such as the *orthographic choice task* (Olson, Wise, Conners, Rack, & Fulker, 1989). The child is presented with pairs of real and pseudowords that are phonologically similar but orthographically different and must identify the real word (e.g., ‘rain’ or ‘rane’). While a child could employ phonological skills to decode the real and pseudowords, this would not be sufficient to answer correctly, since the words sound identical. Instead, the child is expected to rely on his/her orthographic processing skills to choose the correct answer (however, the child could also simply know the word). Although this task has been used to assess children's orthographic processing skills (e.g., Burt, 2006; Stanovich & West, 1989; Wagner & Barker, 1994), some have argued that it is too similar in format to word reading tasks, and have thus proposed sub-lexical tasks as an alternative (Castles & Nation, 2006).

There is increasing evidence that using a sub-lexical task is more valid than lexical tasks to assess orthographic processing skills (Castles & Nation, 2006; Commissaire et al., 2014). Sub-lexical skills, examined in the present study, pertain to the knowledge of letter patterns within a word (Treiman & Cassar, 1997). Cassar and Treiman (1997) developed an *orthographic constraints task* to measure children's sub-lexical orthographic knowledge in English. For this task, the child is presented with pairs of nonwords, one of which follows English constraints on letter sequences, and the other which does not. The child is then asked to choose which item in the pair (e.g., "nuck" or "ckun") looks more like a real word. Each pair of nonwords tests one constraint or regularity in the English writing system. All nonwords are pronounceable. If a child was to base their answer on sound only, rather than letter sequences, both items would be equally as likely to be chosen (Cassar & Treiman, 1997). Pacton, Perruchet, Fayol, and Cleeremans (2001) used a similar task in French to assess the orthographic processing skills of children in Grades 1 to 4, specifically their sensitivity to regularities in the use of double letters in French. Their findings confirmed that even first graders were sensitive to the letters that can and cannot be doubled in French (e.g., illoma-ikkoma).

Several studies, including Deacon et al. (2012), Deacon, Commissaire, Chen, and Pasquarella (2013a), and Commissaire et al. (2014) used either the sub-lexical orthographic processing tasks by Cassar and Treiman (1997) and Pacton et al. (2001), or adaptations of these tasks, and found an association between children's performance on the tasks and word reading. They claimed that while children could attempt the task by using phonology, such skills would be insufficient to perform successfully on the task (i.e., the child still needs to rely on his/her orthographic knowledge to select the correct answer).

Orthographic Processing and Reading

In studies of early reading development in English, there is consensus that phonological awareness, defined as “the ability to access and manipulate speech sounds” (Deacon et al., 2012, p.110), is a strong predictor of reading success (Ehri, 1992; Stanovich, 1992). However, several researchers have suggested that phonological awareness or sensitivity is not sufficient for efficient reading acquisition and that orthographic processing skills also play an important role (Castles & Nation, 2006; Share, 2004; Stanovich, 1992). Currently, there is a limited amount of research on the role early orthographic processing skills play in the prediction of reading. In Badian's (2001) longitudinal study, she measured orthographic processing skills in preschool children using a visual matching task based on letters and numerals. Children's performance on this task contributed significant independent variance to Grade 1 word reading and to other measures of reading through Grade 7. Other studies have shown that even after controlling for phonological and alphabetical skills, orthographic processing skills predict variance in word recognition (Castles & Nation, 2006; Cunningham & Stanovich, 1990).

Recent research has also identified a relationship between orthographic processing and word reading amongst bilingual children (Commissaire et al., 2014; Deacon, Wade-Woolley, & Kirby, 2009; Deacon et al., 2013a; Pasquarella, Deacon, Chen, Commissaire, & Au-Yeung, 2014). Deacon and colleagues (2009; 2013a) found that for English-speaking children in Grade 1 enrolled in early French immersion programs, orthographic processing in French and English was significantly related to word reading in the respective languages, after controls of nonverbal ability, phonological awareness, and receptive vocabulary in English. Commissaire et al. (2014) also suggested that orthographic processing skills contributed to reading. They assessed French immersion children over time (i.e., in Grades 1 and 2) to better understand their orthographic processing skills in English and French. By comparing children’s performance on a sub-lexical task (e.g., which is the more word-like? “sween or sweinn” in English and “fouche or foushe” in

French), the researchers found that children performed similarly across Grades 1 and 2 in both English and French (Commissaire et al., 2014). Additionally, these authors showed that orthographic processing developed at a younger age than predicted by Ehri (1995). Ehri (1995) stated that the orthographic phase begins sometime during the second or third year of schooling. However, Commissaire and colleagues (2014) concluded that learners of two languages rapidly acquire orthographic skills as early as Grade 1.

Pasquarella et al. (2014) examined the within-language and cross-language relationships between orthographic processing and word reading in French and English of French immersion children when they were in Grades 1 and 2. They found that reading influenced children's orthographic processing skills; word reading in Grade 1 predicted orthographic processing skills in Grade 2. They also found that Grade 1 French word reading predicted Grade 2 English orthographic processing beyond controls of nonverbal reasoning, vocabulary, phonological awareness, rapid digit naming, and English word reading. These findings suggest that orthographic processing skills are not language specific and that commonalities in the two orthographies (e.g., -oin, -age) assisted the transfer of skills from one language to the other.

Jared and colleagues (2013) developed a sub-lexical orthographic processing task, called the *Dictionary Task*, to assess children’s orthographic processing in English and French. The children in their study were presented with 40 pseudowords, each containing letter sequences (word bodies) that are permissible in either English or French, but not in both languages. For example, the word body *-ouille* in the pseudoword 'jouille' is allowable in French but not in English, while *-owd* in the pseudoword 'spowd' is allowed in English, but not in French. The child was asked to choose whether the pseudoword belonged in an English or a French dictionary. All of the pseudowords were pronounceable, but in order to be most successful, the child had to demonstrate orthographic knowledge in either English and/or French. Jared and colleagues (2013) found that French immersion students' discrimination scores on this task were significantly above chance, and concluded that children who were learning to read in French and English were able to discriminate French and English orthographic patterns by the end of Grade 2. Since the French pseudowords did not contain diacritics, this finding showed that the children had some knowledge of typical letter sequences in each language. Jared et al. (2013) also found that the children improved significantly in their discrimination abilities from Grade 2 to 3.

Strategy Use by Young Children

The study by Jared et al. (2013), described above, provides evidence that young children have the ability to discriminate between two languages with a shared alphabet, but does not provide insight into how children succeed on such a task. To the best of my knowledge, there are no qualitative analyses to date on the strategies children use to discriminate between English and French orthographic patterns. The discrimination of orthographic patterns is not reading per se; in fact, discrimination tasks may involve pseudowords as alluded to earlier, while reading involves “gaining access to meaning from printed symbols” (Ziegler & Goswami, 2006, p. 429). Children's use of strategies, when they encounter print provides some suggestions about the strategies children might use to discriminate orthographic patterns in two languages with a shared script.

Levy, Gong, Hessels, Evans, and Jared (2006) investigated young monolingual children's understanding of permissible vs. non-permissible characters and sequences in print (i.e., print/spelling conventions). The children were presented with a conventional word and an incorrect alternative that had an orthographic violation, and were asked to choose the word that “Mommy or the teacher would prefer to read” (Levy et al., 2006, p. 67). There were thirteen types of violations grouped into three categories: word shape, word elements, and spelling. The findings showed that by age four, children already began to focus on the internal constituents of words. Even before formal instruction, young children had some letter reading ability revealing the start of the development of orthographic knowledge. In addition, the five- and six-year-olds in the study were more familiar with the letter constituents and had an early understanding that there are permissible combinations of letters (Levy et al., 2006).

Ehri (2004) noted that being strategic in reading involves choosing procedures to optimize outcomes, such as figuring out unfamiliar words by decoding, making an analogy, or making a prediction. Two of these strategies may be relevant for L2 children when trying to discriminate between two languages. Specifically on the *Dictionary Task*, the decoding strategy can be applied when trying to discriminate pseudowords given that decoding “involves transforming graphemes into a blend of phonemes, or transforming spelling patterns into a blend of syllabic units” (Ehri, 2014, p. 6). An analogy strategy could also be used, where children can draw on their familiarity with the phonology or the orthography of the word bodies to classify the pseudowords by language (English or French). Children use orthographic processing skills to make analogies by comparing unknown words to words they already know based on letter combinations (i.e., ‘ight’ in *light*). Children are thus able to recognize pseudowords (i.e., ‘ight’ in *jight*).

Goswami (1994) claimed that analogy strategies played a significant role in reading words, especially those where the spelling reflects word history and structure, rather than just phonemic regularities. In a study by McGeown, Medford, and Moxon (2013), they examined monolingual seven-year-old-children’s reading and spelling strategies. They reported that children with better orthographic processing skills were more likely to use orthographic strategies in reading, while those with poorer orthographic skills depended more on phonological strategies.

Additionally, Ehri (1987) stated that it is quite challenging for early readers to handle the many phonetic anomalies in the English language. Once children become more capable of recognizing orthographic patterns, it will be much easier for them to read when they are faced with special pronunciations (e.g., “gh” in enough) or letters they should ignore when reading (e.g., “s” in island). Zieger and Goswami (2006) found that children supplement a phonologic strategy with orthographic strategies (i.e., recognizing letter patterns, making analogies, and whole word recognition) when reading less orthographically consistent languages such as English and French.

The strategies explored in the present study reflect the different skills used in reading (i.e., phonemic awareness and orthographic processing). In discriminating between two languages, a phonological strategy is defined by a child's reliance on the phonemic information of the stimulus word (McGeown, Medford, & Moxon, 2013). An orthographic strategy is identified when a child relies on the orthographic representations of the stimulus word, such as letters in the word, their position, and their sequence. An analogy strategy is demonstrated when a child is able to recognize phonologic and/or orthographic patterns in a known word, and use it to discriminate pseudowords (Wood, 2002).

The Present Study

Recent research has shed light on the contribution of orthographic processing skills to learning to read in a L2. FLL and ELL will benefit from being familiar with the letter patterns of the L2 to distinguish the L2 from a second script with a shared alphabet, and in turn should be more successful in reading. Jared and colleagues (2013) used the *Dictionary Task* to assess children's ability to discriminate languages with a shared alphabet, but did not inquire about the strategies children used on the task. Asking L2 learners about how they decide the language of a script can reveal whether or not they are consciously using orthographic processing skills, in addition to phonological strategies, which could be effective but less efficient. This study is the first to report qualitatively on the strategies young children use to discriminate between two languages with a shared alphabetic script. If there is a specific strategy that is found to be more frequently used by L2 children then may be building on that strategy and the developing skills to support that strategy may be an effective way to develop children's literacy skills. The study was conducted with children receiving instruction in the L2 of English or French.

The present study had three objectives. One objective was to assess whether children's *Dictionary Task* score predicted unique variance in word reading in English for ELL, and in both French and English for FLL, in addition to measures of maternal education and phonological awareness. I hypothesized that children's scores on the *Dictionary Task* would predict unique variance in word reading for both groups. A second objective was to examine whether FLL and ELL would score similarly on the *Dictionary Task*. I hypothesized that FLL would have higher scores than the ELL group, given that children in this group were more likely to be exposed not only to French but also to English, the majority language in the province. In contrast, the ELL group was less likely to be exposed to French, and thus might have less knowledge of orthographic patterns in French. A third and central objective was to explore the strategies L2 children use to discriminate languages with a shared script using the *strategies task* developed for the study. I anticipated that FLL and ELL would use more orthographic strategies than phonological strategies; given the nature of the task, but might still employ both strategy types. It was also expected that children's phonological and orthographic strategies would include analogies.

Method

Participants

A total of 48 children (*M* age = 92.8 months, *SD* = 5.4) participated. The children were either in Grade 1 (*N* = 13) or Grade 2 (*N* = 35). All of the children were part of an ongoing longitudinal study of language and literacy development taking place in Toronto, Ontario, a large, multi-ethnic city in Canada. Of the 48 participants, 31 (11 boys) were enrolled in early French immersion programs, where children learn to read and speak French at the beginning of Senior Kindergarten, and receive no formal English instruction in the early grades. The students in French immersion are referred to throughout the thesis as FLL. The remaining 17 children (9 boys) attended English stream classrooms with a limited amount of French taught weekly; these students are referred to as ELL. The mean age of the children in the French immersion group was 93.03 months (*SD* = 5.51) and in the English stream group, 92.4 months (*SD* = 5.32). There was no significant difference in age between the two groups, F (1, 46) = 0.456, *n.s*.

Caregivers of the participants completed a consent form and demographic questionnaire. In the FLL group, some children had English as an L1 (n = 22), while others had other languages as an L1 (n = 9). In the ELL group, all children had a different language than English as their L1. Of the 26 children whose first language was not English, the languages spoken at home were Bengali (*n* = 7), Mandarin (*n* = 5), Cantonese (*n* = 2), Spanish (*n* = 2), Tamil (*n* = 2), Dari (*n* = 1), Dutch (*n* = 1), Hindi (*n* = 1), Hungarian (*n* = 1), Japanese (*n* = 1), Korean (*n* = 1), Turkish (*n* = 1), and Vietnamese (*n* = 1).

Maternal education was assessed because it is an important predictor of children's school success, especially in reading (Magnuson, 2007). The frequency distribution of maternal education for both groups is reported in Table 1. For the FLL, approximately 90% of mothers completed at least some college or university. Amongst the ELL, approximately 65% of mothers completed at least some college or university.

Table 1

Frequency Distribution of Maternal Education

Education	FLL	ELL
Some High School	0	2
Completed High School	3	4
Some College/University	9	4
Completed College/University	15	6
Professional Degree/Post-graduate	4	1
Total	31	17

Measures

The participants' parents or legal guardians completed a demographic questionnaire. Participants in the FLL group completed control measures of receptive vocabulary, phonological awareness, and word reading, in English as well as French, while ELL completed the measures only in English. In addition, both groups completed the orthographic processing and *strategies task* central to the present study. Further details about each measure are provided next.

Demographic questionnaire. The demographic questionnaire was distributed to the caregiver of all the participants as part of the larger longitudinal study. In this study, we included responses to questions about the child's grade and educational stream (French immersion or English), first language, proficiency in the home language, how often the child spoke English at home (if at all), and the highest level of education achieved by the mother/primary caregiver.

The language spoken at home and the language of instruction at school were used to classify children as FLL or ELL.

English language and literacy measures. Trained research assistants administered the English measures to the FLL and ELL participants individually.

Receptive vocabulary. English receptive vocabulary was assessed using the Peabody Picture Vocabulary Test - 4th Edition (PPVT-4), Form A (Dunn & Dunn, 2007). The standardized procedures for the test were followed. For the training and test items, the child was presented with four colour pictures, the examiner said a stimulus word, and the child was asked to select the picture that matched the word's meaning. The starting point is determined based on the child's age. Testing was discontinued once the child reached ceiling (by incorrectly identifying six out eight consecutive items in a subset of words). The raw score was calculated as the difference between the total number of errors and the ceiling item.

Phonological awareness. English phonological awareness was assessed using the Comprehensive Test of Phonological Processing 2 (CTOPP-2): Elision subtest (Wagner, Torgesen, & Rashotte, 2013). For the first nine items, the children were asked to say a word, then repeat the word but omit a specified syllable (e.g., "Say sunshine. Now say sunshine without saying sun"). For the following 25 items, children again said a word, then repeated it, but omitted a phoneme (e.g., "Say farm. Now say farm without saying /f/"). Testing was discontinued after a child made three consecutive errors. The raw score was the total number of correct responses.

Word reading. Word reading in English was assessed using the Woodcock Johnson Test of Achievement III (WJ-III): Letter Word-Identification Subtest (Woodcock, McGrew, & Mather, 2001). Children were asked to read aloud a list of letters and of words increasing in difficulty and presented in isolation. This task consisted of 14 letters and 62 words. Testing stopped after six consecutive errors. The raw score was the number of letters and words read correctly.

French language and literacy measures. Only trained French speaking research assistants gave FLL French measures with the corresponding instructions read in the appropriate language(s) (French only or French and English).

Receptive vocabulary. Participants' French receptive vocabulary was assessed using the Échelle de Vocabulaire en Images Peabody (EVIP) Form A, adapted from the PPVT and normed on speakers of Canadian French (Dunn, Dunn & Theriault-Whalen, 1993). The EVIP scale consisted of training items and 170 test items in black and white. While the standard procedures suggest that the start point be determined according to the examinee's age, all of the participants in our study were asked to begin with item 1, given that they were learning French as an L2 and the test was constructed to evaluate native-French Canadian speakers. For the training and test items, the child was presented with four black and white pictures, the examiner said a stimulus word, and the child was asked to select the picture that matched the word’s meaning. The task was done individually and as per the test guidelines, was not timed. Testing was discontinued once the child reached ceiling by incorrectly identifying six out eight consecutive items in a subset. The raw score was calculated as the difference between the total number of errors and the ceiling item.

Phonological awareness. Participants completed an experimental task similar to the CTOPP-2: Elision subtest (Wagner, et al., 2013). For the French Elision test, on the first three items children were asked to say a word, then repeat the word but omit a specified syllable (e.g., “Dis *poisson*. Maintenant, dis poisson sans dire *son*”). For the remaining 23 items, children did the same but omitted a phoneme instead (e.g., “Dis *doigt*. Maintenant dis *doigt* sans dire /*d*/”).

Testing was discontinued after the participant missed six items in a row. The raw score was the total number of correct responses.

Word reading. Participants' word identification skills in French were assessed using the Lecture de Mots subtest of the Test de Rendement Individuel Wechsler II: WIAT-II (Wechsler, 2009). Children were asked to read aloud a list of French words increasing in difficulty and presented in isolation. This task consisted of 84 words and testing was discontinued after seven consecutive incorrect responses. The raw score was the total number of words read correctly.

Orthographic processing task. Orthographic knowledge at the sub-lexical level was assessed via the Dictionary Task (Jared, et al., 2013). Children were presented visually with 40 pseudowords that contained orthographic patterns allowed in one language (French or English) but not permitted in the other language (e.g., *biette* for French and *thuck* for English). The child was asked whether the pseudoword belonged in a French or English dictionary. This task is not timed and every item was administered to each child individually. The raw score was the total number of correct responses.

Strategies task. For the present study, I developed the Strategies Task (see Appendix A). Children were asked questions about how and why they classified a subset of eight words from the Dictionary Task (specifically, *dray, roif, weeth, jight, kanche, minq, spowd, jouille*) as French or English. Of the eight pseudowords selected from the Dictionary Task, four contained permissible patterns in French and four contained permissible patterns in English. Within each language, two pseudowords with low frequency word bodies and two with high frequency word bodies were selected to mirror the original task. The choices were based on frequency data for the word bodies provided by Jared et al. (2013).

The experimenter showed each of the eight pseudowords to the child and asked "Can you tell me what you think of when you see this word?" followed by "What helped you identify this word as English or French?" Every item was administered to every child and responses were audio recorded. Additional probes were given if necessary (see Appendix A). The children did not receive any feedback regarding the accuracy of their responses. The coding of children's responses is described in the Procedure section.

Procedure

Data collection. Data was collected in the spring of 2016 and 2017. FLL participants completed measures in both English and French. ELL participants were given only English measures. Trained undergraduate and graduate students who were native or nearly native speakers of the respective languages administered the tasks at the participant's elementary school in a quiet room. Testing was divided into two 30-minute sessions per language. The tasks were given in English then French to ensure each child understood the tasks, as even children in the French immersion stream spoke English as an L1 or were highly exposed to English. The order of tasks was randomized within language.

Data scoring and entry. Once the data had been collected, the language and literacy measures were scored, reviewed, and entered by trained undergraduate and graduate students using a scoring and coding manual created by members of the *Multilingualism and Literacy Lab* for the longitudinal and current study.

Transcription and coding of strategies. The only task that required transcription and coding was the *strategies task*. The transcriptions were completed by trained research assistants and reviewed again by the author of the thesis for accuracy during the coding stage. The author then coded each strategy. The coding categories follow.

1. Phonological strategy:

a) Refers to one or more sounds in the word, but not to the entire word body

b) Attempts to say the word aloud

c) Mentions they said the word in their head

d) Mentions having heard or not having heard a word before

e) Replies 'yes' to a probe asking if they said the word in their head or to a question clarifying sounds the child said out loud

f) Refers the word or part of the word body sounding like a word the child already knows (i.e., analogy)

2. Orthographic strategy:

a) Refers to the letters in the word, their position, or sequence

b) Refers to the letters being characteristic of English or French

c) Refers to the letters being similar to those in a known word

d) Refers to spelling

e) Replies 'yes' to a probe asking about the letters or to a question clarifying the child's ' reference to letters

f) Refers the word or part of the word body looking or being spelled like a word the child already knows (i.e., analogy)

If the response did not reflect any of the above strategies, it was coded as 'no strategy'. This included instances where the child identified the word as French or English but could not explain why he/she had done so, or mentioned he/she had seen the word before, despite being reminded by the examiner that the words were "made up" (i.e., pseudowords).

Results

The results include descriptive statistics for all measures; the findings from one-way

ANOVAs conducted to examine the effects of group (FLL or ELL) on the measures; Pearson correlations amongst the measures; and findings from hierarchical regressions conducted to examine the effects of certain measures on word reading in English and French.

The descriptive statistics are presented in Table 2, by group, for: child's age, maternal education, vocabulary, phonological awareness, word reading, orthographic processing (*Dictionary Task*), and total number of strategies.

Table 2

Descriptive Statistics

Variables	Range	Mean	*SD*
		FLL (n = 31)	
Age (in months)	80.43-101.06	93.03	5.51
Maternal education	1-4	2.65	0.84
English receptive vocabulary	107-165	137.06	15.3
French receptive vocabulary	21-76	44.68	15.05
English phonological awareness	9-33	22.23	7.34
French phonological awareness	6-26	17.03	7.09
English word reading	25-60	42.84	10.23
French word reading	6-70	36.39	20.33
Orthographic processing	20-37	30.1	4.32
Total number of strategies	1-14	7.87	2.64
		ELL (n = 17[a])	
Age (in months)	81.45-100.40	92.39	5.32
Maternal education	0-4	2	1.17
English receptive vocabulary	95-149	126.06	14.22
English phonological awareness	9-29	17.93	6.12
English word reading	30-61	46.12	8.05
Orthographic processing	19-35	27.18	4.35
Total number of strategies	4-16	9.06	3.36

Note. *SD*= standard deviation, ELL n= 14[a] for phonological awareness, missing data

All variables were inspected for normality. While the Shapiro-Wilk statistics suggested some violations of normality, inspection of histograms and of the skewness and kurtosis statistics suggested the violations of normality were not extreme. A series of one-way ANOVAs did not show significant differences between the FLL and ELL groups on English phonological awareness, F (1, 43) = 3.64, p = .06; English word reading, F (1, 46) = 1.30, p = .260; or total number of strategies, F (1, 46) = 1.83, p = .18. Significant differences between the groups were found on English receptive vocabulary (F (1, 46) = 5.96, p = .019) and orthographic processing (F (1, 46) = 4.99, p = .03). The FLL group scored significantly higher on these two measures than the ELL group.

Table 3 presents Pearson bivariate correlations for all measures in Table 2, for the entire sample (n = 48). There were significant correlations between orthographic processing and maternal education, English phonological awareness, French phonological awareness, English word reading, and French word reading. Age, English receptive vocabulary, French receptive vocabulary, and total number of strategies were not correlated with most variables and therefore were not used as control variables in the series of hierarchical regressions.

Table 3

Correlations of All Measures

Variables	1	2	3	4	5	6	7	8	9
1. Age	-								
2. Maternal Education	-.202	-							
3. English receptive vocabulary	.462**	.040	-						
4. French receptive vocabulary	-.056	-.310*	-.332*	-					
5. English phonological awareness	.049	.282	.221	-.275	-				
6. French phonological awareness	.356*	.013	.357*	.140	.834**	-			
7. English word reading	-.014	-.033	.075	.168	.586**	.749**	-		
8. French word reading	-.132	-.129	.107	.198	.611**	.393*	.664**	-	
9. Orthographic processing	.065	.289*	.089	-.305*	.661**	.411*	.458**	.568**	-
10. Total number of strategies	.027	-.035	.026	.194	-.117	.198	.117	-.324	-.016

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

Predicting Word Reading

Hierarchical linear regressions were conducted to examine whether children's orthographic processing predicted unique variance in English word reading for FLLs and ELLs and in French word reading for FLLs only. The assumption of normality of the residuals was met for the hierarchical linear regression models and the data was checked for multicollinearity. Most variables also met the assumption of linearity. The outcome variables, English and French word reading, were analyzed with raw scores.

Table 4 presents results from the hierarchical regressions, specifically the change in R^2 and the standardized beta coefficients (β) from the final step. Maternal education was entered in the first step. English or French phonological awareness (depending on whether the dependent variable was English or French word reading) was entered in the second step, followed by orthographic processing in the last step.

The upper portion of Table 4 presents the results of regressions on English word reading, for FLL and ELL separately. The control variables of maternal education (Step 1) and English phonological awareness (Step 2), accounted for 62% of the variance for FLL and 23% for ELLs. Orthographic processing (Step 3) contributed an additional 3% of the variance for FLL, and 33% for ELL, showing a relationship between orthographic processing and English word reading, in FLL, $F(1, 30) = 15.30$, $p < .000$, and for ELL, $F(1, 13) = 4.15$, $p < .038$.

The bottom portion of Table 4 presents the regressions on French word reading, a task completed only by the children in the FLL group. The controls of maternal education (Step 1), and French phonological awareness (Step 2) accounted for 16% of the variance. Orthographic processing (Step 3) explained an additional 27% of the variance. The findings provide evidence that orthographic processing contributes to L2 word reading. The ability to discriminate orthographic patterns in two languages with the same script thus predicted word reading in French and English for FLL, and in English for ELL.

Table 4

Hierarchical Linear Regression Predicting English Word Reading for FLLs and ELLs

		FLL (n = 31)		ELL (n = 17[a])	
Step	Predictor	ΔR^2	B	ΔR^2	β
		English word reading			
1	Maternal education	.016	-.274*	.176	.333
2	English phonological awareness	.603**	.632**	.05	-.318
3	Orthographic processing	.027**	.101	.328*	.765*
		French word reading			
1	Maternal education	.017	-.289		
2	French phonological awareness	.156	.182		
3	Orthographic processing	.272**	.634**		

Note. *p < .05; **p < .01 [a]ELL n = 14 for phonological awareness, missing data

Orthographic Processing

To gain further insight into the difference between FLL and ELL orthographic processing skills, scores on the *Dictionary Task* were examined. The results were consistent with the hypothesis that FLLs would score higher than ELLs on this orthographic processing task, given their exposure to both languages. As reported in Table 2, the FLL group had a mean of 30.10 and the ELL group had an average of 27.18, and this difference was significant: $t(46) = 2.23$, $p < .03$. In addition, as reported in Table 5, the FLL group scored significantly higher than the ELL group even on the pseudowords that reflected English orthographic patterns $t(46) = 2.49$, $p < .017$.

Table 5

Descriptive Statistics for Dictionary Task, by Language Pattern and Group

Items	Group	Mean	*SD*
English pseudowords	FLL	14.84	2.75
	ELL	12.59	3.43
French pseudowords	FLL	15.26	2.31
	ELL	14.59	2.76

Note. *SD* = standard deviation

Strategy Use

Table 6 presents descriptive statistics for the types of strategies (i.e., phonological and orthographic) children used on the *strategies task,* expressed as a percentage (i.e., total number of a strategy type divided by the total number of all strategies used). For example, if the total number of phonological strategies was 2 and the total number of all strategies used was 9, the percentage for phonological strategy use would be 22.22%. Within the phonological and orthographic categories, phonological and orthographic analogies are also reported.

When the percentage scores were compared by group, the FLL and ELL groups' scores were significantly different for the phonological strategies $t(46) = -3.57$, $p < .001$, but not for the orthographic strategies, $t(46) = .15$, $p = .878$. As Table 4 shows, ELLs used more phonological strategies than FLLs. Both groups used more orthographic strategies than phonological ones. As Table 6 also shows, some phonological strategies were phonological analogies. Orthographic strategies similarly included orthographic analogies, but at a higher proportion than in the phonological results. Both groups used orthographic analogies more often than phonological analogies.

Table 6

Descriptive Statistics of Type of Strategies

Strategies	Range	Mean	*SD*
		FLL (n = 31)	
Phonological	0-62.5	16.44	18.22
phonological analogy (%)	0-50	5.04	10.86
Orthographic	37.5-100	83.56	18.22
orthographic analogy (%)	0-100	48.68	31.25
		ELL (n = 17)	
Phonological	0-85.71	34.03	23.73
phonological analogy (%)	0-50	4.99	13.54
Orthographic	14.29-100	65.97	23.73
orthographic analogy (%)	0-83.33	29.74	26.29

Note. *SD* = standard deviation

Discussion

The main objective of the present study was to explore the strategies used by L2 children in Grades 1 and 2 to discriminate languages with a shared script. Findings revealed that children in both groups, FLL and ELL, used orthographic strategies, even more than phonological strategies, on the *strategies task.* Thus, consistent with previous findings (Deacon et al., 2009; Ehri, 1999), the participants displayed orthographic processing skills, which children "develop ... by analyzing the regularity of the patterns in print to which they [are] exposed" (Deacon, Chen, Luo, & Ramirez, 2011, p. 68). A second objective was to determine the relationship of orthographic processing to word reading. Indeed, the orthographic processing predicted word reading in English and French for FLL, and in English for ELL. The final objective was to examine the sub-lexical orthographic processing skills of L2 learners in English and French using the *Dictionary Task*. FLL performed significantly better than the ELL, as anticipated.

This study is the first to examine qualitatively the strategies that young L2 learners' use when discriminating orthographic patterns in two languages. I developed a *strategies task* in order to assess children's strategy use. The task required that children vocalize their reasons for classifying pseudowords as English or French. The justifications children gave were then coded as phonological or orthographic. Both the FLL and ELL groups used orthographic strategies more frequently than phonological ones. The percentage of strategies that were orthographic appeared higher in the FLL group (86.56%) than in the ELL group (65.97%), but the difference failed to reach significance. The ELL group used phonological strategies significantly more than FLL. This pattern suggests that L2 children, in second and third grade, relied on orthographic processing skills in English and French to discriminate the two languages, a result which is consistent with Jared et al. (2013). Given that the *Dictionary Task* included pseudowords with English and French spelling patterns in equal proportions, and that the FLL group used orthographic strategies at high rates and at least as frequently as ELL, it appears that the FLL were drawing upon orthographic processing skills in both languages. This finding is consistent with the notion that orthographic processing is built up across languages that are written with the same units - in this case, English and French (Deacon, Chen, Luo, & Ramirez, 2013b).

According to Ehri (1995), orthographic processing plays a critical role in reading development alongside phonological awareness. Ehri (1995) proposed phases of development in learning to read words and applied them to monolingual children between Kindergarten and Grade 3. These phases comprise skills that overlap with those children used to discriminate languages with a shared script in the present study.

In the 'pre-alphabetic' phase, children have not yet learned how to make letter-sound relations. They may try to make connections between visual features of a word and its pronunciation or semantic representation (e.g., a child might connect 'oo' in the word 'look' to round eyes) (Beech, 2005; Ehri, 1995). In the 'partial alphabetic' phase, children read sight words by forming connections between some letters, usually the first and final, with sounds detected in their pronunciation (i.e., /s/ and /n/ in ‘spoon’). In the ‘full alphabetic’ phase Ehri proposed, children form complete connections between letters seen in the written forms of words and phonemes detected in their pronunciations. Children understand that in the conventional spelling system most graphemes map onto a phoneme and are able to transform unfamiliar spelling of words into blended pronunciations (i.e., ‘oo’ in ‘pool’ is pronounced /u/). In my study, children similarly connected letters to sounds to discriminate words; when they did, the strategy was coded as phonological.

In the final phase in Ehri's (1995) model, ‘consolidated alphabetic’, the child has the ability to retain complete information about the spelling of sight words. For example, the child can remember '-est' in nest, pest, rest, test, west and the child will be able to use this larger unit of letters to read new words such as ch/est. This ability facilitates letter identification and speeds up the process of accessing words to make analogies (Ehri, 1992). In my study, when children voiced an awareness of orthographic patterns and discriminated pseudowords on this basis, the strategy was coded as orthographic. Additionally, if they said the pseudoword reminded them of a word, the strategy was coded as orthographic analogy.

In the present study, L2 children often used analogies to discriminate between two languages with a shared script. This was demonstrated when a child was able to recognize the visual similarities between the pseudoword and a word they already knew. That is, if the child referred to the pseudoword or word body looking or being spelled like a word that the child already knew, or stated that the word reminded him/her of a known word, it was coded as analogy. Interestingly, both FLL and ELL used an orthographic analogy strategy, but FLL used it more than half of the time taking into account the total number of strategies used. The use of analogy on the discrimination task is consistent with Goswami's finding that even young children make analogies in reading. Moreover, others have proposed that analogy is the most efficient strategy in reading (McGeown et al., 2013; Wood, 2002). Logically, using an analogical strategy should also help L2 learners discriminate between English and French pseudowords successfully.

Notably, the present study also showed that L2 children exhibited orthographic processing skills as early as Grade 1. This is a novel contribution to the field. Jared and colleagues (2013) found that bi-literate children had begun to discriminate English and French orthographic patterns by the end of Grade 2. However, Commissaire and colleagues (2014) examined the development of orthographic processing skills in French immersion children in Grade 1 and 2 and found that their performance on a sub-lexical task was comparable in French and English even in Grade 1. The results in the present study suggest that (1) L2 children are in fact using orthographic strategies (e.g., orthographic processing skills) when trying to discriminate between English and French orthographic patterns and (2) they are using these skills as early as Grade 1.

The second objective was to examine the relationship between orthographic processing and word reading in English and French. The *Dictionary Task* assesses children’s orthographic pattern knowledge, which taps into their sensitivity to the regularities in both languages, English and French. Consistent with my hypothesis, the results showed that orthographic processing predicted unique variance in English word reading and French word reading for the FLL group, and English word reading for the ELL group, even after maternal education and phonological awareness were entered as controls in the hierarchical regression. These findings are in line with Deacon and colleagues' (2013b) study, which suggested that orthographic processing in one language transfers to another with a shared script. FLL perhaps referred to their orthographic knowledge in both languages to be successful at discriminating the pseudowords on the task.

The third objective was to determine whether FLL scored higher than ELL on the *Dictionary Task*. FLL surpassed the ELL group, receiving a score of 75% on the task, while the ELL group received 68%, confirming my hypothesis. FLL were more successful at discriminating the pseudowords than the ELL. This finding was similar to Jared and colleagues (2013) who found that the French immersion children in their study performed better than monolingual English and monolingual French children. Given that the ELL group had minimal or no exposure to French, they were somewhat at a disadvantage compared to participants in the FLL group who had English as an L1 or were heavily exposed to English, the majority language in the region. However, the ELL group could still succeed on the task by using a process of elimination (i.e., if it is not English, then it must be French). This study showed that both FLL and ELL could discriminate between two languages with a shared script. The findings also suggested that FLL have orthographic processing skills in French and English, consistent with Pasquarella et al. (2014) who reported that French immersion children learning to read in English and French simultaneously developed orthographic processing skills in both languages.

Additionally, the means on both the English pseudowords and French pseudowords were higher for the FLL than ELL. Children instructed in French (the FLL group) were even more successful on the English pseudowords than the children instructed in English (the ELL group). This finding is consistent with the study by Turnbull, Hart, and Lapkin (2001), which showed that English-speaking students in French immersion in Grade 3 did as well or even outperformed their peers in the English stream on language and literacy tasks in English. Turnbull et al. (2001) attributed the findings to the French immersion students' knowledge of English phonology, vocabulary, and morphosyntax, and well as beginning literacy instruction in English in Grade 3 and transfer of literacy skills from French to English. Although students in the present study had no prior literacy instruction at school in English, they nonetheless outperformed the ELLs. This was presumably due to better knowledge of French enhancing the process of elimination but might also reflect children's exposure to English script at home and in their community.

Limitations and Future Directions

There are a few limitations that need to be considered when interpreting the findings in the present study. First, more than half of the children in our sample spoke another language than English at home. Although all the children were instructed in a L2, many of them were not bilingual but multilingual. While the sample reflects the current multicultural population in the city where the study took place, limiting the study to bilingual children only might have led to different results. In future studies, one might compare an FLL group composed entirely of L1 English and an ELL group composed either of speakers of an L1 with a roman script or French-speaking children learning English.

Second, the number of participants was adequate for this study for the hierarchical regression, but a larger sample might have strengthened the results even further for the regression analysis. Future research might follow up on these findings by examining the relationship of orthographic processing and word reading in a larger sample.

Third, the items on the *strategies task* were limited to eight orthographic patterns (4 in English and 4 in French). Including pseudowords that reflect a greater variety of orthographic patterns in each language would further elucidate the strategies children use to discriminate two languages. Given that the *Dictionary Task* has 40 items, this could be accomplished. Future research might also explore which strategy type children use for each orthographic pattern. For instance, children might use one strategy for low frequency patterns but another for high frequency ones.

Educational Implications

There are two educational implications that emerged from the current study. First, teachers can benefit from the evidence in this study that orthographic processing strategies are being used frequently and successfully even by students in Grades 1 and 2. Second, this knowledge could prompt teachers to elicit these strategies explicitly in the classroom. In fact, the *strategies task* developed for the study can be used by educators in the classroom to gather information directly from the children on how they discriminate between two languages with a shared script. Educators can ask the children the questions from the task, orally or in writing, and children can explain their reasoning. In addition to providing insight into children's strategy use, the *strategies task* could help identify children who have difficulty discriminating specific orthographic patterns in English and French.

Conclusion

Despite some limitations to the sample size and some heterogeneity amongst participants in terms of L1, the present study showed that orthographic processing was predictive of English and French word reading in FLL, and English word reading in ELL. Discriminating two languages with a shared script can be challenging for young children, but as the study showed children are able to express the strategies they use, and teachers can build on this capacity in the classroom. Furthermore, educators can teach the different strategies to help children discriminate English and French orthographies to facilitate the development of orthographic processing skills in both languages.

References

Au-Yeung, K., Hipfner-Boucher, K., Chen, X., Pasquarella, A., D'Angelo, N., & Deacon, H. S. (2015). Development of English and French language and literacy skills in EL1 and EL French immersion students in the early grades. *Reading Research Quarterly*, *50*(2), 233-254.

Barker, T. A., Torgesen, J. K., & Wagner, R. K. (1992). The role of orthographic processing skills on five different reading tasks. *Reading Research Quarterly*, *24*(4), 335-345.

Badian, N. (2001). Phonological and orthographic processing: Their roles in reading prediction. *Annals of Dyslexia, 51*, 179-202.

Burt, J. S. (2006). What is orthographic processing skill and how does it relate to word identification in reading. *Journal of Research in Reading*, *29*(4), 400-417.

Cassar, M., & Treiman, R. (1997). The beginnings of orthographic knowledge: Children's knowledge of double letters in words. *Journal of Educational Psychology*, *89*(4), 631-644. doi: 10.1037/0022-0663.89.4.631

Castles, A., & Nation, K. (2006). How does orthographic learning happen? In S. Andrews (Ed.), *From inkmarks to ideas: Current issues in lexical processing* (pp. 151-179). Hove, UK: Psychology Press.

Commissaire, E., Pasquarella, A., Chen, X., & Deacon, S. H. (2014). The development of orthographic processing skills in children in early French immersion programs. *Written Language & Literacy*, *17*(1), 16-39.

Cunningham, A. E., & Stanovich, K. E. (1990). Assessing print exposure and orthographic processing skill in children: A quick measure of reading experience. *Journal of Educational Psychology*, *82*(4), 733-740.

Cunningham, A. E., & Stanovich, K. E. (1997). Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology*, *33*(6), 934-945. doi:10.1037/0012-1649.33.6.934

Chung, S. C., Chen, X., & Deacon, S. H. (2017). The relation between orthographic processing and spelling in grade 1 French immersion children. *Journal of Research in Reading*, Advance online publication, 1-22. doi:10.1111/1467-9817.12104

Deacon, S. H., Wade-Woolley, L., & Kirby, J. R. (2009). Flexibility in young second-language learners: examining the language specificity of orthographic processing. *Journal of Research in Reading*, *32*(2), 215-229.

Deacon, S. H., Chen, X., Luo, Y., & Ramirez, G. (2011). Beyond language borders: Orthographic processing and word reading in Spanish-English bilinguals. *Journal of Research in Reading, 3*(2), 1–17. doi:JO.111l/j.1467-9817.20ll.01490.x

Deacon, S. H., Benere, J., & Castles, A. (2012). Chicken or egg? Untangling the relationship between orthographic processing skill and reading accuracy. *Cognition*, *122*(1), 110-117. doi:10.1016/j.cognition.2011.09.003

Deacon, S. H., Commissaire, E., Chen, X., & Pasquarella, A. (2013a). Learning about print: the development of orthographic processing and its relationship to word reading in first grade children in French immersion. *Reading and Writing*, *26*(7), 1087-1109.

Deacon, S. H., Chen, X., Luo, Y., & Ramirez, G. (2013b). Beyond language borders: Orthographic processing and word reading in Spanish–English bilinguals. *Journal of Research in Reading*, *36*(1), 58-74.

Dunn, L., & Dunn, D. (2007). *PPVT-4: Peabody Picture Vocabulary Test*. Minneapolis: Pearson.

Dunn, L. M., Dunn, L. M., & Thériault-Whalen, C. M. (1993). *Échelle de vocabulaire en images*

Peabody. Toronto: PSYCAN.

Ehri, L. C. (1987). Learning to read and spell words. *Journal of Reading Behavior*, *19*(1), 5-31.

Ehri, L.C. (1992). Reconceptualizing the development of sight word reading and its relationship to recoding. In P. B. Gough, L. C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 107-144). Hillsdale NJ: Erlbaum.

Ehri, L. C. (1995). Phases of development in learning to read words by sight. *Journal of Research in Reading*, *18*(2), 116-125.

Ehri, L. C. (2004). Teaching phonemic awareness and phonics: An explanation of the National Reading Panel meta-analyses. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 153-186). Baltimore: Paul H. Brookes.

Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading*, *18*(1), 5-21.

Lukatela, G., Feldman, L. B., Turvey, M. T., Carello, C., & Katz, L. (1989). Context effects in bi-alphabetical word perception. *Journal of Memory and Language*, *28*(2), 214-236.

Genesee, F., & Lindholm-Leary K. (2007). Dual language education in Canada and the USA. In *Encyclopedia of Language and Education* (pp. 1696-1706). Springer US.

Goswami, U. (1994). Reading by analogy: Theoretical and practical perspectives. In C. Hulme & M. Snowling (Eds.), *Reading development and dyslexia* (pp. 18–30). London: Whurr Publishers.

Jared, D., Cormier, P., Levy, B. A., & Wade-Woolley, L. (2013). Discrimination of English and French orthographic patterns by biliterate children. *Journal of Experimental Child Psychology*, *114*(4), 469-488. doi:10.1016/j.jecp.2012.11.

Katz, L., & Frost, R. (1992). The reading process is different for different orthographies: The orthographic depth hypothesis. *Advances in Psychology*, *94*, 67-84.

Levy, B. A., Gong, Z., Hessels, S., Evans, M. A., & Jared, D. (2006). Understanding print: Early reading development and the contributions of home literacy experiences. *Journal of Experimental Child Psychology*, *93*(1), 63-93.

McGeown, S. P., Medford, E., & Moxon, G. (2013). Individual differences in children's reading and spelling strategies and the skills supporting strategy use. *Learning and Individual Differences, 28*, 75-81. doi:10.1016/j.lindif.2013.09.013

Olson, R., Wise, B., Conners, F., Rack, J., & Fulker, D. (1989). Specific deficits in component reading and language skills: Genetic and environmental influences. *Journal of Learning Disabilities*, *22*(6), 339-348.

Pacton, S., Perruchet, P., Fayol, M., & Cleeremans, A. (2001). Implicit learning out of the lab: the case of orthographic regularities. *Journal of Experimental Psychology, 130*, 401–426.

Paradis, J., Genesee, F., & Crago, M. B. (2011). *Dual language development and disorders*. *A handbook on bilingualism and second language learning*. Baltimore, MD: Paul H. Brookes.

Pasquarella, A., Deacon, H., Chen, B. X., Commissaire, E., & Au-Yeung, K. (2014). Acquiring orthographic processing through word reading: Evidence from children learning to read French and English. *International Journal of Disability, Development and Education*, *61*(3), 240-257.

Perfetti, C. A. (1984). Reading acquisition and beyond: Decoding includes cognition. *American Journal of Education*, *93*(1), 40-60.

Rayner, K., Pollatsek, A., Ashby, J., & Clifton Jr, C. (2012). *Psychology of reading (2nd ed.)*. New York, NY: Psychology Press.

Ricento, T. (2005). Considerations of identity in L2 learning. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 899–910). Mahwah, NJ: Lawrence Erlbaum.

Share, D. L. (2004). Orthographic learning at a glance: On the time course and developmental onset of self-teaching. *Journal of Experimental Child Psychology*, *87*(4), 267-298.

Stanovich, K. E., & West, R. F. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly*, *24*(4), 402-433.

Stanovich, K. E. (1992). Speculations on the causes and consequences of individual differences in early reading acquisition. In P. B. Gough, L. C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 307-342). Hillsdale, NJ: Lawrence Erlbaum Associates.

Statistics Canada. (2012). *Linguistic characterisitics of Canadians.* Ottawa, Ontario: Statistics Canada.

Treiman, R., & Cassar, M. (1997). Spelling acquisition in English. In C. Perfetti, L. Rieben, & M. Fayol (Eds.), *Learning to spell: Research, theory, and practice across languages* (pp. 61-80). Mahwah, NJ: Lawrence Erlbaum.

Turnbull, M., Lapkin, S., & Hart, D. (2001). Grade 3 immersion students' performance in literacy and mathematics: Province-wide results from Ontario (1998 –99). *The Canadian Modern Language Review, 58*, 9 –26.

Wagner, R. K., & Barker, T. A. (1994). The development of orthographic processing ability. In V. W. Berninger (Ed.), *The varieties of orthographic knowledge I: Theoretical and developmental issues* (pp. 173-218). Dordrecht, Netherlands: Kluwer.

Wagner, R., Torgesen, J., Rashotte, C., & Pearson, N. (2013). *Comprehensive Test of Phonological Processing: CTOPP2*. Austin, TX: Pro-ed.

Wechsler, D. (2009). *Wechsler Individual Achievement Test –Third Edition*. Bloomington, MN: Pearson.

Wood, C. (2002). Orthographic analogies and phonological priming effects. *Journal of Research in Reading*, *25*(2), 144.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). Woodcock-Johnson III tests of achievement. Rolling Meadow, IL: Riverside.

Ziegler, J. C., & Goswami, U. (2006). Becoming literate in different languages: similar problems, different solutions. *Developmental Science*, *9*(5), 429-436.

Appendix A

Strategies Task

ID#________________ DATE: ________________ TESTER: __________________

Administer all items in English. No basal or ceiling.

*DO NOT say the words on the cue cards. **This is recorded.**

Materials: Audio recorder, stimulus cards (dictionary task cue cards), testing sheet.

Procedure: When you are asking the questions make sure to follow the examinee's answers when probing. For example, if examinee responds English for item 28. (Minq) but it is in fact French continue to ask, "what helped you identify this word in English?"

Have the DICTIONARY CUE CARDS for the eight selected items and circle ALL if you asked the probes or NONE if you did NOT ask the probes.

Ask for each item questions 1 and 2 (read verbatim):

1. Can you tell me what you think of when you see this word?

2. What helped you identify this word as __ENGLISH or FRENCH__?

If the child fails to answer question 2 (says "I don't know" or does not respond), ask all of theses probes in the following order:

Probes: **A. For English answer: Are you sure this is an ENGLISH word? or**
For French answer: Are you sure this is a FRENCH word?
B. Did you say the word in your head or aloud?
C. Did this word remind you of other words you know?
D. Did you look at certain letters? Which one(s)?

Words	**Probes**	
12. Dray	All	None
15. Roif	All	None
17. Weeth	All	None
20. Jight	All	None
25. Kanche	All	None
28. Minq	All	None
34. Spowd	All	None
40. Jouille	All	None

Appendix B

Example of a Child Using Different Strategies

Legend
Child= CHI
Examiner= EXA
French= FR
English=EN
P= Phonological
PA= Phonological analogy
O= Orthographic
OA= Orthographic analogy

ID#: 1011
Date: June 17, 2016
Transcribed on: August 30, 2016

12. **Word: Dray** **Language: EN** **Strategy: OA**
Time: 00:27

EXA: Okay, can you tell me what you think of when you see this word?
CHI: "Ray," like, "hay" or rays of light.
EXA: Okay. What helped you identify this as an English word?
CHI: Well, like I take away letters of things to see how it would become, like if you take away the 'd' it would become "ray" which is an English word.
CHI: So I just, I thought that it would be an English word.
EXA: Okay, great.

15. **Word: Roif** **Language: EN (wrong)** **Strategy: PA**
Time: 00:48

EXA: Can you tell me what you think of when you see this word?
CHI: Roif (said the word aloud)
EXA: Okay. So, what do you think of when you see this word?
CHI: Roif (said the word again)
EXA: What helped you identify this word as French?
CHI: Long pause. Sounds like rock.
EXA: Do you think it belongs in an English or French dictionary?
CHI: Sound like English.
EXA: Okay.

17. **Word: Weeth Language: EN Strategy: PA**
Time: 1:24

EXA: How about this word? What do you think of when you see this word?
CHI: Teeth.
EXA: Do you think of teeth?
CHI: Mhm.
EXA: And what helped you identify this as English?
CHI: It sounds like it.

20. **Word: Jight Language: EN Strategy: OA**
Time: 1:43

EXA: And, what did you think of when you saw this word?
CHI: Fights (said the word aloud)
EXA: Okay, and what helped you identify it as English?
CHI: Because if you took away that and put in an 'f' it would be English. It would be fight and that is an English word.
EXA: Okay.

25. **Word: Kanche Language: FR Strategy: P**
Time: 2:05

EXA: What helped you identify this word?
CHI: Kanche (said the word aloud).
EXA: Can you tell me what you thought when you saw this word?
CHI: French?
EXA: You just thought French? What helped you identify it as French?
CHI: It didn't sound like English word.
EXA: Okay.

28. **Word: Minq Language: FR Strategy: OA**
Time: ____2:22______

EXA: What you think of when you see this word?
CHI: Yeah, "five" in French, "cinq".
EXA: And, what helped you identify it as French?
CHI: If you took away, the 'm' and then put a 'c' (pronounced in English) it would be "cinq" which is a French word.
EXA: Okay.

34. **Word: Spowd** **Language: EN** **Strategy: O**
Time: 3:30

EXA: What did you think of when you saw this word?
CHI: "Powder."
EXA: Can you say that again?
CHI: "Powder."
EXA: Okay, and what helped you identify this as an English word?
CHI: Well, if you add an 'e' and an 'r' and take away the ‘s’ it would be "powder" which is an English word.
EXA: Okay.

40. **Word: Jouille** **Language: FR** **Strategy: P**
Time: 4:00

EXA: And this one.
EXA: Can you tell me what you think of when you saw this one?
CHI: Jouille (said the word aloud)
EXA: And what helped you identify that as a French word?
CHI: Because it does not sound like an English word.
EXA: Okay.