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# Dynamic Assessment of Early French Immersion Literacy Learning Competencies

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by

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Abstract

French Immersion programming in Canada is not always an inclusive environment for all learners. Students with language disabilities or delays are often placed into English-only programming when difficulties arise in French immersion programming. This study aimed to establish a method of identification of reading difficulties, in either language, early in the reading process. Such an assessment would allow educators to intervene and assist these students, and all students, with reading and vocabulary development in their second language of French before these language issues can negatively affect learning.

Essential to language learning in immersion programs is the development of speech perception and lexical specificity, defined as the knowledge of how words should sound in a language. Dynamic assessments in both French and English were used as they focus on how well a student can learn a concept. This project examined second language (L2) French learning in a dynamic way to predict literacy learning in children who are not yet proficient readers in English, their first language (L1). The particular skills of phonological awareness and vocabulary development in both L1 and L2 were examined.

A one-year longitudinal study was conducted to investigate the language abilities of children in French immersion in grade 2. In L1, dynamic assessments were better predictors of vocabulary than static assessments. In L2, static assessments were better predictors of vocabulary than dynamic assessments. In L1, lexical specificity, word reading, phonological awareness (elision), and rapid naming predicted word reading. In L2, phonological awareness (elision) in both French and English, and French word reading predicted word reading.

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French language education is an important instructional stream within English Canada's education systems. For effective education to occur, it is essential that mechanisms are in place for assessing, identifying, and intervening with students who have disabilities, difficulties, or delays. The goal of this study was to better understand aspects of French language learning that can be used to help assess students, leading to early interventions for the betterment of the learning process. To begin to understand the need for assessment and intervention in French language learning in Canada, it is necessary to examine the history of French use and bilingualism in Canada.

## *An Historical Summary of French Language Use in Canada*

Historically, the tensions between French and English governance in Canada have influenced the prevalence of both French and English languages in Canada. In 1867, the British North America Act (later re-named the Constitution Act of 1867) stated:

> Either the English or the French Language may be used by any Person in the Debates of the Houses of the Parliament of Canada and of the Houses of the Legislature of Quebec; and both those Languages shall be used in the respective Records and Journals of those Houses; and either of those Languages may be used by any Person or in any Pleading or Process in or issuing from any Court of Canada established under this Act, and in or from all or any of the Courts of Quebec.
> The Acts of the Parliament of Canada and of the Legislature of Quebec shall be printed and published in both those Languages. (Constitution Act, 1867, s.133)

This decision allowed for the stronghold of both languages in the cultural context of Canada. One hundred years later, Canada's Royal Commission on Bilingualism and Biculturalism (1967) encouraged the use of both French and English in the federal government, as well as encouraging educational opportunities in either language in parts of the country where the population was large enough to warrant this. From this recommendation, the Official Languages Act of 1969 (revised in 1988) made English and French the official languages of Canada, ensuring that all

federal services are provided in either language (Official Languages Act, 1988). The Charter of Rights and Freedoms (1982) expanded on previous decisions and reinforced English and French as the official languages of Canada (sec. 16). This document also allowed bilingual language education rights in both French and English for Canadian students (sec. 23).

The Canadian Government, in their Roadmap for Canada's Official Languages 2013-2018 (2013) explain the importance of having two official languages, because they "offer enormous economic, social and cultural opportunities and have helped to establish Canada's strong place in the world" (Roadmap for Canada's Official Languages, 2013, p. 1). To support this point, 89% of Francophone, and 73% of Anglophone Canadians acknowledge that being able to communicate in both official languages increases chances of finding a job (Roadmap for Canada's Official Languages, 2013).

***Bilingualism in Canada***

In 2001, overall English-French bilingual rates were less than 20% (Canadian Council on Learning, 2007). These numbers are different for Anglophone Canadians, defined as those from an English-speaking background, and Francophone Canadians, defined as those coming from a French-speaking background. When this bilingual rate of 20% is examined by Anglophone and Francophone groups, French-English bilingual rates in Canada for Anglophone Canadians were less than 10%, compared to an over 40% bilingual rate for Francophone Canadians (Canadian Council on Learning, 2007). A greater percentage of French-speaking Canadians are learning English than English-speaking Canadians are learning French. Since 2001, the rate of bilingualism in both French and English for Canadians has dropped slightly, and currently sits at 17.5% (Lepage & Corbeil, 2013). This remains an increase from the 12.2% level from 1961,

prior to the release of the Report from the Royal Commission on Bilingualism and Biculturalism (Lepage & Corbeil, 2013).

### *French Immersion Programming in Canada*

As Canada is officially a bilingual country, and as a result of the Royal Commission on Bilingualism and Biculturalism, the Official Languages Acts, and the Canadian Charter of Rights and Freedoms (1982), some provinces in Canada require that all students take both French and English classes in elementary school. Specifically, this is a requirement of students in Ontario (Ontario Ministry of Education, 2013), New Brunswick (Government of New Brunswick, 2016), Newfoundland and Labrador, Nova Scotia, and Prince Edward Island (Newfoundland and Labrador Department of Education, n.d.). There are differences in the rules and methods of implementation of French education in each province. This study focused on Ontario French immersion programming, and examined alternate methods of assessing if a child will benefit from French Immersion.

### *Benefits of Bilingualism*

A tremendous amount of research has been conducted that demonstrates the benefits of bilingualism and second-language learning, in regards to performance on first language (L1) and second language (L2) skills. However, not all children who are enrolled in French immersion succeed in French instruction and some children are not enrolled in French immersion due to parental concerns about their child's performance in French immersion classrooms. The ability to determine who will or will not benefit from French immersion will have an impact on placement decisions. One example of the benefits of French immersion is the level at which Ontario French immersion students perform on standardized tests; these students outperform students who are not in immersion programs, even when controlling for parents' education,

student socio-economic status, and student gender (Lepage & Corbeil, 2013). Benefits of bilingualism are not limited to language abilities. Other research has indicated that second-language (L2) immersion programs can strengthen attentional skills (Nicolay & Poncelet, 2015). Bilingualism can change cognitive networks and abilities, resulting in bilingual learners outperforming monolingual peers in executive control (Bialystok, 2011). Greater creative thinking, higher mental flexibility, and sensitivity to verbal and non-verbal cues are seen in students in French immersion when compared with students in English programs (see Lazaruk, 2007, for a summary). Given these benefits, it is important to ensure that families who would like their children enrolled in French immersion are provided with valid information about their children's potential to succeed in French immersion.

Although many parents would like their child to attend French immersion, immigrant children are less likely to be enrolled in French immersion, and parents are even discouraged by policies, other parents, and school staff, from doing so (Mady, 2007). In Ontario, these students may also be exempt from core French programming at all levels, at least until they have achieved some proficiency in English. This occurs regardless of the evidence that these students are able to succeed in French without fluency in English (Mady, 2007).

In 2000, six percent of students in Ontario were enrolled in French immersion programs (Allen, 2004). Reasons for enrollment vary. Perhaps parents are encouraged by evidence of cognitive benefits shown by bilinguals, to enhance academic benefits (e.g., Allen, 2004) or as a way to connect to the Canadian identity (Ontario Ministry of Education, 2013). In addition, for some non-francophone parents in Ontario, this second language instruction is jump-started by placing their children in French immersion programs. On a Canada-wide scale, between 2007 and 2011, there was an 11% increase in enrolment in French immersion programs (Roadmap for

Canada's Official Languages, 2013). During the 2010-2011 school year in Ontario, a total of 2,051,865 students were enrolled in French immersion (Canadian Parents for French, 2010-2011).

In many of these early immersion programs, students learn primarily in French, with English instruction added in later grades. The amount of French instruction varies considerably between school boards. According to the Ontario Ministry of Education (2013), for a program to be considered French Immersion, a minimum of 50% of instruction must be in French. This amounts to a minimum of 3800 hours of French instruction by grade 8 (Ontario Ministry of Education, 2013). For some school boards (e.g., Toronto District School Board, 2014), this French immersion instruction amounts to 100% of the instruction in French, beginning in kindergarten, with English instruction added in grade 4. In other boards (e.g., Waterloo Region District School Board, n.d.), 50% of instruction is in French starting in grade one. Any amount of French instruction less than 50% is considered Extended French, which has a minimum of 25% of instruction in French, which is 1260 hours by grade 8 (Ontario Ministry of Education, 2013). Below 25% of instructional time in French, students learn primarily in English, with a Core French class from grades 4 to 8, which amounts to 600 hours of French instruction (Ontario Ministry of Education, 2013). Some school boards start Core French earlier, sometimes in junior kindergarten (e.g., Ottawa-Carleton District School Board, 2016) or grade one (e.g., Waterloo Region District School Board, n.d.).

Looking closely at the *French as a Second Language Curriculum* in Ontario (the document used for French immersion, extended French, and core French), one goal of the French as a Second Language curriculum is for students to "use French to communicate and interact effectively in a variety of social settings" (Ontario Ministry of Education, 2013, p. 6). To meet

this goal, elementary students need a strong oral language base in French, which focuses on communication (Ontario Ministry of Education, 2013). The idea behind this programming is that students will learn French more effectively if their learning is meaningful and authentic. When looking at French immersion, this translates to some or all subjects being taught in French (Genesee, 1992). This gives students an opportunity to learn French that is useful in many areas of life and education, not simply French for French class. By learning science, math, drama, and other subjects in French, students are using the language in many ways that will benefit them in the future, as well as support and supplement their understanding and use of the language.

***French Immersion Attrition***

Given that French is important within Canadian education, it is essential to make French immersion programs as effective and as accessible as possible. Immersion is particularly important as these programs result in better French language skills than the regular core French program (Au-Yeung et al., 2015). Accessibility, however is not always a core component of French immersion programs. Students who begin their education in French immersion do not always continue in this specialized program throughout their school years. Attrition rates in French immersion are 5 to 10% in each grade, with a fraction of the students making it through the program to grade 12 (Friesen, 2013). For example, in the Toronto District School Board, the 2011 French immersion retention rate from kindergarten to grade six was 70% (Friesen, 2013).

There are many possible explanations for these attrition rates. Learning disabilities, academic difficulties, certain exceptionalities, or other challenges are some of the reasons students leave French immersion (Genesee, 1992). A common reason for a student to leave a French immersion program and begin attending an English program is because of a learning disability. In fact, some students do not even enter French immersion programs to begin with,

because of a suspected learning disability, a specific exceptionality, or other risk factors, where there is an assumption that French immersion would be too difficult (Genesee, 1992). A major concern associated with this self-selection process is that these French immersion programs are becoming elitist, since they might only be used by students with high academic abilities. (Genesee, 1992; Genesee & Jared, 2008). Additionally, students in French immersion tend to be from high socio-economic backgrounds (Hutchins, 2015), indicating that only certain families and students begin and continue to participate in this programming. This self-selection might result in the corresponding English program in a given school becoming weaker or inferior, as so many high achieving students are in the French programs (Genesee, 1992).

***French Immersion and the Exclusion of Students with Exceptionalities***

Of course, many exceptionalities are not identified until students are older and have attended some school, since evidence of these exceptionalities, learning disabilities for example, are not always apparent until the child is in a school environment. Oftentimes it is hard for educators to identify students who are at-risk for reading difficulties, particularly when they are learning in a new language (Linklater, O'Connor, & Palardy, 2009). It is important to recognize whether a language difficulty is a possible reason for delays in learning. Since students are learning in French, it is hard to know whether a student has a reading difficulty when they are not yet proficiently reading in French. In fact, teachers often wait to begin reading instruction in French until some oral proficiency in French has been achieved (Wise, D'Angelo, & Chen, 2015). As a consequence, reading interventions for struggling readers are not put into place until grades two or three, because no delay, or perhaps disability is apparent. For students who struggle with reading, delays might not be noticed until a year or two into their formal education. Compare this late identification of language and reading delays requiring intervention to students

in English programs, where reading interventions are often put into place quite early in their education (Fuchs & Fuchs, 2006). Rather than putting interventions in place in French, the solution has often been to switch the student to an English educational program.

When encouraging the development of a bilingual population, relegating students who have difficulties to a non-immersion environment due to certain exceptionalities, is not a viable pathway to achieving this goal. Disqualifying or discouraging at-risk students from participating in French immersion presents an ethical dilemma, as limiting the possibility of these student attaining bilingualism puts them at even further disadvantages to their peers, at least in the area of future employment opportunities (Genesee & Jared, 2008). In addition, there are few supports currently in place to assist students with exceptionalities struggling in French immersion (Genesee & Jared, 2008).

Despite fears that these at-risk students (i.e., those with certain exceptionalities, low socioeconomic status, belonging to a minority group, low ability in English) might suffer in French immersion, overall, these students tend to benefit from participating in French immersion programs (Genesee, 1992). Students with lower IQ scores on tests, those from low socioeconomic backgrounds, and those that speak a language other than French or English at home are not at a disadvantage when placed in French immersion; these students often demonstrate higher reading abilities when compared with their equivalently leveled peers in English programs (see Genesee & Jared, 2008 for a summary). In fact, at-risk readers in French immersion who receive appropriate phonological awareness-based interventions can even elevate reading levels beyond those of their peers who did not receive interventions (Wise & Chen, 2010). Genesee (2007) has shown that a student with a learning disability will still encounter difficulties in an English classroom; leaving French immersion is not the ultimate solution. In

fact, by thoroughly focusing on sounds and letters in another language, repetition and the transferability of skills, students can re-enforce reading concepts which can actually benefit students with learning disabilities (Alberta Education, 2009).

In actual practice, students learning a new language in an immersive environment (i.e., immigrants learning English) may demonstrate a slower growth in L2 vocabulary development when compared to vocabulary development of monolingual students (Bialystok, Luk, Peets, & Yang, 2010). In part, this may be attributed to the different languages being used in distinct environments, for example home versus school. When speaking another language at home, a student might not be learning English L2 vocabulary related to the home, as they are only speaking English at school and in the larger community. This can occur with any student regardless of a disability, but is more worrisome when a disability or delay is present.

When students have reading difficulties, the earlier an intervention can be put into place, the sooner the gap can be lessened between weak and strong readers, thereby limiting the number of students requiring special education services (Vaughn, Linan-Thompson, & Hickman, 2003). The later an intervention starts, typically the less effective it will be (Good, Simmons, & Smith, 1998). This is a concern identified in the reading literature, as students often diverge in reading abilities, and poor readers find it harder to catch up to good readers as time progresses (Good et al., 1998). In order to initiate appropriate interventions, the first step is to identify students that need interventions (O'Connor, 2011). There are currently no tools that effectively identify at-risk readers early in their language immersion education (Keep, 1993; Genesee, 2007). This study will utilize early assessment practices to develop assessment tools in an effort to assist with identification of at-risk students in immersion contexts. Evaluation of the assessment tools is a

critical first step in identifying areas of deficit or challenge in order to establish effective interventions.

***The Comprehensive Language Approach***

As noted, language acquisition is complex, involving many different components. The comprehensive language approach (CLA) can be used to explain how second-language acquisition can occur. This approach to early literacy acquisition explains that a variety of language skills (e.g., phonological awareness, early print knowledge, receptive vocabulary) contribute significantly to later reading achievement, with oral language abilities playing a key part (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Of particular note in this theory is the role of phonological awareness, which is increased by greater lexical specificity, which is the knowledge of how words in a language should sound (Garlock, Walley, & Metsala, 2001) (See below for a more detailed discussion). Oral language ability is connected to phonological sensitivity even before reading instruction has begun for children; this skill then supports reading at the decoding stage once the child is learning to read (Dickinson et al., 2003). Any gaps in these aspects of language acquisition, without interventions, might impede or delay reading instruction in later years if appropriate interventions are not delivered (Dickinson et al., 2003).

***Components of Language Relevant to French Immersion Research***

It is clear that early identification of language difficulties in students is essential to assisting in the successful participation in French immersion programming. When regarding second language learning, looking at different components of language can help clarify what happens when a student learns a new language. Of particular note are the development of speech perception and lexical specificity. Speech perception has to do with how we hear, understand,

and interpret the sounds of language. To date, there is little known about the connection between speech perception and later literacy development (Metsala, 1997). Speech perception relates to the concepts of phonological awareness and lexical specificity. Phonological awareness is the understanding that one can break words down into shorter units, like letters, sounds, and phonemes and lexical specificity is knowing how words in a language should sound. Both phonological awareness and lexical specificity are essential in developing both L1 and L2 language and literacy skills.

***Phonological Awareness***

As previously stated, phonological awareness is the conscious awareness that speech sounds are combined to make words (O'Connor, 2011). Whether or not this is a conscious understanding has been debated (Anthony & Lonigan, 2004), with the idea that consciousness means the ability to manipulate. If one is able to identify phonemes, syllables, and other units or word segments, then they are acknowledged as having a keen sense of phonological awareness (Morais, 1991). Morais (1991) breaks down phonological awareness into two distinct categories: holistic phonological awareness, and analytic phonological awareness. The former has to do with classification and understanding, the latter with the combination of meaning and sound of words and utterances. These definitions include both awareness and the ability to manipulate, which both play a role in consciousness (Anthony & Lonigan, 2004). On the other hand, some experts believe that consciousness is not a crucial element to the definition of phonological awareness, as consciousness is a difficult term to define, and the depth at which one might consciously be aware of one's skills can vary greatly as a child develops (Stanovich, 1992).

Phonological awareness is not necessary in order to speak, because in speech there is no necessary distinction between phonemes; they overlap with one another (Juel, 1988). However,

in learning to read, phonological awareness is important when decoding written language. Phonemes need to be mapped to graphemes, in order for reading to occur (Juel, 1988; Ehri, 2005), thus phonological awareness is a key component to this study.

Phonological awareness has a far-reaching effect on reading ability, often seen as the factor that differentiates between good and poor readers (Smith, Simmons, & Kameenui, 1998). Wagner and Torgesen (1987) have explained that phonological processing, including phonological awareness, accounts for reading ability in grade one. Phonological awareness contributes a causal function to the development of reading abilities. This skill can be particularly helpful in independently reading words that are unfamiliar to the student (Wagner & Torgesen, 1987). Juel (1988) has shown that lack of phonemic awareness in students entering kindergarten can predict poor reading at the end of grade one, and can still result in poor reading years later. This correlational study showed that there was a strong positive correlation (+.88) between poor readers at the end of grade one and those who were still poor readers at the end of grade four (Juel, 1988).

Some debates have addressed whether phonological awareness is a homogeneous (i.e. a single ability) or heterogeneous (i.e. many skills), with the consensus agreeing that phonological awareness is not a single entity (Treiman & Zukowski, 1996). It is composed of many different components or abilities. Blending (combining sounds), segmenting (separating sounds), and deletion (deleting sounds) are all parts of phonological awareness (Yopp, 1988). In fact, assessments that measure more than one component have been shown to have more reliability and predictive validity on reading acquisition than only one test (Yopp, 1988). Torgesen, Morgan, and Davis (1992) conducted a study, teaching kindergarten students one of three interventions: (1) blending, (2) segmenting, or (3) both blending and segmenting. The

interventions taught what they intended to teach, but the outcomes on word learning and reading were different. The blending-only intervention did not help with a segmenting task, when segmenting was not taught explicitly, showing that these two components of phonological awareness are separate. These authors demonstrated that both blending and segmenting are essential in order to create a complete understanding of the phonemic composition of words; teaching only one or the other did not improve word learning. These findings are supported by Slocum, O'Connor, and Jenkins (1993) who did not find a transfer in learning between blending and segmenting when preschool children were taught one skill or the other. Interventions that focus on phonological awareness need to include many aspects of the skill, including blending and segmenting.

Interventions that focus on phonological awareness can improve reading and academic outcomes for students who are at risk for reading disabilities (O'Connor, 2011). When these interventions positively affect phonological awareness capabilities in students, there are direct effects on reading abilities (Smith, Simmons, & Kameenui, 1998). Torgesen (2000) reviewed a number of studies focusing on reading interventions and also found that interventions focusing on phonological awareness, including blending and segmenting, were more effective than interventions teaching context clues, spelling patterns, and a number of other readings strategies.

***Phonological Awareness and Transfer in Second Language Learners***

Much research has been conducted investigating the transfer of phonological awareness between languages; these languages primarily focus on contexts involving the student's first language and English. Phonological awareness in one language (e.g., Spanish) can correspond to the same level of phonological awareness in another language (e.g., English) (Linan-Thompson, Vaughn, Prater, & Cirino, 2006). Genesee and Geva (2006) have shown that phonological

awareness is a general cognitive mechanism, and is not specific to any language. Additionally, phonological awareness can help with learning a second language. For example, young English language learners who received instruction focused on phonological awareness in kindergarten, and phonics instruction in grade one, were able to match reading levels with monolingual peers by the end of grade two (Lesaux & Siegel, 2003).

Connections between L1 and L2 can be further explained through the Competition Model (MacWhinney, 2002). The Competition Model (MacWhinney, 1997) is both connectionist and functionalist. This model posits that both first and second-language learning rely on cognitive structures. This model explains that when learning a new language, connections are made between both L1 and L2, in regards to sounds and meanings of words (MacWhinney, 2002). The greater the similarities between the languages, the easier it is to make connections. Eventually, the learner creates their own separate system in the L2, on a phonological level (MacWhinney, 2002), as these connections become stronger and more highly linked to vocabulary, phrases, and situations where the L2 is used (MacWhinney, 1997). Similarities between L1 and L2 can assist with language transfer between the two languages (Janssen, Segers, McQueen, & Verhoeven, 2015). For example, as Turkish students learning Dutch were more likely to show higher performance on Dutch phonetic distinctions when those distinctions were similar to Turkish phonetic distinctions. If specific L2 elements of language (e.g., a phoneme) seem similar to elements in L1, speakers learning the L2 will often substitute the L1 structure with which they are more familiar (Hammarberg, 1997). Similar sounds are said to be "equated" (Flege, 1992, p. 572). This perceived equivalence can transfer from one language to the other and is developmental in nature; as a learner becomes more proficient in L2, the use of the L1 elements may decrease (Hammarberg, 1997). Additionally, as one continues to learn the new language,

the L2 sounds will no longer be connected to similar L1 sounds, but equivalent sounds between L1 and L2 will continue to be associated (Flege, 1992). Cross-language transfer can occur between L1 and L2. If the child is proficient enough in L1, then the skills from the L1 can transfer to the L2 Durgunoglu, 2002).

***Lexical Specificity***

One way that phonological awareness is enhanced is by increased lexical specificity (Garlock, Walley, & Metsala, 2001). Just as phonological awareness is an antecedent to literacy, lexical specificity also predicts literacy. Lexical specificity is a term used to describe the "phonological specificity of words…[in] mental lexicons" (van Goch, McQueen, & Verhoeven, 2014, p.155). Lexical specificity is the knowledge of how words should sound in a language. For preliterate children, their mental lexicon needs to be specified to their own language in order to produce and understand speech, and subsequently, develop their reading abilities (van Goch, McQueen, & Verhoeven, 2014).

According to some experts (e.g., van Goch, McQueen, & Verhoeven, 2014) lexical specificity is not a skill to be learned, but a characteristic that develops as a child's lexical representations become more specific and detailed. This concept is explained by the Lexical Restructuring Hypothesis (Walley, 1993), which suggests that the representation of a word in the mental lexicon changes over time as a child develops. It begins as a broad representation, but gradually becomes more specific and detailed (Gruenenfelder & Pisoni, 2009). A young child has a small vocabulary, and thus can distinguish between the few words they know. As the child's vocabulary increases, they must be able to distinguish between more words and many similar words (e.g., bag, bad, bat, pat). Van Goch, McQueen, and Verhoeven (2014) compare obvious differences between "bear" and "dog" to be more general in comparison to the

differences between “bear” and “pear”. A younger child would be able to differentiate between the former pair, but would need to have a more specific phonological representation in the mental lexicon to differentiate between the latter pair. According to the Lexical Restructuring Hypothesis, this ability to distinguish between similar-sounding words happens as it is necessary, when words need to be distinguished from one another in order to understand (Gruenenfelder & Pisoni, 2009).

When students are learning a new language in an immersion classroom setting, they need to develop some lexical specificity in the new language (L2). Lexical skills are related to better word reading and comprehension (Perfetti & Hart, 2002). The nature of this lexical specificity needs to be effective and comprehensive in order to be of significant consequence to reading. This can be explained, in part, by the lexical quality hypothesis (Perfetti & Hart, 2002). Lexical quality reflects the “extent to which the reader’s knowledge of a given word represents the word’s form and meaning” (Perfetti, 2007, p. 359). This lexical quality of a word, as understood by a reader might be that one understands the difference between “night” and “knight”, or how “record” can be used as a noun or a verb (Perfetti, 2007). Additionally, the quality of the phonological form of the word allows rapid retrieval of the word and allows it to be easily differentiated from other words that sound similar (e.g., tornado vs. tomato). The lexical quality hypothesis supposes that if a word is understood poorly, (i.e., being of poor lexical quality), then this can interfere with word reading and comprehension (Perfetti, 2007). Differences in word reading ability are often due to the amount of exposure to a word; low-frequency reading words elicit less comprehension than high-frequency reading words (Perfetti, 2007). As evident in research by Janssen, Segers, McQueen, and Verhoeven (2015), phonological awareness, for example, understanding differences between similar sounding words (e.g., Dutch words *wak* and

*pak*), can contribute to lexical specificity and reading ability. Lexical specificity is a predictor of literacy (Garlock, Walley, & Metsala, 2001). Phonological awareness is a predictor of both lexical specificity and literacy (Segers, McQueen, & Verhoeven, 2015).

There is some evidence that training in lexical specificity can enhance phonological awareness in both L1 and L2, when examining children learning a new language. In a study by Janssen and colleagues (2015), kindergarten students who spoke Turkish (L1) and were learning Dutch (L2) were taught new words in Dutch that were similar to one another. These words differed on one minimal-pair (i.e., one acoustic-phonetic element). For example, they were taught *vak*, meaning "section," *wak*, meaning "ice hole," *pak*, meaning "package," and *rak*, meaning "straight part of a river." Not all of these words were known to the students, and some of the sounds produced by these words were present in both Dutch and Turkish, and some were only present in one of the languages (Janssen et al., 2015). Returning for a moment to the Competition Model, MacWhinney (2002) explains the ability to make connections between the sounds in both languages. This model also explains the eventual development of a separate language system for the L2, which is Dutch in the above study. While the Competition Model is a broad model involving many aspects of language, when explaining second language acquisition, this model focusses on how cognition plays a role in learning the L1 and L2, rather than learning linguistic structures (MacWhinney, 2002). More exposure to the L2 results in more effective development of L2 skills (MacWhinney, 2002). The results of this lexical specificity training showed that students whose L2 was Dutch were able to reach the equivalent level of their Dutch mono-lingual peers on measures of phonetic distinction (Janssen et al., 2015). Additionally, the Competition Model (MacWhinney, 1997) explains that the more similar the languages, the easier it is to make connections between the two. In the current study, the

languages are English and French, which contain many similar phones (Flege, 1981), making language transfer possible.

The current study builds on results from Janssen and colleagues (2015), although the lexical specificity task is not used as a training tool, but is used to understand how lexical specificity is related to literacy outcomes over time. This study will examine how similar the findings of Janssen et al. (2015) might be when conducted in a Canadian French immersion setting, where students will begin their education in English, and then experience French for the first time in grade one, but they were tested in grade two for this study. Of particular focus are the development of vocabulary and reading abilities.

***Memory***

Memory plays an essential role in the development of literacy skills. Working memory is correlated highly with reading scores (Gathercole, Woolgar, Kievit, Astle, Manly, & Holmes, 2016). When memory deficits occur in children, evident by low working memory and low short term memory skills, reading skills can be severely compromised (Gathercole et al., 2016). Working memory can be foundational for other cognitive abilities, including language, making deficits in memory connected to difficulties in numerous areas. More morphologically complex linguistic tasks are harder to recall than simpler tasks (Service & Maury, 2015). The creation of phonological representations in working memory can be an essential part of learning a new language (Service, 1992). For these reasons, memory will be a necessary aspect of investigation in this project.

***Paired Associate Learning***

Paired associate learning has a connection to memory as well. When learning to read successfully, it is important to make connections between a visual representation and a verbal

representation in long-term memory (Li, Shu, McBride-Chang, Liu, and Xue, 2009). Connecting an image to a word can be compared to connecting a letter or written word to a spoken word. This learning can be demonstrated by teaching children nonsense words that correspond with nonsense images. In a study of grade five and six students in China with reading difficulties, students with dyslexia were significantly worse at a visual-verbal paired associate learning task that children without dyslexia (Li et al., 2009). Recall on these tasks after a one-week delay demonstrated long-term retention by participants, demonstrating the important role of memory.

***Static and Dynamic Assessments***

One way to identify language issues before they can negatively affect learning is to use dynamic assessment, which differs from the conventional way to assess students. A conventional static assessment shows a student's ability on a particular task at a particular time; this can be done through any measure, for example, reading passages in French and answering comprehension questions. Erdos et al. (2014) used static measures of phonological awareness and letter-sound knowledge in L1 (English) to create risk profiles for kindergarten students learning French (L2). These authors acknowledge that when French immersion students have not yet become proficient in French or reading, it is difficult to assess how well they read in French (Erdos et al., 2014). To examine a student's ability on a task they have not yet learned, dynamic assessment can be used. This type of assessment focuses on the processes of learning the particular characteristics that are being examined (Camilleri, Hasson, & Dodd, 2014). Instead of testing a student on what they already know, dynamic assessment assesses how well the student can learn a concept or skill; it measures the potential for learning. With the examiners instruction, the participant's performance is modified in order to understand the learning potential of the individual (Swanson & Lussier, 2001). In this type of assessment, the student

interacts with the examiner. Instructions are given, strategies are taught, assistance is given when it is needed. This potential for learning new information can be measured by changes between unassisted and assisted performance, or the progression of the performance (Swanson & Lussier, 2001). For example, a student may be learning vocabulary words, and is given a strategy to learn these words. The student might be given hints or assistance when needed in order to successfully learn these words. This might be assessed by examining the student's ability to learn vocabulary words without assistance and again with assistance.

One could say that this type of assessment identifies a student's zone of proximal development (Vygotsky, 1997). In the zone of proximal development for a student, the tasks and materials cannot be too hard for the student to take part in, but they also cannot be too easy. This zone is where a student can successfully learn with assistance from a teacher, adult, or skilled peer. When participating in dynamic assessment, a student receives assistance from the examiner in order to learn the task or material. The dynamic assessment measures the changes that occur in a student's learning from unassisted to assisted performance (Swanson & Howard, 2005).

Dynamic assessments have been shown to predict end of kindergarten reading progress in early kindergarten non-readers when looking at phonemic awareness skills (Spector, 1992). Researchers using dynamic assessments have been able to distinguish between students with reading disabilities and poor readers; poor readers being those who have low reading abilities due to weak learning support, rather than a specific disability (Swanson & Howard, 2005). In one of these dynamic assessments, participants were asked to perform a task, and if they could not complete the task, a series of hints were given, or questions were asked until they could answer the question. In another task, participants were taught a number of strategies that could be used to solve problems, and they were encouraged to use these strategies when answering questions

(Swanson & Howard, 2005). Bridges and Catts (2011) have demonstrated that dynamic assessments of phonological awareness can be better predictors of end-of-year reading abilities for kindergarteners than static assessments. Dynamic assessments have been used to identify students at-risk for reading disabilities due to comprehension (Elleman, Compton, Fuchs, Fuchs, & Boulton, 2011). For these dynamic assessments, Elleman and colleagues (2011) also showed participants some inferencing strategies, and offered suggestions and cues as needed. Elleman and colleagues (2011) used dynamic assessments to measure reading comprehension more effectively than conventionally used standardized tests. Their dynamic assessment was able to more accurately identify students with poor reading comprehension in order to put interventions in place. A dynamic assessment measure of phonological processing in pre-readers can lead to early interventions, increasing this ability, and leading to better early readers (Wagner & Torgesen, 1987).

***Current Study***

Previous research has attempted to predict how deficits in L1 affect L2 learning in bilingual programs (e.g., Erdos et al., 2014), as well as how lexical specificity predicts language and literacy development (Janssen et al., 2015). This project builds on these results, but in a different environment. Janssen et al. (2015), found that participating in lexical specificity training where participants learned minimal pairs, can improve phoneme awareness and learn new vocabulary words in both L1 (Turkish) and L2 (Dutch). In the present study, we examined L2 (French) and L1 (English) in a dynamic way to predict literacy learning that has not yet occurred in L1, due to students learning to read for the first time in their L2. The assessment used in the present study is called a dynamic lexical specificity assessment. This is used to predict phonological awareness and vocabulary skills in both English (their first language – L1) and

French (their second language – L2). Walley and Metsala (1992) have shown that children as young as 5 years old already have quite a bit of metalexical knowledge about familiar and unfamiliar words.

The main objectives of the present study were to develop effective assessment tools that can be used to identify language difficulties in children entering a French immersion program and to determine whether dynamic assessment is a tool that can better inform language, reading, and vocabulary development than the tool of static assessment. This one-year longitudinal study examined if dynamic lexical specificity assessment can effectively predict vocabulary development and phonological awareness.

This study proposed that the use of dynamic assessment tools will help to identify students who are currently struggling with reading, or may struggle in the future. This study examined the language abilities of children in French immersion at the beginning of grade two. Dynamic lexical assessments were conducted in both languages (English and French). By October of grade two, children have had exposure to the French language for a half day each day for one year. The elicited information has been used to predict the students' performance in literacy in both languages retested six months later, at the end of their grade.

Additionally, measures of word reading, memory, and rapid automatized naming (RAN) have been used. The purpose of these tools is to create a full picture of reading development in French immersion students. Word reading is related to lexical skills (Perfetti & Hart, 2002), and this study examined various predictors of word reading. RAN is a way to test phonological coding as the participant has to visually identify the stimuli and then verbally express what they have seen (Wagner & Torgeson, 1987). RAN has also been shown to be highly correlated with lexical access from memory (Leong, Tse, Loh, & Hau, 2008). Memory plays a significant role in

the development of reading abilities, with impairments in working memory significantly impairing the acquisition of reading skills (Gathercole, Alloway, Willis, Adams, 2006). Rapid automatized naming has been shown to predict English word recognition (Cho & Chiu, 2015).

***School and Age Effects***

This study is part of a larger project, with sites in Toronto, Canada and Nijmegen, Netherlands. Participants in each location in the study have different language experiences due to variability in instruction and programming. In Toronto, French immersion education begins in senior kindergarten, when students are approximately 5 years old (Toronto District School Board, 2014). In Nijmegen, kindergarten lasts two years, starting when the child turns four years old (Janssen et al., 2015). These ages are contrasted with students in the Waterloo Region District School Board, where students begin French immersion in grade one, during their sixth year of age. One benefit for having these different sites is to compare age and school effects of language development. Although part of a much larger project, the current study only examines the Kitchener-Waterloo data.

Since each site begins language immersion at a different age (four, five, six years of age), it is possible to examine age and school effects as outlined by Morrison, Smith, and Dow-Ehrensberger (1995). These authors were able to look at age and school effects by examining children who were on either sides of date cut-off for school. These children were close in age, but those born earlier (within two months before the date) were in school, and those born later (within two months after the date), were not yet attending school. When these authors examined the phonemic awareness and reading skills of these participants, they concluded that reading instruction in school played a significant role in the development of these skills. Students who received no reading instruction, because they were not in school, improved minimally in

phonemic awareness and did not improve at all in reading scores, over the year-long course of this study. It should be noted, that in Kitchener-Waterloo, where students begin French immersion in grade one, they have already attended school for one year, in English (or two, if they attended junior kindergarten) and received some literacy instruction in English during this senior kindergarten year. Comparisons between sites are not a part of this project, but will be utilised in the future.

**Research Questions**

The two main research questions for the present study focused on vocabulary development and identification of effective measures.

Question 1. Specifically, with respect to vocabulary development, the study examined whether the dynamic measures at Time 1 would predict vocabulary at Time 2 better than static measures at Time 1, in both languages. Hypotheses: Given that dynamic assessment measures provide an indication of how well a student learns, this type of assessment would be expected to be a better predictor of the development of vocabulary, than a static assessment. The dynamic assessment measures in this study are the lexical specificity dynamic measure, and the dynamic name learning task. They are compared to static measures of vocabulary in English and in French. Relationships between naming variables will be compared to look for growth between Time 1 and Time 2. Additionally, the Time 2 English vocabulary will be examined in order to see what predicts the variability. Time 1 English vocabulary will likely predict Time 2 English vocabulary, but also lexical specificity will add some variability and may be a strong predictor of Time 2 English vocabulary. As vocabulary knowledge is a precursor to reading, the dynamic assessments are best used to see if they can predict vocabulary. These measures are intended to be used on students who are not yet proficient readers, either in their L1 (English) or their L2

(French). This will lead into a skill that develops through the development of vocabulary: reading.

Question 2. The second question concerns reading at Time 2. Specifically, what measures will predict Time 2 reading? Hypotheses: It is expected that Time 1 lexical specificity and Time 1 reading (measured by word knowledge) will predict Time 2 reading. Other predictors of Time 2 reading will be phonological awareness (measured by elision and blending), phonological memory (measured by memory for digits), and rapid naming (measured by RAN). In examining the connections between these measures, the main interest is in which model will best explain the connections between lexical specificity, phonemic awareness, and reading. A hypothesized model suggests that lexical specificity will predict phonemic awareness (Garlock, Walley, & Metsala, 2001), which will predict phonemic awareness (Juel, 1988). This model will be examined across languages and between languages. It is expected that English measures of lexical specificity and phonological awareness (i.e., elision and blending tasks) will predict English word reading as well as French word reading. French measures of lexical specificity and phonological awareness will predict French word reading.

For a summary table outlining constructs and measures, see Table 1.

## Methods

### Participants

Although the larger study includes participants from Toronto and Nijimen, the current study only focuses on participants at the Kitchener-Waterloo site. Thirty-eight students enrolled in grade two French immersion programs in the Waterloo Region District School Board were involved in this study. In this school board, French immersion begins in grade one, and 50% of

the school day is conducted in French with the remaining 50% conducted in English (Waterloo Region District School Board, n.d.).

At the beginning of the project, the students had already participated in one year of French immersion education during their grade one year. In order to focus solely on English and French languages, only students who primarily and fluently speak English at home were included; fluency in English was determined by their classroom teacher, other language fluency was determined by the parent questionnaire.

At the beginning of the project, there were 38 participants. One student moved halfway through the project, so there were 37 participants in the end. These students attended 6 different schools; four of the schools are located in Waterloo and two of the schools are located in Kitchener. Seventeen of the participants were girls, and 20 were boys. The mean age of participants at Time 1 was 88.95 months (approximately 7 years, 4 months), and at Time 2 the mean age was 93.59 months (approximately 7 years, 9 months). All participants were within the average range ($M$ = 37.82, $SD$ = 10.96) on a non-verbal reasoning task.

**Demographics**

The demographic questionnaire was given to parents along with the consent form in order to determine what languages the participants speak at home with their parents (for the full questionnaire, see Appendix G).

What follows is a summary of the information collected from this questionnaire.

Out of 38 participants, 91% were born in Canada. The others were born in the United States (2) and Iran (1). Out of all the parents, 69% were born in Canada. Parents born outside of Canada were born in China, Iran, Pakistan, Russia, India, Japan, Romania, Jamaica, Turkey, and Eritrea.

Parents were asked for their child's first language. English was the first language for 70% of the children. Two children spoke English and another language as their first language. Other first languages spoken by children were: Japanese, Chinese (not specified), Mandarin, Farsi, Hindi Urdu, Russian, and Tigrinya. The mean age at which all children began speaking English was 19.38 months.

Parents were asked what language they primarily speak at home with their children, and 75% said English. Other languages they speak are: Japanese, Chinese (not specified), Ukrainian, Mandarin, Farsi, Urdu, Hungarian, Hindi, Russian, Tigrinya, Romanian, Italian, Turkish, Amharic, and Punjabi, all in varying amounts.

All children began French immersion at 6 or 7 years of age, in grade one. Out of all parents, 41% said they speak some French at home with their children (although they all responded that this happens rarely).

Parents were asked about the number of books in their homes. Overall, 70% of parents indicated they had over 100 English books in their home, and 24% had 50-100 English books in their home. The remainder had fewer than 50 English books in their home. In addition, 16% of parents said they had 25-50 French books at home, 24% indicated they had 10-25 French books at home. The remaining parents had fewer than 10 French books at home (zero books was also an option in this category).

**Measures**

An initial email to principals (see Appendix A) and a principal information letter (Appendix B) and principal consent form (Appendix C) were used to inform principals about the study. An information letter, a consent form, and a demographic questionnaire were sent home to be filled out by parents (see Appendices D, E, and F). This questionnaire was adapted from a

commonly used demographic measure, the Alberta Language Environment Questionnaire (Paradis, 2011).

During the testing with students, a number of measures were used (see Table 1). They are divided into static measures and dynamic measures.

**Static measures:**

**Rapid Automatized Naming (English and French)**. Rapid Automatized Naming (RAN) (CTOPP-2; Wagner et al., 2013) was used in both English and French. For this measure, participants were asked to read a series of numbers as fast as they could in the language that is specified. Participants were first given a practice session, where they are presented with six numbers. After this, they are shown 36 numbers on a page. The length of time it took to read these numbers was recorded, as well as the number of errors.

**Nonverbal reasoning**. Nonverbal reasoning was measured using Matrix Analogies Test – Extended Form (MAT; Naglieri, 1985). There are four sections to this measure: pattern completion, reasoning by analogy, serial reasoning, and spatial visualization. For this task, participants were asked to complete a matrix by choosing the missing item. Participants chose which image they felt was missing from the original picture; they did so by pointing to their choice from five or six different pieces. This is not a language-based assessment, however, the instructions were given in English.

**Phonological Awareness (English and French)**. To assess phonological awareness, sub-tests from the Complete Test of Phonological Processing, Second Edition (CTOPP-2; Wagner et al., 2013) were administered in English. In CTOPP-2, there are two subtests that were used: elision and blending of real words. Each test was conducted as outlined by the test.

For the elision task, there are 34 items, and for each item the participants were asked to delete a syllable or phoneme from words and to say what remains after the deletion (e.g., Say "bold". Now say, "bold" without the /b/). The test was stopped once the participant missed three items in a row, or if they finished all 34 items.

In the blending words task of CTOPP-2, participants listened to a recording of a voice saying two or more phonemes. The participant was then asked to put the different parts together to make a word, which they said out loud. There are 33 different sets of phonemes, and each set contains at least two phonemes (the earliest sets) and at most 10 phonemes (the last sets). Testing was discontinued when the participants made 3 words incorrect responses in a row, or if they finished all the words. One example of this is "What word do these sounds make? n-ô."

In French, to assess phonological awareness, the French version of CTOPP was be used. The elision and blending portions were used. The French version was the same as the English, but the words and sounds are in French. For example, in the elision section, participants were asked "What word do these sounds make? /tô/-/bé/ ?" Answer: "*tomber*" ('to fall down'). For the elision task, the internal consistency on this measure was calculated and Cronbach's alpha was .779 (Wagner et al., 2013). For the French blending task, the Cronbach's alpha was -.526 when this task was used previously.

**Word Reading (English and French)**. For English word reading, the Letter-Word identification subtest from the Woodcock-Johnson Test of Achievement III (Woodcock, Johnson, & Mather, 1990) was used. This measure assesses letter recognition as well as the accuracy of sight word reading. For this measure, participants were presented with a number of pages containing a series of words, each one progressively more difficult than the word before. For example, the list of reading words begins with "is," "and," and "go," and ends with

"ignominious," "tricot," and "gouache." Participants read as many of the letters and words as they could until they incorrectly read six in a row, or until they had read all the words.

For French word reading, the Wechsler Individual Achievement Test II (WIAT-II; Wechsler, 2001) Word Reading was used. This test is similar to the English test. Students were asked to name a list of letters in French, "*Dis-moi le noms de ces lettres"* ("Tell me the name of these letters"). Participants were then asked to read words aloud, as best they could from a list of 84 words. These words varied in grapheme-phoneme regularity as well as the number of syllables. These words were progressively harder as the list continued, starting with *tu* and ending with *actinoptérygiens.* The WIAT-II has been standardized on French-speaking Canadian children (Wechsler, 2001). The Cronbach's alpha was 0.95 in previous uses of this measure (Johnson, Marlow, & Wolke, 2012).

**Receptive Vocabulary (English and French)**. To assess the breadth of receptive vocabulary in English, Form A of the Peabody Picture Vocabulary Test-IV (PPVT; Dunn & Dunn, 2007) was used. For French receptive vocabulary, Form A of the *Échelle de Vocabulaire en Images Peabody* (EVIP; Dunn et al., 1993) was used.

The PPVT test contains 228 real word items of increasing difficulty, organized into sets of 12. The participant was asked to select one of four pictures which matched a word that was presented orally. For example, the student might be asked to point to the picture that shows someone "laughing". The participant began at an age-appropriate point in the test and continued until they get eight or more items wrong within each set of twelve.

The EVIP was administered in a similar manner, with instructions given in French. For example, the participant might be asked "*Mets ton doigt sur 'table'*" ("Put your finger on 'table.'") The student started at the beginning of the test, and continued until they got six

incorrect within an eight item set. The items are different from the English items. This test contained 170 items.

**Dynamic measures:**

**Dynamic name learning assessment (English and French)**. This learning task involves paired-associate, fast-mapping, vocabulary learning. It has been adapted from a task used by Li, and colleagues (2009) in their study on paired associate learning. This task was administered once in English and once in French. The task was presented as a game: Zola's Matching Game. The story presented to the participants was that Zola the polar bear likes to give weird names to weird objects. For each language, the child was shown six (6) pictures of odd-looking objects on cards and told their fictitious names. The pictures and names were not recognized by the children, as they had been created for this assessment (see Appendix H for English and Appendix I for French). The order of words was different each time, with the cards shuffled between each trial, so that each student did not learn the names in the same order. A specific name (e.g., kesso) went with each picture which the participants were asked to memorize. All of the object names are actually pseudo-words. One half of the object names in the English task contain sounds specific to the L1 (English). One half of the object names in the French task contain sounds specific to the L2 (French). The remaining half of the object names in both tasks share L1 and L2 sounds.

Participants were presented each name and an image of the object one at a time for one learning trial and six test trials. The name was provided orally. After each object was presented, the children were asked to repeat the word. This ensured that they had some minimal acquisition, and that corrections could be made for pronunciation during the learning trial. After this, during the first trial, the participants were shown pictures of the objects and asked to say the name of

each object ("What is the name of this picture?"). Participants were encouraged to try their best if they were unable to remember the name of the object on the card. They were given the correct answer if they made a mistake or did not know the name of the object. There were a total of six trials, each conducted in the same manner as the first, with the cards shuffled between trials so the cards were presented in a different order each time. Answers from each test trial were recorded on an audio recorder, as well as a paper response sheet (see Appendices J and K). The English and the French version of this task took place on separate testing occasions (i.e., different days). Each name learning task took between 5 to 15 minutes. For English name learning, the Cronbach's α at Time 1 and Time 2 were .94 and .93, respectively. For French name learning, the Cronbach's α at Time 1 and Time 2 were .90 and .91, respectively.

**Dynamic lexical specificity learning assessment (English and French)**. A computerized word learning game was used to assess vocabulary trainability. This game was presented as Ziggy's Word Game, with a cartoon monkey appearing on the computer screen. Participants were given oral instructions, which were recorded in the language of administration. The assessment was administered twice, on separate days: once for the English assessment, and once for the French assessment. The participants were presented with four pictures and oral instructions said, "Show me the [TARGET]". Participants selected a key that corresponded to a picture.

This program was created by the researchers, based on a similar one used by Janssen and colleagues (2015). The current version used English and French, with different words and images. This assessment involved two tools: a game in English, and one in French. These learning games were created using E-Prime 2.0 software (Psychology Software Tools, 2012).

Participants were taught new words with only minimal phonological differences (minimal pairs) and were assessed on how well they are able to learn these new words.

Participants learned a series of quadruplets of monosyllabic words with corresponding pictures (see Appendix L for English quadruplets and Appendix M for French quadruplets). A quadruplet consisted of four words: two unfamiliar target words that differ on one acoustic-phonetic feature (in manner of articulation), one unfamiliar control word, and one familiar control word. The control words were very similar, but differed on at most two acoustic-phonetic features from the two target words. All four words were matched on type (i.e., manner, place, voice or height) and place of distinction (i.e., initial or final for consonants, and medial for vowels). In the dynamic assessment tasks, half of the sets of words were unique to that language (French or English) and the other half were shared between the languages (French and English). That is, for the French task, half the words were unique to French (L2) and half the words were shared between French and English (Dynamic Assessment 1 (DA 1)). For the English task, half the words were unique to English (L1) and the other half were shared between French and English (DA2). These words were identified as familiar and unfamiliar (on a 5-point scale) by 6 primary French immersion teachers in Toronto and Kitchener-Waterloo. Items that measured as highly familiar, or highly unfamiliar, were used in the game. There were 20 quadruplet groupings (i.e., 20 groupings of four words) in each language, resulting in 96 words, not including filler words.

For each dynamic assessment, filler items were taken from word frequency lists in each language. The English filler words were taken from the MRC Psycholinguistic Database (Wilson, 1998). This database utilizes data from a number of sources, including word frequency lists and semantic word norms. Parameters entered into the database were that the words needed

to be monosyllabic, and the age of acquisition for the word was between the ages of one year and four years. This resulted in a list of 454 words. From these words, any of those that did not differ in at least two acoustic features from the target words were eliminated. Additional words were eliminated if they were a difficult concept to be addressed by picture (e.g., aim, gain). For a complete list of English filler words see Appendix N. The Cronbach's α for English lexical specificity at Time 1 and Time 2 were .83 and .79, respectively.α

The French filler words were taken from the Manulex database (Ortéga, & Lété, 2010). This database was created using French primary school reading books that are used between grades one and five. The words chosen for this game needed to be highly frequent in the reading books so that they were known by children of the age in this study. From the Manulex database, words used frequently in grade one reading texts were chosen. For French lexical specificity, the Cronbach's α at Time 1 and Time 2 were .82 and .77, respectively. For a complete list of French filler words see Appendix O.

Each trial of the dynamic assessment began with the presentation of four pictures. Two of the pictures showed the very familiar filler items (e.g., ball and car, in English; *lune* and *roi* in French), that were unrelated to the target and control words both phonologically and semantically. The other two pictures showed the target and control words (the experimental items). While the pictures were presented, an audio message said, "Show me the [TARGET]". The participant pressed a key that corresponded to one of the pictures on the computer screen to indicate their response to the question. If the participant chose the correct picture, a picture of a smiling cartoon face appeared on the screen, giving positive feedback. If the participant chose an incorrect picture, nothing appeared on the screen; no feedback was given.

Participants were explicitly taught a strategy for determining what picture refers to the target, by narrowing down the words the student knew and eliminating those options. The strategy was taught for the practice items. This was done by having the researcher go over each picture with the participant, discussing the words for each image, and trying to determine what image is correct. For example, the first practice item asked the participant to "Show me the fob." The researcher went over each image, asking if it is the fob, leading the participant to decide which image shows the fob. Participants then took part in five training sessions, with the possibility to get input from the research assistant conducting the trial. Students were asked if they understood, and the research assistant would see if the student was correctly identifying the target item. For a list of training items, see Appendix P for English and Appendix Q for French.

There were three blocks of assessment during each game. For the first block (easy), each target word was paired with a familiar control and two filler items; this was done for each target word. For the second block (hard), the target word was paired with the unfamiliar control and two different filler items; again, this was done for each target word. For block 3 (test phase), both unfamiliar target words in the quadruplet were paired with two other filler items. For example, one quadruplet used is: foal (target 1), sole (target 2), knoll (unfamiliar control) and bowl (familiar control). For these words, the blocks were as follows. Block 1 (easy) – foal (target), bowl (familiar control), arm (filler word) and sink (filler word); then sole (target), bowl (familiar control), tent (filler word), and cage (filler word). Block 2 (hard) – foal (target word), knoll (unfamiliar control), bird (filler word), and dive (filler word), then sole (target), knoll (unfamiliar control), case (filler word), and pig (filler word). Block 3 (test phase) – foal (target 1), sole (target 2), egg (filler word), and cake (filler word).

Within each block the quadruplets were randomly presented, with each grouping remaining intact, but the order in which the groups of items were presented varied. Additionally, there were nine supportive quadruplets with obvious targets (e.g., mouse, frog) interspersed throughout to give participants an almost certain positive smiling face, as they likely knew these words. For these supportive items, see Appendix R for English and Appendix S for French. The remaining filler item in each task were taken from the English and French filler lists (Appendices M and N). The English and French dynamic assessments took approximately 20 minutes each.

**Procedure**

Ethics approval was received from Wilfrid Laurier University as well as from the Waterloo Region District School Board. Schools were selected from all the schools that offer grade two French immersion in the Waterloo Region District School Board; this amounted to 23 schools. Contact letters were sent to principals by email which explained the study (see Appendix B). Follow-up contact was made with principals to inquire about their school's interest in the project. In the end, five schools were interested in participating (two participants who attend a sixth school were recruited outside of the school through acquaintances of the researcher). When principal approval was given, and the principal had spoken with the classroom teachers, teachers were contacted by email to answer any questions and to set up testing times. Teachers were given information about what the testing involved, but this would not impact what the students are taught in class. These assessments were not ones that teachers would necessarily be familiar with, and they would not have opportunities to prep students for these tasks, even if they wanted to do so. Once classroom had accepted participation in the study, parents were given information and consent forms (Appendices B and C). Participants were informed of the project orally. They were told that participation is voluntary and they may decline without any adverse

consequences, and that even if they initially consent and assent to participate they could always change their mind later.

Participants were tested by graduate and undergraduate students trained in the measures. Participants were tested twice; once in the fall of grade two (October to December), and a second time in the spring of grade two (March). Participants were asked to participate in many language assessments in both English and French, and work one-on-one with a researcher in a quiet place at their school during the school day. Different assessments were used at Time 1 (beginning of grade 2) and Time 2 (end of grade 2). Time 1 measures were: demographic questionnaire, RAN (English and French), PPVT (English), WJ letter-word identification (English), CTOPP-2 Elision and Blending (English), lexical specificity task (English and French), dynamic assessment name learning task (English and French), memory for digits (English), EVIP (French), WIAT letter-knowledge (French), WIAT word reading (French), elision and blending (French), and MAT nonverbal reasoning. Time 2 measures included: RAN (English and French), PPVT (English), WJ letter-word identification (English), CTOPP-2 Elision and Blending (English), lexical specificity task (English and French), dynamic assessment name learning task (English and French), memory for digits (English), EVIP (French), WIAT letter-knowledge (French, WIAT word reading (French), and elision and blending (French). The assessments took approximately three hours at Time 1 and three hours at Time 2. Breaks were given frequently to the participants. Five dollars were given each time to the school for each student that participated in the study, for a total of $10 per student for the entire study. This money was intended to be used to purchase materials for the classroom.

# Results

## Plan for Analyses

This project aimed to identify which measures of language predict reading and language abilities in both English and French for French immersion students. Descriptive statistics and correlational analyses for relevant measures are included to determine the distribution of scores and relations among measures.

Regression analyses are explained for both research questions using regression analyses.

1. Dynamic and static measures are compared in both languages in order to determine which type of assessment is a better predictor of vocabulary. The hypothesis is that dynamic assessments would be better predictors of vocabulary than static assessments.

2. Numerous measures are analyzed to determine the best predictors of word reading in both languages. The hypothesis is that lexical specificity, reading, phonological awareness, phonological memory, and rapid naming will all predict word reading.

## Descriptive Statistics

All participants were included in the analyses: 38 participants at Time 1, and 37 participants at Time 2. The means and standard deviations are reported in Tables 2, 3, and 4, which are separated by languages and time conditions. Table 2 shows the descriptive statistics for age and gender of participants. Table 3 shows the descriptive statistics for measures in English at both Time 1 and Time 2. Scores for name learning, lexical specificity, elision, and word reading all increased from Time 1 to Time 2 in English. Scores for PPVT, blending, and rapid naming all decreased, but these decreases were not statistically significant. In the case of RAN, a decrease means participants are getting faster, as this is a timed activity. These decreases may be due to ceiling effects. Table 4 shows the descriptive statistics for measures in French at

both Time 1 and Time 2. All French measures increased from Time 1 to Time 2. Table 5 shows descriptive statistics for the non-verbal measure. In examining the standard scores, all means were at least in the average range. At Time 1, mean standard scores for the PPVT and Woodcock Johnson word reading were one standard deviation above the mean. However, these scores were within one standard deviation of the mean at Time 2, possibly suggesting regression to the mean.

Comparisons were made between students who spoke primarily English at home, and those who spoke primarily another language at home, to see if there were any differences in the measures. There were significant differences between the two groups on the measures of: English rapid naming at Time 1 and Time 2, French rapid naming at Time 1, French vocabulary at Time 1 and Time 2, French letter knowledge at Time 2, French word reading at Time 1, French phonological awareness (blending) at Time 2, and French name learning at Time 1. All differences favoured the group who spoke another language at home. No differences were found for the dynamic measures. For a complete table of comparisons between these two groups, see Appendix U.

**Mean Comparisons**

Means were compared to examine changes over time. English lexical specificity scores were significantly different across times, $t_{(36)} = 4.88$, $p < .001$. English word reading scores were significantly different across times, $t_{(36)} = 5.87$, $p < .001$. English name learning performance was significantly different across times, $t_{(36)} = 12.92$, $p < .001$. French lexical specificity performance was significantly different across times, $t_{(36)} = 3.33$, $p = .002$. French word reading scores were significantly different across times, $t_{(36)} = 2.64$, $p = .012$. French phonological awareness (blending) was significantly different across times, $t_{(36)} = 3.33$, $p = .002$. French name learning performance was significantly different across times, $t_{(36)} = 6.35$, $p < .001$. These

comparisons and the other non-significant ones are listed in Table 3 for English measures and Table 4 for French measures.

**Correlational Analyses**

The correlations between all variables were analyzed and presented in Tables 6 and 7. Table 6 contains correlations between variables at Time 1, and correlations between variables at Time 2. Table 7 contains correlations between variables at Time 1 and Time 2.

Examining correlations among measures at Time 1, English lexical specificity was related to English vocabulary, English phonological awareness (elision), French lexical specificity, and French phonological awareness (elision). English vocabulary at Time 1 was related to English lexical specificity, English word reading, English phonological awareness (elision), English name learning, French vocabulary, French word reading, French phonological awareness (elision) and French name learning. English word reading at Time 1 was related to English vocabulary, phonological awareness (elision) and name learning and to French vocabulary, word reading, phonological awareness (elision), and name learning at Time 1. English phonological awareness (elision) at Time 1 was related to English vocabulary, English word reading, English name learning, French vocabulary, French word reading, and French phonological awareness (elision). English name learning at Time 1 was related to English vocabulary, word reading, phonological awareness (elision) and to French word reading, phonological awareness (elision), and French name learning at Time 1. See Table 6 for all correlations.

Examining correlations among French measures at Time 1, French vocabulary was related to French lexical specificity, and French word reading. French word reading was related

to French lexical specificity, French vocabulary, French phonological awareness (elision), and French name learning. Table 6 shows these correlations.

Examining English measures at Time 2, English lexical specificity was related to English vocabulary, word reading, phonological awareness (elision), name learning, and French lexical specificity, and French word reading. English vocabulary was related to English lexical specificity, word reading, phonological awareness (elision) and name learning, French vocabulary, word reading, and phonological awareness (elision). English word reading was related to English lexical specificity, vocabulary, phonological awareness (elision), name learning. English word reading was also related to French lexical specificity, vocabulary and word reading, phonological awareness (elision), and name learning. English phonological awareness (elision) was related to English lexical specificity, English vocabulary, English phonological awareness (elision), French word reading, and French phonological awareness (elision). English name learning was related to English lexical specificity, English vocabulary, English word reading, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. Table 6 shows these correlations.

Examining French measures at Time 2, French lexical specificity was related to French vocabulary, French word reading, and French phonological awareness (elision). French vocabulary at Time 2 was related to French lexical specificity, French word reading, French phonological awareness (elision), and French name learning. French word reading was related to French lexical specificity, French vocabulary, French phonological awareness (elision), and French name learning. French phonological awareness (elision) was related to French lexical specificity, French vocabulary, French word reading, French phonological awareness (elision),

and French name learning. French name learning was related to French vocabulary, French word reading, and French phonological awareness (elision). Table 6 shows these correlations.

Examining correlations between Time 1 and Time 2 for English, English lexical specificity at Time 1 was related to the following measures at Time 2: English lexical specificity, English vocabulary, English word reading, and English phonological awareness (elision). English vocabulary at Time 1 was related to the following measures at Time 2: English lexical specificity, English vocabulary, English word reading, English phonological awareness (elision), English name learning, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. English word reading at Time 1 was related to the following measures at Time 2: English lexical specificity, English vocabulary, English phonological awareness (elision), English name learning, French lexical specificity, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. English phonological awareness (elision) at Time 1 was related to the following measures at Time 2: English vocabulary, English phonological awareness (elision), English name learning, French vocabulary, French word reading, and French phonological awareness (elision). English name learning at Time 1 was related to the following measures at Time 2: English vocabulary, English phonological awareness (elision), English name learning, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. Table 7 shows these correlations.

Examining correlations between Time 1 and Time 2 for French, French lexical specificity at Time 1 was related to the following measures at Time 2: English lexical specificity, English word reading, French lexical specificity, and French word reading. French vocabulary at Time 1 was related to the following measures at Time 2: English word reading, French lexical

specificity, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. French word reading at Time 1 was related to the following measures at Time 2: English vocabulary, English word reading, English phonological awareness (elision), English name learning, French lexical specificity, French vocabulary, French word reading, French phonological awareness (elision), and French name learning. French phonological awareness (elision) at Time 1 was related to the following measures at Time 2: English word reading, English phonological awareness (elision), English name learning, French vocabulary, French word reading, and French phonological awareness (elision). French name learning at Time 1 was related to the following measures at Time 2: English word reading, English phonological awareness (elision), French phonological awareness (elision), and French name learning. Table 7 shows these correlations. For a more detailed description of correlations, organized by research questions, see Appendix T.

**Regression Analyses**

Given the sample size of 37, the decision was made to enter three variables maximum in the regressions.

**Research Question 1: Will dynamic assessment measures at Time 1 predict vocabulary at Time 2 better than static measures?** To answer this question, relations among performance on each type of assessment in both languages we examined.

**a) Will the dynamic measures at Time 1 predict vocabulary at Time 2 in English?**

A multiple regression analysis was conducted to determine if English dynamic measures at Time 1 predict English vocabulary at Time 2. English dynamic measures (lexical specificity and name learning) at Time 1 were entered as the independent variables, and English vocabulary at Time 2 was entered as the dependent variable. Linear regression showed that English dynamic

measures at Time 1 predict English vocabulary at Time 2, $R^2 = .42$, $F_{(2,34)} = 12.68$, $p < .001$. Both dynamic assessment (lexical specificity and name learning) measures predicted significant differences in English vocabulary. Specifically, lexical specificity was related to English vocabulary, $\beta = .385$, $t = 2.95$, $p < .01$ as was naming learning, $\beta = .488$, $t = 3.74$, $p < .001$ (See Table 8).

**b) Will the static measures at Time 1 predict vocabulary at Time 2 in English?**

A multiple regression analysis was conducted to determine if English static measures (word reading, phonological awareness (elision task) and phonological awareness (blending task) at Time 1 predict English vocabulary at Time 2. English static measures at Time 1 were entered as the independent variables, and English vocabulary at Time 2 was entered as the dependent variable. This analysis showed that English static measures at Time 1 did not predict English vocabulary measures at Time 2, $R^2 = .19$, $F_{(3,33)} = 2.59$, $p = .070$. None of the static assessment measures (word reading, phonological awareness (elision task) and phonological awareness (blending task) predicted significant differences in English vocabulary (see details in Table 9).

**c) Which measures at Time 1, dynamic or static, are better predictors of vocabulary at Time 2 in English?**

Since dynamic measures at Time 1 predicted vocabulary at Time 2, $R^2 = .42$, $F_{(2,34)} = 12.68$, $p < .001$ (see Table 8), and none of the static measures at Time 1 predicted vocabulary at Time 2, $R^2 = .19$, $F_{(3,33)} = 2.59$, $p = .07$ (see Table 9), the dynamic measures at Time 1 were better predictors of vocabulary at Time 2 in English.

**d) Will the dynamic measures at Time 1 predict vocabulary at Time 2 in French?**

The same multiple regression analysis was conducted in French, using the equivalent French measures. French dynamic measures (lexical specificity and name learning) at Time 1

were entered as the independent variables, and the French vocabulary measure at Time 2 was entered as the dependent variable. French dynamic measures (lexical specificity and name learning) at Time 1 predicted French vocabulary at Time 2, $R^2 = .17$, $F_{(2,34)} = 3.42$, p = .044. Visual inspection of the coefficient table showed that although the full analysis including both variables produced a significant F-statistic, when the significance level of the two French dynamic measures were examined separately, they did not predict vocabulary on their own. French lexical specificity at Time 1 on its own did not predict French vocabulary at Time 2 $\beta$ = .28, $t_{(34)} = 1.75$, $p = .089$, and French name learning at Time 1 on its own also did not predict French vocabulary at Time 2, ß = .26, $t_{(34)} = 1.67$, $p = .105$ (see details in Table 10).

**e) Will the static measures at Time 1 predict vocabulary at Time 2 in French?**

For this multiple regression analysis, French static measures (letter knowledge, word reading, phonological awareness (elision task) and phonological awareness (blending task) at Time 1 were entered as the independent variables in the regression analysis, and the French vocabulary measure at Time 2 was entered as the dependent variable. French dynamic measures (lexical specificity and name learning) at Time 1 were shown to predict French vocabulary at Time 2, $R^2 = .33$, $F_{(4,32)} = 4.02$, p = .009. However, when looking at the individual coefficients, French word reading at Time 1 was the only significant predictor of French vocabulary at Time 2, $\beta = .48$, $t_{(34)} = 2.45$, $p = .018$. No other measures predicted significant differences in French vocabulary at Time 2 (See Table 11).

**f) Which measures at Time 1, dynamic or static, are better predictors of vocabulary at Time 2 in French?**

In French, both dynamic measures at Time 1 predict vocabulary at Time 2, and all static measures at Time 1 predict vocabulary at Time 2. However, when the two dynamic measures

and word reading were entered in a multiple regression analysis, only word reading at Time 1 predicted vocabulary at Time 2, $\beta = .475$, $t = 2.49$, $p = .018$. Therefore, the static assessments appear to be better predictors of vocabulary (See Table 11).

**Research Question 2: What measures will predict Time 2 word reading?**

**a) Will lexical specificity at Time 1 and word reading at Time 1 predict word reading at Time 2 in English?**

Lexical specificity measures in English at Time 1 and word reading measures in English at Time 1 were entered as the independent variables in a linear regression, and English word reading at Time 2 was entered as the dependent variable. English lexical specificity and word reading were shown to predict English word reading at Time 2, $R^2 = .88$, $F_{(2,34)} = 124.81$, $p < .001$ (see details in Table 12).

To further explore predictors of word reading at Time 2 in English, Time 1 phonological awareness as measured by elision was included in addition to Time 1 word reading and Time 1 lexical specificity in a hierarchical regression analysis to determine the unique variance contributed by the independent variables in the model. Elision was selected as the phonological awareness variable to be included in the analyses to reduce the number of variables. Also, elision is more highly related to later reading skills. The first model included English word reading at Time 1 and English phonological awareness (elision task) at Time 1 entered as the first step as predictors of English word reading at Time 2. These measures predicted word reading, $R^2 = .85$, $F_{(2,34)} = 99.36$, $p < .001$. However, looking at the measures separately, only English word reading at Time 1 predicted word reading at Time 2, $\beta = .84$, $t_{(34)} = 9.20$, $p < 000$, whereas the English elision task at Time 1 did not predict English word reading at Time 2, $\beta = .12$, $t_{(34)} = 1.27$, $p = .214$. In the second step, English lexical specificity at Time 1 was entered into the

model, along with English word reading at Time 1 and the elision task at Time 1. This model significantly predicted word reading at Time 2, $R^2 = .88$, $F_{(2,34)} = 82.68$, $p < .001$. When looking at the individual measures within this model, both word reading at Time 1, ß = .84, $t_{(34)} = 10.11$, $p < .001$, and lexical specificity at Time 1, $\beta = .18$, $t_{(34)} = 2.84$, $p = .008$, were unique predictors of word reading at Time 2. The elision task at Time 1 did not predict word reading at Time 2 in this second model, $\beta = .07$, $t_{(34)} = .83$, $p = .413$ (See Table 13).

To examine this further, these same measures were entered in a series of hierarchical regression analyses in a different order. In the first step, the model was tested to determine if English lexical specificity at Time 1 would predict English word reading at Time 2. As a model, this measure predicted word reading, $R^2 = .12$, $F_{(1,35)} = 4.79$, $p = .035$. In the second step, English phonological awareness (elision task) at Time 1 was added, along with the previous measures of English lexical specificity at Time 1. This model significantly predicted English word reading at Time 2, $R^2 = .52$, $F_{(2,34)} = 18.36$, $p < .001$. When looking at the individual measures within this model, only English phonological awareness (elision task) at Time 1 predicted English word reading at Time 2, $\beta = .65$, $t_{(34)} = 5.31$, $p < .001$. English lexical specificity at Time 1 did not predict English word reading at Time 2, $\beta = .18$, $t_{(34)} = 1.43$, $p = .161$, in this second model. In the third step, English word reading at Time 1 was added to the previous measures of English lexical specificity at Time 1 and English phonological awareness (elision task) at Time 1. This model significantly predicted English word reading at Time 2, $R^2 = .88$, $F_{(3,33)} = 82.68$, $p < .001$. When looking at the individual measures within this model, both English lexical specificity at Time 1 predicted English word reading at Time 2, $\beta = .18$, $t_{(34)} = 2.84$, $p = .008$, and English word reading at Time 1, $\beta = .84$, $t_{(34)} = 10.11$, $p < .001$ were unique predictors of word reading at Time 2. English phonological awareness (elision task) at Time 1

did not predict English word reading at Time 2, $\beta = .07$, $t_{(34)} = .83$, $p = .413$ (see details in Table 14). Examining these three models reveals some statistical suppression. English lexical specificity at Time 1 is significant to the model in the first step, becomes non-significant to the model when English phonological awareness (elision task) at Time 1 is added (although the elision task is significant), and then is significant again when English word reading at Time 1 is added (and the elision task is no longer significant in the third step).

**b) Will English lexical specificity and phonological awareness at Time 1 predict English word reading at Time 2?**

Lexical specificity in English at Time 1 and phonological awareness in English at Time 1 were entered as the independent variables in a multiple regression, and English word reading at Time 2 was entered as the dependent variable. Although the F-statistic for the full model was significant Time 2, $R^2 = .52$, $F_{(3,33)} = 11.97$, $p < .001$, only phonological awareness (i.e., elision task) in English at Time 1, $\beta = .62$, $t_{(34)} = 4.68$, $p < .001$, predicted English word reading at Time 2 (See Table 15). The other measures did not predict English word reading at Time 2.

**c) Will English phonological awareness at Time 1, English phonological memory at Time 1, and English rapid naming at Time 1 predict English word reading at Time 2?**

Phonemic awareness measures in English at Time 1, phonological memory in English at Time 1, and rapid naming in English at Time 1 were entered as the independent variables in a multiple regression, and English word reading at Time 2 was entered as the dependent variable. The results of the regression analyses showed that English phonological awareness at Time 1, English phonological memory at Time 1, and English rapid naming at Time 1 predict English word reading at Time 2, $R^2 = .58$, $F_{(4,32)} = 11.01$, $p < .001$. Phonemic awareness (i.e., elision task) in English at Time 1, $\beta = .53$, $t_{(34)} = 3.72$, $p = 001$, and rapid naming in English Time 1, $\beta =$

-.32, $t_{(34)} = -2.35$, $p = .025$, were unique predictors of English word reading at Time 2 (see details in Table 16). The other measures did not predict English word reading at Time 2.

**d) Will French lexical specificity at Time 1 and French word reading at Time 1 predict French word reading at Time 2?**

Lexical specificity measures in French at Time 1 and word reading measures in French at Time 1 were entered as the independent variables in a multiple regression analysis, and French word reading at Time 2 was entered as the dependent variable. The full model was significant with both French lexical specificity at Time 1, and French word reading at Time 1 as predictors of French word reading at Time 2, $R^2 = .78$, $F_{(2,34)} = 61.52$, $p < .001$. However, only French word reading at Time 1 predicted French word reading at Time 2, $\beta = .92$, $t_{(34)} = 2.45$, $p < .001$ (See Table 17).

To further explore predictors of word reading at Time 2 in French, one measure of phonological awareness, elision, was added to the previous measures in a hierarchical regression analysis to determine unique variance contributed by the independent variables in the model. In the first step, the model was tested to see if French lexical specificity at Time 1 and French phonological awareness (elision task) at Time 1 would predict French word reading at Time 2. As a model, these measures predicted word reading, $R^2 = .41$, $F_{(2,34)} = 11.73$, $p < .001$. However, looking at the measures separately, only French phonological awareness (elision task) at Time 1 predicted word reading at Time 2, $\beta = .56$, $t_{(34)} = 4.07$, $p < 000$, whereas French lexical specificity at Time 1 did not predict French word reading at Time 2, $\beta = .20$, $t_{(34)} = 1.46$, $p = .152$. In the second step, French word reading at Time 1 was added to the model, along with the previous measures of French phonological awareness (elision task) at Time 1 and French lexical specificity at Time 1. This model significantly predicted word reading at Time 2, $R^2 = .41$, $F_{(2,34)}$

= 7.59, $p$ = .001. When looking at the individual measures within this model, only French phonological awareness (elision task) at Time 1 predicted French word reading at Time 2, $\beta$ = .55, $t_{(34)}$ = 2.94, $p$ = .006. Neither French lexical specificity at Time 1, $\beta$ = .20, $t_{(34)}$ = 1.44, $p$ = .159, nor French word reading $\beta$ = .01, $t_{(34)}$ = .07, $p$ = .948 predicted French word reading at Time 2 in this second model (see details in Table 18).

**e) Will French phonological awareness and French rapid naming at Time 1 predict word reading at Time 2 in French?**

Phonological awareness measures in French at Time 1 and rapid naming in French at Time 1 were entered as the independent variables in a linear regression, and French word reading at Time 2 was entered as the dependent variable. French phonological measures and rapid naming were shown to predict French word reading at Time 2, $R^2$ = .37, $F_{(3,33)}$ = 6.52, $p$ = .001. When looking at the individual measures within this model, only one measure of phonological awareness (i.e., elision task) in French at Time 1 predicted French word reading at Time 2, $\beta$ = .60, $t_{(34)}$ = 3.49, $p$ = .001 (see details in Table 19). Rapid naming in French at Time 1 and French phonological awareness (blending task) did not predict French word reading at Time 2.

**f) Will lexical specificity and phonological awareness in French at Time 1 predict word reading in French at Time 2?**

Lexical specificity in French at Time 1, and phonological awareness in French at Time 1, were entered as the independent variables in a linear regression, and French word reading at Time 2 was entered as the dependent variable. French lexical specificity and phonological awareness were shown to predict French at Time 2, $R^2$ = .41, $F_{(3,33)}$ = 7.64, $p$ = .001. When looking at the individual measures within this model, only one measure of phonological awareness (i.e., elision task) in French at Time 1 ($\beta$ = .53, $t_{(34)}$ = 3.39, $p$ = .002) predicted French

word reading at Time 2 (see details in Table 20). The other measures did not predict French word reading at Time 2.

To further explore predictors of word reading at Time 2 in French, Time 1 French lexical specificity, Time 1 French phonological awareness (elision task), and Time 1 French word reading at Time 1 were included in a hierarchical regression analysis to determine the unique variance contributed by the independent variables in the model. The first model included French lexical specificity at Time 1 entered as the first step as a predictor of French word reading at Time 2. This measure predicted French word reading at Time 2, $R^2 = .12$, $F_{(1,35)} = 4.79$, $p = .035$. In the second step, French phonological awareness (elision task) at Time 1 was entered into the model, along with French lexical specificity. This model significantly predicted French word reading at Time 2, $R^2 = .41$, $F_{(2,34)} = 11.73$, $p < .001$. When looking at the individual measures within this model, French lexical specificity no longer predicted French word reading at Time 2. Only French phonological awareness (elision task) at Time 1 predicted word reading at Time 2, $\beta = .56$, $t_{(34)} = 4.07$, $p < 000$, whereas French lexical specificity at Time 1 did not predict French word reading at Time 2, ß = .20, $t_{(34)} = 1.46$, $p = .152$. In the third step, the model was tested to determine if French word reading at Time 1 would predict French word reading at Time 2, along with the previous measures of French phonological awareness (elision task) at Time 1 and French lexical specificity at Time 1. This model significantly predicted French word reading at Time 2, $R^2 = .79$, $F_{(3,33)} = 40.15$, $p < .001$. When looking at the individual measures within this model, only French word reading at Time 1 predicted French word reading at Time 2, $\beta = .89$, $t_{(34)} = 7.60$, $p < .001$. Neither French lexical specificity at Time 1, $\beta = -.08$, $t_{(34)} = -.85$, $p = .401$, nor French phonological awareness (elision task) at Time 1, $\beta = .05$, $t_{(34)} = .47$, $p = .640$ predicted French word reading at Time 2 in this second model (see details in Table 21).

**g) Will lexical specificity and phonological awareness in English at Time 1 predict word reading in French at Time 2?**

Lexical specificity in English at Time 1, and phonological awareness in English at Time 1, were entered as the independent variables in a linear regression, and French word reading at Time 2 was entered as the dependent variable. All measures together predict French word reading at Time 2, $R^2 = .39$, $F_{(3,33)} = 6.91$, $p = .001$. When examined separately, only one measure of phonological awareness (i.e., elision task) in English at Time 1 ($\beta = .60$, $t_{(34)} = 3.98$, $p < .001$) predicted French word reading at Time 2 (see details in Table 22). The other measures did not predict French word reading at Time 2.

To further explore predictors of word reading at Time 2 in French, Time 1 English lexical specificity, Time 1 English phonological awareness as measured by elision at Time 1, and English word reading at Time 1 were included in a hierarchical regression analysis to determine the unique variance contributed by the independent variables in the model. The first model included English lexical specificity at Time 1 entered as the first step as a predictor of French word reading at Time 2. This model did not predict word reading, $R^2 = .07$, $F_{(2,34)} = 2.42$, $p = .129$. In the second step, English phonological awareness as measured by the elision task at Time 1 was added to English lexical specificity to see if these measures would predict French word reading at Time 2. This model significantly predicted French word reading at Time 2, $R^2 = .41$, $F_{(2,34)} = 11.78$, $p < .001$. When looking at the individual measures within this model, English lexical specificity no longer predicted French word reading at Time 2. Only French phonological awareness (elision task) at Time 1 predicted word reading at Time 2, $\beta = .61$, $t_{(34)} = 4.46$, $p <$ 000, whereas English lexical specificity at Time 1 did not predict French word reading at Time 2, $\beta = .10$, $t_{(34)} = .70$, $p = .486$. In the third step, English word reading at Time 1 was added to the

model, along with the previous measures of English phonological awareness (elision task) at Time 1 and English lexical specificity at Time 1. This model significantly predicted word reading at Time 2, $R^2 = .67$, $F_{(2,34)} = 22.62$, $p < .001$. When looking at the individual measures within this model, only English word reading at Time 1 predicted French word reading at Time 2, $\beta = .72$, $t_{(34)} = 5.16$, $p < .001$. Neither English lexical specificity at Time 1, $\beta = .01$, $t_{(34)} = .92$, $p = .363$, nor English phonological awareness (elision task) at Time 1, $\beta = .11$, $t_{(34)} = .79$, $p = .438$ predicted French word reading at Time 2 in this second model (see details in Table 23).

## Discussion

This study investigated two main research questions: 1. Which are the better predictors of vocabulary, dynamic or static measures? 2. What are the best predictors of word reading, in both languages? The applicability of dynamic assessments, how word reading can be best predicted, and an attempt to understand how lexical specificity and name learning fit into the lexicon are discussed below.

### Vocabulary

Initially, the following research question was addressed: Will dynamic measures at Time 1 predict vocabulary at Time 2 better than static measures at Time 1? Analyses were conducted and dynamic measures were shown to be better predictors of vocabulary than static measures, in English (L1). These results support the hypothesis that dynamic measures will be better predictors of vocabulary than static measures. Dynamic assessments measure the process of learning (Camilleri, Hasson, & Dodd, 2014), so new vocabulary can be learned at the same time that this vocabulary is also being assessed. These results are consistent with the results of previous studies where researchers found that dynamic assessments are better predictors of

reading abilities (Bridges & Catts, 2011) and reading comprehension (Elleman, et al., 2011) than static measures.

If dynamic measures are so effective, then it can be expected that they would be used more frequently by researchers and clinicians. However, use of these measures is not very prevalent. One reason for this lack of use may be that this concept is newer than the traditional static measures, so fewer dynamic measures have been developed and are in use. In fact, for this project, the two dynamic assessments were created for this study. Dynamic assessments often take longer to administer than static measures. The lexical specificity measure took 15 to 20 minutes to administer to each child in each language. The name learning task took 10 to 15 minutes to administer to each child in each language. When you compare this to the 5 to 10 minutes needed for the static phonemic awareness measures, or the 5 minutes needed for the static word reading measure, it is noticeable how much longer dynamic measures take to administer. For either type of task, the time spent with each participant is hands-on and one-to-one, but for a dynamic assessment this time requires more engagement from the researcher. In a static measure, there is a script where the researcher reads the instructions, and the participant responds. With the dynamic measures, the researcher needs to give instructions, ensure that the participant is learning the concept, adapt the instructions, and make sure the participant is continuing to understand the concepts as time progresses. This procedue is somewhat less hands-on with the lexical specificity task than the name learning, as the computer asks the questions. However, the strategies needed to complete the task need to be taught initially, which is more active than reading a script as with a static measure.

When examining the results for the French data, dynamic assessments were not better than static assessments. The model with both of the dynamic measures (in this case: lexical

specificity and name learning) predicted vocabulary when examined together, but each variable was not individually related to French vocabulary. Static measures (in this case: letter-knowledge, word reading, and phonological awareness) also were related to vocabulary when examined together, but only word reading predicted vocabulary.

One of the goals of this study was to develop dynamic assessments in order to identify struggling students in French immersion before problems arise. This goal was not achieved. The intent was to develop a tool to assess skills in students that are precursors to reading in French, before the students can read in French. Students have not yet learned how to read proficiently in English, and so assessing their reading in French is even more difficult, as these French language skills are often delayed. An early assessment to identify which students are likely to struggle can allow for earlier interventions that are more useful than when using static measures. These French language dynamic assessments were not better than static measures, at least when it comes to vocabulary development. Theoretically, dynamic assessments should be more informative than static assessments, however this has not been shown in this study. Perhaps it is due to the small sample size. Additionally, it could be due to the limited French abilities of the participants, despite these measures being designed to be used on students with little French language knowledge. Perhaps dynamic assessments are not effective when assessing early L2 learning.

There are a few possible explanations for why these results differed between English and French when using dynamic assessments. The students using these assessments are all fluent in English. Their English skills are much more established than their French skills. Perhaps these measures are not effective for measuring processes related to vocabulary, but they measure something else. Despite both being dynamic assessments, name learning and lexical specificity

do not act in the same way; in fact, it is likely that they are measuring two different concepts. As these are new measures designed for this study, it is too soon to understand everything about them. These measures are different depending on whether they are in English or French. In English they are much better predictors of vocabulary than they are in French. This may be due to the fact that different abilities are being used in the L1 (English) versus the L2 (French).

The lexical quality hypothesis (Perfetti & Hart, 2002) could explain the differences between the languages. For the students in this study, lexical items in their L1 have a high lexical quality in terms of semantic connections and phonological representation as it is, for the most part, their first language. Lexical items in their L2 are represented with much lower lexical quality. One year of part-time immersion in French is likely not sufficient for the lexical quality of the phonological representations to be on par with that of English, making the predictive quality of these measures weaker.

Memory also played a role in this study, particularly in the dynamic assessments. The lexical specificity tasks require that participants connect a new word to an image, and then remember that image in a later block of information. If they do not connect the image with the word correctly, they must remember that their initial response was incorrect in order to determine the correct response on subsequent blocks. In the name learning tasks, the paired-associate learning task, participants must remember the pseudo-word that is connected to the nonsense object. In both of these tasks, the participants complete blocks or trials to rehearse their knowledge, and there are opportunities for them to be corrected. In the lexical specificity task, the computer gives feedback when their answer is correct (a happy face) or incorrect (no image). In the name learning task, the researcher gives verbal feedback and a correction, if necessary. Despite memory being a fundamental aspect of these tasks, only English lexical specificity was

significantly correlated with memory for digits. Service (1992) hypothesizes that phonological processing in working memory is an important part of learning a new language, and repetition accuracy plays a role as well. In this study, the rehearsal schedule of the name learning task (a possible six trials where the word is corrected and rehearsed each trial) allows these pseudo-words to be reinforced in the working memory of the participant.

Additionally, some of the children might be using memory strategies by repeating or rehearsing the names of the items in their heads. At this age, rehearsal is a common strategy to use (Pressley, 1982). Some participants even remembered names from Time 1 at Time 2 (5 months later), suggesting that this repetition allowed the words to be entered into their long-term memory. This name learning measure reinforces this memory strategy. For the lexical specificity task, participants completed three blocks of trials, with 51 questions in block one, 51 questions in block two, and 27 questions in block three (filler items are included in these numbers). The training blocks were repeated, with the last block as the test block. However, remembering this many items, most of which were chosen to be unknown to the participants, is a daunting task. Therefore, memory skills would aid the children in performing this task.

**Word Reading**

This research question asked which of the measures utilised in this study predicted word reading at Time 2 in both languages. Examining the English data first, the first few hypotheses were that lexical specificity and word reading at Time 1 would predict word reading at Time 2. This did occur, supporting this hypothesis. The second hypothesis stated that lexical specificity and phonological awareness at Time 1 would predict word reading at Time 2. Although the model predicting word reading was significant, but only phonological awareness (elision) predicted word reading on its own. For the third hypothesis, phonological awareness,

phonological memory, and rapid naming at Time 1 were thought to be predictive of word reading at Time 2, which was the case when examined together, however phonological awareness (elision) and rapid naming were the only two measures that predicted word reading on their own. To summarize the English data, lexical specificity, word reading, phonological awareness (elision), and rapid naming at Time 1, were all shown to predict word reading at Time 2, showing that dynamic and static measures at Time 1 were related to word reading at Time 2.

In examining the French data, the first hypothesis was that lexical specificity and word reading at Time 1 would predict word reading at Time 2. Both measures together predicted word reading, but only word reading at Time 1 was a unique predictor of word reading at Time 2. The second hypothesis with regard to the French data was that phonological awareness and rapid naming at Time 1 would predict word reading at Time 2, which was the case when all measures were examined together. On their own, only phonological awareness (elision) predicted word reading. For the third hypothesis, lexical specificity and phonological awareness at Time 1 were thought to predict word reading at Time 2, which was the case. Only phonological awareness (elision) predicted word reading on its own. The final hypothesis involved cross language relations, specifically, English lexical specificity and English phonological awareness at Time 1 was expected to predict French word reading at Time 2. This hypothesis was correct when the measures were examined together. When examined on their own, only English phonological awareness (elision) at Time 1 predicted French word reading at Time 2. To summarize the French data, phonological awareness (elision) in both French and English, along with French word reading all predicted French word reading at Time 2.

These results support an expansion of the comprehensive language approach to include L2 acquisition. The comprehensive language approach suggests that many skills are involved in

the acquisition of a second language. Dickinson and colleagues (2003) explain that phonological awareness and vocabulary are some of the components related to reading achievement. The results from the current study did show that phonological awareness, elision in particular, played an important role in predicting later word reading in both languages, and across languages (i.e., English elision predicted French word reading).

Phonological awareness is critical in the development of reading abilities, and this study supports the role of elision, in particular, as a predictor of word reading. Elision was shown to predict word reading abilities in almost every analysis in both languages. Elision is only one part of phonological awareness, however, in this study, blending did not play a role on its own in the prediction of reading ability. It is no wonder that phonological awareness in one language can help word reading in another language. Phonological awareness is not specific to any language (Genesee & Geva, 2006) and can aid in the learning of a new language. A strong understanding of phonological awareness in one language can assist with reading in a second language (Lesaux & Siegel, 2003). This current study demonstrated that elision in English can predict word reading in French.

The Competition Model (MacWhinney, 2002) explains that learning a new language requires connecting the phonology and meaning of words between L1 and L2. When there are more and better connections between phonemes, the connections are easier to make for word learning, and these connections become stronger. In the current study, both the lexical specificity task and the name learning task use phonemic contrasts from both English (L1) and French (L2), as well as phonemes only found in each language in order to aid in this association between familiar phonemes and unfamiliar phonemes. Similarities between English and French that were used in the lexical specificity tasks, and the connections made in the lexicon of the participants

themselves could explain how English tasks were able to predict French reading abilities in this study.

Lexical specificity and phonological awareness are both precursors to literacy, as in this study, where both were shown to predict word reading. A stronger connection was made between lexical specificity and phonological awareness in English and word reading in English than for the same measures in French. However, the study participants had only been exposed to a year of half-day French instruction, so perhaps their French abilities were not strong enough to be able to predict word reading in French. Walley (1993) explains this in the Lexical Restructuring Hypothesis. This hypothesis suggests that as a child develops and is exposed more to the language, their mental lexicon changes. Eventually phonological representations in the lexicon become more detailed and specific (Gruenfelder & Pisoni, 2009). As the students who participate in this study are exposed to more French and become more competent in the language, their ability to distinguish between phonemes in the lexical specificity task, for example, will become more proficient. This might explain why lexical specificity is not a significant predictor of word reading in French, but it is in English in this study.

The weaker predictive abilities of the French measures are consistent with the lexical quality hypothesis (Perfetti & Hart, 2002). The lexical quality of a word might not be understood or stored as well by a student in this study as compared to someone more fluent in French. In the lexical specificity task, students are taught to distinguish between similar sounding words, e.g., *tas* and *taud*, and recognizing the differences between words such as these contribute to lexical specificity and word reading (Janssen et al., 2015). This lexical quality hypothesis is crucial to understanding how these measures are related to representations in the lexicon.

The lexicon consists of many components. For the present study, phonology and semantics were the focus of interest. Our dynamic measures, the lexical specificity assessment and the name learning assessment focus on different parts of the lexicon. The lexical specificity task focuses on phonological representations due to the minimal pairs being so similar and requiring the participant to distinguish between the words. The name learning task requires an understanding of semantics, as this task has the participant attach a meaning, (i.e., the picture), to the pseudo-word.

The lexical quality hypothesis explains that poor lexical quality of words can lead to poor comprehension and retrieval (Perfetti, 2007). The lexical specificity tasks and the name learning tasks are designed to give participants their initial exposure to rarely used English and French words. Grade one and two teachers were consulted in the development of the lexical specificity task in order to determine which words were not likely to be known by their students, and these words were chosen for the test items. Since these words were low-frequency, they would likely elicit much less comprehension for the participants than the high-frequency words (Perfetti, 2007).

The name learning task measures the ability to learn new vocabulary in the L1 and L2. The names of the objects are designed to sound like English words (e.g., poffy) or French words (e.g., *huignant*). Using these pseudo-words, it is possible to see how well a student can learn new vocabulary when given some feedback during a dynamic assessment. The English and French name learning tasks are highly positively correlated with one another, perhaps demonstrating that skill in this task in one language might translate into the same skill in another language as suggested by the *language interdependence hypothesis* (Cummins, 1991). The mean for the

English task is higher than that for the French task, indicating perhaps that English items, being more familiar to the participants, are easier to learn and remember.

In the L2 (French), students in early French immersion are developing their lexicon. They are immersed in a new language, and through this experience they are developing lexical specificity that starts quite broad, and then becomes more strongly related to their L2 as their education continues. As the vocabulary grows, the phonological representations in their lexicon become more specific (van Goch, McQueen, & Verhoeven, 2014). It is in this way that students will eventually be able to distinguish between *tas* and *taud*, an example from the lexical specificity task. This ability to distinguish between words with small phonological differences will eventually be expanded from understanding how one speaker says these words, to how many speakers pronounce the word and many situational contexts where one might need to know these distinctions (van Goch, McQueen, & Verhoeven, 2014).

Overall, the findings of this research project were consistent with the initial predictions, at least in English. English dynamic assessments were more predictive of vocabulary in English than static measures. In French, the findings were not as strong, and static measures were slightly better at predicting vocabulary than dynamic measures. These dynamic measures in French were not as effective as hoped, and in their present form would not be useful tools for identifying those that might struggle in French immersion.

Predictors of reading were: lexical specificity, word reading, phonological awareness (elision), and rapid naming in English. In French, the predictors of word reading were phonological awareness (elision) in both French and English, along with French word reading. Again, the French measures were not as effective predictors of word reading as the English

measures. These tools need to be developed further before they can be used productively as screening measures in French.

**Limitations**

This project had a fairly small sample size. This is due to the challenges in finding principals, teachers and parents to participate. All schools with French immersion in this school board were contacted, and there was no option of testing students from other school boards as each school board in Ontario has a different structure for French immersion.

Most of the measures in French were experimental measures without standardized scores. This likely affected the results of this project. More standardized measures in French would help assess the participants. When standardized measures in French were used, such as the EVIP, which measures French perceptive vocabulary, it is standardized to French-Canadian native speakers, a population of which our sample is not a part. These participants are not fluent French speakers, and French is not their native language. This measure could be standardized to French immersion learners.

The dynamic assessment created for this project requires some fine-tuning in order for it to be more effective, especially with respect to flexibility in administration. For example, there was no way to pause the activity, so that students could have a break, which some students required. Additionally, if students missed hearing a word, there was no way to repeat the word, so they would have to guess, and their feedback would not be effective, since they did not know what the question asked. Additionally, the task took quite a long time, and some students tried to rush through it because it took so long. A shorter task might be more effective.

**Future Studies**

This study was conducted on students in grade two, after one year of half day French immersion instruction. Perhaps using these measures on students as they start French immersion, at the beginning of grade one, and following them for a few years, would give a better understanding of vocabulary and reading development in L2. Even testing late adolescents in their early years of university who have been in French immersion or core French using the dynamic assessment tool might demonstrate some interesting results. Many of the words in the French dynamic assessment task might not be recognized by undergraduate students in French classes in southern Ontario.

Future research could also include other measures, including a non-verbal memory task, and other reading tasks, such as those that measure word reading rate and efficiency.

**Conclusion**

To summarize the major findings briefly: dynamic assessments were better predictors of vocabulary than static assessments in L1. In L2, static assessments were slightly better predictors of vocabulary than dynamic assessments. In L1, lexical specificity, word reading, phonological awareness (elision), and rapid naming predicted word reading. In L2, phonological awareness (elision) in both French and English, and French word reading predicted word reading. This gives a better understanding of the development of L2 in an immersion setting.

The main purpose of this study was to create a tool to help identify students who are struggling in French immersion so that interventions could be put in place early. The dynamic lexical specificity assessment and the name learning task are not ready to be utilized in a clinical setting, but this study is a first step in developing effective tools for this purpose. With the

knowledge gained by this study, these tools can be created in the future. This study did provide some understanding of the development of L2 in an immersion program.

This area of research is important to Canadians, as part of an officially bilingual country. It is necessary to understand how language development occurs in the French immersion programs that are tasked with creating bilingual Canadians. This information can also be used to improve these programs. If Canadians want Canadians to be able to communicate in both official languages, then it is important that policy makers understand the best ways to develop these skills, without leaving behind those that struggle.

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Table 1: *Summary Table of Measures*

| Construct | Measure | Language | Time 1 | Time 2 |
|---|---|---|---|---|
| Vocabulary | | | | |
| | PPVT | English | ✓ | ✓ |
| | EVIP | French | ✓ | ✓ |
| | Name Learning | English | ✓ | ✓ |
| | Name Learning | French | ✓ | ✓ |
| | Lexical Specificity | English | ✓ | ✓ |
| | Lexical Specificity | French | ✓ | ✓ |
| Phonological Processing | | | | |
| Phonological Awareness | CTOPP Elision and Blending | English | ✓ | ✓ |
| | CTOPP Elision and Blending | French | ✓ | ✓ |
| Phonological Memory | Memory for digits | English | ✓ | |
| Rapid Naming | RAN | English | ✓ | ✓ |
| | RAN | French | ✓ | ✓ |
| Reading | | | | |
| | Letter-Word WJ | English | ✓ | ✓ |
| | Letter-Word WIAT | French | ✓ | ✓ |
| Non-verbal reasoning | | | | |
| | MAT | no language | ✓ | |

Table 2: *Descriptive Statistics for Age and Gender of Participants*

| | Time 1 | Time 2 |
|---|---|---|
| | Mean (SD) | Mean (SD) |
| Age (in months) | 88.95 (3.61) | 93.59 (3.60) |
| Male | 89.15 (3.80) | 93.70 (4.09) |
| Female | 88.72 (3.48) | 93.47 (3.04) |

Table 3: *Descriptive Statistics and Mean Comparisons for Measures used in the English language*

| Construct | Measure | Time 1 | Time 2 | Mean Comparisons | | |
|---|---|---|---|---|---|---|
| | | Mean (SD) | Mean (SD) | df | t | Sig |
| Vocabulary | | | | | | |
| | PPVT Raw | 143.18 (15.54) | 138.86 (20.10) | 36 | -1.679 | .102 |
| | PPVT SS | 118.29 (12.70) | 111.38 (15.92) | | | |
| | Name learning | 10.84 (8.93) | 21.86 (8.65) | 36 | 12.917 | .000 |
| | Lexical specificity | 51.29 (11.78) | 57.92 (10.57) | 36 | 4.877 | .000 |
| Phonological awareness | | | | | | |
| | Elision Raw | 22.89 (7.45) | 23.03 (6.53) | 36 | .274 | .786 |
| | Elision SS | 11.08 (3.04) | 10.46 (2.92) | | | |
| | Blending Raw | 20.55 (4.01) | 20.05 (3.40) | 36 | -.928 | .359 |
| | Blending SS | 9.58 (2.59) | 8.24 (2.05) | | | |
| Phonological memory | | | | | | |
| | Memory for digits Raw | 17.47 (2.67) | | | | |
| | Memory for digits SS | 11.53 (2.66) | | | | |
| Rapid naming | | | | | | |
| | RAN Raw | 21.68 (4.35) | 20.83 (5.16) | 36 | -1.479 | .148 |
| | RAN SS | 10.42 (1.90) | 10.14 (2.41) | | | |
| Reading | | | | | | |
| | Word reading Raw | 42.58 (9.60) | 47.62 (9.17) | 36 | 5.866 | .000 |
| | Word reading SS | 115.00 (13.97) | 114.86 (13.40) | | | |

**SS**, standard score

Table 4: *Descriptive Statistics and Mean Comparisons for Measures used in the French language*

| Construct | Measure | Time 1 | Time 2 | Mean Comparisons | | |
|---|---|---|---|---|---|---|
| | | Mean (SD) | Mean (SD) | df | t | Sig |
| Vocabulary | | | | | | |
| | EVIP Raw | 28.84 (15.91) | 32.27 (18.27) | 36 | 1.192 | .241 |
| | EVIP SS | 57.84 (14.26) | 57.27 (15.56) | | | |
| | Name learning | 9.26 (7.19) | 16.11 (8.28) | 36 | 6.354 | .000 |
| | Lexical specificity | 40.32 (10.86) | 45.78 (10.28) | 36 | 3.332 | .002 |
| Phonological awareness | | | | | | |
| | Elision | 16.42 (6.00) | 17.76 (6.86) | 36 | 1.832 | .075 |
| | Blending | 9.39 (2.52) | 10.78 (2.30) | 36 | 3.334 | .002 |
| Rapid naming | | | | | | |
| | RAN | 32.10 (13.58) | 32.73 (19.74) | 36 | .401 | .691 |
| Reading | | | | | | |
| | Letter WIAT | 16.45 (7.00) | 17.00 (7.04) | 36 | .594 | .556 |
| | WIAT | 21.89 (16.72) | 26.08 (17.47) | 36 | 2.635 | .012 |

**SS**, Standard score

Table 5: *Descriptive Statistics for Non-verbal Measures*

| Construct | Measure | Time 1 |
|---|---|---|
| | | Mean (SD) |
| Non-verbal reasoning | MAT Raw | 37.82 (10.96) |
| | MAT SS | 119.21 (11.25) |

**SS**, Standard score

Table 6: *Correlation matrix of English, French, and non-verbal variables at Time 1 above the diagonal and Time 2 below the diagonal*

| Variables | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | E-LS | --- | -.295 | .494** | .238 | .312 | .596** | .129 | .415** | .422** | .077 | .119 | .269 | .280 | .250 | .335* | -.011 | .240 |
| **2** | E-RAN | -.123 | --- | -.486** | -.558** | -.512** | -.452** | -.375* | -.235 | -.239 | .590** | -.299 | -.419** | -.484** | -.545** | -.327* | -.287 | .013 |
| **3** | PPVT | .524** | -.109 | --- | .464** | .343* | .456** | .547** | .257 | .241 | -.214 | .329* | .328* | .414** | .365* | .292 | .359* | .152 |
| **4** | WJ | .502** | -.533** | .480** | --- | .729** | .332* | .724** | .228 | .312 | -.381* | .519** | .443** | .812** | .734** | .214 | .367* | .141 |
| **5** | E-PE | .461** | -.393* | .348* | .552** | --- | .503** | .534** | .329* | .200 | -.486** | .353* | .591** | .647* | .858** | .503** | .251 | .178 |
| **6** | E-PB | .310 | -.107 | .376* | .082 | .381* | --- | .257 | .273 | .363* | -.208 | .172 | .500** | .382* | .500** | .495** | .345* | .142 |
| **7** | E-NL | .443** | -.351* | .560** | .768** | .305 | .016 | --- | .097 | .238 | -.216 | .257 | .198 | .533** | .513** | .069 | .433** | .000 |
| **8** | E-MD | --- | --- | --- | --- | --- | --- | --- | --- | .202 | -.198 | .309 | .289 | .204 | .183 | .100 | -.043 | .236 |
| **9** | F-LS | .455** | -.190 | .216 | .383* | .205 | .187 | .183 | --- | --- | .000 | .487** | .191 | .464** | .268 | .086 | .152 | .261 |
| **10** | F-RAN | -.015 | .631** | -.113 | -.413* | -.288 | -.016 | -.314 | --- | .068 | --- | -.274 | -.612** | -.337* | -.526** | -.408 | -.250 | -.130 |
| **11** | EVIP | .216 | -.177 | .386* | .407* | .140 | .381* | .325* | --- | .478** | -.164 | --- | .353* | .623** | .316 | .279 | .252 | .274 |
| **12** | WIAT-L | .224 | -.279 | .157 | .506** | .621** | .338* | .275 | --- | .176 | -.399* | .371* | --- | .462** | .681** | .494** | .091 | .229 |
| **13** | WIAT-W | .404* | -.467** | .506** | .806** | .571** | .247 | .622** | --- | .347* | -.310 | .541** | .539** | --- | .672** | .381* | .358* | .154 |
| **14** | F-PE | .288 | -.437** | .424** | .694** | .704** | .228 | .484** | --- | .355* | -.426** | .404* | .708** | .571** | --- | .505** | .354* | .195 |
| **15** | F-PB | .285 | -.115 | .341* | .260 | .372* | .282 | .081 | --- | .300 | -.221 | .372* | .412* | .247 | .480** | --- | .325* | .056 |
| **16** | F-NL | .225 | -.302 | .296 | .512** | .072 | .180 | .503** | --- | .254 | -.269 | .497** | .308 | .625** | .410* | .311 | --- | -.081 |
| **17** | MAT | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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

**E-LS**, English lexical specificity; **E-RAN**, English rapid naming; **PPVT,** English vocabulary; **WJ**, English word reading; **E-PE**, English phonological awareness (elision); **E-PB**, English phonological awareness (blending); **E-NL**, English name learning; **E-MD**, English phonological memory; **F-LS**, French lexical specificity; **F-RAN**, French rapid naming; **EVIP**, French vocabulary; **WIAT-L**, French letter knowledge; **WIAT-W**, French word reading; **F-PE**, French phonological awareness (elision); **F-PB**, French phonological awareness (blending); **F-NL**, French name learning; **MAT**, non-verbal reasoning

Table 7: *Correlation matrix of English, French, and non-verbal variables across times with Time 1 across the top and Time 2 down the side.*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 E-LS | .761** | -.376* | .555** | .353* | .316 | .531** | .324 | .415** | .425** | -.012 | .174 | .209 | .302 | .215 | .285 | .128 | .078 |
| 2 E-RAN | .042 | .818** | -.233 | -.540** | -.357* | -.207 | -.304 | -.155 | -.207 | .642** | -.314 | -.336* | -.443** | -.491** | -.115 | -.269 | .184 |
| 3 PPVT | .438** | -.402 | .628** | .480** | .382* | .301 | .530** | .065 | .167 | -.166 | .220 | .345* | .365* | .314 | .341* | .329* | -.010 |
| 4 WJ | .347** | -.594** | .550** | .920** | .700** | .435* | .740** | .244 | .360* | -.347* | .443** | .404* | .751** | 661** | .260 | .355* | .055 |
| 5 E-PE | .408* | -.421** | .387* | .531** | .616** | .411* | .307 | .416* | .003 | -.359* | .112 | .554** | .424** | .631** | .372* | .112 | -.085 |
| 6 E-PB | .371* | -.271 | .433** | .071 | .264 | .338* | .124 | .124 | .153 | -.239 | .119 | .231** | .172 | .290 | .282 | -.040 | .027 |
| 7 E-NL | .289 | -.471** | .609** | .731** | .487** | .320 | .833** | .154 | .246 | -.288 | .244 | .273 | .539** | .412* | .081 | .260 | .049 |
| 8 E-MD | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9 F-LS | .226 | -.198 | .216 | .409* | .292 | .178 | .263 | .053 | .576** | -.017 | .371* | .235 | .367* | .324 | .082 | .160 | -.057 |
| 10 F-RAN | .106 | .501** | -.090 | -.389* | -.425 | -.237 | -.206 | -.094 | -.023 | .770** | -.313 | -.501** | -.345* | -.443** | -.275 | -.164 | -.017 |
| 11 EVIP | .039 | -.197 | .447** | .466** | .353* | .153 | .421** | .081 | .316 | -.270 | .613** | .421* | .494* | .327* | .352* | .304 | -.024 |
| 12 WIAT-L | .198 | -.290 | .229 | .557** | .500** | .407* | .280 | .199 | .117 | -.449** | .263 | .777** | .552** | .637** | .426** | .176 | .132 |
| 13 WIAT-W | .254 | -.478** | .470** | .809** | .633** | .279 | .622** | .179 | .347* | -.310 | .541** | .424** | .882** | .609** | .317 | .290 | .034 |
| 14 F-PE | .164 | -.478** | .414* | .738** | .829** | .401* | .552** | .267 | .218 | -.536** | .359* | .706** | .721** | .844** | .480** | .435** | .025 |
| 15 F-PB | .315 | -.352* | .332* | .366* | .419** | .360* | .169 | .218 | .437** | -.262 | .625** | .355* | .665** | .399* | .514** | .296 | .066 |
| 16 F-NL | .025 | -.336* | .568** | .462** | .276 | .392* | .567** | -.072 | .298 | -.327* | .361* | .194 | .477** | .314 | .336* | .667** | -.045 |
| 17 MAT | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

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

* Correlation is significant at the .05 level (2-tailer).

**E-LS**, English lexical specificity; **E-RAN**, English rapid naming; **PPVT,** English vocabulary; **WJ**, English word reading; **E-PE**, English phonological awareness (elision); **E-PB**, English phonological awareness (blending); **E-NL**, English name learning; **E-MD**, English phonological memory; **F-LS**, French lexical specificity; **F-RAN**, French rapid naming; **EVIP**, French vocabulary; **WIAT-L**, French letter knowledge; **WIAT-W**, French word reading; **F-PE**, French phonological awareness (elision); **F-PB**, French phonological awareness (blending); **F-NL**, French name learning; **MAT**, non-verbal reasoning

Table 8: *English dynamic measures at Time 1 predict English vocabulary at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English lexical specificity Time 1 | .385 | .225 | 2.952 | 34 | .006 |
| English name learning Time 1 | .488 | .292 | 3.735 | 34 | .000 |

Table 9: *The relationship between English static measures at Time 1 and English vocabulary at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English word reading Time 1 | .220 | .477 | 1.007 | 34 | .321 |
| English phonological awareness (elision) Time 1 | .151 | .669 | .635 | 34 | .530 |
| English phonological awareness (blending) Time 1 | .169 | .902 | .955 | 34 | .347 |

Table 10: *French dynamic measures at Time 1 predict French vocabulary at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| French lexical specificity Time 1 | .277 | .263 | 1.753 | 34 | .089 |
| French name learning Time 1 | .263 | .401 | 1.665 | 34 | .105 |

Table 11: *French static measures at Time 1 predict French vocabulary at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| French letter knowledge Time 1 | .312 | .529 | 1.528 | 34 | .136 |
| French word reading Time 1 | .475 | .211 | 2.486 | 34 | .018 |
| French phonological awareness (elision) Time 1 | -.276 | .728 | -1.171 | 34 | .250 |
| French phonological awareness (blending) Time 1 | .165 | 1.247 | .971 | 34 | .339 |

Table 12: *English lexical specificity and English word reading at Time 1 predict English word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English lexical specificity Time 1 | .185 | .048 | 3.064 | 34 | .004 |
| English word reading Time 1 | .887 | .060 | 14.680 | 34 | .000 |

Table 13: *English word reading at Time 1, English phonological awareness (elision) at Time 1, and English lexical specificity at Time 1 predict English word reading at Time 2*

Total $R^2 = .883$

| | | $\Delta R^2$ | ß | t/sig | Final ß |
|---|---|---|---|---|---|
| Model 1 | English word reading Time 1 | .854 | .840 | 9.20** | .840 |
| | English phonological awareness (elision) Time 1 | | .116 | 1.27 | .070 |
| Model 2 | English lexical specificity Time 1 | .029 | .175 | 2.84* | .175 |

Table 14: *English lexical specificity at Time 1, English phonological awareness (elision) at Time 1, and English word reading at Time 1 predict English word reading at Time 2*

Total $R^2$ = .883

| | | $\Delta R^2$ | ß | t/sig | Final ß |
|---|---|---|---|---|---|
| Model 1 | English lexical specificity Time 1 | .763 | .347 | 2.19* | .175 |
| Model 2 | English phonological awareness (elision) Time 1 | .244 | .654 | 5.31** | .070 |
| Model 3 | English word reading Time 1 | .883 | .840 | 10.11** | .840 |

Table 15: *English lexical specificity at Time 1 and English phonological awareness at Time 1 predict English word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English lexical specificity Time 1 | .184 | .116 | 1.249 | 34 | .221 |
| English phonological awareness (elision) Time 1 | .621 | .406 | 4.679 | 34 | .000 |
| English phonological awareness (blending) Time 1 | .072 | .369 | .450 | 34 | .656 |

Table 16: *English phonological awareness at Time 1, English phonological memory at Time 1, and English rapid naming at Time 1 predict English word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English rapid naming Time 1 | -.320 | .288 | -2.353 | 34 | .025 |
| English phonological awareness (elision) Time 1 | .531 | .184 | 3.723 | 34 | .001 |
| English phonological awareness (blending) Time 1 | .065 | .314 | .480 | 34 | .634 |
| English memory for digits | -.045 | .422 | -.362 | 34 | .720 |

Table 17: *French lexical specificity at Time 1 and French word reading at Time 1 predict French word reading at Time*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| French lexical specificity Time 1 | -.080 | .143 | -.891 | 34 | .379 |
| French word reading Time 1 | .920 | .095 | 10.205 | 34 | .000 |

Table 18: *French lexical specificity at Time 1, French phonological awareness (elision) at Time 1, and French word reading at Time 1 predict French word reading at Time 2*

Total $R^2 = .408$

| | | $\Delta R^2$ | ß | t/sig | Final ß |
|---|---|---|---|---|---|
| Model 1 | French lexical specificity Time 1 | .408 | .200 | 1.46 | .159 |
| | French phonological awareness (elision) Time 1 | | .556 | 4.07** | .006 |
| Model 2 | French word reading Time 1 | .000 | .012 | .066 | .175 |

Table 19: *French phonological awareness at Time 1 and French rapid naming at Time 1 predict French word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| French rapid naming Time 1 | .019 | .210 | .113 | 34 | .911 |
| French phonological awareness (elision) Time 1 | .601 | .508 | 3.491 | 34 | .001 |
| French phonological awareness (blending) Time 1 | .037 | 1.124 | .230 | 34 | .820 |

Table 20: *French lexical specificity at Time 1, French phonological awareness (elision) at Time 1, and French phonological awareness (blending) at Time 1 predict French word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| French lexical specificity Time 1 | .203 | .221 | 1.459 | 34 | .154 |
| French phonological awareness (elision) Time 1 | .534 | .465 | 3.387 | 34 | .002 |
| French phonological awareness (blending) Time 1 | .046 | 1.069 | .302 | 34 | .764 |

Table 21: *French lexical specificity at Time 1, French phonological awareness (elision) at Time 1, and French word reading at Time 1 predict French word reading at Time 2*

Total $R^2 = .785$

| | | $\Delta R^2$ | ß | t/sig | Final ß |
|---|---|---|---|---|---|
| Model 1 | French lexical specificity Time 1 | .120 | .347 | 2.19* | -.078 |
| Model 2 | French phonological awareness (elision) Time 1 | .408 | .556 | 1.46 | .051 |
| Model 2 | French word reading Time 1 | .257 | .123 | 7.60** | .123 |

Table 22: *English lexical specificity at Time 1 and English phonological awareness at Time 1 predict French word reading at Time 2*

| | ß | Std. Error | t | df | Sig. |
|---|---|---|---|---|---|
| English lexical specificity Time 1 | .179 | .250 | 1.073 | 34 | .291 |
| English phonological awareness (elision) Time 1 | .598 | .875 | 3.981 | 34 | .000 |
| English phonological awareness (blending) Time 1 | -.073 | .796 | -.405 | 34 | .688 |

Table 23: *English lexical specificity at Time 1, English phonological awareness (elision) at Time 1, and English word reading at Time 1 predict French word reading at Time 2*

Total $R^2 = .673$

| | | $\Delta R^2$ | ß | t/sig | Final ß |
|---|---|---|---|---|---|
| Model 1 | English lexical specificity Time 1 | .065 | .254 | 1.56 | .095 |
| Model 2 | English phonological awareness (elision) Time 1 | .409 | .608 | 4.46** | .111 |
| Model 3 | English word reading Time 1 | .199 | .715 | 5.16** | .715 |

Appendix A: Initial Email to Principals

Dear Principal _____,

My name is Alexandra Bellissimo. I am an elementary teacher currently doing my Masters degree in developmental psychology at Wilfrid Laurier University. Our team, which includes Dr. Alexandra Gottardo, is conducting a research project on French Immersion students. This project has been reviewed and approved by the Waterloo Region District School Board Ethics Research Committee and the Wilfrid Laurier Ethics Committee. All our researchers have been trained and received a certificate for ethical conduct in research from the university. They also have had a vulnerable sectors screening by the Waterloo Police Department.

We realize that not all students are successful in the French Immersion program, often switching to the English program when problems arise. Rather than waiting to see who is struggling later in the year, we are exploring ways to determine who might have difficulties early in the year. Our project will provide a comprehensive picture of children's reading development and help identify and support at-risk readers. We are hoping to recruit Grade 1 and Grade 2 participants at your school. Our project would take place at two time points: once beginning in the fall (October/November) and again in the spring (April/May). Individual testing will take place in about four 30-minute sessions at each time point, with each child.

As a token of our appreciation for your collaboration and involvement with our project, we will provide your school with a $10 honorarium per participating child, delivered as a cheque or gift certificate. Please let me know if there is a time when you might be available for a short meeting, either in person or by phone.

I look forward to hearing from you and discussing this exciting project!

Best wishes,

Alexandra Bellissimo, BA, BEd.
Masters Candidate, Developmental Psychology
Department of Psychology
Wilfrid Laurier University

Appendix B: Principal Information Letter

WILFRID LAURIER UNIVERSITY
INFORMATION LETTER

Dynamic Assessment of Early Immersion Literacy Learning Competences

Principal Investigators
Dr. Alexandra Gottardo, Alexandra Bellissimo, Psychology Dept.
Dr. Xi Chen, Klaudia Krenca OISE/ University of Toronto

Dear Principal,

My name is Dr. Alexandra Gottardo and I am a Professor in Psychology at Wilfrid Laurier University. Our team is conducting a project, which examines the relation between speech perception and subsequent literacy development (e.g., vocabulary, word reading) in emergent readers of students in Grade 1 and Grade 2 French immersion classrooms. Together with data we've already collected in French Immersion programs, our project will provide a comprehensive picture of student's development and help identify and support at-risk readers. This project is entitled "Dynamic Assessment of Early Immersion Literacy Learning Competences". This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and Wilfrid Laurier University research ethics and protection policies.

INFORMATION

The purpose of this study is to understand what predicts how students learn French in French immersion settings. One hundred and twenty students will be recruited in Waterloo region and 60 in Toronto. The students will be followed for 1 year.

Individual tests will be given to each student to measure his/her ability to read words and comprehend texts in English and French. Individual testing will take approximately 30 minutes over 4 sessions (total 2 hours) at two time points (September of Grade 1 and 2, and the end of Grade 1 and 2). The students will be individually tested by one tester in a quiet room with the door open. For some of the tests, the student's answers will be recorded as an audio file using a digital recorder so that responses can be scored at a later time. All tests will take place at school during times that are convenient to the school and will not affect students' regular lessons and curriculum time. Parents/guardians will also be asked to complete a short (10 minutes) demographics/language questionnaire.

The student's participation in the study is completely voluntary and the student or parent/guardian may choose to stop participating at any time. The student will not have to answer any questions that he or she does not want to answer. Each session will only begin if the student agrees to take part, and the student may decide to end his or her participation in the study at any time. If parents/guardians decide to withdraw their child from the study, they can ask me to remove part or all of his or her information from the study.

RISKS

There are no foreseeable risks, discomforts, or inconveniences for the students beyond those that the students would experience in an everyday school environment. Children may be concerned about their performance on the tasks; however, the activities will be conducted in a fun, stress-free manner, and no information about children's individual performance will be shared outside of the research team. The research assistants will be trained to be highly sensitive to the needs of the participants and to discontinue testing if discomfort or anxiety is sensed or overtly expressed by children. In the event that a session is taking longer than 30 minutes, a 5-minute break will be provided. If a child experiences any discomfort as a result of participating in this study, please inform the researchers.

BENEFITS

Your input will contribute to a greater understanding of reading development in French immersion students in Canada. The results of this research will help educators and parents learn new information and skills that can be used to support the development of reading skills in immersion students.

COMPENSATION

Each participating school will receive an honorarium ($10 per student; that is, $5 for time 1 and $5 for time 2). The money can be used to buy books for the students. Each student will also receive a small reward (e.g., pencil, eraser) after each session.

WILL THESE DATA BE CONFIDENTIAL?

It is important to protect the privacy of the students who participate in this research. The information of parents/guardians and students will be kept confidential. All participants' files will be given a number that will be used for all data entry and data analysis purposes. To ensure confidentiality, the signed informed consent forms will be stored separately from the completed questionnaires. All personal information that parents/guardians supply during the research will be held in confidence and names will not appear in any report or publication of the research. Group scores will be reported, but no individual scores will be reported or discussed with you, teachers or parents/guardians. Trained graduate (Alexandra Bellissimo, Klaudia Krenca) and trained undergraduate students will conduct the testing and data entry**.**Your data will be safely stored in locked files in a locked research office at Wilfrid Laurier University. Electronic files will be stored on a password-protected computer in the researchers' office or secure network storage at Wilfrid Laurier University. Data access is limited to research personnel involved in this study, Dr. Alexandra Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca. The de-identified electronic and hard copy data will be retained indefinitely and may be analyzed again in the future as part of a separate project (i.e., secondary analysis). Dr. Gottardo will delete all personal/contact information and consent forms by August 31st, 2017 collected from the Waterloo research.

IS THERE ANY OBLIGATION TO PARTICIPATE IN THIS STUDY?

Participation in the study is completely voluntary and parents/guardians or students may choose to stop participating at any time. Students will not have to answer any questions that they do not want to answer. Each session will only begin if the student agrees to take part, and the student may decide to end his or her participation in the study at any time. If parents/guardians decide to withdraw their child from the study, they can ask me to remove part or all of his or her information from the study. No information about an individual student's performance will be provided to any party outside of the research team.

HOW CAN I GET THE FEEDBACK?

The results of this research will be used for presentations at conferences and in on-line electronic or paper versions of research journals written by Dr. Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca. A written summary of the preliminary results will be delivered to every school and teacher that participated in this study at the end of each year of the study (i.e., by December 31, 2016 and December 31, 2017). If you would like any additional information about this study please contact Dr. Alexandra Gottardo, Dr. Xi Chen, or Alexandra Bellissimo.

HOW I CAN CONTACT YOU?

If you have any questions at any time about the study or the procedures you may contact Dr. Alexandra Gottardo at 519-884-0710 ext. 2169 or at agottardo@wlu.ca, Dr. Xi Chen, xi.chen.bumgardner@utoronto.ca, or Alexandra Bellissimo at bell9710@mylaurier.ca. You can also contact us by mail at Department of Psychology, 75 University Ave. W. Waterloo, ON, N2L 3C5. This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and the Wilfrid Laurier University research ethics and protection policies. If you feel that any student has not been treated according to the descriptions in this form, or the student's rights as a participant in research have been violated during the course of this project, you may contact Dr. Roberto Basso, Chair, Wilfrid Laurier University Research Ethics Board, 519-884-1970 ext. 4994 or at rbasso@wlu.ca.

Please let me know if there is a time next week when you might be available for a short meeting, either in person or by phone. If you like, you can also contact me at 519-884-1970 ext. 2169 or agottardo@wlu.ca.

I hope to hear from you soon!

Best wishes,

Dr. Alexandra Gottardo
Professor
Department of Psychology
Wilfrid Laurier University

Appendix C: Principal Consent Form

WILFRID LAURIER UNIVERSITY
CONSENT FORM

Dynamic Assessment of Early Immersion Literacy Learning Competences

Principal Investigators
Dr. Alexandra Gottardo, Alexandra Bellissimo, Psychology Dept.
Dr. Xi Chen, Klaudia Krenca OISE/ University of Toronto

I am inviting you and your school to participate in a research project entitled "Dynamic Assessment of Early Immersion Literacy Learning Competences". This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and Wilfrid Laurier University research ethics and protection policies.

INFORMATION

The purpose of this study is to understand what predicts how students learn French in French immersion settings. Sixty students will be recruited in Waterloo region and 60 in Toronto. The students will be followed for 1 year.

Individual tests will be given to each student to measure his/her ability to read words and comprehend texts in English and French. Individual testing will take approximately 30 minutes over 4 sessions (total 2 hours) at two time points (September of Grade 2, and the end of Grade 2). The students will be individually tested by one tester in a quiet room with the door open. For some of the tests, the student's answers will be recorded as an audio file using a digital recorder so that responses can be scored at a later time. All tests will take place at school during times that are convenient to the school and will not affect students' regular lessons and curriculum time. Parents/guardians will also be asked to complete a short (10 minutes) demographics/language questionnaire.

The student's participation in the study is completely voluntary and the student or parent/guardian may choose to stop participating at any time. The student will not have to answer any questions that he or she does not want to answer. Each session will only begin if the student agrees to take part, and the student may decide to end his or her participation in the study at any time. If parents/guardians decide to withdraw their child from the study, they can ask me to remove part or all of his or her information from the study.

RISKS

There are no foreseeable risks, discomforts, or inconveniences for the students beyond those that the students would experience in an everyday school environment. Children may be concerned about their performance on the tasks; however, the activities will be conducted in a fun, stress-free manner, and no information about children's individual performance will be shared outside of the research team. The research assistants will be trained to be highly sensitive to the needs of the participants and to discontinue testing if discomfort or anxiety is sensed or overtly expressed by children. In the event that a session is taking longer than 30 minutes, a 5-minute break will be provided. If a child experiences any discomfort as a result of participating in this study, please inform the researchers.

BENEFITS

Your input will contribute to a greater understanding of reading development in French immersion students in Canada. The results of this research will help educators and parents learn new information and skills that can be used to support the development of reading skills in immersion students.

COMPENSATION

Each participating school will receive an honorarium ($10 per student; that is, $5 for time 1 and $5 for time 2). The money can be used to buy books for the students. Each student will also receive a small reward (e.g., pencil, eraser) after each session.

WILL THESE DATA BE CONFIDENTIAL?

It is important to protect the privacy of the students who participate in this research. The information of parents/guardians and students will be kept confidential. All participants' files will be given a number that will be used for all data entry and data analysis purposes. To ensure confidentiality, the signed informed consent forms will be stored separately from the completed questionnaires. All personal information that parents/guardians supply during the research will be held in confidence and names will not appear in any report or publication of the research. Group scores will be reported, but no individual scores will be reported or discussed with you, teachers or parents/guardians. Trained graduate and undergraduate students will conduct the testing and data entry**.** Your data will be safely stored in locked files in a locked research office at Wilfrid Laurier University. Electronic files will be stored on a password-protected computer in the researchers' office or secure network storage at Wilfrid Laurier University. Data access is limited to research personnel involved in this study, Dr. Alexandra Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca. The de-identified electronic and hard copy data will be retained indefinitely and may be analyzed again in the future as part of a separate project (i.e., secondary analysis). Dr. Gottardo will delete all personal/contact information, consent forms from the Waterloo research by August 31st, 2017.

IS THERE ANY OBLIGATION TO PARTICIPATE IN THIS STUDY?

Participation in the study is completely voluntary and parents/guardians or students may choose to stop participating at any time. Students will not have to answer any questions that they do not want to answer. Each session will only begin if the student agrees to take part, and the student may decide to end his or her participation in the study at any time. If parents/guardians decide to withdraw their child from the study, they can ask me to remove part or all of his or her information from the study. No information about an individual student's performance will be provided to any party outside of the research team.

HOW CAN I GET THE FEEDBACK?

The results of this research will be used for presentations at conferences and in on-line electronic or paper versions of research journals written by Dr. Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca. The findings may also be made available through Open Access resources. A written summary of the preliminary results will be delivered to every school and teacher that participated in this study at the end of each year of the study (i.e., by December 31,

2016 and December 31, 2017). If you would like any additional information about this study please contact Dr. Alexandra Gottardo, Dr. Xi Chen, or Alexandra Bellissimo.

HOW I CAN CONTACT YOU?

If you have any questions at any time about the study or the procedures you may contact Dr. Alexandra Gottardo at 519-884-0710 ext. 2169 or at agottardo@wlu.ca, Dr. Xi Chen, xi.chen.bumgardner@utoronto.ca, or Alexandra Bellissimo at bell9710@mylaurier.ca. You can also contact us by mail at Department of Psychology, 75 University Ave. W. Waterloo, ON, N2L 3C5. This project has been reviewed and approved by the University Research Ethics Board at Wilfrid Laurier University (REB #4761), which is supported by the Research Support Fund. If you feel that any student has not been treated according to the descriptions in this form, or the student's rights as a participant in research have been violated during the course of this project, you may contact Dr. Roberto Basso, Chair, Wilfrid Laurier University Research Ethics Board, 519-884-1970 ext. 4994 or at rbasso@wlu.ca.

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CONSENT

**Name of Project:** Dynamic Assessment of Early Immersion Literacy Learning Competences (REB #4761)

**Consent to Participate and Signature**

I understand the information presented in the consent form about participating in this research project. I have had all my questions satisfactorily answered, and agree to allow my school to participate in the study. Agreeing to participate in this study does not waive my legal rights or release the researchers or institution from their legal and professional responsibilities.

I understand that participation is voluntary and I can withdraw my school from the study at any time. As well, I am free to ask questions at any time during the study.

□ **I consent for my school to participate**

**Name of School (please print):** _____

**Name of Principal (please print):** _____

**Signature of Principal:** _____ **Date:** _____

**Signature of Researcher:** _____ **Date:** _____

**Please detach and return this form to the researcher.**

Appendix D: Parent Information Letter

WILFRID LAURIER UNIVERSITY
INFORMATION LETTER

Dynamic Assessment of Early Immersion Literacy Learning Competences

Principal Investigators
Dr. Alexandra Gottardo, Alexandra Bellissimo, Psychology Dept.
Dr. Xi Chen, Klaudia Krenca OISE/ University of Toronto

Dear Families,

I am inviting you and your child to participate in a research project entitled "Dynamic Assessment of Early Immersion Literacy Learning Competences". This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and Wilfrid Laurier University research ethics and protection policies.

The purpose of this study is to understand what predicts how children learn French in French immersion settings. One hundred and twenty students will be recruited in Waterloo region and 60 in Toronto. The children will be followed for 1 year. You are asked to fill out a short questionnaire attached to this form, once only, and it will take approximately 10-15 minutes.

Individual tests will be given to your child to measure his/her ability to read words and comprehend texts in English and French. Individual testing will take approximately 30 minutes over 4 sessions (total 2 hours) at two time points (October/November of Grade 1 or 2, and April/May of Grade 1 or 2). Your child will be individually tested by one tester in a quiet room with the door open. For some of the tests, your child's answers will be recorded as an audio file using a digital recorder so that responses can be scored at a later time. All tests will take place at school during times, which are convenient to the school and will not affect students' regular lessons and curriculum time.

Please read and sign the attached consent form if you would like to participate, and return it along with the questionnaire in the attached envelope. You may keep the information pages.

Thank you,

Dr. Alexandra Gottardo,
Dr. Xi Chen
Alexandra Bellissimo
Klaudia Krenca

Appendix E: Parent Consent Form

WILFRID LAURIER UNIVERSITY
INFORMED CONSENT FORM

Dynamic Assessment of Early Immersion Literacy Learning Competences

Principal Investigators
Dr. Alexandra Gottardo, Alexandra Bellissimo, Psychology Dept.
Dr. Xi Chen, Klaudia Krenca OISE/ University of Toronto

I am inviting you and your child to participate in a research project entitled "Dynamic Assessment of Early Immersion Literacy Learning Competences". This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and Wilfrid Laurier University research ethics and protection policies.

INFORMATION

The purpose of this study is to understand what predicts how children learn French in French immersion settings. Sixty students will be recruited in Waterloo region and 60 in Toronto. The children will be followed for 1 year. You are asked to fill out a short questionnaire attached to this form, once only, and it will take approximately 10-15 minutes.

Individual tests will be given to your child to measure his/her ability to read words and comprehend texts in English and French. Individual testing will take approximately 30 minutes over 4 sessions (total 2 hours) at two time points (September of Grade 1 or 2, and the end of Grade 1 or 2). Your child will be individually tested by one tester in a quiet room with the door open. For some of the tests, your child's answers will be recorded as an audio file using a digital recorder so that responses can be scored at a later time. All tests will take place at school during times, which are convenient to the school and will not affect students' regular lessons and curriculum time.

Your participation in the study is completely voluntary and you and your child may choose to stop participating at any time. Your child will not have to answer any questions that he or she does not want to answer. Each session will only begin if your child agrees to take part, and your child may decide to end his or her participation in the study at any time. If you decide to withdraw your child from the study, you can ask me to remove part or all of his or her information from the study. School grades are not determined by this testing and no information about your child's performance will be provided to the school.

RISKS

There are no foreseeable risks, discomforts, or inconveniences for you and your child beyond those that your child would experience in an everyday school environment. Your child will be asked questions and may be unsure of an answer, or confused by a question. Some of these tasks may seem strange (e.g., learning the name of a Martian with a French or English sounding name). These activities can also be fun, as they will be presented in a computer game format. Your child may be concerned about his or her performance on the tasks; however, the activities will be conducted in a fun, stress-free manner, and no information about your child's individual

performance will be shared outside of the research team. The research assistants will be trained to be highly sensitive to the needs of the participants and to discontinue testing if discomfort or anxiety is sensed or overtly expressed by your child. In the event that a session is taking longer than 30 minutes, a 5-minute break will be provided. If your child experiences any discomfort as a result of participating in this study, please inform the researchers.

BENEFITS

Your input will contribute to a greater understanding of reading development in French immersion students in Canada. The results of this research will help educators and parents learn new information and skills that can be used to support the development of reading skills in immersion students.

COMPENSATION

Each participating school will receive an honorarium ($10 per student; that is, $5 for time 1 and $5 for time 2). The money can be used to buy books for the children. Your child will also receive a small reward (e.g., pencil, eraser) after each session.

WILL THESE DATA BE CONFIDENTIAL?

It is important to protect the privacy of the children who participate in this research. Information provided by you and your child will be kept confidential. All participants' files will be given a number that will be used for all data entry and data analysis purposes. To ensure confidentiality, the signed informed consent forms will be stored separately from the completed questionnaires. All personal information you supply during the research will be held in confidence and names will not appear in any report or publication of the research. Group scores will be reported, but no individual scores will be reported or discussed with you or with the principal, teachers or parents. Trained graduate students and undergraduate students recruited from Wilfrid Laurier University will conduct the testing and data entry. The data will be safely stored in locked files in a locked research office at Wilfrid Laurier University. Electronic files will be stored on a password-protected computer in the researchers' office or secure network storage in the Wilfrid Laurier University. Data access is limited to research personnel involved in this study, Dr. Alexandra Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca**.** The de-identified electronic and hard copy data will be retained indefinitely and may be analyzed again in the future as part of a separate project (i.e., secondary analysis). Dr. Gottardo will delete all personal/contact information and consent forms by August 31st, 2017 collected from the Waterloo research.

IS THERE ANY OBLIGATION TO PARTICIPATE IN THIS STUDY?

Your participation in the study is completely voluntary and you and your child may choose to stop participating at any time. Your child will not have to answer any questions that he or she does not want to answer. Each session will only begin if your child agrees to take part, and your child may decide to end his or her participation in the study at any time. If you decide to withdraw your child from the study, you can ask me to remove part or all of his or her information from the study. School grades are not determined by this testing and no information about your child's performance will be provided to any party outside of the research team.

HOW CAN I GET THE FEEDBACK?

The results of this research will be used for presentations at conferences and for publication in on-line electronic or paper versions of research journals written by Dr. Gottardo, Dr. Xi Chen, Alexandra Bellissimo and Klaudia Krenca. A written summary of the preliminary results will be delivered to every school and teacher that participated in this study at the end of each year of the study (i.e., by December 31, 2016 and December 31, 2017). You can receive a copy of this summary by providing your email or mailing address below. If you would like any additional information about this study please contact Dr. Alexandra Gottardo, Dr. Xi Chen, or Alexandra Bellissimo.

HOW I CAN CONTACT YOU?

If you have any questions at any time about the study or the procedures, or you or your child experience any adverse effects as a result of participating in this study, you may contact Dr. Alexandra Gottardo at 519-884-0710 ext. 2169 or at agottardo@wlu.ca, Dr. Xi Chen, xi.chen.bumgardner@utoronto.ca, or Alexandra Bellissimo at bell9710@mylaurier.ca. You can also contact us by mail at Department of Psychology, 75 University Ave. W. Waterloo, ON, N2L 3C5. This research has been granted clearance according to the recommended principles of Canadian ethics guidelines and the Wilfrid Laurier University research ethics and protection policies. If you feel that any student has not been treated according to the descriptions in this form, or the student's rights as a participant in research have been violated during the course of this project, you may contact Dr. Roberto Basso, Chair, Wilfrid Laurier University Research Ethics Board, 519-884-1970 ext. 4994 or at rbasso@wlu.ca.

**CONSENT**

**Name of Project:** Dynamic Assessment of Early Immersion Literacy Learning Competences (REB #4761)

**Consent to Participate and Signatures**

I understand the information presented in the consent form about participating in this research project. I have had all my questions satisfactorily answered, and agree to participate in the study. Agreeing to participate in this study does not waive my legal rights or release the researchers or institution from their legal and professional responsibilities.

I understand that participation is voluntary and I can withdraw my son/daughter from the study at any time. As well, I am free to ask questions at any time during the study.

**□ I consent for my child to participate**

**Child's name (please print): _____**

**Child's class: _____**

**Name of Parent/Guardian (please print): _____**

**Signature of Parent/Guardian: _____ Date: _____**

**Signature of Researcher: _____ Date: _____**

**□ I wish to receive a copy of the summary of findings (please write email or postal address below)**

_____

**Please return this CONSENT PAGE to your child's teacher in the envelope along with the questionnaire.**

# Appendix F: Parent Demographic Questionnaire

**Demographic Questionnaire**

In an effort to better understand the factors that influence a child's ability to learn to read, we would appreciate it if you could take a moment to complete this questionnaire. *Please return the questionnaire to your child's classroom teacher along with the consent form.*

**My child's name: _____ My child's gender: _____**

**My child's date of birth: (MM/DD/YYYY) _____**

**Questions to Guardian 1 (please specify relationship to child _____)**

1. Were you born in Canada? Please circle one: **Yes / No**
   a. If not, what is your home country? _____
   b. When did you arrive in Canada? _____
2. Was your child born in Canada? Please circle one: **Yes / No**
   a. If not, where was your child born? _____
   b. At what age did he/she come to Canada? _____
3. What is your child's first language? _____
4. At what age did your child first speak English? _____
5. How old/what grade was your child when he/she started the French Immersion program? Age: _____ Grade: _____

6. How fluent are you in English and any other languages? Please check the appropriate boxes, and write in any other languages you speak in the blanks provided.

| | Not fluent<br>No understanding or speaking ability | Limited fluency<br>Some understanding and can say short, simple sentences | Somewhat fluent<br>Good understanding and can express myself on many topics | Quite fluent<br>Can understand and use the language adequately for work and most other situations | Very fluent<br>Understand almost everything. Very comfortable expressing self in all situations |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

7. What languages do you speak with your child? Please check the appropriate boxes, and write in any other languages you speak in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

8. What languages does your child speak with YOU? Please check the appropriate boxes, and write in any other languages you speak in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

9. What language do you speak *most often* with others in your home? _____

10. Please circle the highest level of education you have completed (in any country):

**Primary / Secondary / College / University – Degree / University – Master / University – PhD**

**Questions to Guardian 2 (please specify relationship to child _____)**

11. Were you born in Canada? Please circle one: **Yes / No**
    a. If not, what is your home country? _____
    b. When did you arrive in Canada? _____
12. How fluent are you in English or any other languages? Please check the appropriate boxes, and write in any other languages you speak in the blanks provided.

| | Not fluent No understanding or speaking ability | Limited fluency Some understanding and can say short, simple sentences | Somewhat fluent Good understanding and can express myself on many topics | Quite fluent Can understand and use the language adequately for work and most other situations | Very fluent Understand almost everything. Very comfortable expressing self in all situations |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

13. What languages do you speak with your child? Please check the appropriate boxes and write in any other languages that you speak in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

14. What languages does your child speak with YOU? Please check the appropriate boxes and write in any other language your child speaks in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

15. What language do you speak *most often* with others in your home? _____

16. Please circle the highest level of education you have completed (in any country):

**Primary / Secondary / College / University – Degree / University – Master / University - PhD**

**Questions for both parents and/or guardians:**

17. In addition to guardians 1 and 2, is there another primary caregiver in the home? **Yes / No**
    a. If yes, what language(s) does s/he speak with your child? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

    b. What language(s) does your child speak with her/him? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

18. Approximately how many children's books do you have in the home (including library books)? Please check one for each applicable language.

**English books: More than 100____ 50-100____ 25-50____ 10-25____ Fewer than 10____**

**Other _____: More than 100____ 50-100____ 25-50____ 10-25____ Fewer than 10____**

**Other _____: More than 100____ 50-100____ 25-50____ 10-25____ Fewer than 10____**

19. How often does your child do the activities below, either in English or in other languages? Please check the appropriate boxes below, and please specify the language in which the child does the activity.

| **Activity** | **English** | | | **Language: _____** | | | **Language: _____** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Every day** | **At least once a week** | **Almost never/ never** | **Every day** | **At least once a week** | **Almost never/ never** | **Every day** | **At least once a week** | **Almost never/ never** |
| Reads books/magazines | | | | | | | | | |
| Uses a computer | | | | | | | | | |
| Watches TV/movies | | | | | | | | | |
| Storytelling | | | | | | | | | |
| Sings songs | | | | | | | | | |
| Writes | | | | | | | | | |

20. Does your child attend an English language program outside of school (after-school, or on the weekends)? **Yes / No**
    a. If yes, how many hours per week? Please specify: _____
21. Does your child attend an international language program outside of school (after-school, or on the weekends)? **Yes / No**
    a. If yes, for which language? _____
    b. How many hours per week? _____

22. Does your child participate in any extracurricular activities which require the use of language skills, either in English or in other languages (*for example, art classes, dance classes, sports teams, etc.*)?
    a. If yes, how many hours per week? Please specify: _____

23. Does your child have brothers or sisters? **Yes / No**
    *If yes, please answer questions 20 – 25.*

24. **Sibling 1**: Gender: _____ Date of birth: _____

25. What language(s) does **Sibling 1** speak with the child? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

26. What language(s) does your child speak with **Sibling 1**? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

27. **Sibling 2**: Gender: _____ Date of birth: _____

28. What language(s) does **Sibling 2** speak with the child? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

29. What language(s) does your child speak with **Sibling 2**? Please check the appropriate boxes and write in any other languages in the blanks provided.

| | Never | Seldom | 50% | Usually | Almost always |
|---|---|---|---|---|---|
| English | | | | | |
| Language: _____ | | | | | |
| Language: _____ | | | | | |

23. Please circle the appropriate answer to indicate whether your child has diagnosed or suspected difficulties in the areas below:

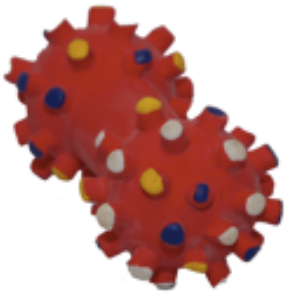
| **Area of difficulty** | **Diagnosis** | **Who diagnosed the difficulty?** | **If a diagnosis was received, what was the diagnosis given?** | **Was the problem treated?** | **Does your child still have problems in this area?** |
|---|---|---|---|---|---|
| Speech, or Language | Yes ☐ No ☐ Suspected but not diagnosed ☐ | Speech therapist ☐ Psychologist ☐ Other: _____ | | Yes ☐ No ☐ | Yes ☐ No ☐ |
| Hearing | Yes ☐ No ☐ Suspected but not diagnosed ☐ | Audiologist ☐ Doctor ☐ Other: _____ | | Yes ☐ No ☐ | Yes ☐ No ☐ |
| Autism Spectrum Disorder | Yes ☐ No ☐ Suspected but not diagnosed ☐ | Psychologist ☐ Other: _____ | | Yes ☐ No ☐ | Yes ☐ No ☐ |
| Learning | Yes ☐ No ☐ Suspected but not diagnosed ☐ | Psychologist ☐ Teacher ☐ Other: _____ | | Yes ☐ No ☐ | Yes ☐ No ☐ |
| Behavior | Yes ☐ No ☐ Suspected but not diagnosed ☐ | Psychologist ☐ Other: _____ | | Yes ☐ No ☐ | Yes ☐ No ☐ |

***Thank you for taking the time to fill out this questionnaire. We greatly appreciate your responses. Please return this questionnaire to your child's teacher with the consent form at your earliest convenience.***

Appendix H: English Name Learning Task Images

| | |
|---|---|
|  Hudgie |  Kesso |
|  Poffy |  Ratha |
|  Thitcho |  Voona |

Appendix I: French Name Learning Task Images

| | |
|---|---|
|  Failledou |  Goeuron |
|  Huignant |  Pivoux |
|  Rimboeux |  Témaux |

Appendix J: English Name Learning Response Sheet

**Student ID#_____**
**School Name: _____**
**Examiner: _____**
**Date: _____**

**Recorded:** YES/NO (Circle)

| **Trial** | *Poffy* | *Voona* | *Kesso* | *Thitcho* | *Ratha* | *Hudgie* | **Total** |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| **Total** | | | | | | | /36 |

**Scoring:**

1 – CORRECT 0 – INCORRECT DK – DON'T KNOW

**CEILING RULE** → Testing stops if all six items in one test trial were named correctly on two consecutive trials. Full credit is awarded for trials not administered if the child reaches the discontinuation criterion. The maximum score on the learning task is 36 (6 names X 6 test trials).

Appendix K: French Name Learning Response Sheet

**Student ID#**_____
**School Name:** _____
**Examiner:** _____
**Date:** _____
**Recorded:** YES/NO (Circle)

| **Trial** | *Pivoux* | *Témaux* | *Failledou* | *Huignant* | *Rimboeux* | *Goeuron* | **Total** |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| **Total** | | | | | | | /36 |

**Scoring:**

1 – CORRECT 0 – INCORRECT DK – DON'T KNOW

**CEILING RULE** → Testing stops if all six items in one test trial were named correctly on two consecutive trials. Full credit is awarded for trials not administered if the child reaches the discontinuation criterion. The maximum score on the learning task is 36 (6 names X 6 test trials).

Appendix L: Dynamic Lexical Specificity English Quadruplets

| Item | Target 1 | Target 2 | Unfamiliar control | Familiar control |
|---|---|---|---|---|
| 1 | /fol/ foal (young horse) | /sol/ *sole* (fish) | /nol/ knoll (small hill) | /bol/ bowl |
| 2 | /tɑt/ tot (child) | /kɑt/ cot (bed) | /mɑt/ mot (girl, young woman) | /θɑt/ thought |
| 3 | /fɑn/ fawn (baby deer) | /pɑn/ (chess) pawn | /dɑn/ dawn (of day) | /jɑn/ yawn |
| 4 | /bæs/ bass (fish) | /bæʃ/ bash (party) | /bæp/ bap (small bun or roll) | /bæk/ back |
| 5 | /stæg/ stag (male deer) | /stæŋ/ stang (pole) | /stɑl/ stall (stable for animals) | /stɑɹ/ star |
| 6 | /bɹe/ brey (animal noise) | /bɹi/ bree (soup/broth) | /bɹu/ brew (hill) | /bɹɑw/ (eye) brow |
| 7 | /tom/ tome (large book) | /tum/ (burial) tomb | /tæm/ tam (wool hat) | /tim/ team |
| 8 | /mot/ (castle) moat | /mut/ moot (assembly) | /mɑjt/ mite (insect) | /mit/ meat |
| 9 | /lom/ loam (soil) | /lum/ (weaving) loom | /lɪm/ limb (arm or leg) | /læm/ lamb |
| 10 | /gɹov/ (tree) grove | /gɹuv/ groove | /gɹiv/ greave (leg armour) | /gɹev/ (burial) grave |
| 11 | /fɪtʃ/ fitch (polecat) | /hɪtʃ/ (trailer) hitch | /lɪtʃ/ litch (zombie) | /wɪtʃ/ witch |
| 12 | /hæg/ hag (witch) | /ʃæg/ shag (carpet) | /dæg/ dag (ornamental piece of cloth) | /bæg/ bag |
| 13 | /dɪn/ din (loud, prolonged noise) | /dɪŋ/ ding (dent) | /dɪt/ dit (dot in Morse code) | /dɪʃ/ dish |
| 14 | /hæʃ/ (potato) hash | /hætʃ/ hatch (door) | /hæɹ/ harr (wind) | /hæm/ ham |
| 15 | /ʃin/ sheen (shininess) | /ʃiɹ/ sheer (curtain) | /ʃiθ/ (sword) sheath | /ʃip/ sheep |
| 16 | /kɹɑk/ crock (stoneware jar) | /kɹʊk/ crook (shepherd's staff) | /kɹɪk/ crick (muscle cramp) | /kɹæk/ crack |
| 17 | /bɹɑk/ brock (male badger) | /bɹʊk/ brook (small stream) | /bɹæk/ brack (sea water) | /bɹɪk/ brick |
| 18 | /ɹæm/ ram (animal) | /ɹɪm/ rIm (of cup) | /ɹom/ rome (blackberry) | /ɹum/ room |
| 19 | /bɹɪm/ (hat) brim | /bɹim/ breem (fish) | /bɹom/ brome (grass) | /bɹum/ broom |
| 20 | /bɹæn/ bran (crow) | /bɹajn/ brine (sea/ocean water) | /bɹɑn/ brawn (muscle) | /bɹɑwn/ brown |

Appendix M: Dynamic Lexical Specificity French Quadruplets

| Item | Target 1 | Target 2 | Unfamiliar Control | Familiar Control |
|---|---|---|---|---|
| 1 | /bɛn/ benne (F) 'dumpster' | /dɛn/ daine (F) 'doe (female deer)' | /fɛn/ faîne (F) 'beechnut' | /ʁɛn/ reine (F) 'queen' |
| 2 | /sɔm/ somme (F) 'nap' | /tɔm/ tome (M) 'volume (of book, etc.)' | /mom/ môme (M/F) 'kid' | /gɔm/ gomme (F) 'eraser' |
| 3 | /mɛs/ messe (F) 'mass (ceremony)' | /mɛʃ/ mèche (F) '(candle) wick' | /mɛk/ mec (M) 'guy' | /mɛʁ/ mère (F) 'mother' |
| 4 | /pɛl/ pelle (F) 'shovel' | /pɛn/ pêne (M) '(lock) bolt' | /pɛs/ pesse (F) 'horse-tail (aquatic flower)' | /pɛʁ/ père (M) 'father' |
| 5 | /bak/ bac (M) 'bin' | /bag/ bague (F) 'ring (jewelry)' | /baf/ baffe (F) 'slap' | /bal/ balle (F) 'ball' |
| 6 | /gʁɑ/ gras (M) 'fat' | /gʁo/ grau (M) 'inlet, estuary' | /gʁy/ grue (F) 'crane' | /gʁi/ gris (M) 'grey' |
| 7 | /mɑ/ mât (M) 'mast (of a ship)' | /mu/ moue (F) 'pout' | /mɔ̃/ mont (M) 'hill' | /mɛ̃/ main (F) 'hand' |
| 8 | /bɛʃ/ bêche (F) 'spade (shovel)' | /biʃ/ biche (F) 'doe (deer)' | /bɑʃ/ bâche (F) 'tarp(aulin)' | /buʃ/ bouche (F) 'mouth' |
| 9 | /ge/ gué (M) 'ford (in river)' | /gi/ gui (M) 'mistletoe' | /gɔ̃/ gond (M) 'hinge' | /gɑ̃/ gant (M) 'glove' |
| 10 | /mol/ môle (M) 'breakwater' | /mul/ moule (M) 'mold (shape)' | /mal/ malle (F) 'suitcase' | /mil/ mille (M) 'thousand' |
| 11 | /gam/ gamme (F) '(musical) scale' | /ʁam/ rame (F) 'oar' | /lam/ lame (F) 'blade' | /fam/ femme (F) 'woman' |
| 12 | /ʒal/ jale (F) 'basin, large bowl' | /ʁal/ râle (M) 'groan (sound)' | /kal/ cale (F) 'wedge' | /sal/ salle (F) 'room' |
| 13 | /bɔg/ bogue (F) 'chestnut husk' | /bɔʁ/ bord (M) 'edge' | /bɔs/ bosse (F) 'bump/hump' | /bɔt/ botte (F) 'boot' |
| 14 | /sɛv/ sève (F) '(tree) sap' | /sɛʁ/ serre (F) 'greenhouse' | /sɛp/ cèpe (M) 'porcini (mushroom)' | /sɛt/ sept (M) 'seven' |
| 15 | /sil/ cil (M) 'eyelash' | /siɲ/ cygne (M) 'swan' | /siʁ/ cire (M) 'wax' | /sis/ six (M) 'six' |
| 16 | /fɑ̃t/ fente (F) 'slot' | /fɔ̃t/ fonte (F) 'cast iron' | /fɛ̃t/ feinte (F) 'trick/trap' | /fɛt/ fête (F) 'party' |
| 17 | /fo/ faux (F) 'scythe' | /fɔ̃/ fond (M) 'bottom/background' | /fy/ fût (M) 'barrel, keg' | /fɛ̃/ faim (F) 'hunger' |
| 18 | /bʁɛ/ brai (M) 'pitch (tar)' | /bʁɛ̃/ brin (M) 'blade (of grass)' | /bʁu/ brout (M) 'browse (twigs & shoots eaten by animals)' | /bʁɑ/ bras (M) 'arm' |
| 19 | /ʁɛ/ raie (F) 'part (in hair) | /ʁɛ̃/ rein (M) 'kidney' | /ʁo/ rot (M) 'burp' | /ʁy/ rue (F) 'street' |
| 20 | /tʁo/ trot (M) 'trotting (of horse)' | /tʁɔ̃/ tronc (M) '(tree) trunk | /tʁi/ tri (M) 'sorting (of recyclying, etc.)' | /trɛ̃/ train (M) 'train (vehicule)' |

Appendix N: Dynamic Lexical Specificity English Filler Words

| arm |
| --- |
| axe |
| bath |
| bed |
| bench |
| bird |
| bite |
| block |
| blush |
| bow |
| box |
| bridge |
| bush |
| cage |
| cake |
| car |
| case |
| chain |
| cheese |
| coach |
| coat |
| cold |
| cone |
| core |
| crab |
| dad |
| deck |
| dive |
| dog |
| doll |
| door |
| dough |
| drain |
| dress |
| drink |
| duck |
| egg |
| eight |
| elf |

| eye |
| --- |
| flag |
| fork |
| fort |
| fox |
| frame |
| frog |
| gas |
| geese |
| girl |
| glove |
| golf |
| grape |
| green |
| guard |
| heart |
| hen |
| hide |
| hive |
| hoof |
| hop |
| horn |
| hose |
| hush |
| ice |
| kick |
| knee |
| lamp |
| lime |
| line |
| lunch |
| mouse |
| mud |
| nail |
| net |
| night |
| nose |
| nurse |
| owl |

| park |
| --- |
| peach |
| pig |
| plug |
| pool |
| porch |
| punch |
| rake |
| rope |
| salt |
| sand |
| seal |
| shield |
| shirt |
| sink |
| sleeve |
| snake |
| soap |
| sock |
| space |
| spoon |
| square |
| stool |
| stove |
| stripe |
| stump |
| sweep |
| sword |
| tear |
| tent |
| track |
| trip |
| trunk |
| van |
| wood |
| worm |

Appendix O: Dynamic Lexical Specificity French Filler Words

| |
|---|
| art |
| bleu |
| bois |
| cage |
| carte |
| cent |
| chaud |
| chat |
| clé |
| coeur |
| coin |
| cou |
| coude |
| dent |
| doigt |
| dos |
| eau |
| fleur |
| frère |
| froid |
| glace |
| heure |
| jambe |
| jaune |
| joie |
| jus |
| lac |
| lait |
| langue |
| ligne |
| lime |
| lire |
| lit |
| loup |
| lune |
| neige |
| nez |
| neuf |
| nid |

| |
|---|
| noir |
| oeuf |
| ours |
| page |
| parc |
| pain |
| plage |
| plume |
| pomme |
| porte |
| pot |
| poule |
| peur |
| robe |
| roi |
| rose |
| rouge |
| rire |
| riz |
| sac |
| sel |
| ski |
| soupe |
| sport |
| terre |
| tête |
| vache |
| verre |
| vert |
| vase |
| vent |
| ville |
| yeux |

Appendix P: Dynamic Lexical Specificity English Practice Words

| |
|---|
| fob |
| shawm |
| yegg |
| tiff |
| spawn |

Appendix Q: Dynamic Lexical Specificity French Practice Words

| |
|---|
| laine |
| quai |
| pente |
| puce |
| pite |

Appendix R: Dynamic Lexical Specificity English Supportive Items

| |
|---|
| skirt |
| smile |
| mouse |
| worm |
| branch |
| duck |
| box |
| stripe |
| frog |

Appendix S: Dynamic Lexical Specificity French Supportive Items

| coeur |
|---|
| porte |
| rat |
| lune |
| pomme |
| lit |
| glace |
| rose |
| lac |

Appendix T: Correlational Analyses Organized by Research Questions

**English variables related to dynamic measures.** English lexical specificity at Time 1 did not have a significant relationship with English name learning at Time 1, $r_{(37)} = .129$, $p = .440$. Correlational analysis showed that English lexical specificity at Time 1 had a significant relationship with English vocabulary at Time 2, $r_{(37)} = .438$, $p = .007$ (See Table 9. English name learning at Time 1 had a significant relationship with English vocabulary at Time 2, $r_{(37)} = .530$, $p = .001$ (See Table 5).

**English variables related to static measures.** Correlational analysis showed that English word reading at Time 1 had significant relationships with the measures of English phonological awareness (elision and blending tasks) at Time 1, $r_{(37)} = .729$, $p < .001$, $r_{(37)} = .332$, $p = .042$, respectively. English word reading at Time 1 had a significant relationship with English vocabulary at Time 2, $r_{(37)} = .480$, $p = .003$. A within construct relationship was revealed between English phonological awareness (elision) and English phonological awareness (blending) at Time 1, $r_{(37)} = .503$, $p = .001$. English phonological awareness (elision) has a significant relationship with English vocabulary at Time 2, $r_{(37)} = .382$, $p = .020$. English phonological awareness (blending) at Time 1 did not have a significant relationship with English vocabulary at Time 2, $r_{(37)} = .301$, $p = .071$ (See Table 6).

**French variables related to dynamic measures.** Correlational analysis showed that French lexical specificity at Time 1 did not have a significant relationship with French name learning at Time 1, $r_{(37)} = .152$, $p = .363$. French lexical specificity at Time 1 did not have a significant relationship with French vocabulary at Time 2, $r_{(37)} = .316$, $p = .057$. French name learning at Time 1 does not have a significant relationship with French vocabulary at Time 2, $r_{(37)} = .304$, $p = .068$ (See Table 7).

**French variables related to static measures.** Correlational analyses were conducted examining relations among Time 1 variables for the French measures. The results of the analyses showed that French letter-word reading at Time 1 had a significant relationship with French word reading at Time 1, $r_{(37)} = .462$, $p = .003$. French letter-word reading at Time 1 had a significant relationship with French phonological awareness (elision) at Time 1, $r_{(37)} = .681$, $p < .001$. French letter-word reading at Time 1 had a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .494$, $p = .002$. French word reading at Time 1 had a significant relationship with phonological awareness (elision) at Time 1, $r_{(37)} = .672$, $p < .001$. French word reading at Time 1 had a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .381$, $p = .018$. French phonological awareness (elision) at Time 1 had a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .503$, $p = .001$ (See Table 8).

Correlational analyses also were conducted to examine relations between Time 1 variables and Time 2 variables. French letter-word reading at Time 1 had a significant relationship with French vocabulary at Time 2, $r_{(37)} = .421$, $p = .009$ (See Table 10). French word reading at Time 1 had a significant relationship with French vocabulary at Time 2, $r_{(37)} = .494$, $p = .002$. French phonological awareness (elision) at Time 1 had a significant relationship with French vocabulary at Time 2, $r_{(37)} = .327$, $p = .048$. French phonological awareness (blending) at Time 1 had a significant relationship with French vocabulary at Time 2, $r_{(37)} = .352$, $p = .033$ (See Table 8).

**English variables related to word reading.** Correlational analyses were conducted to determine variables related to English word reading. First, correlations among Time 1 variables were examined. The results of the analyses showed that English lexical specificity at Time 1 did

not have a significant relationship with English rapid naming at Time 1, $r_{(37)} = -.295$, $p = .072$. with English word reading at Time 1, or with English phonological awareness (elision task) at Time 1, $r_{(37)} = .312$, $p = .057$. English lexical specificity at Time 1 had a significant relationship with English phonological awareness (blending), $r_{(37)} = .596$, $p < .001$. English lexical specificity at Time 1 had a significant relationship with memory for digits at Time 1, $r_{(37)} = .415$, $p = .010$ (See Table 5). English word reading at Time 1 had a significant relationship with English rapid naming, $r_{(37)} = -.558$, $p < .001$. English word reading at Time 1 had a significant relationship with English phonological awareness (elision) at Time 1, $r_{(37)} = .729$, $p < .001$, English word reading at Time 1 had a significant relationship with English phonological awareness (blending) at Time 1, $r_{(37)} = .332$, $p = .042$. English phonological awareness (elision) at Time 1 had a significant relationship with English rapid naming at Time 1, $r_{(37)} = -.512$, $p = .001$. English phonological awareness (elision) at Time 1 had a significant relationship with English phonological awareness (blending) at Time 1, $r_{(37)} = .503$, $p = .001$. English phonological awareness (elision) at Time 1 had a significant relationship with English memory for digits at Time 1, $r_{(37)} = .329$, $p = .044$. English phonological awareness (blending) at Time 1 had a significant relationship with English rapid naming at Time 1, $r_{(37)} = -.452$, $p = .004$. English phonological awareness (blending) at Time 1 did not have a significant relationship with English memory for digits at Time 1, $r_{(37)} = .273$, $p = .097$. English rapid naming at Time 1 did not have a significant relationship with English memory for digits at Time 1, $r_{(37)} = -.235$, $p = .156$ (See Table 9).

Additionally, Time 1 variables were examined in relation to Time 2 variables. English lexical specificity at Time 1 had a significant relationship with English word reading at Time 2, $r_{(37)} = .347$, $p = .035$ (See Table 9). English word reading at Time 1 had a significant relationship

with English word reading at Time 2, $r_{(37)} = .920$, $p < .001$. English phonological awareness (elision) at Time 1 had a significant relationship with English word reading at Time 2, $r_{(37)} = .700$, $p < .001$. English phonological awareness (blending) at Time 1 had a significant relationship with English word reading at Time 2, $r_{(37)} = .435$, $p = .007$. English rapid naming at Time 1 had a significant but negative relationship with English word reading at Time 2, $r_{(37)} = -.594$, $p < .001$. English memory for digits at Time 1 did not have a significant relationship with English word reading at Time 2, $r_{(37)} = .244$, $p = .146$ (See Table 9).

**French variables related to word reading.** Correlational analyses were used to examine Time 1 variables related to French word reading. The results of the analyses showed that French lexical specificity at Time 1 did have a significant relationship with French word reading at Time 1, $r_{(37)} = .464$, $p = .003$. French lexical specificity at Time 1 did not have a significant relationship with French phonological awareness (elision) at Time 1, $r_{(37)} = .268$, $p = .104$. French lexical specificity at Time 1 did not have a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .086$, $p = .600$. French lexical specificity at Time 1 did not have a significant relationship with French rapid naming at Time 1, $r_{(37)} = .001$, $p = .999$. French rapid naming at Time 1 had a significant relationship with French word reading at Time 1, $r_{(37)} = -.337$, $p = .039$. French rapid naming at Time 1 had a significant relationship with French phonological awareness (elision) at Time 1, $r_{(37)} = .526$, $p = .001$. French rapid naming at Time 1 had a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = -.408$, $p = .011$ (See Table 7). French word reading at Time 1 had a significant relationship with French phonological awareness (elision) at Time 1, $r_{(37)} = .672$ $p < .001$. French word reading at Time 1 had a significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .381$ $p = .018$. French phonological awareness (elision) at Time 1 had a

significant relationship with French phonological awareness (blending) at Time 1, $r_{(37)} = .505$, $p = .001$ (See Table 7).

Correlational analyses were conducted to determine relations among Time 1 variables and Time 2 French word reading. French lexical specificity at Time 1 had a significant relationship with French word reading at Time 2, $r_{(37)} = .360$, $p = .029$ (See Table 10). French rapid naming at Time 1 did not have a significant relationship with French word reading at Time 2, $r_{(37)} = -.310$, $p = .062$. French word reading at Time 1 did not have a significant relationship with French word reading at Time 2, $r_{(37)} = .882$. $p < .001$. French phonological awareness (elision) at Time 1 had a significant relationship with French word reading at Time 2, $r_{(37)} = .609$, $p < .001$. French phonological awareness (blending) at Time 1 did not have significant relationship with French word reading at Time 2, $r_{(37)} = .317$, $p = .056$ (See Table 10).

**English variables related to French word reading.** Correlational analysis showed that English lexical specificity at Time 1 did not have a significant relationship with English phonological awareness (elision) at Time 1, $r_{(37)} = .312$, $p = .057$. English lexical specificity at Time 1 had a significant relationship with English phonological awareness (blending) at Time 1, $r_{(37)} = .596$, $p < .001$. English lexical specificity at Time 1 did not have a significant relationship with English word reading at Time 1, $r_{(37)} = .238$, $p = .150$. English phonological awareness (elision) at Time 1 did not have a significant relationship with English phonological awareness (blending) at Time 1, $r_{(37)} = .503$, $p = .001$. English phonological awareness (elision) at Time 1 did not have a significant relationship with English word reading at Time 1, $r_{(37)} = .729$, $p < .001$. English phonological awareness (blending) at Time 1 had a significant relationship with English word reading at Time 1, $r_{(37)} = .332$, $p = .042$ (See Table 11).

Correlational analyses were conducted to determine relations among Time 1 English variables and Time 2 French word reading. English phonological awareness (blending) at Time 1 did not have a significant relationship with French word reading at Time 2, $r_{(37)} = .279$, $p = .095$. English lexical specificity at Time 1 did not have a significant relationship with French word reading at Time 2, $r_{(37)} = .254$, $p = .129$. English phonological awareness (elision) at Time 1 had a significant relationship with French word reading at Time 2, $r_{(37)} = .633$, $p < .001$. English word reading at Time 1 had a significant relationship with French word reading at Time 2, $r_{(37)} = .809$, $p < .001$. (See Table 11).

Appendix U: Comparing participants who speak primarily English at home and those that speak primarily another language at home.

| Measure | Group | Mean | Std. | t | df | sig. |
|---|---|---|---|---|---|---|
| English lexical specificity at Time 1 | English | 52.14 | 11.08 | .79 | 36 | .433 |
| | Other | 48.56 | 14.18 | | | |
| English lexical specificity at Time 2 | English | 58.50 | 9.50 | .58 | 35 | .563 |
| | Other | 56.11 | 13.91 | | | |
| English rapid naming at Time 1 | English | 22.45 | 4.21 | 2.06 | 36 | .047 |
| | Other | 19.18 | 4.04 | | | |
| English rapid naming at Time 2 | English | 22.00 | 5.11 | 2.63 | 35 | .013 |
| | Other | 17.18 | 3.46 | | | |
| English vocabulary at Time 1 | English | 142.41 | 14.73 | -.54 | 36 | .590 |
| | Other | 145.67 | 18.69 | | | |
| English vocabulary at Time 2 | English | 139.29 | 20.32 | .22 | 35 | .826 |
| | Other | 137.56 | 20.56 | | | |
| English word reading at Time 1 | English | 42.14 | 10.02 | -1.70 | 36 | .097 |
| | Other | 48.22 | 6.59 | | | |
| English word reading at Time 2 | English | 46.50 | 9.67 | -1.33 | 35 | .194 |
| | Other | 51.11 | 6.72 | | | |
| English phonological awareness (elision) at Time 1 | English | 22.62 | 7.75 | -.40 | 36 | .690 |
| | Other | 23.78 | 6.74 | | | |
| English phonological awareness (elision) at Time 2 | English | 22.68 | 6.93 | -.57 | 35 | .574 |
| | Other | 24.11 | 5.26 | | | |
| English phonological awareness (blending) at Time 1 | English | 20.31 | 4.02 | -.66 | 36 | .511 |
| | Other | 21.33 | 4.09 | | | |
| English phonological awareness (blending) at Time 2 | English | 19.96 | 3.26 | 1.28 | 35 | .781 |
| | Other | 20.33 | 4.00 | | | |
| English name learning at Time 1 | English | 10.48 | 9.54 | -.44 | 36 | .662 |
| | Other | 12.00 | 6.93 | | | |
| English name learning at Time 2 | English | 21.64 | 8.87 | -.27 | 35 | .787 |
| | Other | 22.56 | 8.40 | | | |
| English memory for digits | English | 17.48 | 2.37 | .04 | 36 | .971 |
| | Other | 17.44 | 3.64 | | | |
| French lexical specificity at Time 1 | English | 38.52 | 9.32 | -1.90 | 36 | .066 |
| | Other | 46.11 | 13.83 | | | |
| French lexical specificity at Time 2 | English | 44.18 | 9.230 | -1.72 | 35 | .094 |
| | Other | 50.78 | 12.28 | | | |
| French rapid naming at Time 1 | English | 35.36 | 13.90 | 2.92 | 36 | .006 |
| | Other | 21.59 | 3.63 | | | |
| French rapid naming at Time 2 | English | 36.14 | 21.57 | 1.92 | 35 | .063 |
| | Other | 22.14 | 3.95 | | | |
| French vocabulary at Time 1 | English | 25.45 | 10.85 | -2.53 | 36 | .016 |
| | Other | 39.78 | 24.13 | | | |
| French vocabulary at Time 2 | English | 28.64 | 11.48 | -2.25 | 35 | .031 |
| | Other | 43.56 | 29.47 | | | |
| French letter knowledge at Time 1 | English | 15.45 | 7.35 | -1.62 | 36 | .114 |
| | Other | 19.67 | 4.58 | | | |
| French letter knowledge at Time 2 | English | 15.71 | 7.35 | -2.05 | 35 | .048 |
| | Other | 21.00 | 4.06 | | | |
| French word reading at Time 1 | English | 18.34 | 14.30 | -2.51 | 36 | .017 |
| | Other | 33.33 | 19.58 | | | |
| French word reading at Time 2 | English | 23.50 | 16.75 | -1.62 | 35 | .114 |
| | Other | 34.11 | 18.16 | | | |
| French phonological awareness (elision) at Time 1 | English | 15.52 | 6.35 | -1.71 | 36 | .096 |
| | Other | 19.33 | 3.64 | | | |
| French phonological awareness (elision) at Time 2 | English | 16.64 | 7.17 | -1.80 | 35 | .081 |
| | Other | 21.22 | 4.55 | | | |
| French phonological awareness (blending) at Time 1 | English | 9.21 | 2.61 | -.82 | 36 | .417 |
| | Other | 10.00 | 2.236 | | | |
| French phonological awareness (blending) at Time 2 | English | 10.36 | 1.87 | -2.08 | 35 | .045 |
| | Other | 12.11 | 3.06 | | | |
| French name learning at Time 1 | English | 7.90 | 6.84 | -2.21 | 36 | .034 |
| | Other | 13.67 | 6.86 | | | |
| French name learning at Time 2 | English | 14.86 | 7.75 | -1.66 | 35 | .106 |
| | Other | 20.00 | 9.10 | | | |
| Non-verbal reasoning | English | 36.83 | 10.63 | -1.00 | 36 | .325 |
| | Other | 41.00 | 12.07 | | | |