THE DEVELOPMENT OF READING SKILLS OF CHILDREN WITH ENGLISH AS A
SECOND LANGUAGE

by

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Abstract

The first study examined the development of reading, spelling and syntactic skills in English speakers (L1) and children with English as a Second language (ESL) from kindergarten to grade 3. This longitudinal study also investigated procedures for identifying reading difficulties in the early grades of elementary school for both English speakers and children with ESL. Reading, spelling, phonological processing, syntax, lexical access and working memory skills were assessed in kindergarten. Additional tasks were incorporated into the battery to assess cognitive and reading processes in grade 3. By the end of grade 3, the L1 and ESL normally achieving readers performed in similar ways on all tasks except on the spelling, arithmetic and syntactic awareness tasks. The ESL normally achieving readers performed better than the L1 on spelling and arithmetic tasks, however the L1 normally achieving readers performed better than the ESL on the syntactic awareness task. Similar cognitive and reading components predicted word reading and reading comprehension in grade 3 for both language groups. The results show that learning English as a second language is not an impediment to successful literacy learning, and may even be an advantage. In the second part of this study we examine whether the first language of children with ESL affected the reading, spelling and syntactic awareness in English. Seven language groups, Chinese, Farsi, Slavic, Japanese, Romance, Tagalog, and native English speakers groups, were compared in a cross sectional study. This study included all the children with ESL in kindergarten and grades 1, 2 and 3. The results demonstrated positive as well as negative effects in spelling and syntactic skills, resulting from the transfer to English

for members of different language groups. Differences across language groups reflect the nature of the native language. Specifically, a positive transfer occurred when the L1 grammar system was more complex than the L2 grammar system. When investigating second language it is necessary to consider the native language and effect on the acquisition of a second language.

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Introduction

"At first, the people of the whole world had only one language and used the same words" (Genesis, 11:1).

"When I was in China, my mother told me that Canada was so far away it would take us more than 14 hours to get there. Now I am living in Canada, but sometimes I still feel that Canada is so far from me. Language is my major problem. Although I am able to deal with the assignments and the tests, I feel that I simply can't communicate with other students. Actually, I should say that I am really nervous about misunderstanding others so that I become more and more reticent. Anyway, I don't regret coming to Canada. I should not always think about the negative side. Actually, I have learned much during the eight months. For instance, I feel that my English is much better than those days when I was first here..."

Xuan Cen

China (Porter, 1991, p. 22).

"The most difficult problem to overcome is language. Although in Hong Kong some subjects are taken in English, sometimes when teachers explain to the class they use Cantonese instead of English. Here, everything is taught in English, and when the teachers speak fast, I cannot understand. Sometimes a teacher makes jokes and students laugh a lot, but I just sit on my seat like a stone. How embarrassed I am."

Hau Yu Wong

Hong Kong (Porter, 1991, p. 52).

In these two quotes, Xuan Cen and Hau Yu Wong, both adolescents, have succinctly articulated the linguistic challenges that students who immigrated to Canada face (Porter, 1991). Younger students confront similar, if not greater,

challenges in their first steps in a Canadian school; however, unlike their adolescent counterparts, they have a harder time giving voice to their frustrations. This research aims to explore the unique difficulties that some young English as a Second Language (ESL) children encounter in their initial, educational experiences, specifically with reading acquisition. For the researcher, this is a daunting task as she or he attempts to analyze the linguistic challenges of children who have a hard time expressing basic needs, let alone articulating their frustrations. Yet, this is a worthwhile endeavor. As we have learned over the past few years, language acquisition is a key component in a child's integration into a new society. A better understanding of these processes at a young age, would help children in this critical transition and facilitate their entire educational experience.

The research literature on reading development of students with ESL and first language (L1) students has raised some interesting issues, although the research has been limited in scope and some of the major issues need to be further examined. For example, there is a relatively vast research on the phonological processing of native English speakers (e.g., Calfee, Lindamood & Lindamood, 1973; Hurford, Johnston, Nepote, Hampton, Moore, Neal, Mueller, McGeorge, Huff, Awad, Tatro, Juliano & Huffman, 1994) and students with ESL (e.g., Abu Rabia & Siegel, 1996; Chiappe & Siegel; 1999; Durgunoglu, Nagy & Hancin-Bhatt, 1993; Muter & Diethelm, 2001), although our knowledge on other cognitive skills that are part of the reading and spelling acquisition of students with ESL is more limited. Additionally, investigators have made us aware of the fact that there are differences in syntactic awareness between ESL and L1 normally achieving readers (e.g., Da

Fontoura & Siegel, 1995), although little is known about how those differences change over time with exposure to the English language. Also, although we are well aware of differences in reading development between L1 reading disabled (RD) and L1 normally-achieving students (e.g., Siegel, 1993), the information on the development of reading of ESL RD students or even who is RD in the first place, is very limited. And although we now have some data on differences between ESL RD and ESL normally achieving students with regard to specific reading measures (e.g., Abu Rabia & Siegel, 1996; Comeau, Cormier, Grandmaison & Lacroix, 1999; Durgunoglu, Nagy & Hancin-Bhatt, 1993; Geva & Siegel, 2000), we do not know if there are differences on other reading tasks, such as reading comprehension and reading fluency, and also what changes may take place over time. Finally, we know primarily from studies on adults (e.g., Akamatsu, 1999; Holm & Dodd, 1996; Wade-Woolley, 1999) that the native language can affect reading and writing acquisition in English, although our knowledge on how different language backgrounds affect reading and spelling acquisition within children is limited.

In consideration of these issues, this study will attempt to address four questions: how do the reading skills of children with ESL and L1 English speakers develop from kindergarten to grade 3? What are the reading patterns of at risk children with ESL and at risk L1 English speaking children? What factors in kindergarten predict reading in grade 3 for ESL and L1 English speaking children? And finally, does the native language of children with ESL affect reading and cognitive skills in English?

The literature that relates to this study falls into two distinct fields: ESL and

reading disability. The research on reading disability can inform us about questions pertaining to the reading development of children with ESL. Of special interest to this study is literature that deals with the following questions: historical and statistical information about the population with ESL and its relevance to a Canadian context; descriptions of the cognitive processes involved in the development of reading skills of RD students and students with ESL; reviews of current research about intervention for ESL and RD children, and characteristics of different languages.

Immigration to Canada

As a result of the increased number of immigrants to developed countries, there are many children who speak English as a second language (ESL). Students with ESL are defined as students whose first spoken language at home to their parents, siblings, and grandparents is not English.

As recent research has shown, immigration has had a profound impact on the languages spoken in Canadian homes. In 1996, 4.7 million people reported a mother tongue other than English or French, a 15.1% increase from 1991. This increase was 2½ times faster than the overall growth rate of the Canadian population (Statistics Canada, 1997). Almost 80% of the 1,039,000 immigrants who came to Canada between 1991 and 1996 reported a non-official language as their mother tongue in the 1996 Census. Chinese was reported to be Canada's most common language spoken at home, after English and French.

Further, research has revealed that immigrants who arrived between 1991 and 1996 largely settled in Canada's three largest metropolitan areas: Toronto, Montreal and Vancouver. Toronto had the highest proportion of individuals (25%)

that spoke a non-official language at home in 1996, followed by Vancouver (22%) and Montreal (12%) (Statistics Canada, 1997). Almost one-fifth of the people aged 15 or younger in Toronto and Vancouver, spoke a non-official language most often at home (Statistics Canada, 1997).

Children of immigrant parents usually find themselves exposed to a language at home (spoken, read and written), which is completely different from the language used in public schools in Canada. The initial part of their adjustment process is learning a new language. Obviously, this is not an easy task. Immigrant students are facing significant challenges in the school systems. One evidence for these challenges is the higher percentage of students with ESL who drop out of school compared to native English-speaking students (Alberta Education, 1992; Gunderson & Clarke, 1998; Radwanski, 1987; Watt & Roessingh, 1994). Generally, it was found that the ESL dropout rate varied according to the student's English language proficiency at entry to high school. Students who started high school with beginner level of English proficiency suffered a 95.5% dropout rate (Watt & Roessingh, 1994). These findings suggest that students with different linguistic backgrounds who are exposed to English as the language of instruction may experience tremendous difficulties in their school years.

Reading Development and Reading Disabled Children

One of the important questions in the reading literature is how reading skills are developed in normally achieving students, RD students and students with ESL. In order to answer this question, some clarification about the cognitive processes that are involved in the development of reading skills will be presented, followed by a review of current research in the RD and ESL fields.

In the last 40 years, the field of reading disability has been the focus of a great deal of investigation. This is particularly true since learning disability was officially identified by the researcher Samuel Kirk (1963). Since that time, investigators have concentrated on the reading process as a skill that needs to be further investigated in order to better understand reading disabilities. As a result, we know much more today about the cognitive processes that are involved in reading than in the past. This knowledge has helped with the identification of reading problems at an early age, as well as promoted the need for appropriate remediation and intervention. Furthermore, this knowledge could enhance our ability to understand the difficulties that children with ESL encounter.

There are three cognitive processes that are significantly disrupted in children who are reading disabled: phonological processing, syntactic awareness and working memory. These processes have been demonstrated to increase significantly during the rapid acquisition of reading skills (Siegel, 1993).

Phonological processing has been found to be one of the critical skills for learning to read for English speakers from early pre-school to university students (e.g., Calfee, Lindamood & Lindamood, 1973; Hurford et al., 1994). Gilbertson and Bramlett (1998) examined whether informal phonological awareness measures can predict first grade reading ability. Ninety-one kindergarten subjects were administered standardized assessments of cognitive ability and receptive vocabulary, and informal phonological awareness measures. By the end of grade 1, the three phonological awareness tasks (invented spelling, categorization and blending) identified at-risk students with 92% accuracy (Gilbertson & Bramlett,

1998).

In another study, Calfee, Lindamood and Lindamood (1973) examined 660 students from kindergarten to grade 12. They found that phonological awareness characterized even poor readers at the high school level compared to good readers.

Phonological processing skills were also found to be deficient among adults with reading disability (e.g., Bruck, 1990; Pennington, Van Orden, Smith, Green & Haith, 1990). A recent study that compared the phonological processing of university students with dyslexia to average university students indicated that differences in phonological processing skills were still evident even at this age (Wilson & Lesaux, 2001).

Furthermore, phonological awareness tests have also been reported as good predictors of reading and spelling abilities for English speakers (e.g., Gilbertson & Bramlett, 1998; Gottardo, Stanovich, & Siegel, 1996; MacDonald, & Cornwall, 1995; Tunmer, Herriman & Nesdale, 1988). MacDonald and Cornwall (1995) followed up on 24 teenagers who were initially tested in kindergarten for phonological analysis and reading and spelling. The results indicated that their kindergarten phonological awareness skill, as measured by the Auditory Analysis Test (Rosener & Simon, 1971) was both a concurrent and long term predictor of word identification and spelling skills. Scores on the AAT at age six accounted for approximately 25% of the variance in word identification and spelling skills at age 17 (MacDonald & Cornwall, 1995).

In another study, Gottardo, Stanovich and Siegel (1996) examined third-graders' phonological sensitivity, working memory, syntactic processing, word

recognition, pseudoword reading, and reading comprehension. They found that phonological sensitivity was a strong predictor of reading performance after working memory and syntactic processing had been partialled (Gottardo et al., 1996).

Although regarded as perhaps less critical in the development of reading acquisition than phonological processing, syntactic awareness is the ability to understand the syntax of the language. It is critical for fluent and efficient reading of text and it requires making predictions about the next sequence of words (Siegel, 1993). Poor readers demonstrate poor syntactic awareness skills (e.g., Tunmer & Hoover, 1992; Tunmer, Nesdale, & Wright, 1987). Siegel and Ryan (1988) compared RD students aged 7 to 13 to normal readers on a measure of syntactic awareness. In this study, it was found that the RD students performed significantly more poorly than normal readers on the syntax awareness measure.

Another skill that is necessary for reading fluency is working memory. Working memory is composed of a central coordinating executive system and one or more subsidiary systems (e.g., Baddeley, 1983). Working memory involves the retention of information in short-term storage while simultaneously processing incoming information and retrieving information from long-term storage. Working memory is extremely relevant to reading (e.g., Baddeley, 1983; Daneman & Carpenter, 1980; Siegel & Ryan, 1988; Siegel, 1994) since the reader must decode and/or recognize words while remembering what has already been read, and then retrieve information such as grapheme-phoneme conversion rules (Siegel, 1993). In addition, working memory has limited capacity; when there are more demands on the executive system, less processing space and cognitive energy will be available

for the subsidiary systems. Individuals with reading disabilities experience significant difficulties with working memory (e.g., Gottardo, Stanovich, & Siegel, 1996; Siegel, 1994; Swanson, 1993, 1994). Siegel and Ryan (1989) examined the performance of reading disabled, arithmetic disabled, attentional deficit disorder and normally achieving students on a working memory task for sentences and working memory task for counting. Overall, there were 173 students, aged 7 to 13 years. The results demonstrated that the RD students had significantly lower scores on both tasks, compared to the normally-achieving students. Yet, the arithmetic-disabled students had significantly lower scores on the working memory counting task only, than the normally-achieving group (Siegel & Ryan, 1989). This study demonstrated the deficit in working memory among RD and arithmetic-disabled students in the early school years.

Another study demonstrated the persistent deficit of disabled readers in working memory through the life span. Chiappe, Hasher, and Siegel (2000) investigated the relationship among working memory, inhibitory control, and reading skills with 966 individuals, aged 6 to 49 years (Chiappe et al., 2000). Working memory was assessed using a working memory (listening span) task in which the experimenter read sentences to participants in which the final word was missing. The participants needed to supply the missing word and attempted to repeat all the set's missing words on completion of the set. The results indicated that at each age, there were differences between skilled and disabled readers on working memory tasks. Therefore, the investigators suggested that "difficulties in working memory for disabled readers extend beyond childhood into adolescence and adulthood"

(Chiappe et al, 2000, p. 15).

The literature and theories about RD, as well as those about reading processes can help inform research about students with ESL. Since both deal with reading processes, we can use reading theories and reading risk factors when investigating reading development in students with ESL.

Reading Development and Students with English as a Second Language

The literature on the three of the fundamental cognitive processes that are involved in reading (phonological processing, syntactic awareness, working memory) is limited when it pertains to students with ESL. Phonological awareness skills have received more attention than the other two processes in the research on students with ESL. Overall it was found that phonological awareness skills are universal and that these skills are transferred from language to language (e.g., Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Verhoeven, 1994).

Gottardo, Yan, Siegel, and Wade-Woolley (2000) compared native English speakers to children with ESL whose first language was Cantonese. The findings demonstrated a correlation between phonological processing skills in the first and second languages (Gottardo, Yan, Siegel, & Wade-Woolley, 2000). Also, individual differences in phonological skills in the first and second languages explained individual differences in reading ability in the second language (Gottardo et al., 2000).

When children with ESL from different native language backgrounds read in English, phonological processing skills have been found to be an essential skill (e.g., Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Muter & Diethelm, 2001). When

examining reading skills in an alphabetic language such as Punjabi, Chiappe and Siegel (1999) found that phonological processing measures discriminated between groups of children based on reading skills, and not their first language (Chiappe & Siegel, 1999).

In another study, Abu Rabia and Siegel (1996) investigated the three fundamental cognitive processes in reading for students with ESL who spoke Arabic as their first language. Arabic is an alphabetic language that is regular and predictable in the correspondence between sounds and letters. The script system is different from English as the writing and reading system is from right to left. Abu Rabia and Siegel (1996) compared L1 English speakers to bilingual English-Arabic children. English was the main instructional language for all the children and Arabic was the language spoken at home for the bilingual children. All the bilingual children attended a Heritage Language Program where they were taught to read and write Arabic. The results demonstrated that the bilingual readers who performed poorly in Arabic (their first language) also scored poorly on word and pseudoword English reading tasks. Conversely, the students who performed well in Arabic tended to score well in English language acquisition. Phonological processing skills were highly correlated with word recognition skills in English and Arabic for bilingual children (Abu Rabia & Siegel, 1996).

Another study examined 31 Spanish-speaking students in grade one who received English instruction (Durgunoglu et al., 1993). These beginner readers were administered tests of letter naming; Spanish phonological awareness; Spanish and English word recognition; and Spanish and English oral proficiency. The results

indicated that English word and pseudoword recognition tests were related to levels of Spanish phonological awareness and Spanish word recognition (Durgunoglu et al., 1993).

The relationship between phonological awareness and reading achievement was also assessed in French immersion programs. The immersion program is distinct from traditional approaches to bilingual education because the second language is not only explicitly taught, but is also the medium of curriculum instruction (Genesee, 1985). Phonological awareness was measured in both English and French. It was found that phonological awareness was strongly related to word decoding in each language, and phonological awareness was correlated for each participant across both languages (Comeau, et al., 1999).

Phonological skills have also been found to be essential for reading English for native speakers of non-alphabetic languages. For example, Gottardo, Yan, Siegel, and Wade-Woolley (2000) investigated the transfer of phonological processing skills by comparing native English speakers with children with ESL whose first language is Cantonese. The findings demonstrated that phonological processing skills were correlated across the first and second languages. Also, individual differences in phonological skills in the first and second languages were related to individual differences in reading in the second language (Gottardo et al., 2000).

In summary, children with ESL perform in a similar way on phonological processing tasks in English and in their native language. These results mean that children who performed poorly on tasks in their native language will probably

perform poorly on phonological processing tasks in English. And phonological processing skills are universal and essential in reading alphabetic languages.

As opposed to phonological processing skills, syntactic awareness was found to differentiate between native English speakers and children with ESL. Da Fontoura and Siegel (1995) compared the reading development of Portuguese-Canadian normally achieving children to L1 English speaking normally achieving readers, and no differences were found except on a syntactic awareness task. The Portuguese-Canadian group had significantly lower scores on the English Oral Cloze task than the monolingual English speakers (Da Fontoura & Siegel, 1995).

Another study examined which reading processes are involved in the reading acquisition for Punjabi-speaking ESL students and L1 English speaking children. Fifty L1 English speakers and 38 Punjabi-speaking children (ESL) in grade one were examined on tasks assessing reading skills. It was found that the performance profiles of the students with ESL were similar to those of L1 students. However, the Punjabi-speaking children had lower scores on the Oral Cloze tasks that measured syntactic sensitivity. In this task the children were instructed to fill in the missing word in sentences that were presented to them orally (Chiappe & Siegel 1999).

Very few studies investigated the working memory of children with ESL. Gholamain and Geva (1999) found that working memory in L1 and L2 contributed significantly to single word recognition and pseudoword reading skills in L1 and L2 (Gholamain & Geva, 1999). Da Fontoura and Siegel (1995) administered English and Portuguese tasks for Portuguese children that are learning English as a second language. They found that the Portuguese working memory task, and not the

English working memory task, discriminated between reading disabled and normal readers when English reading was examined. The investigators stressed that this may indicate the significance of working memory in the first language (Da Fontoura & Siegel 1995).

Children with ESL that were identified as reading disabled showed the same difficulties with phonological processing, syntactic awareness and working-memory, as do disabled readers who were English native speakers. Students with ESL who spoke Punjabi as their first language showed the same frequency of reading difficulties in English as they did in Punjabi (Chiappe & Siegel, 1999). In their study, Chiappe and Siegel (1999) found that the measures of word recognition and phonological processing were the ones that discriminated between average and poor readers in both languages.

Da Fontoura and Siegel (1995) examined reading development and the three reading processes among 37 bilingual Portuguese-Canadian children aged 9 to 12. English was the main instructional language for the children and Portuguese was the language spoken at home. All the children attended a Heritage Language Program at a school where they were taught to read and write Portuguese. Portuguese is an alphabetic language that is regular and predictable in the correspondence between sounds and letters. Poor readers in Portuguese displayed the same difficulties with phonological processing, as did poor readers in English. In both languages, deficiencies in working memory and syntactic awareness were also characteristic of Portuguese-English individuals with poor reading performance; although the degree of deficiency was not as pronounced as with phonological

processing (Da Fontoura & Siegel, 1995).

This review of studies on students with ESL reveals a somewhat limited answer to the question "How do reading skills develop in students with ESL?" The review did show that the three cognitive processes (syntactic awareness, phonological processing and working memory) play important roles in the reading development of students with ESL. Yet, the studies that have focused on these cognitive processes were limited to the examination of a single language, and most of the studies focused on a specific age group.

Knowing more about the reading development of students with ESL and RD children will help in assessing those at-risk populations and providing them with appropriate intervention programs. As we have seen with the literature on reading development, while there are numerous studies on intervention programs for RD children, the same cannot be said about children with ESL.

Students with Reading Disability: Assessment and Intervention

The literature on reading disabilities provides strong support for the importance of early identification. The poor reader tends to read less than the good reader, and this increases the gap between them. Good readers practice more and, therefore, their vocabulary development and knowledge acquisition becomes stronger (Stanovich, 1986). Reading disabilities are persistent over time, as children who demonstrate reading difficulties in kindergarten and grade 1 remain behind in school achievement throughout their years in school (Lyon, 1995). Moreover, reading disabilities have serious social implications. There was a high prevalence of reading disabilities among homeless and runaway adolescents and adolescents

who have committed suicide (Barwick & Siegel, 1996; McBride & Siegel, 1997). These studies clearly point to the need for early identification to prevent negative academic and social consequences over an individual's life.

In order to provide intervention, there is a need for assessment, and diagnostic procedures that will identify the crucial components in reading development that differentiates between good and poor readers.

The assessment of individuals with learning disabilities continues to be a controversial issue since learning disabilities can be defined in many different ways. The formulas that are commonly used among researchers and in the schools are the achievement and age formula, and the discrepancy formula. The most common formula that is used to define learning disability is the discrepancy formula. This formula uses the discrepancy between the student's actual and expected achievement (the latter measured by the student's intelligence or potential as determined by an IQ test). The use of an IQ test to measure "potential" abilities has been criticized by researchers and is an invalid tool for the diagnosis of RD for various reasons. Many research studies in the past 20 years have provided evidence that standard IQ tests are not valid for measuring potential learning ability for RD individuals (Fletcher, Epsy, Francis, Davidson, Rourke, & Shaywitz, 1989; Fletcher, Francis, Rourke, Shaywitz, & Shaywitz, 1992; Siegel, 1988, 1989, 1992; Gunderson & Siegel, 2001). Standardized IQ tests measure, among other abilities, expressive language skills, short-term memory, speed of processing information, speed of responding, and knowledge of specific facts (Siegel, 1990). Studies indicate that these functions are deficient in many individuals with learning

disabilities (Siegel, 1985; Siegel & Feldman, 1983; Siegel & Linder, 1984; Siegel & Ryan, 1984, 1988; Vellutino, 1978, 1979). Therefore, the IQ test cannot be a true measure of the intelligence of individuals with a learning disability.

A number of studies have found little difference between the reading, spelling, phonological skills, and reading comprehension of LD individuals with high IQ scores and those with low IQ scores. This means that there are no differences between individuals with dyslexia and poor readers in assessing the processes most directly related to reading (Fletcher et al., 1992; Siegel, 1988; Siegel, 1992; Tal & Siegel, 1996).

Another relationship that might influence the validity of the IQ measure test is the "Matthew Effect" (Stanovich, 1986). Stanovich described this effect associated with reading when he wrote, "...Reading itself develops other related cognitive abilities" (Stanovich, 1993). In other words, the cognitive skills of individuals who read less, such as RD students, will be under-developed, thus resulting in lowered performance on IQ tests.

Finally, there is also a general claim that IQ tests are not valid as measures of individual ability, and some researchers have suggested alternate ways to measure ability (Gardner, 1983; Goleman, 1995; Lazear, 1994). Gardner (1983) suggested the concept of multiple intelligences. He claimed that there is not just one type of intelligence that correlates with success in life but several kinds of intelligences. He defined intelligence as a multidimensional phenomenon that is present at multiple levels of our brain/mind/body system. Gardner's seven intelligences included logical mathematical, visual-spatial, body-kinesthetic,

musical-rhythmic, interpersonal, intrapersonal, and verbal-linguistic intelligence. He believes that IQ tests are based on a very limited view of intelligence.

As a solution to the problematic use of the IQ test for assessing LD children, some investigators suggested the use of achievement tests as a way to assess learning disabilities: "These data suggested that the assessment of learning disabilities should concentrate on specific academic skills rather than on IQ scores. For diagnostic reading disability, the most appropriate measure appears to be, simply, a low reading score" (Siegel, 1992, p. 130-131).

The need for early intervention for RD children is essential, since academic performance, peer relations and extra-curricular activities are influenced by failure in reading (Stanovich, 1986). There is vast support for the critical role of phonological processing in reading development. Therefore, intervention programs for kindergarten children and in the beginning of reading acquisition focus on phonological skills in order to promote success in future word reading skills.

Intervention programs that are based on training phonological processing skills assist reading in the first few grades in school. Phonological processing skills require a variety of different operations and manipulations. Therefore, knowing which phonological manipulations are essential in future reading is essential. Torgesen, Morgan, and Davis (1992) compared the effect of two types of phonological awareness training programs in kindergarten with a third group of children at the same age. One of the training programs provided explicit instruction on both analytic and synthetic (blending) phonological tasks, while the other program trained synthetic skills only. The participants were 48 kindergarten children

that scored between the 15th and 50th percentile on a screening phonological awareness test. The children participated in small group training sessions three times per week for 7-8 weeks. Children who received both analytic and synthetic training improved significantly in their ability to segment words into phonemes. Children who received the synthetic training only improved on blending skills and did not show significant improvements in segmenting skills in comparison with the control group. Another important finding was that the strong blending skills attained by children in the synthetic training program were not sufficient to produce reliable differences in their word-learning abilities compared to the control group. Only the children in the synthetic and analytic training group learned the new words at a reliably faster rate than did the control group (Torgesen et al., 1992).

Early intervention using explicit instruction in phonological skills can assist not only normally achieving children, but also at-risk students for reading failure (e.g., Bradley & Bryant, 1985; Lundberg, Frost, & Peterson, 1988; Torgesen, Wagner, & Rashotte, 1994). Hurford et al. (1994) examined the value of training phonological processing - particularly for poor readers. Hurford, et al., (1994) demonstrated that remediation for reading problems can be based on phonological processing training. Fifty-three children were identified as being at risk for reading disabilities based on discrepancies between reading and intelligence scores, while 46 were identified as at risk for becoming poor readers on the basis of poor reading skills, such as below average intelligence, without demonstrating discrepancy between achievement and intelligence scores at the beginning of the first grade. Half of the RD and poor reader groups received phonological-processing

intervention, while the other half were control group. Post-training assessment indicated that the training procedure was effective in increasing phonological processing skills and reading ability of both groups as compared to the matched control groups at the end of the first grade. Both - the RD and poor readers in the training groups benefited from the phonological processing training. The results support the claim that intelligence level information may not be necessary for differentiating children with RD and poor readers (Siegel, 1989, 1992) and phonological processing skills can be improved and trained (Hurford, et al, 1994).

Furthermore, in term of intervention programs, recent studies demonstrated that IQ scores did not predict the ability to benefit from remediation program. The IQ scores did not differentiate between poor readers who were found to be readily remediated and poor readers who were difficult to remediate (Vellutino, Scanlon, & Lyon, 2000). In another study, reading impaired first graders were given daily tutoring as a diagnostic measure to aid in distinguishing between reading difficulties caused by basic cognitive deficits and those caused by experiential deficits. Reading achievement in most of these children was found to be within or above the average range after one semester of remediation. Children who were difficult to remediate performed below both children who were readily remediated and normal readers on kindergarten and first-grade tests evaluating phonological skills, but not on test evaluating visual, semantic, and syntactic skills (Vellutino, Scanlon, Sipay, Small, Pratt, Chen, & Denckla, 1996).

The research on assessment and intervention of reading disabled children in the last decade had focused on phonological processing as a vital component for

reading success. More investigations on intervention programs and their effect on later reading skills, such as reading comprehension and fluency, can help assist appropriate intervention programs, and to prevent future reading failure.

Students with ESL: Assessment and Intervention

In addition to the general need for early identification of all reading disabled students, it is crucial to identify students with ESL that are having reading difficulties and to help them in the adjustment process, yet little is known about the early identification of RD in students with ESL.

Additional issues, however, may complicate the early identification of students with ESL. A representative case from California in the 1970s illustrates the bias in assessment, misdiagnosis and inappropriate placement of students with ESL. The suit *Diana v. State Board of Education* (1970) was filed on behalf of nine Spanish L1 Mexican-American children who had been placed in classes for the mentally retarded on the basis of verbally loaded IQ tests administered in English. The court ruled that the inherent cultural bias of the tests discriminated against the plaintiffs. Therefore, one of the provisions of the out-of-court settlement was that all children whose native language is other than English must be tested in both their primary language and English. Furthermore, these children must be tested with tests or sections of tests that do not depend on their vocabulary or general information; rather, they should be evaluated based on achievement tests or nonverbal tests (Oakland & Laosa, 1977). One effect of the Diana's lawsuit was that close to 10,000 minority students were reinstated in regular classrooms in the following years (Oakland & Laosa, 1977).

In Toronto, Ontario, Canada in the 1970s, there were also concerns about

the disproportionate number of immigrant students in vocational rather than academic programs. The educational assessment procedures that schools used to assess students with ESL were strongly criticized for cultural and linguistic bias (Costa & Di Santo, 1973). In response to the criticisms about the overrepresentation of minority groups in special education, most of the school systems in Metropolitan Toronto instituted a policy to delay the diagnosis of students with ESL for at least two years after the student came to Canada (e.g., York Board of Education, 1977) in order to allow time for proficiency in English to develop. This situation led to the tendency to ignore the possibility that students with ESL were having difficulties - not only due to insufficient oral language proficiency, but also because of legitimate reading disabilities. This policy was not a solution since some of the students with ESL that needed more support were ignored for at least two years. No specific directions regarding the assessment of students with ESL were provided by the Ministry of Education guidelines in the early 1980s (Berryman, 1981). Since 1981 the situation has changed considerably in terms of support programs for students with ESL but overall, the situation has remained the same and students with ESL are still not well served by educational guidelines with respect to reading.

There is also limited research on the reading development of student with ESL, and on appropriate way to diagnose reading and effective intervention programs. Specifically, the situation in Canada and the United States in the 1970s illustrates some of the central issues that still exist today with respect to the identification of students with ESL with reading difficulties. The use of the IQ tests, standardized tests and informal tests as assessment and diagnostic tools for

students with ESL still maintain as problematic issues.

In addition to concerns about the use of IQ tests to assess learning disabilities in native speakers, there are even more concerns about their use as an assessment tool for students with ESL. An IQ test typically consists of measures of factual knowledge, definition of words, memory recall, fine motor coordination, and fluency of expressive language, rather than reasoning skills. Furthermore, the IQ test is also not language free, since it requires knowledge in problem solving. Therefore, IQ tests are not free of cultural biases because cultural background is important as well as understanding of the test and the testing process (Gunderson & Siegel, 2001). Moreover, in some subtests, the test taker can achieve extra points for responding quickly. Individuals with a culturally based slow deliberate style will achieve lower scores (Gunderson & Siegel, 2001).

Gunderson and Siegel (2001) paraphrase Stanovich's concept of the "Matthew effect" (Stanovich, 1986) for readers of second language. They indicate a concern regarding the use of the IQ test to assess students with ESL, and described it as the Matthew Effect and second-language students. Researchers found that immigrants with a strong L1 reading background develop L2 reading skills faster (e.g., Cummins & Swain, 1986). On the other hand, students that experience difficulties with reading in their first language may have limited exposure to print and as a result the reading and cognitive skills may not improve. This situation would probably influence their performance on IQ tests and according to the Matthew effect and second -language students "the rich L1 will become the L2 rich" (Gunderson & Siegel, 2001, p. 53).

Gunderson and Siegel (2001) claimed that translating the IQ test might not solve the language problem since those tests are using scoring schemes that favor faster response time. The investigators stated "...IQ tests are simply wrong for identifying learning disabilities for ESL students" (Gunderson & Siegel, 2001, p. 52).

The case with standardized tests is very similar to the case with IQ tests. Various formal standardized tests have norms that are based on the characteristics of a native English-speaking population, and are therefore based on competence in English vocabulary and syntax. Even when norms are available for populations different than English speakers, the norms tend to be based on L1 monolingual speakers, rather than native speakers of a language other than English who are subsequently exposed to English (e.g., bilingual Spanish–American students, Tosi, 1984). There were some attempts to design standardalized tests for "bilingual" populations such as Hispanic children who are learning English as a second language. However, these efforts have been hampered by the fact that there are cultural and linguistic differences among the Hispanic populations of: Puerto Rico, Cuba, Mexico, and Hispanic groups from Central and South America (Kayser, 1989). Clearly, there is a need to compare the language skills of student with ESL to an appropriate group in order for the assessment to be valid. It is therefore reasonable to compare a student's with ESL to other students with ESL from the same language background.

A related concern pertains to the use of informal assessment tools since the interpretation of the results is subjective in nature. Since there is no comparable group or available norms for an informal test, how can the examiner determine what

is the functional level of the student with ESL and whether the development of the ESL student's language skills is normal?

In order to assess students with ESL that are at-risk for reading difficulties, Gunderson and Siegel (2001) suggested that an analysis of errors in reading, spelling, arithmetic tests, and in writing samples can be very useful, rather than culturally biased IQ tests. They recommended the use of teacher observations, and the use of teacher administered standardized achievement tests as well as informal reading inventory in order to identify at-risk students.

However, a recent study showed certain problems associated with relying on teacher observation. Limbos and Geva (2001) examined the accuracy of teacher assessments of students with ESL and L1 students at risk for RD and demonstrated problems with these informal tests in assessing ESL and L1 students. In this study, 369 children (249 ESL and 120 L1) were administered academic and oral language tests at the beginning of grade 1 and at the end of grade 2. Fifty-one teachers nominated children at risk for reading failure and completed rating scales assessing the children's academic and oral language skills. A third method that assessed teacher's accuracy in assessing at risk students was by reviewing the students' scholastic records for notation of teacher's concern or referral. In order to evaluate the teacher's assessment, tests that measures phonological awareness, rapid naming, and word recognition were also used. There was relatively low sensitivity with a high specificity, of teacher assessment of at risk status. In other words, once a teacher identifies a child, as at risk, there is a high likelihood that he or she indeed has a disability. However, there were many children that the teachers did not

identify who were also at risk (Limbos & Geva, 2001).

The sensitivity of a teacher's expressed concern as was measured in the scholastic files, was less accurate than teacher nomination and teacher rating scales, especially in the ESL group.

The authors explain this finding by suggesting that there may be a bias in the teachers' reports, especially for students with ESL. Despite teacher concerns about the performance of some students, this concern was not recorded in the files of students with ESL. Second, teachers might have felt that because some students with ESL already received some services, it was not necessary to conduct a formal referral. Another explanation was that teachers might be waiting for students with ESL to mature or develop oral skills before making referrals. This study demonstrated problems associated with "trusting" informal tests and teachers as being diagnostic. The investigators suggested that screening of ESL and L1 reading problems should combine teacher's interviews and objective tests (Limbos & Geva, 2001).

When the development of reading skills of English as a Second Language (ESL) children, investigators have primarily relied on two methods. In the first method, students with ESL from the same L1 group were compared to native English speakers. In this method children with ESL whose native language was Hebrew (Geva & Siegel, 2000), Punjabi (Chiappe & Siegel, 1999), Portuguese (Da Fontoura & Siegel, 1995), Arabic (Abu Rabia & Siegel, 1996), Italian (Campbell & Sais, 1995; D'Angiulli, Siegel & Serra, 2001), Persian (Gholamain & Geva, 1999) or Chinese (Gottardo, Yan, Siegel, & Wade-Woolley, 2000; Wang & Geva, in press)

for example, were compared to L1 English speakers. In the second method, a group of children with ESL who speak different languages were compared as a group to native English speakers (e.g., Muter & Diethelm, 2001; Stuart, 1999; Wade-Woolley & Siegel, 1997). Studies using this methodology were important in order to acquire preliminary evidence about the reading and spelling development of ESL students. It is necessary to take the next step in research design and learn more about different language groups and how reading skills develop for certain language groups of students learning ESL. This examination will allow comparison between the language groups, and will thus provide an opportunity to assess the strengths and the weaknesses of each language group when learning English as a second language. In order to make these comparisons, some dimensions on how languages differ should be considered

Languages: Orthographic and Special Characteristics

Languages differ in many ways including origin, orthographic systems, the nature and extent of word-formation processes, the order of the main constituents of a sentence, the grammatical rules and a variety of other factors. Furthermore, the cognitive processes associated with languages are also believed to differ. One way to assess whether a specific language requires specific cognitive skills is to examine the process of acquiring a second language. This process provides an opportunity to see how differences in orthographies and language structures impact the ability to acquire a second language. Because English is a commonly acquired second language, some have speculated that certain languages can enhance the cognitive processes associated with English language acquisition, while other

languages can hinder the cognitive processes. Indeed, this is not just an interesting, theoretical question, but rather a real problem. The reason is that the trend towards increased globalization means that people are more easily moving from one country to another and usually need to learn a new language, and frequently the new language is English. However, the native language can play an important role in the acquisition of a new language as English. Therefore, knowing more about orthographic systems and dimension of the native language may help in understanding the acquisition of the second language.

There are three types of language orthographies: logography, syllabary, and alphabet. These orthographic systems can be divided into two types based on the fundamental units of representation: morphography and phonography. In morphography, e.g., Chinese, the representational unit is word or morpheme, and it is semantically oriented. In contrast, the unit of representation in nonlogographic system is a syllable in syllabary, or phoneme in the alphabet system (Koda, 1989; Muljani, Koda, & Moates, 1998).

Evidence from research with adults has shown that the structure of the native language as well as the native language orthography influenced the reading process in English. Adult readers with an alphabetic orthography in their L1 were better in segmenting phonemes and in processing nonwords in English than readers with nonalphabetic L1 orthography (e.g., Akamatsu, 1999; Holm & Dodd, 1996). In another study, Russian and Japanese speaking learners of English at a low intermediate proficiency level were examined. The mean age of the Japanese group was 21.9 years and the mean age of the Russian group was 22.5 years. The

Russians showed superiority in phonological skills, particularly in accuracy at phoneme deletion, whereas the Japanese were more accurate at recognizing legitimate spelling patterns in English (Wade-Woolley, 1999). The author concluded that "the strategy preferences and relative strengths displayed by each group may be predictable based on the characteristics of each language's orthographies; as are most speakers with alphabetic orthographies, the Russian are more efficient at sublexical speech manipulation of words, whereas the Japanese, due to their experience with Kanji, show evidence of a greater sensitivity to visual information conveyed by orthographic patterns" (p. 466) (Wade-Woolley, 1999).

Another study examined English word recognition of Indonesian and Chinese university students. Indonesian is an alphabetic language while Chinese is a logographic language. The results demonstrated that an alphabetic L1 facilitates word recognition in an alphabetic L2. The higher word recognition scores of the Indonesian students relative to the Chinese participants suggested that they develop a stronger interletter associative network through their first language reading experience. This experience transferred to word recognition in English (Muljani, Koda, & Moates, 1998).

Another linguistic dimension is the degree of regularity in sound symbol correspondence, called the orthographic depth. The idea is that orthographic depth leads to different word processing. In a shallow orthography, there is one-to-one correspondence between letters and sounds. In a deep orthography there are more complex or opaque relation of letters and sounds. This idea was originally proposed to explain differences among alphabetic writing systems (Katz & Frost, 1992).

In a recent study, Wang and Geva (in press) compared the spelling performance of Chinese ESL children in grade 2, to English native speakers. The Chinese ESL children showed poorer performances in spelling to dictation of pseudowords than L1 children. However, Chinese ESL children performed better than their L1 peers in a confrontation-spelling task of orthographically legitimate and illegitimate letter strings. The orthographically legitimate letter strings were pronounceable pseudowords. The illegitimate letter strings were unpronounceable letter string, which were orthographically similar to the ones that were pronounceable except the vowels in the pronounceable items were replaced by visually similar consonant letters (e.g., pcth). The authors explained that negative transfer happened when the Chinese children were forced to access orthography through phonology. A positive transfer in spelling familiar and known English words was found because Chinese children rely more heavily on a direct and non-phonological route that was acquired and practiced in their L1 reading and writing activities. A negative transfer in spelling pseudowords can be explained by the strong lexicality effect in L2 readers of logographic L1 systems (Wang & Geva, in press). In other words, the children experienced difficulty in processing phonological information, and mapping the phonemes to graphemes in spelling (Wang & Geva, in press)

This literature review of ESL studies, however, reveals a somewhat limited answer to the question “How do reading skills develop in ESL students?” The review did show that the three cognitive processes (syntactic awareness, phonological processing and working memory) play important roles in the reading

development of students with ESL. Yet, the studies have focused on these cognitive processes from a rather limited scope: the studies were limited to the examination of a single language, and most of the studies focused on a specific age group. The questions that still remain are: is the development of reading skills the same for all students with ESL with different language backgrounds? How are reading skills of students with ESL with different language background developing over time? Is there a specific language group that will develop reading skills differently, and if so why?

Knowing more about the reading development of children with ESL that were identified as reading disabled will help in assessing those at-risk populations and providing them with appropriate intervention programs. As we have seen with the literature on reading development, while there are numerous studies on intervention programs for RD children, the same cannot be said about children with ESL.

What We Should Know About Reading Development of Students with ESL:

Research Questions

The reading development of students with ESL in Canada is especially important since Canada has a large immigrant population. Furthermore, literacy is a basic quality and essential skill in today's society. Research has identified three fundamental cognitive processes: phonological processing, syntactic awareness and working memory (Siegel, 1993). In addition, research has also demonstrated that these three fundamental cognitive processes are significantly disrupted in children who are reading disabled (Siegel, 1993). These three processes have also

been identified as critical in the reading development of students with ESL, even though the ESL studies have been limited in their scope. Specifically, the studies have offered limited description of few reading components or have only concentrated on a specific language background.

We know today that phonological awareness is a skill that transfers from language to language. However, the research on other cognitive skills that transfer from language to language is less clear. Cognitive skills such as syntactic awareness and working memory require further investigation. Also, it is not clear to what extent unique characteristics of a first language, such as the language orthography, influence the acquisition of a second language.

The first objective of this study was to describe reading development of two groups of readers from a variety of language backgrounds (ESL children and L1 English speakers) over two periods of time: kindergarten and grade three. The second objective was to describe reading development of at-risk children from two different groups (ESL and L1 English speakers). Another objective of this study was to examine whether there were any differences in reading and cognitive skills across language groups over the four years of this study. The literature does not provide any cross language comparison of reading development of ESL students and the current study will therefore expand our knowledge on this subject. Finally, the study attempted to find the components in kindergarten that will predict reading in grade 3.

Two studies were conducted to address the research questions. A longitudinal study from kindergarten to grade 3 was conducted to address the three

research questions that focused mainly on the development of reading of ESL and at risk ESL children and the predictors for reading in grade 3. The second study focused on whether L1 language background affects the reading development of English as a second language. This cross sectional study investigated seven language groups in kindergarten and in grades 1, 2 and 3 using measures such as phonological awareness, working memory, lexical retrieval, spelling and reading.

Chapter II

Method

Two studies were conducted to address the four research questions. The longitudinal study followed a group of children from kindergarten to grade 3 and presents the reading development in kindergarten and in grade 3. The cross sectional study examined children with ESL from different language groups in kindergarten and grades 1, 2 and 3.

Participants – Longitudinal Study

The children in this study were part of a longitudinal study and were enrolled in the 30 schools of the entire North Vancouver (Canada) public school district. The students were classified into language groups based on their native language status. Students with ESL were defined as students whose first spoken language at home to their parents, siblings, and grandparents was not English. Most of the students with ESL were immigrants to Canada, although some were born in Canada but did not speak English until they began to attend school. There were 665 L1 English students and 100 students with ESL. The sample represents L1 English students from a wide range of socioeconomic backgrounds. The students with ESL in this study came from divergent linguistic backgrounds. Overall, there were 40 languages in the study, with Cantonese, Mandarin and Farsi as the predominant languages. Students with ESL who attend elementary schools of this district receive the same classroom instruction as L1 English speaking students.

Design - Longitudinal Study

All children were tested in the fall of their kindergarten year. In kindergarten, children were classified as either at risk or not at risk for reading failure based on their performance on the reading subtest of the Wide Range Achievement Test-3 (WRAT3; Wilkinson, 1993). Children were classified as at risk for reading failure if their performance on the WRAT3 Reading subtest was equal to or below the 25th percentile. The use of the 25th percentile as the cut-off score has been recommended as an appropriate criterion for identifying children with significant difficulties in reading (Siegel & Heaven, 1986; Siegel & Metsala, 1992). Children were classified as not at-risk if their performance on the WRAT3 Reading subtest was equal to or above the 30th percentile. In order to have two distinct reading level groups (at risk and not at risk), children that scored at the 26-29 percentiles in the WRAT3 Reading subtest were eliminated from this analysis (four cases). Previous related studies used also this method to create two reading levels (e.g., Chiappe & Siegel, 1999; Da Fontura & Siegel, 1995).

Table 1 summarizes the number of children by language group, reading level and gender. In kindergarten, 202 children scored at the 25th percentile or below, from which 171 children were L1 English students and 31 were students with ESL. There were 563 children that scored above the 30th percentile on the WRAT3 Reading subtest, from which 494 students were L1 English speakers and 69 were students with ESL. Overall, 765 students participated in the longitudinal study; 384 were females and 381 were males. The mean age was 64.31 months and the standard deviation was 3.40 months.

This study was designed as a longitudinal study. Therefore all students in kindergarten were tested four years later. However, for the purpose of this longitudinal study, only the children that were part of both testing sessions (i.e., kindergarten and grade 3) were included in longitudinal sample. Children that moved away from this district after kindergarten were excluded from this study. Also children that moved into the district after the fall of kindergarten were eliminated from the study.

There were 765 children in grade 3 who had been tested in kindergarten. As can be seen in Table 1 there were 665 L1 English students and 100 students with ESL. Children were classified as reading disabled or normally achieving readers, based on their performance on the reading subtest of the WRAT3. Children were classified as reading disabled if their performance on the WRAT3 reading subtest was equal to or below the 25th percentile. Children were classified as normally achieving readers if their performance on the WRAT3 Reading subtest was equal to or above the 30th percentile. Children that scored between percentiles 26-29 on the WRAT3 Reading subtest were eliminated from this analysis (eight cases), and their scores were removed from the kindergarten sample. Of the L1 English students, 639 were normally achieving readers and 26 were RD. Of the students with ESL, 96 were normally achieving readers and four were RD. The mean age was 106.23 months and the standard deviation was 3.56 months.

Table 1

Longitudinal Study: The Number of Students by Language Group, Reading Level and Gender in Kindergarten and grade 3

	Native English Speakers		ESL Speakers		Total
	Number	Percentage	Number	Percentage	
Kindergarten					
Below 25 th percentile	171	84.65	31	15.34	202
Above 30th percentile	494	87.74	69	12.25	563
Total number	665	86.92	100	13.07	765
Females	333	86.71	51	13.28	384
Males	332	87.13	49	12.86	381
Grade 3					
Below 25 th percentile	26	86.66	4	13.33	30
Above 30th percentile	639	86.93	96	13.06	735
Total number	665	90.47	100	13.60	735

Participants - Cross Sectional Study

The cross sectional study compared seven language groups. The students with ESL in this study came from different linguistic backgrounds. Overall, there were 40 languages in the study.

Design - Cross Sectional Study

All children were tested in the fall of their kindergarten year. In kindergarten, children were classified as either at risk or not at risk for reading failure based on

Design - Cross Sectional Study

All children were tested in the fall of their kindergarten year. In kindergarten, children were classified as either at risk or not at risk for reading failure based on their performance on the reading subtest of the Wide Range Achievement Test-3 (WRAT3; Wilkinson, 1993). All the children were tested in the spring of grades 1, 2 and 3 and were classified as reading disabled or normally achieving readers based on their performance on the reading subtest of the Wide Range Achievement Test-3 (WRAT3; Wilkinson, 1993). Only the children that were classified as normally achieving readers in grades 1, 2, 3 were included in the cross sectional aspects of study.

Table 2 summarizes the number of children by language status, age, and gender for kindergarten and grades 1, 2, and 3. In kindergarten, 851 children were classified, as not at risk for reading failure, of which 765 children were L1 English speakers and 86 were students with ESL. The mean age in months was 64.22 and the standard deviation was 3.37. There were 466 females and 385 males.

In grade 1, 984 students were classified as normally achieving readers. There were 917 L1 English speakers and 67 students with ESL. The mean age in months was 79.98 and the standard deviation was 7.65. There were 487 females and 497 males.

In grade 2, 921 students were classified as normally achieving readers. There were 779 L1 English speakers and 142 students with ESL. The mean age in months was 93.59 and the standard deviation was 3.62. There were 454 females and 467 males.

months was 106.23 and the standard deviation was 3.65. There were 517 females and 501 males.

Table 2

Cross-Sectional Study: The Number of Children by Language Status, Age, and Gender in Kindergarten and Grades 1, 2 and 3

Grades	Native English Speakers	ESL Speakers	Age		Females	Males	Total number of children
			<i>Mean</i>	<i>SD</i>			
Kindergarten	765	86	64.22	3.37	466	385	851
Grade 1	917	67	79.98	7.65	487	497	984
Grade 2	779	142	93.59	3.62	454	467	921
Grade 3	870	148	106.23	3.65	517	501	1018

The second classification was based on the first language of the children.

Table 3 summarizes the number of children by language group in kindergarten and grades 1, 2, and 3. The children spoke a variety of first languages, and they were grouped into six families as follows: Chinese group (Mandarin, Cantonese); Farsi; Slavic group (Russian, Bulgarian, Serbian, Polish, Croatian); Japanese group (Japanese and Korean); Romance group (French, Italian, Romanian, Spanish); and Tagalog group (Tagalog and Indonesian). Another group was composed of native English speakers (L1 English).

For the purpose of the analysis, the minimum number of participants in each language group that were required to create a significant language group was seven. Therefore, language groups that contained less than seven children were

eliminated from this study (e.g., Greek and Hebrew). Also, children that spoke two languages at home other than English were eliminated from this study.

Table 3

Cross Sectional Study: The Number of Students by Language Group in Kindergarten and Grades 1, 2, and 3

Language groups	Kindergarten all children	Kindergarten not at risk	Grade 1 NA	Grade 2 NA	Grade 3 NA
Chinese	38	33	14	43	45
Farsi	31	21	18	37	35
Slavic	12	9	7	12	14
Japanese	19	8	11	21	20
Romance	17	8	8	16	20
Tagalog	11	7	9	13	14
Total ESL	128	86	67	142	148
L1 English	1018	765	917	779	870

Note: not at risk=not at risk for reading failure; NA= normally achieving children

Measures

We administered a battery of tasks to the students in kindergarten to assess early literacy, phonological processing, spelling, grammatical sensitivity, lexical access and working memory. In grades 1, 2, and 3 we incorporated some additional tasks to evaluate processes that are involved in reading at that grade level. The non-standardized tasks are presented in Appendix A.

Table 4 presents the measures that were used in each grade. The following measures were used in order to assess the research questions:

Literacy and Reading

Wide Range Achievement Test-3 (Wilkinson, 1993). The Reading subtest (blue form) is an individually administered, standardized oral reading achievement test. This test consists of letters and a list of increasingly difficult words that the child is asked to name. In the kindergarten level, the student was asked to name as many letters as they can. In grades 1, 2 and 3, the child was required to read as many letters and words as possible from the list. The test consists of 15 capital letters and 42 unrelated words, ranging from very frequent (e.g., cat, book, tree) to relatively uncommon (e.g., collapse, municipal, egregious). When the child made 10 consecutive errors, testing was discontinued. The number of letters and words correctly identified is transformed to standard scores.

Letter Identification. In kindergarten, the child was presented with 26 written lower-case letters, in a random order, and had to name the letter. This task has a maximum score of 26.

Simple Word Reading. The child was presented with ten written familiar words, and had to read the words. This task was administered in grade 1 only and has a maximum score of ten. The ten simple words were: did, good, him, have, said, would, can, men, made, one.

Simple Nonword Reading. The child was presented with ten written nonwords, and was asked to read them. This task was administered in grades 1

and 2 and has a maximum score of ten. The ten simple nonwords were: fid, pem, pood, lup, yaid, hon, dit, tave, vone, tive.

Woodcock Johnson Reading Mastery Test- Revised (Form G)

(Woodcock, 1987): Word Attack. The subtest of the Woodcock Johnson Reading Mastery Test-Revised is a standardized measure that is made up of a list of pseudowords of increasing difficulty. The child was required to decode as many words as possible from the list. The task was administered to grades 1, 2, and 3 students. Sample words from the list include: nan, gusp, sluke.

Woodcock Johnson Reading Mastery Test- Revised (Form G)

(Woodcock, 1987): Word Identification. The subtest of the Woodcock Johnson Reading Mastery Test-Revised (Form G) (Woodcock, 1987): Word Identification is composed of a word-reading list of increasing difficulty. The children were required to read as many words as possible from the list. The task was administered to grade 1, 2, and 3 students. Sample words from the list include: dog, must, because, island, process.

Phonological Processing

GFW Sound Mimicry. This subtest from Goldman, Fristoe, and Woodcock (1974) was used to assess children's skill at recognizing and reproducing sounds in oral language. In this task, the children were requested to repeat pseudowords of increasing difficulty that had been read to them by the examiner. Pseudowords ranged in difficulty from vowel-consonant syllables (e.g., ab, id) to polysyllabic pseudowords (e.g., deponiel, bafmotbem). This task was administered to the children in kindergarten.

Rhyme Detection Task. Task from the Phonological Awareness Test (Muter, Hulme, & Snowling, 1997). In this task, the child was shown four pictures. A picture of the target word appeared above three pictures. The child was asked which of the three words rhyme with the target word. For example: “what rhymes with boat? Foot, bike, or coat?” There were three demonstration items and ten test items. If the child fails the demonstration item and the first five items, the administration was discontinued. This task was administered in kindergarten.

Phoneme Deletion Task. Task from the Phonological Awareness Test (Muter, Hulme, & Snowling, 1997). In this task, the examiner presented the child with a picture of a word and the child was asked to delete a phoneme (initial or final) from the word. The task consists of eight initial phoneme deletion items, eight final phoneme deletion items and four demonstration items for each section. If the child failed the demonstration items and the first four test items, the task was discontinued. This task was administered in kindergarten and grade 1.

Syllable Identification and Phoneme Identification. Tasks from the Phonological Awareness Test (Muter, Hulme, & Snowling, 1997). In these tasks, children were required to complete words. In the syllable identification part, the examiner presented a picture (i. e., table) to the child. The examiner said the first part of the word (i.e., “ta”) and asked the child to complete the word (i.e., “ble”). In the phoneme identification task, the examiner presented a picture (e.g., fish) and said the first part of the word (i.e., “fi”) and asked the child to complete the word (i.e., “sh”). The task consists of eight syllable identification items, eight phoneme identification items and two demonstration items for each section. If the child failed

the demonstration items and the first four test items, the task was discontinued. This task was administered to the kindergarten children.

Phoneme Deletion and Substitution. Items selected from level F, G, and H of the Auditory Motor Skills Training (Rosner, 1973) were administered to children in grade 1. In this task, the examiner presented the child with a word and the child was asked to repeat the word and then to delete a phoneme (initial or final) from the word and to remove phonemes and to substitute with other phoneme that the examiner provided with. The task consists of eight initial phoneme deletion items, eight final phoneme deletion items and eight substitution items for each section.

Sample items include:

Phoneme deletion initial: "Say the word fill."

"Now say fill again, but don't say /f/ "

Phoneme deletion final: "say the word goat."

"Now say the word goat without the/t/."

Phoneme substitution: say the word slip." Now say slip, but instead of /l/ say /n/.

Pseudoword Repetition. In this task, the children were required to repeat pseudowords of increasing difficulty that had been read to them by the examiner. The task administration was discontinued when a child produced five consecutive errors. This task was administered in grade 1. Sample words include: tull, clird, rubid, sladding, thickery, trumpetine, woogalamic.

Rosner Auditory Analysis Test (Rosner & Simon, 1971). Each child was told that: "We are going to play a game of removing sounds from words. I am going to say a word and then tell you to take part of the sound off and then say what's left."

The child was given three practice items followed by the 40 test items. Each child was asked to delete syllables or single phonemes from both the initial and final positions in words, and also single phonemes from blends. The 40 items were arranged in approximate order of difficulty, and administration of the test items was discontinued after five consecutive error responses. This task was administered to the children in grades 2 and 3. For example: "Say the word please without the /se/ sound (plea/se/)". Say the word "clip" without the /c/ sound (/c/lip)."

Reading Fluency

One Minute Pseudoword Reading: Words from the Word Attack list (Form H; Woodcock, 1987) were used to assess reading fluency. Each child was presented with a list of pseudowords and was asked to read as many words as possible within a one-minute time period. Standardized norms are not available when the list is used as a timed task. This task was administered in grades 2 and 3. Sample words include: ree, din, mem, knap, chur.

One Minute Word Reading: Words from the WRAT3 Reading subtest (WRAT3; Wilkinson, 1993, tan form) were used to assess reading fluency. Each child was presented with a list of real words of increasing difficulty and was asked to read as many words as possible within a one-minute time period. Standardized norms are not available when the list is used as a timed task. This task was administered to the grades 2 and 3 children. Sample words included: huge, residence, regime, factitious.

Reading Comprehension

Stanford Diagnostic Reading Test (Karlsen & Gardner, 1994): Reading Comprehension. This test was administered in groups to assess reading comprehension, in each of the grades 2 and 3 classrooms. Each child received a booklet and was required to read the short passages within the booklet and to provide responses to multiple-choice questions in a prescribed time limit.

Lexical Access

Rapid Automatized Naming was used to assess phonological recoding in lexical access, or word retrieval; (RAN; Denckla & Rudel, 1976). In this task, the child was requested to name 40 items on a page consisting of line drawings of five different items (i.e., tree, chair, bird, pear, car) repeated eight times. A practice trial of the five items was presented before the presentation of the 40 items to ensure the child knew the target words. If a child could not name one of the five practice items, the examiner provided the name and the child was asked to practice the five items a second time. If the child was not able to readily produce the names of the five items after the prompting, this task was not administered to the child. The score was the time taken (in seconds) to complete the 40 items. This task was administered in kindergarten and grade 1.

Rapid Automatized Naming (RAN). In order to assess efficiency in lexical retrieval, the children were requested to name individual numbers (1-9) presented in

a random order in a 5 x 5 array. Each child's performance was timed in seconds.

This task was administered in grades 2 and 3.

Syntactic Awareness

The Oral Cloze Task - Kindergarten. The Oral Close task was used to assess syntactic awareness (Willows & Ryan, 1981; Siegel & Ryan, 1988). In kindergarten, children were required to listen to the examiner read 12 sentences, each with a missing word and then, for each sentence, provide a word, which created a semantically and syntactically well-formed sentence. The class of the missing word varied: nouns, adjectives, adverbs, prepositions, auxiliary verbs and conjunctions were used. An example of a sentence the examiner read to the child is:

"The moon shines bright in the _____".

The Oral Cloze Task - Grade 1. In grade 1, children were required to listen to the examiner read 14 sentences, each with a missing word and then, for each sentence, provide a word, which created a semantically and syntactically well-formed sentence. The class of the missing word varied; nouns, adjectives, adverbs, prepositions, auxiliary verbs and conjunctions were used. An example of a sentence is: "Sally has a party dress and a school dress. She has two _____".

The Oral cloze Task - Grades 2 and 3. In this task, students were requested to supply the missing word for each of 11 sentences that were read to them. Children were required to listen to the examiner read 11 sentences, each with a missing word and then, for each sentence, provide a word, which created a semantically and syntactically well-formed sentence. The children listened while the examiner read each sentence and said "beep" where the word was missing. The

class of the missing word varied: nouns, adjectives, adverbs, prepositions, and conjunctions were used. The maximum score on the task was 11. This task was administered in grades 2 and 3. An example of a sentence the examiner read to the child is:

“Dad _____ Bobby a letter several weeks ago.”

Working Memory

Working Memory for Sentences. The Stanford Binet Memory for Sentences test (Thorndike, Hagen, & Sattler, 1986) was used in which children were asked to repeat sentences ranging from simple two words sentences to complex sentences. The task was discontinued when a child failed at least three out of four items at two consecutive levels. This task was administered in kindergarten and grade 1. An example of this task includes: Tall girl (simple form); The airplane’s engines sputtered, then stopped, forcing an emergency landing (complex form).

Working Memory for Words. The Working Memory for Words (Siegel & Ryan, 1989) was administered. Each child was told that: “I am going to say some sentences and the last word in each sentence will be missing. I want you to tell me what you think the last word should be.” After a trial on completing a sentence, the examiner continued: “Now I am going to read two sentences. After each sentence, I want you to tell me the word that should go at the end of the sentence. When I finish the two sentences, I want you to tell me the two words that you said for the end of each sentence. Please tell me the words in the order that you said them.” The child was given one practice item followed by 12 test items. Three trials were administered within each set of increasingly long sentences (2, 3, 4, 5). To minimize

word-finding problems, the sentences were chosen so that the missing word was virtually predetermined. The task administration was discontinued when the child failed all the items at one level. The maximum score on the task was 12. The task was administered in grades 2 and 3. Examples of the sentences include: "In the baseball game, the pitcher throws the _____"

"On my two hands, I have ten _____"

Child's responses _____ (ball, fingers).

Working Memory for Numbers. Each child in the Working Memory for Numbers task (Siegel & Ryan, 1989) was asked to count yellow dots from a field of blue and yellow dots. The dots were arranged in a randomly determined irregular pattern on a 5 x 8 inch index card with sets (levels) of 2, 3, 4, or five cards. The child was then asked to recall the counts for each set in the correct order. There were three sets at each level. The task administration was discontinued when the child failed all the items at one level. This task was administered in grades 2 and 3.

Spelling

Simple Word Spelling. In this task, children were asked to print their names, and five simple words. The five words were: mom, no, I, dad, cat. This task was administered to the kindergarten children. The children were awarded 1 point for correctly spelling their names and 1 point for each of the simple words.

Real Word Spelling. The children were presented orally with words and were required to generate the correct spelling. The maximum score on this task was ten.

This task was administered in grades 1 and 2. Sample items included: him, love, toy, said, head, some.

Nonword Spelling. The children in grades 1 and 2 were presented orally with pseudowords. The children were required to generate a plausible representation of the word that was presented. Sample items included: fid, pood, coth, ged.

GFW Nonword Spelling. The children were administered the Spelling of Symbols subtest of the GFW Sound-Symbols Test (Goldman, Fristoe, & Woodcock, 1974). The task is made up of 15 orally presented nonwords. Each child was asked to spell words that were read aloud. This task was administered in groups in grade 3. Sample words include: jesh, imbaf. Any acceptable phonetic equivalent was scored as correct. (imbaf; imbaff).

Wide Range Achievement Test- 3 (Wilkinson, 1993): Spelling (blue form). This subtest was administered in groups in grade 2 and 3 to assess real word spelling. The children were presented orally with words of increasing difficulty, and the child was required to generate the correct spelling. Sample items included: must, enter.

Arithmetic

The Arithmetic (blue form) subtest from the Wide Range Achievement Test - 3 (Wilkinson, 1993). This task was administered in groups to the children in grade 2 and 3. The children were required to solve computational written mathematics problems to the best of his/her ability.

Table 4

Measures Used in Kindergarten and in Grades 1, 2, and 3

Measures	Kindergarten	Grade 1	Grade 2	Grade 3
WRAT3 Reading percentile	√	√	√	√
Letter Identification (max. 26)	√	-	-	-
Simple Word Reading (max. 10)	-	√	-	-
Simple Nonword Reading (max. 10)	-	√	-	-
W-J Word Attack percentile	-	√	√	√
W-J Word Identification percentile	-	√	√	√
GFW Sound Mimicry percentile	√	-	-	-
Rhyme Detection (max. 10)	√	-	-	-
Phoneme Deletion (max. 16)	√	√	-	-
Syllable Identification and Phoneme Identification (max. 16)	√	-	-	-
Phoneme Deletion and Substitution (max. 18)	-	√	-	-
Pseudoword Repetition (max. 32)	-	√	-	-
Rosner Auditory Analysis Test (max. 40)	-	-	√	√
One Minute Pseudoword Reading (max. 45)	-	-	√	√
One Minute Word Reading (max. 42)	-	-	√	√
SDRT Comprehension percentile	-	-	√	√
Rapid Automatized Picture Naming (sec.)	√	√	-	-
Rapid Automatized Naming (sec.)	-	-	√	√
Oral Cloze (max. 12)	√	-	-	-
Oral Cloze (max. 14)	-	√	-	-
Oral Cloze (max. 11)	-	-	√	√
Memory for Sentences (max. 42)	√	√	-	-
Working Memory for Words (max. 12)	-	-	√	√
Working Memory for Numbers (max. 12)	-	-	√	√
Simple Word Spelling (max. 6)	√	-	-	-
Real Word Spelling (max. 10)	-	√	√	-
Nonword Spelling (max. 10)	-	√	√	-
GFW Nonword Spelling (max. 15)	-	-	-	√
WRAT3 Spelling Percentile	-	-	√	√
WRAT3 Arithmetic Percentile	-	-	√	√

The Phonological Awareness Intervention Program

In the North Vancouver school district, all children received phonological awareness instruction in kindergarten. The phonological awareness program, Firm Foundation, was a classroom-based program for both L1 and ESL children. The children that were identified as being at risk for reading problems received additional phonological awareness training provided by the classroom and resource teachers in small groups and on an individual basis. This phonological awareness training was based on the prototype of the program, *Launch into reading success* (Bennett & Ottley, 2000). In addition, the "Firm Foundations" program consists of early literacy skills development, letter-sound relationship, and language development. For instance, small groups and individuals are provided with different activities in a play format such as rhymes, sound-symbol, early writing activity (journals) and letter identification activities (baking letter-shaped cookies). Overall, the intervention was provided three to four times a week for 20 minutes.

In grades 2, and 3 the district implemented the Reading 44 program, a classroom program that was written by the teachers of North Vancouver. The heart of the program lies in the "Daily Dozen": 12 reading strategies that good readers use and instructional activities and graphic organizers for classroom use that encourage students to learn these strategies.

Procedure

Trained graduate students administered the measures in the child's school. In kindergarten and grade 1, all the tasks were administered individually, in one session of 40 minutes. In grades 2, and 3, the WRAT3 Arithmetic, WRAT3 Spelling, Nonword Spelling and reading comprehension tasks were administered in a group setting in the classrooms. All the other measures were administered in individual sessions. All the instructions were presented in English.

Chapter III

Results

The results will be presented according to the research questions. First, reading and cognitive profiles from the longitudinal study will be assessed using series of analysis of variance (ANOVA) for the kindergarten and grade 3 data. Then, stepwise regression analysis will be done in order to predict word reading in grade 3 from the various measures captured when the students were in kindergarten. Finally, examination of the development of reading skills of students with ESL from specific language groups in kindergarten, and grades 1, 2 and 3 will be presented.

Analysis of standard scores and percentile scores is presented, however since there were no major differences between the results, only the analysis of the percentile scores will be discussed.

ESL and L1 Children: Kindergarten and Grade 3 Performance

The first research question of this study concerns the development of the reading skills of children with ESL and L1 English speakers from kindergarten to grade 3. In order to examine this question, series of analysis of variance (ANOVA) with language status (ESL, L1) as fixed factors and all the kindergarten tasks as dependent measures was conducted. Table 5 presents the mean scores for the not at risk children within the two language groups in kindergarten. In kindergarten, children with ESL had significantly lower scores than the L1 children on most of the measures. The ESL group had significantly lower scores than the L1 group on the spelling measure, $F(1, 563) = 6.10, p < .05$. Furthermore, the ESL group had significantly lower scores than the L1 group on two of the phonological processing

tasks, the GFW sound mimicry measure, $F(1, 563) = 4.19, p < .05$, and on the Rhyme Detection task: $F(1, 563) = 28.01, p < .001$. In addition, the ESL group made more grammatical errors than the L1 group on the Oral Cloze tasks: $F(1, 563) = 17.87, p < .001$. The children with ESL also had significantly lower scores than the L1 group on the Memory for Sentences task, $F(1, 563) = 53.23, p < .001$ and on the Rapid Naming task $F(1, 563) = , p < .05$.

However, the ESL group had significantly higher scores than the L1 English group on two tasks: the WRAT3 Reading subtest: $F(1, 563) = 5.62, p < .05$ and on the Letter Identification task: $F(1, 563) = 7.85, p < .01$. Both tasks mostly measure letter-naming ability at the kindergarten level.

There were no significant differences between the L1 and the ESL groups on three phonological processing tasks. The ESL group performed in a similar way to the L1 group on Syllable Identification tasks: $F(1, 563) = .86, ns$, on the Phoneme Identification task: $F(1, 563) = .70, ns$, and on the Phoneme Deletion task: $F(1, 558) = 2.35, ns$.

Table 5

Descriptive Statistics for the Measures by Language Group in Kindergarten

Kindergarten Measures	L1 English Not at risk (n=494)		ESL Not at risk (n=69)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Early Literacy				
WRAT3 Reading ^a	67.73	17.70	73.07 *	16.06
WRAT3 Reading standard scores	108.15	9.28	111.0	10.43
Letter Identification (max. 26)	18.17	5.62	20.18 **	5.36
Simple Word Spelling (max. 6)	3.01	1.85	2.42 *	1.73
Phonological Processing				
GFW Sound Mimicry ^a	83.03	18.68	77.91 *	24.06
Rhyme Detection (max. 10)	7.18	2.93	5.15 ***	3.25
Phoneme Deletion (max. 16)	3.92	4.78	2.99	4.48
Syllable Identification (max. 8)	4.90	2.44	4.81	2.11
Phoneme Identification (max. 8)	3.16	2.98	2.84	2.74
Grammatical Sensitivity, Memory, Lexical Access				
Oral Cloze (max. 12)	2.63	2.74	1.17 ***	1.78
Memory for Sentences (max. 42)	17.13	3.59	13.79 ***	3.27
Rapid Naming (sec.) ¹	66.38	21.61	75.42 *	24.57

Note. ¹ scale is reversed whereby longer time indicates slower naming; ^a These scores are percentiles; the remainder are raw scores; *p < 0.05; ** p < 0 .01

*** p < .001

In grade 3, we followed the children from kindergarten and we classified the children again based on their reading level. We examined the reading and cognitive skills of the L1 normally achieving readers and the normally achieving readers with

ESL. The mean scores on the tasks for normally achieving students for the language groups in grade 3 are presented in Table 6. An Analysis of variance (ANOVA) was conducted with language status as fixed factors and all grade 3 tasks as dependent measures.

The ESL group in grade 3 performed in a similar way to the L1 English group on most of the measures such as reading, phonological processing, spelling pseudowords, working memory and lexical access measures. Specifically, the L1 and the ESL groups performed in a similar way on the WRAT3 Reading subtest, $F(1, 733) = .009$, *ns*, on the Woodcock Johnson Word Identification measure, $F(1, 733) = 0.55$, *ns*, on the Woodcock Johnson Word Attack measure, $F(1, 733) = 1.22$, *ns*, on the Reading Comprehension task, $F(1, 733) = .01$, *ns*, on the One Minute Word Reading, $F(1, 733) = 1.53$, *ns*, and on the One Minute Pseudoword Reading, $F(1, 733) = 0.61$, *ns*. Also on the phonological processing task, there were no differences between the L1 and the ESL normally achieving readers: $F(1, 733) = .02$, *ns*. In addition, there were no statistically significant differences between the groups on the Rapid Naming measure, $F(1, 733) = .35$, *ns*, on the Working Memory for Number task, $F(1, 733) = .35$, *ns*, or on the Working Memory for Words task $F(1, 733) = 1.19$, *ns*.

The ESL group had significantly lower scores than the L1 English group on only one task, the Oral Cloze task, $F(1, 733) = 13.19$, $p < .001$. However, the ESL group had significantly higher scores than the L1 group on two measures: Spelling and Arithmetic. The ESL group had significantly better scores than the L1 on the

WRAT3 Spelling subtest, $F(1, 733) = 7.66, p < .01$, and the WRAT3 Arithmetic subtest, $F(1, 733) = 8.70, p < .05$.

Table 6
Descriptive Statistics for the Measures by Language Group in Grade 3

Grade 3 Measures	L1 English NA (n=639)		ESL NA (N=96)	
	M	SD	M	SD
Reading				
WRAT3 Reading ^a	75.80	19.67	76.10	17.37
WRAT3 Reading standard scores	114.15	12.92	126.89*	132.09
W-J Word Identification ^a	80.58	19.77	82.20	18.96
W-J Word Identification standard scores	118.21	19.27	118.89	13.59
W-J Word Attack ^a	77.49	21.62	80.10	19.74
W-J Word Attack standard scores	116.74	16.27	116.52	15.91
SDRT Comprehension ^a	49.71	24.02	49.40	27.20
SDRT Comprehension standard scores	639.92	37.27	636.02	68.14
One Minute Pseudoword Reading (max. 45)	29.33	7.75	30.00	6.53
One Minute Word Reading (max. 42)	18.81	4.52	19.40	4.31
Phonological Processing				
Rosner Auditory Analysis (max. 40)	28.83	7.72	29.00	6.91
Memory				
Working Memory Numbers (max. 12)	7.58	2.32	7.43	2.10
Working Memory Words (max. 12)	4.46	1.79	4.25	1.69
Language Proficiency				
Oral Cloze (max. 11)	8.11	1.48	7.50 ***	1.77
Lexical Access				
Rapid Naming (sec.) ¹	11.10	2.44	10.90	2.54
Spelling				
GFW Nonword Spelling (max. 15)	9.64	2.83	9.06	3.02
WRAT3 Spelling ^a	64.48	22.87	71.40 **	21.21
WRAT3 Spelling standard scores	107.90	12.76	111.09*	12.24
Arithmetic				
WRAT3 Arithmetic ^a	52.84	25.52	61.20*	27.96
WRAT3 Arithmetic standard scores	101.43	12.21	106.99***	15.27

Note: ^a These scores are percentiles; the remainder are raw scores; ¹ scale is reversed whereby longer time indicates slower naming; NA= Normally achieving reader; * $p < .05$; ** $p < .01$ *** $p < .001$

Figure 1 and 2 summarize the performances for the L1 and ESL normally achieving students in grade 3. As can be seen in Figure 1, the normally achieving students with ESL performed in a similar way to the L1 normally achieving students on all the reading measures: WRAT3 Reading, W-J Word Identification, W-J Word Attack and reading comprehension tests. The ESL group performed better than the L1 English group on the WRAT3 Spelling and on the WRAT3 Arithmetic subtests.

Figure 1

Mean Scores on WRAT3 Reading, W-J Word Identification, W-J Word Attack, Reading Comprehension, WRAT3 Spelling, and WRAT3 Arithmetic by Language Group in Grade 3

As can be seen in Figure 2, the normally achieving students with ESL performed in a similar way to the L1 English normally achieving students on the One minute reading, One minute pseudoword, Rosner Auditory Analysis, Working

Memory for Numbers, Working Memory for Words, RAN, and Nonword Spelling.

The L1 English group performed better than the ESL group on the Oral Cloze task.

Figure 2

Mean Scores on Fluency, Phonological Processing, Working Memory, Syntactic Awareness, Lexical Access and Nonwords Spelling Measures by Language Group in Grade 3

ESL and L1 with Risk Status in Kindergarten and Grade 3

The second research objective of this study was to examine the reading patterns of at risk ESL and at risk L1 English speaking children in kindergarten and grade 3.

We were interested to assess the pre-literacy and cognitive skills of the at risk children from both language groups in the beginning of kindergarten (November), and therefore before exposure to any formal system and before the implementation of any intervention program. After four years we assessed again students from both language groups that scored below the 25th percentile on the WRAT3 Reading subtest and thus were identified as reading disabled. Our aim was to examine what are the difficulties of these students from both language groups. Secondly, we wanted to identify whether the same students who had been identified in kindergarten as at risk for reading failure were still having reading difficulties in grade 3. Finally, we wanted to examine if the phonological awareness program that was implemented in kindergarten and grade 1 supported the students that were at risk for reading problems.

L1 Performance as a Function of Risk Status in Kindergarten

In kindergarten, within the native English speakers, the not at risk children were compared to the at risk children for reading failure. Table 7 presents the mean scores for at risk and not at risk children within the two language groups in kindergarten. The at risk group had significantly lower scores than the not at risk group on all the measures, on the WRAT3 Reading subtest: $F(1, 667) = 1543.08$, $p < .001$, on the Identification of Letters: $F(1, 667) = 607.93$, $p < .001$, and on Spelling

accuracy: $F(1, 667) = 158.58, p < .001$. The at risk group also had significantly lower scores than the not at risk group on all five phonological processing measures. Specifically, the at risk group achieved significantly lower scores than the not at risk group on the GFW Sound Mimicry test, $F(1, 667) = 22.07, p < .001$, on the Rhyme Detection task, $F(1, 667) = 17.58, p < .001$, on the Syllable Identification task, $F(1, 667) = 45.00, p < .001$, on the Phoneme Identification task, $F(1, 667) = 45.29, p < .001$, and on the Phoneme Deletion task, $F(1, 667) = 27.82, p < .001$. In addition, the L1 at risk group had significantly lower scores than the L1 not at risk group on the Oral Cloze task, $F(1, 667) = 19.28, p < .001$, on the Memory for Sentences task, $F(1, 667) = 30.73, p < .001$ and on the Rapid Naming task, $F(1, 667) = 27.23, p < .001$.

Table 7

The Performances of students with L1 English as a Function of Reading Skill in Kindergarten

Kindergarten Measures	L1 English Not at risk (n=494)		L1 English At risk (n=171)		
	<i>M</i>	<i>SD</i>	<i>M</i>		<i>SD</i>
Early Literacy					
WRAT3 Reading ^a	67.73	17.70	13.09	***	7.02
WRAT3 Reading standard scores	108.15	9.28	82.02	***	5.90
Letter Identification (max.26)	18.17	5.62	6.40	***	4.53
Simple Word Spelling (max. 6)	3.01	1.85	1.14	***	0.90
Phonological Processing					
GFW Sound Mimicry ^a	83.03	18.68	74.42	***	24.96
Rhyme Detection (max. 10)	7.18	2.93	6.05	***	3.26
Phoneme Deletion (max. 16)	3.92	4.78	1.84	***	3.05
Syllable Identification (max. 8)	4.90	2.44	3.38	***	2.81
Phoneme Identification (max. 8)	3.16	2.98	1.45	***	2.38
Grammatical Sensitivity, Memory, Lexical Access					
Oral Cloze (max. 12)	2.63	2.74	1.61	***	2.09
Memory for Sentences (max. 42)	17.13	3.59	15.35	***	3.55
Rapid Naming (sec.) ¹	66.38	21.61	76.76	***	23.75

Note. ¹scale is reversed whereby longer time indicates slower naming; ^a These scores are percentiles; the remainder are raw scores; NA=Normally achieving students; RD- reading disabled students; *** $p < .001$

L1 Normally Achieving and L1 RD in Grade 3

In Grade 3, the L1 RD English speakers had significantly lower scores on all the measures compared to the L1 normally achieving group. Table 8 presents the

mean scores for normally achieving and reading disabled children within the L1 English speakers in grade 3. Specifically, there were statistically significant differences in favor of the L1 normally achieving readers on all the reading measures: on the WRAT3 Reading subtest, $F(1, 663) = 221.51, p < .001$, on the Woodcock Johnson Word Identification measure, $F(1, 663) = 194.41, p < .001$, on the Woodcock Johnson Word Attack measure, $F(1, 663) = 118.87, p < .001$, on the Reading Comprehension test, $F(1, 663) = 34.79, p < .001$, on the One Minute Word Reading, $F(1, 663) = 80.63, p < .001$, and on the One Minute Pseudoword Reading, $F(1, 663) = 107.86, p < .001$. In addition, the L1 normally achieving students achieved significantly higher scores than the L1 RD students on the Rosner Auditory Analysis measure, $F(1, 663) = 27.52, p < .001$. Furthermore, on the working memory measures, the RD group had significantly lower scores compared to the normally achieving group. The L1 normally achieving students had significantly higher scores than the L1 RD students on the on the Working Memory for Number task, $F(1, 663) = 8.92, p < .01$ and on the Working Memory for Words task, $F(1, 663) = 5.18, p < .05$. The L1 normally achieving students also had significantly higher scores than the L1 RD students on the Oral Cloze task, $F(1, 663) = 20.15, p < .001$, and on the Rapid Naming measure, $F(1, 663) = 30.61, p < .001$.

The spelling skills were measured by the spelling subtest from the standardized WRAT3 test, and Nonword Spelling task. The L1 RD group had significantly lower scores on both spelling measures compared to the L1 normally achieving group. Specifically, there were statistically significant differences in favor

of the L1 normally achieving group on the Nonword Spelling Task, $F(1, 663) = 25.94, p < .001$ and on the WRAT3 Spelling subtest, $F(1, 663) = 76.45, p < .001$.

The L1 RD scored significantly lower than the L1 normally achieving students on the WRAT3 Arithmetic measure, $F(1, 664) = 27.20, p < .001$.

Table 8
The Performances of Students with L1 English as a Function of Reading Skill in Grade 3

Grade 3 Measures	L1 English NA (n=639)		L1 English RD (n=26)	
	M	SD	M	SD
Reading				
WRAT3 Reading ^a	75.87	19.67	18.30***	5.60
WRAT3 Reading standard scores	114.15	12.92	86.04***	4.03
W-J Word Identification ^a	80.58	19.77	26.00***	13.00
W-J Word Identification standard scores	118.21	19.27	89.42 ***	6.60
W-J Word Attack ^a	77.49	21.62	30.84***	13.90
W-J Word Attack standard scores	116.74	16.27	91.73***	6.65
SDRT Comprehension ^a	49.71	24.02	21.42***	22.70
SDRT Comprehension standard scores	639.92	37.27	586.69***	48.69
One Minute Pseudoword Reading (max. 45)	29.33	7.75	13.31***	6.76
One Minute Word Reading (max. 42)	18.81	4.52	10.73***	3.33
Phonological Processing				
Rosner Auditory Analysis (max. 40)	28.83	7.72	20.69***	8.42
Working Memory				
Working Memory Numbers (max. 12)	7.58	2.32	6.19**	2.17
Working Memory Words (max. 12)	4.46	1.79	3.65*	1.32
Language Proficiency				
Oral Cloze (max. 11)	8.11	1.48	6.77***	1.58
Lexical Access				
Rapid Naming (sec.) ¹	11.10	2.44	13.85***	3.44
Spelling				
GFW Nonword Spelling (max. 15)	9.64	2.83	6.73***	3.42
WRAT3 Spelling ^a	64.48	22.87	24.88***	15.30
WRAT3 Spelling standard scores	107.90	12.76	88.81***	7.55
Arithmetic				
WRAT3 Arithmetic ^a	52.84	25.52	26.38***	20.60
WRAT3 Arithmetic standard scores	101.43	12.21	88.65 ***	10.37

Note: ^a These scores are percentiles; the remainder are raw scores; ¹ scale is reversed whereby longer time indicates slower naming; NA= normally Achieving students; RD= reading Disabled students; * $p < .05$; ** $p < .01$ *** $p < .001$

The performances of the students that were identified as L1 RD in grade 3 were analyzed in depth. Overall, there were 26 L1 English students that scored below the 25th percentile. The 26 children can be classified into three groups based on their WRAT3 Reading performance across the years. The results of the follow up analyses of the WRAT3 Reading subtests through the years are presented in Figure 3. An examination of the history of the 26 students that make up the L1 RD grade 3 group, shows that there are three distinct groups: the first group is the largest group and contained 18 students. This group is characterized by a consistent status of experiencing reading difficulties over the years. Indeed, most continued to score below the 25th percentile in the reading subtest all three years. In the second group, there were students that scored between the 30th and 40th percentile on the WRAT3 Reading subtest in kindergarten. During the next three years, their performance on the WRAT3 Reading subtest decreased so that by grade 3, their subtest score was below the 25th percentile. This group contained four students and they can be identified as being in the "border line", between having reading difficulties and being normally achieving reader. The third group contained four students that scored between the 58th and 79th percentile on the WRAT3 Reading subtest in kindergarten. The performance of the students in this group was inconsistent during grades 1 and 2 on the WRAT3 Reading subtest, and by grade 3; they scored below the 25th percentile. A detailed examination on the scores of these four children revealed low scores on the phonological processing tests across the years for three of the children.

Figure 3

Mean Percentile of the L1 RD Trends on the WRAT3 reading Subtest Across the Years

ESL Performance as Function of Risk Status

Within the ESL group in kindergarten, the performance of the not at risk group was compared to the performance of the at risk group for reading failure. The mean scores on the tasks for the at risk and not at risk children within the ESL group are presented in Table 9. The ESL at risk group had significantly lower scores than the ESL not at risk group on the three literacy measures, as there were differences on the WRAT3 Reading subtest, $F(1, 97) = 430.93, p < .001$, on the

identification of letters: $F(1, 97) = 204.06, p < .001$, and on Spelling accuracy, $F(1, 97) = 20.86, p < .001$.

The ESL at risk group had significantly lower scores on two out of five phonological processing measures compared to the not at risk group. Specifically, the ESL at risk group had significantly lower scores than the ESL not at risk group on the Syllable Identification task, $F(1, 97) = 15.09, p < .001$, on the Phoneme Identification task, $F(1, 97) = 10.40.71, p < .01$, and on the Rapid Naming task, $F(1, 89) = 4.83, p < .05$. There were no significant differences between the ESL at risk and not at risk groups on the measures of Oral Cloze, $F(1, 97) = 3.103, ns$, on the measure of Memory for Sentences, $F(1, 97) = 1.50, ns$, and on three phonological processing tasks: on the GFW Sound Mimicry, $F(1, 97) = 3.07, ns$, on the Rhyme Detection task, $F(1, 97) = 1.62, ns$, and on the Phoneme Deletion task, $F(1, 97) = .29, ns$.

Table 9

The Performances of Students with ESL, as a Function of Reading Skill in Kindergarten

Kindergarten Measures	ESL Not at risk (n=69)		ESL At risk (n=31)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Early Literacy				
WRAT3 Reading ^a	73.07	16.06	10.51 ***	7.74
WRAT3 Reading standard scores	111.16	10.44	78.70 ***	8.63
Letter Identification (max. 26)	20.18	5.36	4.53 ***	3.99
Simple Word Spelling (max. 6)	2.42	1.73	0.93 ***	0.73
Phonological Processing				
GFW Sound Mimicry ^a	77.91	24.06	68.00	27.08
Rhyme Detection (max. 10)	5.15	3.25	4.25	2.90
Phoneme Deletion (max. 16)	2.99	4.48	2.41	3.61
Syllable Identification (max. 8)	4.81	2.11	2.87 ***	2.64
Phoneme Identification (max. 8)	2.84	2.74	1.06 **	1.71
Grammatical Sensitivity, Memory, Lexical Access				
Oral Cloze (max. 12)	1.17	1.78	0.55	0.82
Memory for Sentences (max. 42)	13.79	3.27	14.65	3.45
Rapid Naming (sec.) ¹	75.42	24.57	89.08 *	31.15

Note. ¹scale is reversed whereby longer time indicates slower naming; ^a These scores are percentiles; the remainder are raw scores; * $p < .05$; ** $p < .01$; *** $p < .001$

In grade 3, children from both language groups were classified again by reading level. Table 10 presents the performances of students with ESL, in grade 3. There were 26 L1 RD and 4 ESL RD. Since the ESL RD group in grade 3 contained

only four students, no statistical analyses were conducted, and these four cases will be reported individually.

Table 10

The Performances of Students with ESL, as a Function of Reading Skill in Grade 3

Grade 3 measure	ESL NA (n=96)		ESL RD (n=4)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Reading				
WRAT3 Reading ^a	76.10	17.37	17.50	8.69
WRAT3 Reading standard scores	126.89	132.09	85.25	6.29
W-J Word Identification ^a	82.20	18.96	26.25	12.84
W-J Word Identification standard scores	118.89	13.59	89.75	6.29
W-J Word Attack ^a	80.10	19.74	26.00	7.74
W-J Word Attack standard scores	116.52	15.91	232.75	304.66
SDRT Comprehension ^a	49.40	27.20	3.00	5.35
SDRT Comprehension standard scores	636.02	68.14	555.50	21.99
One Minute Pseudoword Reading (max. 45)	30.00	6.53	16.25	7.14
One Minute Word Reading (max. 42)	19.40	4.31	10.50	0.58
Phonological Processing				
Rosner Auditory Analysis (max. 40)	29.00	6.91	26.25	1.50
Working Memory				
Working Memory Numbers (max. 12)	7.43	2.10	5.50	1.29
Working Memory Words (max. 12)	4.25	1.69	3.00	0.00
Language Proficiency				
Oral Cloze (max. 11)	7.50	1.77	6.50	1.73
Lexical Access				
Rapid Naming (sec.) ¹	10.90	2.54	12.00	2.71
Spelling				
GFW Nonword Spelling (max. 15)	9.06	3.02	7.50	3.00
WRAT3 Spelling ^a	71.40	21.21	17.50	6.24
WRAT3 Spelling standard scores	111.09	12.24	85.75	3.77
Arithmetic				
WRAT3 Arithmetic ^a	61.20	27.96	15.50	12.66
WRAT3 Arithmetic standard scores	106.99	15.27	81.00	12.83

Note. ¹ scale is reversed whereby longer time indicates slower naming; ^a These scores are percentiles; the remainders are raw scores

In summary, within the normally achieving readers, the ESL group performed in a very similar way to the L1 English group on most of the grade 3 measures. Only on the Oral Cloze task, did the L1 English students perform better than the students with ESL, while the ESL group had significantly higher scores than the L1 group on the arithmetic and spelling tasks.

Within the native English-speaking group, the L1 RD group had significantly lower scores on all the measures (reading, phonological processing, spelling, memory, arithmetic, lexical access) compared to the L1 normally achieving group.

ESL RD: Performances in Grade 3

In grade 3, the number of students with ESL that were identified as reading disabled decreased dramatically. Only four students with ESL (4.16%) all from different language background (Squamish; Farsi, Hungarian and Kurdish) performed below or equal to the 25th percentile, and therefore, they were identified as reading disabled. Figure 4 presents the raw scores on WRAT3 Reading subtest across the years, for the students with ESL that were identified as RD in grade 3.

Figure 4

Raw scores of the four ESL RD Students on WRAT3 Reading Subtest Across the Years

Figure 4 reveals a similar profile for the four ESL RD students across the years in terms of their performance on the WRAT3 Reading subtest. Overall, the ESL RD students had very low scores (below 6) on the WRAT3 Reading subtest in kindergarten. Gradually across the years there is an increasing improvement, but still in grade 3, their performance is below the 25th percentile. Since the performances of the four students with ESL on the WRAT3 Reading subtest were somewhat similar across the years, we examined their performance in grade 3. In general, the four ESL RD students were characterized by overall low performance on all the measures. The average scores on the standardized tests were below the

26th percentile. In summary, the performance of the four ESL RD students reveals weaker skills on all measures.

Kindergarten Factors Predict Reading and Phonological Processing in Grade 3

In this study, we also examined the variables in kindergarten that predicted reading in grade 3. Four stepwise regression analysis were conducted to predict word reading, reading comprehension, spelling of pseudowords and reading of pseudowords.

ESL and L1: Prediction of Word and Reading Comprehension

A stepwise regression procedure was used; with the WRAT3 Reading subtest in grade 3 as the outcome. Separate regressions were conducted for students with ESL and L1 speakers. All the reading and cognitive measures in kindergarten were entered into the regression equations as predictor variables, Letter Identification, simple spelling, GFW Sound Mimicry, Rhyme Detection, Syllable Identification, Phoneme Identification, Phoneme Deletion, Oral Cloze task, Memory for Sentences, and Rapid Naming. The results of the stepwise regressions to predict reading ability in grade 3 are presented in Table 11.

Table 11

Stepwise Regression: WRAT3 Reading Performance as Predicted by Cognitive and Reading Measures

Kindergarten Measures	β	R^2	F	Probability
<u>L1 Group (n=638)</u>				
1. Letter Identification	.275			
2. Sound Mimicry	.172			
3. Phoneme Deletion	.155			
4. Oral Cloze	.086	.219	44.25	< .01
<u>ESL Group (n=91)</u>				
1. Letter Identification	.410	.168	17.93	< .001

The results of the regression analyses reveal that four measures for the L1 group and one measure for the ESL group significantly predicted word reading ability in grade 3. For both groups, Letter Identification explained the most significant proportion of the variance. Within the L1 group, Letter Identification, Sound Mimicry, Phoneme Deletion, and the Oral Cloze explained 21.9% of the variable, whereas within the ESL group, the Letter Identification task predicted 16.8% of the reading performance.

Reading comprehension is an essential skill, especially in grade 3. Stepwise regression procedures were used to predict which factors in kindergarten predicted reading comprehension in grade 3. Separate regressions were conducted for ESL and L1 speakers. Reading and cognitive measures in kindergarten, specifically,

WRAT3 Reading subtest, Letter Identification, simple spelling, GFW Sound Mimicry, Rhyme Detection, Syllable Identification, Phoneme Identification, Phoneme Deletion, Oral Cloze task, Memory for Sentences, and Rapid Naming, were the variables used for prediction. The results of the stepwise regressions to predict reading comprehension ability in grade 3 are presented in Table 12.

Table 12

Stepwise Regression: Reading Comprehension as Predicted by Cognitive Measures

Kindergarten Measures	β	R^2	F	Probability
<u>L1 Group (n=638)</u>				
1. Letter Identification	.271			
2. Memory for Sentences	.153			
3. Oral Cloze	.154			
4. Rhyme Detection	.095			
5. RAN (sec.)	-.088	.251	42.39	< .05
<u>ESL Group (n=91)</u>				
1. WRAT3 Reading	.210			
2. Phoneme Deletion	.221			
3. Memory for Sentences	.263			
4. RAN (sec.)	-.212	.335	10.85	< .05

The results of the stepwise regression revealed somewhat similar predictors for the reading comprehension test in grade 3 for both languages groups. For the L1 group, Letter Identification, Memory for Sentences, Oral Cloze and Rhyme Detection and RAN time predicted 25.1% of the variance. For the ESL group, WRAT3 Reading, that assessed mainly letter identification at the kindergarten level, Phoneme Deletion, Memory for Sentences, and RAN time predicted 33.5% of the variance. For both groups, tasks that assessed letter identification, phonological awareness and working memory predicted reading comprehension in grade 3. The only difference was that the syntactic awareness skills played a significant role in predicting reading comprehension, for native English speakers, while this component was not significant for the students with ESL who had not mastered the grammar rules yet. For the ESL group, there was a floor effect on the syntactic awareness task.

Overall, the components that were significant in predicting reading comprehension ability were very similar to the components that were significant in predicting reading words on the WRAT3 Reading subtest. The results support the claim that the components of the reading process for students with ESL are very similar to components of the reading process for L1 English speakers. The regression analyses also provided additional evidence regarding the important role of phonological processing for word reading and reading comprehension.

ESL and L1: Prediction of Pseudoword Reading and Writing

The ability to decode pseudowords was measured in grade 3 by the Woodcock Johnson Word Attack test. The purpose of this task is to measure the

ability to read in English, using phonological processing. Since phonological processing is a crucial skill in English for reading acquisition, it was interesting to examine which skills in kindergarten predict phonological processing ability in grade 3. A stepwise regression procedure was used; the outcome variable was the Nonword Spelling task in grade 3. Separate regressions were conducted for ESL and L1 speakers. Reading and cognitive measures in kindergarten, specifically, WRAT3 Reading subtest, Letter Identification, simple spelling, GFW Sound Mimicry, Rhyme Detection, Syllable Identification, Phoneme Identification, Phoneme Deletion, Oral Cloze task, Memory for Sentences, and Rapid Naming, were the variables used for prediction. The results of the stepwise regression to predict spelling of pseudowords in grade 3 are presented in Table 13.

Table 13

Stepwise Regression: Spelling of Pseudoword as Predicted by Cognitive Measures

Kindergarten Measures	β	R ²	F	Probability
<u>L1 Group (n=638)</u>				
1. Memory for Sentences	-.092	.008	5.32	< .05
<u>ESL Group (n=91)</u>				
1. Rhyme Detection	.232	.054	5.04	< .05

The results of the regression analyses reveal that spelling of pseudowords was predicted significantly by Memory for Sentences for the L1 group and by Rhyme Detection task for the ESL group. For the L1 English speaking group,

Memory for Sentences predicted 0.8% of the variance. For The ESL group, Rhyme Detection predicted 5.4% of the variance.

We further examined the components that predicted reading of pseudowords. A stepwise regression procedure was used; the outcome variable was the reading of pseudowords in grade 3. Separate regressions were conducted for ESL and L1 speakers. Reading and cognitive measures in kindergarten, specifically, the WRAT3 Reading subtest, Letter Identification, simple spelling, GFW Sound Mimicry, Rhyme Detection, Syllable Identification, Phoneme Identification, Phoneme Deletion, Oral Cloze task, Memory for Sentences, and Rapid Naming, were the variables used for prediction. The results of the stepwise regression to predict reading of pseudoword in grade 3 are presented in Table 14.

Table 14

Stepwise Regression: Reading Pseudoword (Word Attack) as Predicted by Cognitive Measures

Kindergarten Measures	β	R^2	F	Probability
<u>L1 Group (n=638)</u>				
1. Memory for Sentences	-.126			
2. Phoneme Deletion	.088	.018	5.76	< .01
<u>ESL Group (n=91)</u>				
1. Memory for Sentences	.291	.085	8.22	< .01

The results of the regression analyses reveal that reading of pseudowords was predicted significantly by Memory for Sentences and Phoneme Deletion for the

L1 group and by Memory for Sentences for the ESL group. For the L1 English speaking group, Memory for Sentences and Phoneme Deletion predicted 1.8% of the variance and for the ESL group, Memory for Sentences predicted 8.5% of the variance.

Overall, The reading and cognitive measures in kindergarten predicted a very small percentage of reading and spelling of pseudowords in grade 3.

Kindergarten and Grade 3: Analysis by Language Status and Reading Group

Figure 5 summarizes the classification of the children by language status and reading group in kindergarten and in grade 3. In kindergarten, within the L1 group, 34.61% of the children were classified as at risk for reading failure, and 65.38% were classified as not at risk. Within the ESL group, 44.92% were classified as at risk for reading failure, and 55.07% were classified as not at risk for reading failure. In grade 3, within the L1 group, 4.06% of the children were classified as reading disabled, while 95.93% were classified as normally achieving readers. Within the ESL group, 4.16% were classified as reading disabled and 95.83% were classified as normally achieving readers.

Figure 5

Frequency of Reader Classification by Native Language in Kindergarten and Grade

3

L1 Speakers - Kindergarten ESL Speakers- Kindergarten L1 Speakers - Grade 3 ESL Speakers - Grade 3

The Development of Reading Skills of Students with ESL from Different Language Backgrounds

Finally, we wanted to examine the development of reading skills of ESL students from specific language groups in kindergarten, and grades 1, 2, and 3. For these analyses, all the normally achieving readers in the 4 years of this study were included each year. The native languages other than English were grouped into six language families. An ANOVA was conducted for kindergarten and grades 1, 2 and 3 with native language as the factor and the various reading and cognitive tasks as the dependent measures. Analysis of standard scores and percentile scores are presented, but since there were no major differences between the scores, analysis of the percentile scores will be discussed. There were multiple comparisons in this analysis. This should be taken into consideration when interpreting the results..

Language Groups Performance in Kindergarten

In kindergarten, there were significant differences for the language groups on six measures: WRAT3 Reading subtest, Letter Identification, Rhyme Detection, RAN, Oral Cloze task, and Memory for Sentences. Table 15 summarizes the literacy results for both at risk and not at risk students in each language group in kindergarten.

In kindergarten, the language groups were significantly different on the WRAT3 Reading subtest, $F(6, 1139) = 2.49, p < .01$. The Chinese group had significantly better scores than the Japanese group on this subtest.

The language groups were significantly different on the Letter Identification task, $F(6, 1133) = 3.07, p < .01$. The Chinese group named more letters than the

Japanese and Romance language groups, and had significantly higher scores on this task.

There were no significant differences between the language groups on the Real Word Spelling measure. The language groups performed in a similar way on the Real Word Spelling tasks: $F(6, 1096) = 2.12, ns$.

Table 15

Cross Sectional Study: Mean Scores for Each Language Group on the Literacy, Measures in Kindergarten

	WRAT3 Reading ¹		WRAT Reading standard scores		Letter Identification		Simple Word Spelling	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	54.53	28.59	101.88	14.83	15.37	7.47	2.59	1.82
Chinese	65.21*	27.28	107.34	15.19	19.02* ^a	8.17	2.44	2.02
Farsi	51.58	31.66	100.51	16.57	14.64	8.24	2.03	1.73
Slavic	50.41	26.62	100.33	11.68	16.16	7.97	2.30	1.94
Japanese	39.26*	36.5	95.36	19.98	11.94*	10.07	1.77	1.80
Romance	40.52	36.3	96.00	22.23	11.00 ^a	9.55	1.88	1.65
Tagalog	55.09	32.47	101.54	14.73	15.81	8.85	1.40	1.42

Note: ¹ These scores are percentiles; the remainder are raw scores;

* Chinese > Japanese, $p < .01$; ^a Chinese > Romance, $P < .01$;

Table 16 summarizes the lexical access and syntactic awareness results for both at risk and not at risk students in each language group in kindergarten.

The language groups were significantly different on the RAN task, $F(6, 1100) = 6.01, p < .001$. The mean scores of the Farsi group indicated significantly longer time to name the 40 items on the page than the Chinese group. The mean seconds of the Japanese group indicated significantly longer time than the L1 English.

The language groups were significantly different on the Oral Cloze task, $F(6, 1125) = 4.19; p < .001$. The L1 English group scores were significantly higher than the Chinese group on the Oral Cloze task.

Table 16

Cross Sectional Study: Mean Scores for Each Language Group on the Lexical Access and Syntactic Awareness Measures in Kindergarten

	RAN (sec.)		Oral Cloze	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	68.85***	22	2.37 ^{aa}	2.72
Chinese	74.19**	29	0.91 ^{aa}	1.62
Farsi	84.43**	37	1.51	2.77
Slavic	84.54	30	1.66	2.83
Japanese	89.38***	33	1.00	1.87
Romance	76.71	23	1.25	1.84
Tagalog	83.00	23	0.45	0.52

Note: ¹ These scores are percentiles; the remainder are raw scores;

** Farsi > Chinese, $p < .001$;

*** L1 > Japanese, $p < .001$; ^{aa} L1 > Chinese, $p < .001$

Table 17 summarizes the Working Memory and Phonological Processing results for all students in each language group in kindergarten.

The language groups were significantly different on the Memory for Sentences task, $F(7, 1143) = 12.72$; $p < .001$. The L1 English group had significantly higher scores than four other language groups: the Chinese group, the Farsi group, the Tagalog group and the Japanese group. The mean scores of the French group were significantly higher than the Chinese group.

The language groups were significantly different on the Rhyme Detection task, $F(6, 1144) = 9.68$; $p < .001$. The mean scores of the Chinese group on this task were significantly lower than the Farsi group. Also, the mean scores of the Chinese group and the Japanese group on this task were significantly lower than the L1 English group.

There were no significant differences between the language groups on the other four phonological processing tasks. The language groups performed in a similar way on the Sound Mimicry task: $F(6, 1124) = 3.51$, *ns*, on the Phoneme Deletion task: $F(6, 1123) = 1.16$, *ns*, on the Syllable Identification task: $F(6, 1134) = 1.09$, *ns*, and on the Phoneme Identification task: $F(6, 1133) = 1.22$, *ns*.

Table 17

Cross Sectional Study: Mean Scores for Each Language Group on Working Memory, and Phonological Processing Measures for all the Children in Kindergarten

	Memory for Sentences		Sound Mimicry ¹		Rhyme Detection		Phoneme Deletion		Syllable Identification		Phoneme Identification	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	16.80 ^{*a***aa}	3.76	80.40	21.47	6.90 ^{*a}	3.08	3.49	4.52	4.67	2.57	2.80	2.96
Chinese	12.45 ^a	4.45	70.26	30.58	3.84 ^{***a}	3.37	3.24	4.48	4.18	2.22	2.76	2.75
Farsi	14.51 ^{**}	3.76	80.48	20.69	6.45 ^{***}	2.66	3.00	4.34	4.58	2.59	2.93	3.08
Slavic	16.08	4.39	80.33	24.17	6.25	3.07	4.08	5.35	4.66	2.74	3.83	2.94
Japanese	12.41 [*]	3.31	66.61	29.90	4.05 [*]	2.83	3.12	4.06	3.57	2.73	2.66	2.99
Romance	16.11	4.16	77.06	18.58	5.41	3.26	2.75	4.87	4.23	2.53	1.76	2.33
Tagalog	12.72 ^{aa}	3.87	66.18	32.68	5.00	3.13	0.18	0.41	3.63	3.00	1.09	1.44

Note: ¹ These scores are percentiles; the remainders are raw scores* L1>Japanese, $p < .001$; ** L1>Farsi, $p < .001$; *** Farsi > Chinese, $p < .001$;

^a L1>Chinese, $p < .001$; ^{aa} L1>Tagalog, $p < .001$

Another analysis was conducted with the students in kindergarten that were classified as “at not risk for reading failure”. Table 18 summarizes the literacy, working memory and lexical access performances of the “not at risk” children in kindergarten. The purpose of this separate analysis was to determine if there are any differences between the entire kindergarten group and the students that were classified as not at risk. The fixed factor was the native language status of the children that were classified not at risk for reading failure, and all the kindergarten tasks were the dependent measures.

The language groups were significantly different on Memory for Sentences task, $F(6, 836) = 11.00$; $p < .001$. The mean scores of the L1 English group were significantly higher than both the Chinese and Japanese groups

There were no significant differences between the language groups on the literacy measures. The language groups performed in a similar way on WRAT3 Reading subtest: $F(6, 844) = 1.68$, *ns*, on the Letter Identification task: $F(6, 841) = 2.11$, *ns*, and on the Real Word Spelling, $F(6, 814) = .734$, *ns*.

There were no significant differences between the language groups on the lexical access measure. The language groups performed in a similar way on RAN task, $F(6, 826) = 2.58$, *ns*.

Table 18

Cross Sectional Study: Mean Scores for Each Language Group on the Literacy, Working Memory and Lexical Access Measures in kindergarten for the “not at risk for reading failure” Group

	WRAT3 Reading ¹		WRAT3 reading standard scores		Letter Identification		Simple Word Spelling		Memory for Sentences		RAN (sec.)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	68.14	17.97	108.53	9.81	18.31	5.65	3.05	1.8	17.25* ^a	3.70	66.43	20.87
Chinese	73.81	16.67	111.63	10.97	21.21	6.27	2.68	2.00	12.93 ^a	4.22	72.15	27.40
Farsi	70.09	18.87	109.71	10.66	18.47	5.87	2.63	1.73	15.14	3.55	71.39	25.05
Slavic	61.22	20.95	105.11	9.04	19.22	6.33	2.71	2.21	16.44	4.92	85.55	33.80
Japanese	77.25	22.27	115.25	13.95	21.37	4.83	2.87	2.10	12.12*	3.39	72.06	16.19
Romance	76.12	15.62	115.37	17.06	18.62	7.04	2.87	1.80	16.75	4.52	77.71	24.11
Tagalog	77.85	7.26	111.71	3.63	21.71	3.09	2.00	1.54	14.00	2.70	81.42	21.71

Note: ¹ These scores are percentiles, the remainders are raw scores;

* L1 > Japanese, $p < .001$; ^a L1 > Chinese, $p < .001$

Table 19 presents the mean scores for each language group on the Oral Cloze task and phonological processing measures in Kindergarten. The ANOVA revealed that the language groups were significantly different on the Oral Cloze task: $F(6, 833) = 2.60$; $p < .01$. The mean scores of the L1 English group on this task were significantly higher than the Chinese group.

Rhyme Detection was a task that measured phonological processing. The language groups were significantly different on the Rhyme task, $F(6, 843) = 6.98$; $p < .001$. The mean scores of the L1 English group were significantly higher than the Chinese group and the mean scores of the Farsi group were significantly higher than the Chinese group.

There were no significant differences between the language groups on the other four phonological processing tasks. The language groups performed in a similar way on the Sound Mimicry task: $F(6,834) = 2.74$, *ns*, on the Phoneme Deletion task: $F(6,836) = 1.01$, *ns*, on the Syllable Identification task, $F(6,841) = 1.07$, *ns*, and on the Phoneme Identification task, $F(6,841) = 1.15$, *ns*.

Table 19

Cross Sectional Study: Mean Scores for Each Language Group on the Syntactic Awareness and Phonological Processing Measures in Kindergarten for the “not at risk for reading failure” Group

	Oral Cloze		Sound Mimicry ¹		Rhyme Detection		Phoneme Deletion		Syllable Identification		Phoneme Identification	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	2.63*	2.84	82.50	19.44	7.26 ^a	2.90	3.94	4.75	5.02	2.39	3.23	3.01
Chinese	1.00*	1.71	73.45	29.30	4.15 ^{a**}	3.36	3.24	4.50	4.48	2.04	3.00	2.81
Farsi	2.19	3.17	82.14	19.67	7.19**	2.44	3.95	4.85	5.09	2.38	3.85	3.18
Slavic	2.11	3.17	81.89	23.68	6.22	3.45	5.00	5.85	5.55	2.55	4.55	3.00
Japanese	1.87	2.47	61.63	33.04	5.12	2.64	4.63	5.06	4.37	2.32	4.12	3.48
Romance	1.87	2.23	72.50	17.93	6.12	3.56	2.50	5.63	3.37	2.55	2.25	3.05
Tagalog	0.42	0.53	83.57	17.49	6.28	2.81	0.29	0.48	5.00	2.44	1.42	1.61

Note: ¹ These scores are percentiles, the remainders are raw scores;

^a L1 > Chinese, $p < .001$; * L1 > Chinese, $p < .01$; ** Farsi > Chinese, $p < .001$

Language Groups Performance in Grade 1

Table 20 summarizes the results for the language groups on the reading measures in Grade 1. There were no significant differences between the language groups on the reading measures in grade 1. The language groups performed in a similar way on the WRAT3 Reading subtest: $F(6, 977) = 1.72$, ns , on the Simple Word Spelling: $F(6, 977) = 2.13$, ns , and on the Nonword Spelling task, $F(6, 975) = .80$, ns .

Table 20

Cross Sectional Study: Mean Scores for Each Language Group on the Reading Measures in Grade 1

	WRAT3 Reading ¹		WRAT3 Reading standard scores		Simple Word Reading		Simple Nonword Reading	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	70.56	22.3	108.10	16.54	7.93	2.24	6.91	2.73
Chinese	76.00	21.41	108.36	13.39	9.21	1.12	7.71	2.61
Farsi	73.56	21.83	107.78	15.89	8.22	1.73	6.89	2.84
Slavic	90.00	12.41	113.29	11.6	9.29	1.25	8.00	2.00
Japanese	76.64	20.89	115.73	13.33	8.73	1.34	8.09	1.51
Romance	74.25	27.48	104.63	11.43	7.38	2.66	7.13	3.22
Tagalog	83.89	14.66	109.11	10.38	9.33	0.86	7.56	1.66

Note: ¹ These scores are percentiles; the remainders are raw scores

Table 21 summarizes the results for the language groups on the W-J reading measures in Grade 1. There were no significant differences between the language groups on the W-J reading measures in grade 1. The language groups performed in a similar way on the Woodcock- Johnson Word Attack task, $F(6, 971) = 1.61$, *ns*, and on the Woodcock-Johnson Word Identification task, $F(6, 968) = 3.35$, *ns*.

Table 21

Cross Sectional Study: Mean Scores for Each Language Group on the Woodcock-Johnson Reading Measures in Grade 1

	W-J Word Attack ¹		W-J Word Attack standard scores		W-J Word Identification ¹		W-J Word Identification standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	63.96	24.01	105.44	13.89	68.29	23.55	108.36	15.68
Chinese	71.57	21.26	103.28	14.66	83.36	14.15	107.35	17.36
Farsi	63.11	22.88	105.66	14.83	72.44	25.07	106.16	18.63
Slavic	82.00	14.49	105.85	11.00	87.00	14.02	113.85	13.81
Japanese	74.73	18.81	107.00	11.126	80.82	15.57	115.18	11.11
Romance	61.00	28.18	105.50	9.69	75.88	18.27	108.36	13.73
Tagalog	75.67	13.20	100.22	16.30	87.67	9.35	106.55	8.39

Note: ¹ These scores are percentiles; the remainders are raw scores

Table 22 summarizes the results for the language groups on the phonological processing and working memory measures in Grade 1. The ANOVA revealed that in grade 1, the language groups were significantly different for the Memory for Sentences task, $F(6, 976) = 7.07$; $p < .001$. The L1 English group scores were significantly higher than the Chinese and Japanese language groups.

There were no significant differences between the language groups on the phonological processing measures in grade 1. The language groups performed in a similar way on the Phoneme Deletion task: $F(6, 971) = 1.07$, *ns*, on the phoneme Deletion and Substitution task: $F(6, 933) = 1.22$, *ns*, and on the Pseudoword Repetition task, $F(6, 970) = 1.74$, *ns*.

Table 22

Cross Sectional Study: Mean Scores for Each Language Group on the Phonological Processing and Working Memory Measures in Grade 1

	Phoneme Deletion		Phoneme Deletion & Substitution		Pseudoword Repetition		Memory for Sentences	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	3.64	0.12	10.78	3.84	26.66	4.29	18.42 ^{a*}	3.78
Chinese	3.46	0.92	10.43	3.54	25.46	4.39	14.29 ^a	3.14
Farsi	2.84	0.71	10.88	4.27	25.83	3.69	16.33	3.19
Slavic	0.37	0.14	14.14	2.54	28.33	2.65	19.14	4.29
Japanese	1.00	0.30	9.82	3.60	25.73	5.00	14.36 [*]	1.62
Romance	5.12	1.81	11.43	2.87	23.88	3.31	15.88	1.95
Tagalog	1.64	0.54	9.56	3.77	23.67	6.22	15.56	3.24

Note: ^a L1 > Chinese, $p < .001$; * L1 > Japanese, $p < .001$

Table 23 summarizes the results for the language groups on the lexical access, oral cloze and spelling measures in Grade 1. There were significant differences between the groups on the Oral Cloze task: $F(6, 969) = 7.40$; $p < .001$. The L1 English group scores were significantly higher than the Chinese and Japanese language groups. The Slavic group scores were significantly higher than the Japanese group.

There were no significant differences between the language groups on the lexical access and spelling measures in grade 1. The language groups performed in a similar way on the RAN task: $F(6, 973) = 1.61$, *ns*, on Real Word Spelling task: $F(6, 977) = 2.13$, *ns*, and on the Nonword Spelling task, $F(6, 929) = .60$, *ns*.

Table 23

Cross Sectional Study: Mean Scores for Each Language Group on the Lexical Access, Syntactic Awareness, and Spelling Measures in Grade 1

	RAN (sec.)		Oral Cloze		Real Word Spelling		Nonword Spelling	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	50.45	14.2	9.08 ^{a*}	3.13	6.39	2.54	7.20	2.61
Chinese	45.21	10.9	6.07 ^a	3.62	6.07	2.55	7.23	2.31
Farsi	57.89	20.1	7.50	3.03	6.78	2.21	7.06	2.18
Slavic	44.57	8.46	10.29 ^{aa}	0.95	6.29	1.38	9.00	1.26
Japanese	46.27	7.7	5.09 ^{*aa}	2.50	6.18	2.48	7.00	2.09
Romance	47.25	14.2	7.13	1.80	6.25	2.49	7.75	3.01
Tagalog	48.11	4.31	6.44	2.18	6.22	2.48	7.67	1.50

Note: ^a L1 > Chinese, $p < .001$; * L1 > Japanese, $p < .001$;

^{aa} Slavic > Japanese, $p < .001$

Language Groups Performance in Grade 2

In grade 2, the language groups showed statistically significant differences on seven measures: One Minute Word Reading, One Minute Pseudoword Reading, Real Word Spelling, Pseudoword Spelling, WRAT3 Spelling, Oral Cloze task, and WRAT3 Arithmetic.

Table 24 summarizes the Reading measures results of the language groups in Grade 2. There were no significant differences between the language groups on the WRAT3 Reading subtest, Word Attack and Word Identification measures in grade 1. The language groups performed in a similar way on the WRAT Reading subtest: $F(6, 914) = .86$, *ns*, on Word Attack task:

$F(6, 914) = 2.08$, *ns*, and on the Word Identification task, $F(6, 913) = 1.96$, *ns*.

Table 24

Cross Sectional study: Mean Scores for Each Language Group on the Reading Measures in Grade 2

Note: ¹ These scores are percentiles, the remainders are raw scores;

	WRAT3 Reading ¹		WRAT3 reading standard scores		W-J Word Attack ¹		W-J Word Attack standard scores		W-J Word Identification ¹		W-J Word Identification standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	74.07	19.15	109.9	13.54	74.51	20.63	111.1	14.1	76.35	22.58	112.61	16.36
Chinese	74.91	15.67	111.6	11.65	74.91	19.4	111.9	11.3	83.83	17.74	118.22	12.88
Farsi	76.54	17.85	109.6	15.12	74.92	21.42	109.3	16.7	75.86	22.92	111.23	18.96
Slavic	83.83	17.07	111.3	14.32	84.5	10.8	116.6	15.2	88.25	9.65	115.22	17.45
Japanese	74.43	20.95	113.5	12.58	84.71	18.05	120.7	13.1	80.29	21.84	120.05	17.33
Romance	74.95	15.81	112.8	10.13	76.88	16.51	112.6	11.1	76.19	21.36	113.26	11.16
Tagalog	80.77	16.99	115.5	10.22	87	13.56	121.1	12.3	88.38	12.23	120.71	10.14

Table 25 summarizes the reading fluency and reading comprehension measures results of the language groups in Grade 2. The language groups were significantly different on the One Minute Reading task, $F(6, 832) = 3.62$; $p < .01$. The Chinese group read significantly more words on the W-J One Minute Reading task than the L1 English group. The language groups were significantly different on the One Minute Pseudoword Reading task, $F(6, 903) = 2.66$; $p < .05$. The Japanese group read more pseudowords in one minute than the L1 English group. There were no significant differences between the language groups on the Reading Comprehension measure: $F(6, 888) = 1.68$, *ns*.

Table 25

Cross Sectional Study: Mean Scores for Each Language Group on the Reading Fluency and Reading Comprehension Measures in Grade 2

	One Minute Pseudoword Reading		One Minute Word Reading		SDRT Comprehension ¹		SDRT Comprehension standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	24.20 ^a	8.69	22.67*	5.45	55.45	22.31	615.6	42
Chinese	25.88	7.82	25.69*	3.66	52.88	24.61	601.72	97.41
Farsi	26.35	6.97	23.27	4.58	46.64	21.79	599.22	38.83
Slavic	26.17	6.71	25.82	4.66	58.17	21.36	627.06	30.5
Japanese	30.62 ^a	7.38	25.29	4.59	64.1	21.57	627.45	42.05
Romance	23.81	7.67	21.73	3.82	59.25	20.23	617.53	32.85
Tagalog	26.62	7.52	25.09	4.25	51.17	27.2	612.77	41.31

Note: *Chinese > L1; $p < .01$; ^a Japanese > L1, $p < .05$

Table 26 summarizes the phonological processing, lexical access, syntactic awareness and working memory measures results of the language groups in Grade 2. The ANOVA analysis revealed that the language groups were significantly different for the Oral Cloze task, $F(6, 912) = 10.90$; $p < .001$. The mean scores of the Slavic group were significantly higher than the Chinese group and Farsi groups. The Oral Cloze scores of the L1 English group were significantly higher than three other language groups: the Chinese, Farsi and Romance language groups.

There were no significant differences between the language groups on the phonological processing task, lexical access task, and working memory measures

in grade 2. The language groups performed in a similar way on the Rosner Auditory analysis task: $F(6, 913) = .90$, *ns*, on the RAN task: $F(6, 913) = .83$, *ns*, on the Working Memory for Words task, $F(6, 912) = 2.08$, *ns*, and on the Working Memory for Number task: $F(6, 913) = .83$ *ns*.

Table 26

Cross Sectional Study: Mean Scores for Each Language Group on Phonological Processing, Lexical Access, Syntactic Awareness and Working Memory Measures in Grade 2

	Rosner Auditory Analysis		RAN (sec.)		Oral Cloze Task		Working Memory for Words		Working Memory for Numbers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	22.00	5.86	12.83	2.97	7.62 ^{a***}	1.66	3.52	1.57	6.17	2.39
Chinese	21.72	6.02	12.06	2.66	6.33 ^{a***}	2.19	3.42	1.97	6.40	2.62
Farsi	22.19	6.37	12.71	3.15	6.08 ^{**aa}	2.29	2.72	1.40	5.59	2.48
Slavic	23.58	3.15	13.31	2.50	8.17 ^{aa***}	1.89	4.17	1.46	6.00	1.85
Japanese	24.33	4.04	12.00	3.53	6.70	2.31	3.48	2.06	6.57	2.56
Romance	22.56	6.18	13.18	2.05	6.50 [*]	1.63	3.19	2.16	5.94	1.98
Tagalog	23.77	4.43	12.46	2.63	6.15	1.57	3.00	0.81	5.92	2.32

Note: ^a L1 > Chinese, $p < .001$; ^{aa} Slavic > Farsi, $p < .001$; ^{*} L1 > Romance, $p < .001$; ^{**} L1 > Farsi, $p < .001$; ^{***} Slavic > Chinese, $p < .001$

Table 27 summarizes the spelling and arithmetic measures results of the language groups in Grade 2. On the Real Word Spelling task, the language groups were significantly different: $F(6, 813) = 2.70$; $p < .05$. The Chinese group spelled more words correctly than the L1 English group.

On the Pseudoword Spelling task, the language groups were significantly different: $F(6, 813) = 2.26$; $p < .05$. The L1 English group spelled more pseudowords accurately than the Chinese group.

On the WRAT3 Spelling subtest, the language groups were significantly different: $F(6, 878) = 4.02$; $p < .01$. The Chinese group spelled more words accurately than the L1 English group.

On the WRAT3 Arithmetic subtest, there were also significant differences between the language groups: $F(6, 883) = 5.09$; $p < .001$. The scores of the Chinese group were significantly higher than three groups: the L1 English group, Farsi and Tagalog language groups.

Table 27

Cross Sectional Study: Mean Scores for Each Language Group on Spelling and Arithmetic Measures in Grade 2

	Real Word Spelling		Nonword Spelling		WRAT3 Spelling ¹		WRAT3 Spelling standard scores		WRAT3 Arithmetic ¹		WRAT3 Arithmetic standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	8.89 ^{aa}	1.42	8.39 ^{***}	1.54	63.06 ^{aaa}	21.43	104.96 ^{**}	11.35	54.19 ^{**}	22.29	101.27 ^{**}	11.22
Chinese	9.64 ^{aa}	0.59	7.53 ^{***}	1.9	76.42 ^{aaa}	16.06	112.41 ^{**}	10.49	72.77 ^{a***}	22.5	111.72 ^{a***}	12.75
Farsi	8.97	1.36	7.89	2.13	67.06	20.3	105.51	11.97	57.92 ^a	22.01	103.51 ^a	9.33
Slavic	9.55	0.82	8.09	2.21	72.92	18.05	108.12	9.41	57.92	19.55	103.71	8.19
Japanese	9.33	0.79	8.1	1.57	72.11	21.87	110.25	10.59	58.75	20.61	105.6	11.64
Romance	8.87	1.72	8.07	1.58	63.63	21.73	109.42	15.32	58.13	17.46	103.16	9.15
Tagalog	9.55	0.93	8.36	1.02	73.33	16.92	110.92	10.36	50.50 [*]	23.15	102.92	17.11

Note: ¹ These scores are percentiles, the remainders are raw scores;

^a Chinese > Farsi, $p < .001$; ^{aa} Chinese > L1, $p < .05$;

^{aaa} Chinese > L1, $p < .01$; * Chinese > Tagalog, $p < .001$;

^{**} Chinese > L1, $p < .001$; ^{***} L1 > Chinese, $p < .05$

Language Groups Performance in Grade 3

In grade 3, the language groups showed statistically significant differences on five measures: the Reading Comprehension, Oral Cloze task, WRAT3 Spelling, Pseudoword Spelling, and WRAT3 Arithmetic subtest.

Table 28 presents the mean scores for the language groups on the word reading measures. There were no significant differences between the language groups on all the word -reading measures in grade 3. The language groups performed in a similar way on the WRAT3 Reading subtest: $F(6, 1011) = 1.55$, *ns*, on the Word Attack task: $F(6, 1011) = 1.67$, *ns*, and on the Word Identification task, $F(6, 1011) = 1.58$, *ns*.

Table 28

Cross Sectional Study: Mean Scores for Each Language Group on the Word
Reading Measures in Grade 3

	WRAT3 Reading ¹		WRAT3 Reading standard scores		W-J Word Attack ¹		W-J Word Attack standard scores		W-J Word Identification ¹		W-J Word Identification standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	75.57	19.71	114.68	21.74	77.22	21.73	116.53	16.29	80.18	20.18	117.80	18.91
Chinese	78.57	16.72	144.24	192.31	79.32	19.68	116.67	13.27	86.46	13.89	120.67	11.38
Farsi	77.37	18.22	114.20*	11.38	81.74	20.52	119.40	15.16	81.60	19.48	118.09	13.00
Slavic	84.07	10.25	117.43	9.92	79.21	19.16	118.21	15.83	88.64	16.55	123.79	13.45
Japanese	80.55	17.42	119.00	15.73	84.05	15.70	121.05	15.19	83.15	20.09	121.85	16.76
Romance	74.10	18.16	112.15	10.91	85.10	18.26	119.90	11.98	81.40	20.00	118.65	14.36
Tagalog	86.64	15.42	122.50	13.87	89.07	17.40	127.43	15.22	89.07	12.26	122.00	10.16

Note: ¹ These scores are percentiles, the remainders are raw scores;

^a L1 > Farsi, $p < .01$; * Chinese > Farsi, $p < .01$

Table 29 presents the mean scores for the language groups on the reading fluency and reading comprehension measures. The ANOVA revealed statistically significant differences between language groups on the Stanford Reading Comprehension: $F(6, 1011) = 2.97$; $p < .01$. The Chinese group had significantly higher scores than the Farsi group. The mean scores of the L1 English group were also significantly higher than the Farsi group.

The language groups performed in a similar way on the One Minute Pseudoword Reading task: $F(6,1011) = 1.36$, *ns*, and on the One Minute Reading task: $F(6, 1011) = 1.73$, *ns*.

Table 29

Cross Sectional Study: Mean Scores for Each Language Group on the Reading Fluency and Reading comprehension Measures in Grade 3

	One Minute Pseudoword Reading		One Minute Word Reading		SDRT Comprehension ¹		SDRT Comprehension standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	29.17	7.72	18.79	4.53	50.63 ^a	24.18	640.76	42.29
Chinese	29.04	8.21	20.16	4.53	54.11*	24.58	646.67	46.07
Farsi	30.37	4.83	19.31	3.70	34.82 ^{a*}	20.32	618.86	30.41
Slavic	30.86	7.31	21.14	4.84	57.07	26.28	650.57	36.38
Japanese	33.10	6.80	20.05	4.76	49.90	23.26	644.45	34.48
Romance	30.45	5.63	18.75	4.35	48.45	32.56	613.00	127.41
Tagalog	31.57	7.36	20.36	4.36	43.21	20.88	632.86	28.41

Note: ¹ These scores are percentiles, the remainders are raw scores;

Table 30 presents the mean scores for the seven language groups on the phonological processing, lexical access, syntactic awareness, and working memory measures. The ANOVA revealed statistically significant differences between language groups on the Oral Cloze task, $F(6, 1011) = 9.75$; $p < .001$. The mean

scores of the Chinese group on this task were significantly lower than the Farsi, Slavic, Romance and L1 English language groups.

There were no significant differences between the language groups on phonological processing, lexical access, and working memory measures in grade 3. The language groups performed in a similar way on the Rosner auditory analysis task: $F(6, 1011) = .61$, *ns*, on the RAN task: $F(6, 1011) = 1.25$, *ns*, on the Working Memory for Words task, $F(6, 1011) = .91$, *ns*, and on the Working Memory for Numbers task: $F(6, 1011) = .40$, *ns*.

Table 30

Cross Sectional Study: Mean Scores for Each Language Group on the Phonological Processing, Lexical Access, Syntactic Awareness and Working Memory Measures in Grade 3

	Rosner Auditory Analysis Test		RAN (sec.)		Oral Cloze Task		Working Memory for Words		Working Memory for Numbers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	28.97	7.63	11.08	2.38	8.12 ^{aa}	1.47	4.49	1.80	7.54	2.36
Chinese	29.29	6.71	10.78	3.04	6.53 ^{a***}	1.96	4.33	1.82	7.84	2.15
Farsi	29.23	7.50	10.77	1.53	7.57 ^a	2.09	4.17	1.90	7.43	2.34
Slavic	30.50	8.07	10.21	2.11	8.57 [*]	1.60	4.79	1.62	7.43	2.87
Japanese	31.75	6.11	9.95	1.14	7.30	1.12	4.35	1.42	7.35	2.18
Romance	29.30	7.58	10.70	2.40	8.00 ^{**}	1.83	3.95	1.46	6.95	2.06
Tagalog	30.43	7.22	10.79	2.54	7.36	1.86	3.79	0.80	7.29	2.09

Note: ^a Farsi > Chinese, $p < .001$; ^{aa} L1 > Chinese, $p < .001$;

* Slavic > Chinese, $p < .001$; ** Romance > Chinese, $p < .001$

Table 31 presents the mean scores for the seven language groups on the spelling and arithmetic measures. The language groups were significantly different on the Nonword Spelling task, $F(6, 1011) = 2.44$; $p < .05$. The L1 English group spelled more pseudowords accurately than the Chinese group.

On the WRAT3 Spelling subtest, there were also significant differences between the groups: $F(6, 1010) = 5.05$; $p < .001$. The Chinese group spelled more words accurately than the L1 English group.

On the WRAT3 Arithmetic subtest, there were significant differences between the language groups: $F(6, 1011) = 7.04$; $p < .001$. The scores of the Chinese group were significantly higher than those of the Farsi group, and the L1 English groups.

Table 31

Cross sectional Study: Mean Scores for Each Language Group on Spelling and Arithmetic Measures in Grade 3

	GFW Nonword Spelling		WRAT3 Spelling ¹		WRAT3 Spelling standard scores		WRAT3 Arithmetic ¹		WRAR 3 Arithmetic standard scores	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
L1 English	9.58*	2.80	64.18 ^a	23.03	108.83	34.63	52.98 ^a	25.40	101.48	12.12
Chinese	8.11*	3.30	76.71 ^a	17.69	133.84	132.04	74.97 ^{a**}	23.45	114.02	13.97
Farsi	9.23	3.21	69.37	22.48	110.14	12.42	55.65 ^{**}	26.29	102.71	12.58
Slavic	10.40	2.49	80.85	14.97	116.39	11.65	65.14	24.31	107.21	11.39
Japanese	8.95	2.94	73.85	23.73	114.30	13.35	66.55	23.48	107.65	11.38
Romance	9.15	3.11	64.55	24.90	107.60	13.13	59.65	25.68	105.95	13.64
Tagalog	10.00	1.96	80.78	18.61	116.21	11.48	63.50	26.86	109.07	16.26

Note: ¹ These scores are percentiles, the remainders are raw scores;

^a Chinese > L1, $p < .001$; * L1 > Chinese, $p < .05$;

** Chinese > Farsi, $p < .001$

Table 32 summarizes the main results of the analyses of language groups from kindergarten to grade 3. Two different analyses were conducted in kindergarten: one for all the kindergarten children and the other for only the children that were not at risk for reading failure. Six measures differentiated between the language groups in the analysis for all the kindergarten children. Two literacy measures, the WRAT3 Reading and the Letter Identification task, and the RAN differentiated between the not at risk group and the group that included all the children regardless of their reading level.

In grade 1, only two measures differentiated between the language groups: the Oral Cloze task and the Memory for Sentences. The analyses also revealed that L1 English speakers generally demonstrated higher scores than the other language groups.

Grade 2 places more demands on students in terms of the complexity of reading, reading fluency and spelling, and this change was reflected in our results. Seven measures differentiated between the language groups: two reading fluency measures, three spelling, arithmetic and syntactic awareness measures. A similar pattern was also present in grade 3.

Reading demands continue to grow in grade 3 with more emphasis placed on reading comprehension. The reading comprehension measure differentiated between the language groups for the first time in grade 3. Syntactic awareness, spelling and arithmetic measures continued to differentiate between the language groups.

Overall, the Oral Cloze task was the only task that consistently differentiated between the Chinese group and the L1 English group in the years from kindergarten to grade 3.

Table 32

Cross Sectional Study: The Main Results for the Language Groups Performances in Kindergarten, and Grades 1, 2 and 3

Measures	Kindergarten all	Kindergarten "not at risk"	Grade 1	Grade 2	Grade 3
Rhyme Detection	√	√	-	-	-
Oral Cloze Task	√	√	√	√	√
Memory for Sentences	√	√	√	-	-
WRAT3 Reading	√	-	-	-	-
Letter Identification	√	-	-	-	-
RAN time	√	-	-	-	-
One Minute Word Reading	-	-	-	√	-
One minute Pseudoword Reading	-	-	-	√	-
Real word Spelling	-	-	-	√	-
Nonword Spelling	-	-	-	√	-
GFW Nonword Spelling	-	-	-	-	√
WRAT3 Spelling	-	-	-	√	√
WRAT3 Arithmetic	-	-	-	√	√
STRD Comprehension	-	-	-	-	√

Note: WRAT3- Wide Range Achievement Test (3rd Ed.); RAN- Rapid Automatized Naming; GFW-Goldman Fristoe Woodcock; W-J- Woodcock Johnson Reading Mastery Tests; SDRT- Stanford Diagnostic Reading Test; √= significant differences between the language groups; - = not significant differences between the language groups.

Chapter IV

Discussion and Implications

The first objective of this study was to investigate the reading pattern of children who had ESL as compared to their native English-speaking counterparts.

ESL and L1 Children: Kindergarten and Grade 3 Performances

In kindergarten, the children with ESL did not perform as well as the native English speakers on most of the measures. Specifically, the children with ESL had significantly lower scores than the L1 English children on some of the phonological processing measures, syntactic awareness, lexical access and spelling. Since all these tasks involved language proficiency, these results are not surprising.

However, in kindergarten the children with ESL had significantly higher scores than the L1 English speakers on the WRAT3 Reading subtest and the Letter Identification task. For this age group, the WRAT3 Reading subtest consists mostly of naming letters. This is somewhat a surprising result since in most of the other measures; the children with ESL had significantly lower scores than the L1 English speakers. However, as opposed to all the other measures, the Letter Identification task and the WRAT3 Reading subtest visually presented English letters. These tasks mostly involved the processing of visual cues (letters) and retrieval from long-term memory without auditory information. At an early stage of developing reading skill, visual processing appears to be better than auditory processing for the ESL group.

By grade 3 however, the students with ESL have caught up with their L1 English speaking peers. The performance on most of the measures of the children

with ESL were similar to that of native English speakers. On the reading measures that assessed reading words, reading of pseudowords, reading comprehension and fluency, the children with ESL performed similarly to L1 English children. It is important to note that ESL group performed similarly to native English children in a complicated task, such as reading comprehension, that involved decoding, vocabulary knowledge, fluency and memory.

Within the normally achieving readers in grade 3 there were significantly different scores between the children with ESL and the L1 English speakers on three measures: syntactic awareness, spelling, and arithmetic. Syntactic awareness was still not as a strong skill for children with ESL at grade 3 as it was for the L1 English speaking children. Despite the intensive exposure to English as the language of instruction and the extensive availability of role model peers for oral English during school hours, children with ESL achieved significantly lower scores in syntactic awareness as measured by Oral Cloze task. These findings are consistent with previous studies: Portuguese-English bilingual children in Canada scored significantly lower on Oral Cloze than English monolingual children in grades 4, 5, and 6 (Da Fontoura & Siegel, 1995). In another study, children from Punjabi-speaking families also scored lower on the Oral Cloze task than monolingual English children (Chiappe & Siegel, 1999).

However, the children with ESL had higher scores on spelling and arithmetic measures. The children with ESL had significantly higher scores than L1 English children on the WRAT3 spelling subtest that required accurate spelling of real words. The spelling process for real words refers to words that have usually been

seen in print in the past and thus have an orthographic representation in a sight word vocabulary. One explanation is that children with ESL have metalinguistic abilities due to their exposure to different language systems. This metalinguistic ability assisted them when learning to spell new language units. Another measure that the ESL group had significantly higher scores on than the L1 group was arithmetic. Although arithmetic is not a reading measure, it is a subject taught in English. Thus, the finding that the children with ESL exceeded the native English speakers was very interesting and requires further investigation.

In conclusion, the ESL normally achieving readers demonstrated very similar reading profiles to their L1 normally achieving peers by the end of grade 3.

Reading Development of ESL RD and L1 RD

The second question that this study addressed pertained to the reading patterns of at risk ESL and at risk L1 English-speaking children. This question is of a special interest since this is the population that must be identified early on to avoid later social and emotional consequences due to consistent school failure.

Within the L1 group in kindergarten, 171 (34.61%) L1 children were identified as at risk for reading failure. At risk and not at risk children differed significantly on all the measures. Yet by grade 3, only 26 children (4.06%) were diagnosed as RD. Consistent with our kindergarten results, all the measures in grade 3 distinguished between at risk and not at risk for reading failure L1 speakers. The significant differences between these two groups on the measures demonstrate that the three cognitive processes: phonological processing, syntactic awareness and working

memory, are significantly disrupted in children who are reading disabled (Siegel, 1993).

It is important to note the decrease in the number of at risk children from kindergarten to grade 3. The decrease in the at risk population can be related to the intensive phonological awareness program in kindergarten and in grade 1, and a balanced literacy and strategy instruction program. The intervention program that based on the program Launch into Reading Success (Bennett & Ottley, 2000) was a comprehensive and balanced program that was used in kindergarten and in grade 1. This program consists of early literacy skills development, language development and reading instruction with ongoing performance assessments to identify those students who are having difficulties. In this program, small groups and individuals were provided with classroom and home intervention programs in a play format. Also, the teachers were using the program Reading 44 in grade 2 and 3. This classroom program is built on 12 reading strategies that good readers use during reading process. The instructional activities as well as the graphic organizers for classroom, encourage students to learn and use these strategies

Unfortunately, even after the phonological awareness program and direct instruction, 26 L1 English speaking children were still identified as RD. This group is important to examine closely, since the intervention and the support system that were provided by the school did not facilitate reading for this unique group. A detailed examination on the performance of these 26 children revealed that 18 students of this group were previously identified in kindergarten as at risk for reading problems, and across the years performed, in most of the cases, below the

25th percentile on the WRAT3 Reading subtest. Another four children that were identified as RD in grade 3 were on the borderline in kindergarten and across the years, and performed below the 25th percentile probably due to increasing reading demands in grade 3. Of special interest is the last group that contained four students that performed above the 60th percentile on the WRAT3 Reading subtest in kindergarten. Across the years, the performances of these students decreased and by the end of grade 3, they were identified as RD. The WRAT3 Reading subtest did not diagnose these students as at risk in kindergarten, however, by the end of grade 3, they showed reading problems. In kindergarten, the WRAT3 Reading subtest mainly assessed letter identification. These students performed very well on the letter identification task in kindergarten, and thus, were misdiagnosed. Later on, the WRAT3 Reading subtest demands more decoding of words and also more vocabulary. When the four students were assessed in grade 3, they probably did not perform well on reading simple words or were challenged by the vocabulary that was not familiar to them. In kindergarten, three out of the four children had low scores on the phonological processing tests across the years. The fourth child had average phonological processing skills but demonstrated a very low score on the WRAT3 Arithmetic subtest.

Within the ESL group in kindergarten, 31 (44.92%) of the children with ESL were identified as at risk for reading failure based on their scores on the WRAT3 Reading subtest. At risk and not at risk children with ESL for reading failure were distinguishable in kindergarten on almost all the administered measures. However, four measures (Sound Mimicry, Rhyme Detection, Oral Cloze and Memory for

Sentences) did not differentiate between the at risk and not at risk children with ESL. It is important to understand why those tasks did not differentiate between the ESL reading level groups, since misinterpretation of those tasks can lead to misdiagnosis. The phonological processing tasks, sound mimicry and rhyme detection, did not differentiate between at risk and not at risk ESL children in kindergarten. These tasks are considered as being easy phonological processing tasks, but perhaps the reliance on English vocabulary knowledge, was challenging for both groups. The more difficult phonological processing tasks, Syllable Identification and Phoneme Deletion, differentiated between the at-risk and not at-risk children. This finding suggests that since both ESL groups have limited English exposure, their phonological processing is affected. The Syllable Identification and Phoneme Identification tasks required the ability to break a word into syllable and phoneme units and thus are probably better diagnostic tools for phonological processing.

It was not a surprising finding that the Oral Cloze task, a measure of syntactic awareness, did not differentiate between at risk ESL and not at risk ESL children in kindergarten. The scores of all the children with ESL were low on that task. Both ESL groups had recently immigrated to Canada, or came from homes in which English was not spoken. As such, the children would be expected to demonstrate poor performance on measures that assess English language structure, such as syntactic awareness.

In addition, the task that assessed Working Memory for Sentences also required some proficiency in English, in order to supply and remember the

sentence. Children with ESL at-risk and ESL not at risk children performed similarly on that task, suggesting that poor proficiency in English influences performance on that task. Further support for this claim emerged from the performance of the L1 English students at risk on this task. The L1 at risk scored higher than both the ESL not at risk and the ESL at risk groups on this task, suggesting that language proficiency, and not cognitive skills, influences the performance of the ESL groups.

By grade 3, there were only four children with ESL (4.16%) identified as reading disabled. Because of the small size of that group, statistical analysis was not appropriate. In general, the four ESL RD students were characterized by overall low performance on all the measures. Their average scores on the standardized tests were below the 26th percentile. All of the students with ESL that were identified as reading disabled on the Stanford Reading Comprehension were at the 3rd percentile. Since reading comprehension is a complicated skill that demands decoding, fluency, memory and more, it is not surprising that ESL RD children had difficulties, especially in a task that integrates so many skills. However, 3rd percentile scores are definitely an indication of serious difficulties in reading.

There are several explanations for the decrease in the number of ESL at risk students across the years. First, similar to the L1 at risk students the phonological processing intervention program as well as the reading strategies program, Reading 44, could have made the difference. Since these programs help support phonological processing, which is crucial skill for reading, very few students were identified as RD by grade 3. Another reason for the dramatic decrease in the number of ESL at risk children might be because the screening measure, WRAT3

Reading subtest, was not a sensitive screening test. As such, it might have caused an overrepresentation of children with ESL.

Prediction of Reading in grade 3 by Kindergarten Measures

The third objective of the study was to identify the factors in kindergarten that predict reading in grade 3 for ESL and L1 English speaking children. For L1 speakers in grade 3, Letter Identification, Sound Mimicry, Phoneme Deletion, and Oral Cloze tasks predicted 21.9% of the variance in word reading. For children with ESL in grade 3, Letter Identification predicted 16.8% of the variance in reading. It is important to note that for both language groups, the letter Identification skill predicted most of the variance. The similarity between the two groups is consistent with the findings of Muter and Diethelm (2001). In their longitudinal study from kindergarten to grade one, phonological processing and letter knowledge proved significant predictors of both concurrent and later reading achievement, regardless of the children's native language. The results could be influenced by that the intervention program, since phonological processing skills did not play significant role in predicting word reading.

Also, for both L1 and ESL children in grade 3, there were similar predictors for reading comprehension. These predictors are also very similar to those that predict reading at the word level, suggesting that the essential skills for reading words are also necessarily for future reading tasks such as reading comprehension. This finding is important because it reflects the similarity in the reading development of L1 and ESL children in the early school years. Moreover, as similar factors

determine reading levels for ESL and L1 students, both groups can benefit from the same intervention program

The reading and cognitive measures in kindergarten predicted a very small percentage of reading and spelling of pseudowords in grade 3. Since reading and spelling of pseudowords assessed phonological processing skills this finding is very interesting. These findings demonstrate the importance of the phonological processing intervention programs in kindergarten. Therefore, the result provides evidence for the importance of phonological processing intervention program for both ESL and L1 students.

The Impact of Native Languages skills on English as a Second Language

The fourth objective of this study was to examine how native language skills influence the cognitive processes involved in English reading. Seven language groups were analyzed on an exhaustive battery of reading, working memory, phonological processing, lexical access, syntactic awareness and arithmetic skills.

In kindergarten, two analyses were conducted: one for all the reading level groups and another for the "not at risk for reading failure" group. The purpose of these analyses was to determine if there were any differences between the groups at the starting point in kindergarten that may be related to the level of pre-literacy skills. A difference between the groups was found for the RAN - a measure of lexical access that typically differentiates between good and poor readers. Other differences between the not at risk group and the group that included at risk and not at risk children were on WRAT3 Reading and letter Identification tasks. These two

literacy tasks were probably influenced by the reading level, rather than on differences that relate to the native language group.

The analysis of the various measures from kindergarten to grade 3 demonstrated differences in cognitive and reading performance across the normally achieving children in the language groups. In kindergarten, there were significant differences among the language groups on some measures of phonological processing, on the syntactic awareness, on Working Memory, and Letter Identification tasks. The L1 English speakers demonstrated enhanced abilities on most of the measures.

The Chinese group had lower scores on most of the measures than the native English speakers. In the Rhyme Detection task, the Chinese group had weaker performance than the native English speakers. These findings may be related to the fact that in pre-school years, L1 English native speakers practice nursery rhyming songs with their parents or within formal group activities. There is strong concentration, especially in the English language and within North America, on songs that emphasize rhyming, and it would be expected that the English native speakers would demonstrate strong rhyming skills.

Syntactic awareness was examined by the Oral Cloze task. The Chinese group was the only group that demonstrated significantly weaker performance than the L1 English speakers. This is not a surprising result since it was expected that native English speakers would perform better than children that recently came to Canada or were mostly exposed to languages different than English for most of their life. But the Chinese group performed more poorly on the syntactic awareness

task than all the other ESL groups. Therefore, the Chinese grammar probably did not facilitate learning the English grammar for ESL native Chinese speakers, and even interfered with learning the new grammar system. It may be that Chinese grammar influenced these results, since this grammar has a lack of grammatical markers of plurals and verb tenses, no articles and no prepositions. Therefore, the Chinese grammar is very different from English grammar.

In the Memory for Sentences task, children were asked to repeat sentences ranging from simple two words sentences to complex sentences. This task not only demanded working memory skills but also familiarity with the language. The L1 English speakers had significantly higher scores than the Chinese and Japanese groups. The combination of a first language with a very different grammatical system, and growing demands on auditory processing (that rely on phonological processing) probably put the Chinese and Japanese groups at a disadvantage on this task, and as such their performance was lower than the other ESL groups.

Although the native English speakers had higher scores than the Chinese group on Rhyme Detection task, Oral Cloze task, and Memory for Sentences, the Chinese group demonstrated a significant advantage over other ESL groups such as the Japanese and Romance language groups, on Letter Identification task. This advantage during the pre-school years may be related to the strong visual memory skills of the Chinese group — most likely as a result of their sensitivity to visual information related to Chinese orthography.

There were other groups that showed differences in a few of the measures. The Farsi group had significantly higher scores than the Chinese group on the

Rhyme Detection task. Many of the sounds in English are sounds in Farsi, but not in Chinese. The familiarity of the native Farsi speakers with sounds that are part of the English sound system probably gave them an advantage over the Chinese native speakers in the Rhyme Detection task.

The Chinese group demonstrated weaker performance than the L1 English group on the phonological processing tasks. The results are somewhat consistent with previous studies. Holm and Dodd (1996) examined university students from China, Hong Kong, Vietnam and Australia on an English task and found that the Hong Kong students, with non-alphabetic L1, had limited phonological awareness compared to students with alphabetic L1 (Holm & Dodd, 1996). Wade-Woolley and Siegel (1997) examined children with ESL in grade 2 and found similar findings. The primary languages spoken by ESL speakers were Cantonese, Mandarin, Gujarati, Urdu and Punjabi. They found that the ESL group had weaker phonological processing abilities than the native English speakers (Wade-Woolley & Siegel 1997).

In grade 1, the two Asian language groups, Chinese and Japanese, demonstrated poorer performance than the L1 English speakers on both Memory for Sentences and Oral Cloze tasks. In the Oral Cloze task, the Chinese language group continued to demonstrate significantly weaker performance than the L1 English group. The Japanese group demonstrated weaker syntactic awareness skills in grade 1. The Japanese grammar and orthographic system are very different from the English grammar and the English alphabetic system. For example, the Japanese sentence structure is subject-object-verb while the English structure is

subject-verb-object. Japanese uses postpositions instead of prepositions and Japanese uses very few pronouns, preferring instead to simply eliminate references to people or other nouns that are already established. Since the two grammar systems are very different, the L1 system cannot facilitate the L2 grammar system and hence, a negative transfer from the grammar rules that are familiar in the L1 Japanese affected the performance on the English Oral Cloze. Native speakers of the Asian languages struggled more than other ESL students to master the grammatical structure of the English language, probably because of very different grammatical system in their first language.

The Slavic group demonstrated better performance than the Japanese groups on the Oral Cloze task. The Slavic grammar considers being complicated. It may be that there is an easy transfer from complex grammar structure, as the Slavic grammar system, to less complex grammar system, such as in the English language.

In the Memory for Sentences task, the Chinese and Japanese groups continued, as in kindergarten, to demonstrate significantly weaker performance than the L1 English group.

In grade 2, there are more demands in terms of the complexity of reading, reading fluency and spelling. Other demands on cognitive skills also increased during this grade such as mathematics skills. Interestingly, this increase in demands manifested itself on the differences between the language groups on reading fluency, spelling and arithmetic.

In the Oral Cloze task, the Chinese language group continued to demonstrate significantly weaker performance than the L1 English group in grade 2. The Slavic group demonstrated better scores than the Chinese and the Farsi groups. This finding can be related to the complex language structure of the Slavic languages in relation to the English language. The L1 Slavic speaking children may have developed a meta syntactic awareness that made learning English easier compared to other groups.

Two measures assessed reading fluency: one-minute word reading and one-minute pseudoword reading. In the one-minute word reading, the children were required to read as fast as possible in an accurate way, within a one minute time period. This task demanded quick decoding and the words could be read by a direct, non-phonological route. The Chinese group had significantly higher scores than the L1 English speakers on this task. Probably the reliance of the Chinese group on visual memory and the non-phonological route helped them to quickly name the words. Our results are somewhat inconsistent with previous findings. Muljani, Koda, and Moates (1998) compared Indonesian and Chinese L1 speakers who were university students that were learning English as a second language. They found that the Indonesians had significantly higher scores than the Chinese group on word recognition task and concluded that related L1 orthographic backgrounds is more efficient in word recognition than unrelated backgrounds (Muljani, Koda, & Moates, 1998). Since the word recognition task was timed in our study, maybe using visual memory as a strategy to decode words was faster

channel than the phonological processing one, and this strategy helped the Chinese group to perform better than the L1 English speakers on this task.

In the one-minute pseudoword, the children were required to read pseudowords as fast as they could. This task can be process by converting letters to sounds or by making analogies to components of known words. The Japanese group read more pseudowords than the L1 English speakers on this task. Japanese Kana is a very transparent phonological system. Being familiar with such a consistent system, probably helped the Japanese group in reading pseudowords, and even gave them an advantage over the English native speakers. This result suggests that at the early age of acquiring a writing system, being familiar with consistent phonological system may develop more awareness to sound-symbol relationship compared to being exposed to a system that is less transparent.

Three measures were used to assess spelling processes in grade 2: Real Word Spelling, Pseudoword Spelling and WRAT3 Spelling subtest. The Chinese group had significantly higher scores than the L1 English group on the two measures that assessed spelling of words: the Real word spelling and the WRAT3 spelling tasks. Again, the Chinese group had an advantage over the L1 English speakers when considering regular spelling and it is possible that reliance on visual memory assisted the performance of the Chinese group. However, on the pseudoword spelling task, where there was a need to use phonological awareness skills, the Chinese group performed poorly. These results are somewhat consistent with previous findings that non-alphabetic L1 speakers were more accurate at recognizing legitimate spelling patterns in English than alphabetic L1 speakers

(Wade-Woolley, 1999). Also a recent study found that Chinese ESL children in grade 2 showed poorer performance in spelling pseudowords, but they performed better than their L1 in spelling of legitimate and illegitimate letter strings (Wang & Geva, in press).

Although arithmetic is not a reading measure, it is a subject taught in English. Thus, the finding that the Chinese children exceeded the native English speakers, the Farsi group and the Tagalog group was very interesting. There are several possible explanations to this result. The cultural differences in expectations for academic achievement in math may put more pressure on Chinese students to achieve and concentrating on mathematics. Chinese parents may focus more on mathematics skills than the other language groups, and, as a result, Chinese students get more practice of mathematic skills. Another explanation comes from the linguistic field. Studies showed that the structure of the Chinese language contributes to greater success on mathematics tests than the structure of English language (e.g., Miura, Okamoto, Kim, Chang, Steere, & Fayol, 1994). Miller and Stigler (1987) showed that the structure of word used for numbers in most Asian languages, makes counting easier for Asian children relative to American children. In the Chinese language the value of a given digit in a multidigit numeral depends on the face value of the digit (0 through 9) and on its position in the numeral. Children speaking Asian languages must learn the numerical names from 1 to 10, and than the numbers between 11 and 20 are formed by compounding the decade value with a unit value. For instance, the number eleven is spoken as "ten-one". And twenty is spoken as "two-ten". English language speakers must memorize the

numerical names between one and nineteen as well as the decade names. The lack of systematic generation of numerical names is also found in French (Miura, et al., 1994). This different numerical structure can explain the advantage of the Chinese students over the English native speakers especially in the early grades. Also the speed at which the number can be pronounced in Chinese can give Chinese students an advantage, especially on timed tests (Chen & Stevenson, 1988; Stigler, Lee, & Stevenson, 1986). Our results are consistent with previous studies that examined why Chinese children performed better than US and European children in mathematics' skills (Geary, Bow-Thomas, Fan & Siegler, 1993; Geary, Bow-Thomas, Liu & Siegler, 1996).

In grade 3, differences among the language groups were found on syntactic awareness, spelling, reading comprehension and arithmetic measures. Due to increased demands on reading skills, there were probably differences in measures that assessed more complex reading ability such as reading comprehension.

In the Oral Cloze task in grade 3, the Chinese group still lagged behind as they did in kindergarten, grade 1 and grade 2. However, the grade 3 results revealed that it was not just the L1 English speakers that demonstrated better performance on this task, but also that other language groups, such as Farsi, Slavic and the Romance groups, had significantly higher scores than the Chinese group. These results are consistent with previous studies that ESL children had lower scores on Oral Cloze tasks than the native English speakers (Chiappe & Siegel, 1999; Da Fontura & Siegel, 1995). The vital question, however, that is raised by these results is why do the Chinese group demonstrate such poor results on the

Oral Cloze task, even compared to the other language groups? One explanation might relate to interference between Chinese as L1 language and English as a second language. Negative transfer from the first language to the second language was reported in the literature in relation to pronunciation and the structure of the sentences. In our findings, we see evidence for negative transfer in relation to grammatical structure.

As opposed to the negative grammar skill transfer from Chinese to English, there seems to be positive transfer in relation to spelling skills as the Chinese group had significantly higher scores than the native English group on spelling task. This result is consistent with previous studies. Spelling in English cannot rely only on phonological processing, since there are many irregular forms. Therefore, using visual memory as a strategy to spell words in English can help in spelling more accurately. The Chinese students in grade 3 spelled better than the L1 English speakers on tests using regular words. Another explanation for the superior performance of the Chinese students might relate to their strong visual memory due to the cognitive requirements in the reading process from their first language. This cognitive skill probably endows them with a better memory for real words, especially in an irregular language as English. In order to spell correctly, Chinese students must rely on visual memory rather than on phonological processing.

The Chinese groups performed better than the L1 group on a measure of computational arithmetic. Similar to the findings from grade 2, the Chinese group had significantly better scores than the L1 English speakers and the Farsi group. Probably the required skills for grade 3 mathematics are more complicated, and

therefore, the Chinese group could demonstrate their strong math skills/ability.

However in grade 3, and our result showed that the Chinese group had significantly higher scores than other two groups: the Farsi and the native English speakers groups.

Our findings demonstrated that L1 orthography effects L2 reading and spelling strategies. For example, the Chinese group showed better spelling skills, probably as a result of a positive transfer of reading strategies in their first language.

In terms of grammar, our findings showed that a positive transfer occurred when the L1 grammar system is more complicated than the L2 grammar system. For example, in grade 3, the Slavic group showed superior syntactic awareness skills to the other ESL groups. On the other hand, a negative transfer occurred when the L1 grammar system is less complicated than the second language grammar system. Our results demonstrated that the Chinese group had significant difficulties with the English grammar. Their difficulties were significant and consistent across the four years of this study.

Implications

The findings have several implications for the diagnosis and intervention of children with ESL. First, one of the most important issues in the ESL research and practice concerns how to identify ESL RD in kindergarten when the reading skills are not yet developed. The concern is that children with ESL will not be overrepresented among children with reading difficulties. On the other hand, there is another concern that children with ESL will be underrepresented among students identified as having reading difficulties, so that the children with ESL who need

support will not be identified. Our results show that at risk ESL students in kindergarten demonstrated different reading and cognitive profiles than ESL not at risk children. Specifically, literacy measures, two phonological processing tasks and the lexical access task differentiated between ESL at risk to ESL not at risk children at that very young age.

Additionally, the reading profile of at risk ESL children was very similar to the reading profile of at risk native English speaking children, with the exception of measures that assess high level of exposure to the structure of the English language such as syntactic awareness. This finding is consistent with previous findings that reading profiles of ESL RD children are similar to those of RD English native speakers (e.g., Chiappe & Siegel; 1999; Da Fontoura & Siegel, 1995). Furthermore, the reading difficulties in English occurred with almost the same frequency in English native speakers and children with ESL. This finding was also supported by previous research on Punjabi speaking Canadian students (Chiappe & Siegel, 1999).

Another implication of our study concerns the efficacy of early intervention programs. The school district involved in this study was committed to a balanced literacy program, thus demonstrating again the critical role that phonological processing plays in reading acquisition for both native and non-native speakers. The findings point to the importance of phonological skills to facilitate reading development. The phoneme awareness-training program in kindergarten and grade 1 seems to have had an immediate short-term benefit as it helped to bridge the gap in the reading skills of children with ESL entering kindergarten with limited English

or no English exposure. If detection and remediation are available for children with ESL during the early years of school, their reading development can be similar to their native English-speaking peers in the long term.

In the long term, the percentage of at risk students from both language groups decreased dramatically, suggesting the success of phonological awareness program for both language groups. Poor readers in kindergarten and grade 3 had similar reading profiles.

The phonological awareness program provided in kindergarten succeeded in developing adequate reading skills for L1 speakers as well as for ESL speaking children. In grade 3, very few children (4%) from both language groups still demonstrated reading difficulties.

Furthermore, our result demonstrated that students with different native languages use different strategies that probably relate to the structure and the orthography of their first language. Understanding the strategies that these students are using while reading and writing in English can help in understanding their strengths as well as their weaknesses and to allow educators to provide the particular support that each group needs.

In conclusion, the results of this study suggest that when immigrant students or students with limited English exposure are provided with phonological awareness support, as well as intensive exposure to English by native speakers, they can develop reading profiles similar to native English speakers. Under this condition, students with ESL with reading difficulties experience the same difficulties as native English speakers with RD. Also the prevalence of the ESL RD in grade 3 was very

similar to the prevalence of L1 RD. Furthermore, the results of our study suggested that acquiring English as a second language in the early grades of elementary school is not an impediment to successful literacy learning, and even can be an advantage.

There are some limitations of this study. We do not know the language proficiency of the ESL student. For instance, do they know to read and write in their first language? Are they practicing reading in their first language? How much do they speak in their first language? To their parents? Siblings? Friends after school? This information is important since different levels of proficiency differentiate between individuals and may influence their school performance. Another limitation concerns the intervention program. All the children in the North Vancouver public school board participated in the intervention program and hence there was no control group.

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Appendix A**Letter Identification****Instructions**

Examiner: I am going to show you letters one at a time. Tell me the name of each letter.

_____ j
_____ g
_____ l
_____ z
_____ s
_____ a
_____ e
_____ u
_____ d
_____ w
_____ t
_____ f
_____ n
_____ o
_____ c
_____ m
_____ x
_____ v
_____ h
_____ r
_____ b
_____ q
_____ y
_____ i
_____ k
_____ p

Score _____ / 26

j	g	l	z
s	a	e	u
d	w	t	f
n	o	c	m
x	v	h	r
b	q	y	i
k	p		

Rhyme Detection

Instructions

Examiner:

"Here is a picture of a cat. Down here are three more pictures..."(the examiner points to and names each of the 3 choice pictures). Now which of these three- fish, sun or hat rhymes with cat?" Provide the correct answer (hat) if necessary and explain that hat rhymes with cat because they end with the same sound (at). Continue as above with the other 2 demonstration items, giving an explanation when necessary. The instructions from the 10 items are the same as for the demonstration items. Do not give feedback on the test items. If the child fails the demonstration items and the first 5 test items, you may discontinue the test.

Demonstration Items

Stimulus Word

1. cat
2. ball
3. spoon

Response Items

fish	sun	hat
wall	bell	bag
cup	moon	ship

Test Items

Stimulus Word

1. boat
2. key
3. chair
4. house
5. head
6. bell
7. sock
8. train
9. egg
10. car

Response Items

foot	bike	coat
cow	tree	door
car	table	bear
mouse	horse	window
hand	bed	eye
bottle	dress	shell
clown	clock	shoe
rain	tractor	spoon
bag	spoon	leg
star	bike	cake

Phoneme Deletion

Instructions for Initial Phoneme Deletion:

Examiner: "Here is a picture of a bus. If I say the word /bus/ without the /b/. we'll be left with /us/. Bus without /b/ says us. Let's try some more." Give all 4 demonstration items, and explain fully, as for "bus".

Administer items 1 to 8 with the instruction, "Meat without /m/ says..." Do not give feedback for the test items.

If the child fails the demonstration items and the first 4 test items, you may discontinue the task.

Demonstration Items

bus sad pie cow

Test Items

1. meat
2. bear
3. hat
4. sit
5. jam
6. tin
7. cake
8. cup

Score: _____/8

Instructions for Final Phoneme Deletion

Examiner: "Now this time, instead of taking off the first sound of words, let's try and take off the last sound. This will make things that are not real words. Here's a picture of a foot. Can you hear the last sound of foot? The last sound in foot is /t/. Now can you say foot without /t/? Foot without /t/ is foo."

Give all 4-demonstration items, and explain fully as for foot.

Administer items 1 to 8 with the instruction, "Meat without /t/ says..." Do not give feedback for the test items.

If the child fails the demonstration items and the first 4 test items, you may discontinue the task.

Demonstration Items

Foot bag bell spoon

Test Items

1. meat
2. sad
3. hat
4. bus
5. jam
6. tin
7. cake
8. cup

Score: _____/8
Total Score _____/16

Syllable Identification and Phoneme Identification

Instructions for Syllable identification (Word Completion)

Examiner: "here is a picture of a rabbit. I'm going to say the first part of the word. Can you finish it off for me? Here is a ra..." (the child should respond 'bit.' If the child fails to give the correct answer, say "If I say ra, you finish the word by saying bit. Let's try it with rabbit. Ra...." Supply the bit again if necessary.

Repeat as above for the second example, bottle. A full explanation and feedback are given for the two demonstration items.

Present the test items 1 to 8 with the instructions, "This is a table. Ta...". Do not give feedback for the test items.

If the child fails the demonstration items and the first four test items, the task may be discontinued.

Demonstration Items

____ Ra-bbit
____ Bo-ttle

Test Items

1. ____ Ta-ble
2. ____ Pic-ture
3. ____ Cabb-age
4. ____ Mon-ey
5. ____ O-range
6. ____ Sand-wich
7. ____ Mon-ster
8. ____ Lem-on

Score ____/8

Instructions for Phoneme Identification

Examiner: "Now we are going to do something that is a bit more difficult. Here is a picture of a watch. I'll say the first part-you finish it off. Here is a watch. Wa..." Provide corrective feedback if necessary. Repeat for the demonstration item, cat.

Proceed with items 1-8 using the instructions "This is a horse, Hor..." Do not provide feedback for test items.

If the child fails the demonstration items and the first four test items, the task may be discontinued.

Demonstration Items

____ Wa-tch
____ Ca-t

Test Items

1. ____ Hor-se
2. ____ Fi-sh
3. ____ Kni-fe
4. ____ Shi-p
5. ____ Bo-ne
6. ____ Ca-rd
7. ____ Go-te
8. ____ Do-g

Score ____/8

Phoneme Deletion & Substitution

Pretrials: say to the child, "Now we are going to change the way words sound. I'm going to say a word, and I want you to say it back to me. After that, I'll tell you how to change the word. "Say *doll*." After the child repeats it, say "Now say *doll* again, but don't say /d/. "Say *doll*." After the child repeats it, say "Now say *doll* again, but instead of /d/ say /w/."

Initial

fill (remove /f/) _____
 cup (remove /k/) _____
 bat (remove /b/) _____

fill (change /f/ to /b/) _____
 cup (change /k/ to /p/) _____
 bat (change /b/ to /s/) _____

Final

Goat (remove /t/) _____
 Make (remove /k/) _____
 Seal (remove /l/) _____

fill (change /l/ to /t/) _____
 cup (change /p/ to /t/) _____
 bite (change /t/ to /k/) _____

Blends

Slip (remove /l/) _____
 Slip (change /l/ to /n/) _____
 Nest (remove /s/) _____

crest (change /s/ to /p/) _____
 stick (remove /t/) _____
 (change /t/ to /l/) _____

Total Score _____/18

Pseudoword Repetition

"You are now going to hear nonwords. That is, I am going to say to you words that are not real words. Rather, they are silly sounding—nothing you've ever heard before. I want you to listen close, and repeat the silly words after me, exactly the way I say it."

*Fill in the child's response for each syllable in the appropriate space. **Discontinue this task once the child has made 5 consecutive errors.***

Practice:

a) bift _____

b) prindle _____

Test Pseudowords:

1. sep _____
2. naked _____
3. tull _____
4. thip _____
5. hond _____
6. grall _____
7. smip _____
8. clird _____

9. pennel _____
10. rubid _____
11. diller _____
12. bannow _____
13. hampent _____
14. glistow _____
15. sladding _____
16. tafflest _____

17. commerine _____
18. barrazon _____
19. doppelate _____
20. thickery _____
21. frescovent _____
22. trumpetine _____
23. brasterer _____
24. skiticult _____

25. penneriful _____
26. loddenapish _____
27. fenneriser _____
28. woogalamic _____
29. blonterstaping _____
30. stopograttic _____
31. contamponist _____
32. empliforvent _____

Score ____/32

Rosner Auditory Analysis Test

Now we are going to play a game of removing sounds from words. I'm going to say a word and then tell you to take part of the sound off and then say what's left. Here is how it will work. "Say 'cowboy'." Wait for response. "Now say cowboy again, but without the boy sound." "Say 'toothbrush'." Wait for response. "Now say toothbrush again, but without the tooth sound". If the child fails either of the two practice items, attempt to teach the task by giving the correct response, explaining why it is correct, and re-presenting the item. Say "sat". Now say "sat" without the /s/ sound. If either item is failed again, discontinue testing and score the test zero. If the items are answered correctly, then proceed.

Testing for all subjects ends after five consecutive errors. Present the remainder of the items in the same way.

Check items answered correctly. Mark line under last item attempted.

Sample Items:

cow(boy) _____
 (tooth)brush _____
 (s)at _____

1. birth(day) _____	12. stea(k) _____
2. (car)pet _____	13. bel(t) _____
3. m(en) _____	14. (sc)old _____
4. ro(de) _____	15. (c)lip _____
5. w(ill) _____	16. (s)mile _____
6. (l)end _____	17. (p)ray _____
7. (s)our _____	18. (b)lock _____
8. (g)ate _____	19. (b)reak _____
9. to(ne) _____	20. s(m)ell _____
10. ti(me) _____	21. (t)rail _____
11. plea(se) _____	22. de(s)k _____
23. (sh)rug _____	
24. cr(e)ate _____	remove [ee], answer[create]
25. s(m)ack _____	
26. re(pro)duce _____	remove [pra], answer[reduce]
27. s(k)in _____	
28. s(w)ing _____	
29. (st)rain _____	
30. g(l)ow _____	
31. st(r)eam _____	
32. c(l)utter _____	
33. off(er)ing _____	remove [er], answer [offing]
34. dy(na)mo _____	remove [nuh], answer [dimo]
35. auto(mo)bile _____	remove [muh], answer [autobeel]
36. car(pen)ter _____	remove [puhn], answer [carter]
37. Ger(ma)ny _____	remove [muh], answer [journey]
38. lo(ca)tion _____	remove [kaa], answer [lotion]
39. con(tin)ent _____	remove [tin], answer [conent]
40. phi(lo)sophy _____	remove [law], answer [fuhosophy]

Total Correct ____/40

1 MINUTE NONWORD READING

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- I want to know how quickly you can sound words that are not real words.
- When I turn over this page you will see some words that are called nonwords.
- I want you to sound them out as quickly as you can starting with the first row and moving down the page.
- If you come across a nonword that you cannot sound out, skip it and go on to the next word.
- When I say begin, start reading and don't stop until I tell you to do so.

Score (1 or 0)	Error Response	Sound Category or Syllable (Error Inventory)
1. ____ree r-ē	_____	16-34
2. ____ip i-p	_____	30-15
3. ____din d-i-n	_____	3-30-13
4. ____ig i-g	_____	30-5
5. ____dat d-a-t	_____	3-28-19
6. ____tay t-ā	_____	19-33
7. ____yee y-ē	_____	24-34
8. ____rayed r-ā-d	_____	16-33-3
9. ____mem m-e-m	_____	12-29-12
10. ____oft o-ft	_____	31-26
11. ____glack gl-a-k	_____	26-28-9
12. ____hend h-e-nd	_____	6-29-26
13. ____shum sh-u-m	_____	18-32-12
14. ____eb e-b	_____	29-1
15. ____dreek dr-ē-k	_____	26-34-9
16. ____weaf w-ē-f	_____	22-34-4
17. ____knap n-a-p	_____	13-28-15
18. ____ful's f-u-lz	_____	4-32-26
19. ____sess s-e-s	_____	17-29-17
20. ____chur ch-ər	_____	2-41
21. ____zoath z-ō-th	_____	25-36-20
22. ____rejune rə/jōon	_____	68/69
23. ____depine də/pīn	_____	70/71
24. ____viv v-i-v	_____	21-30-21

Score (1 or 0)	Error Response	Sound Category or Syllable (Error Inventory)
25. ____yox y-o-ks	_____	24-31-23
26. ____rhunk r-u-ŋk	_____	16-32-26
27. ____throbe thr-ō-b	_____	27-36-1
28. ____sloy sl-oi	_____	26-38
29. ____sprawn't spr-aw-nt	_____	27-37-26
30. ____quox kw-o-ks	_____	10-31-23
31. ____phet f-e-t	_____	4-29-19
32. ____brecked br-e-kt	_____	26-29-26
33. ____wrault r-aw-lt	_____	16-37-26
34. ____darlanker dar/lan/kər	_____	72/73/74
35. ____whumb hw-u-m	_____	7-32-12
36. ____mieb m-ī-b	_____	12-35-1
37. ____squow skw-ou	_____	27-40
38. ____pelnidlun pel/nid/lun	_____	75/76/77
39. ____hopdalhup hop/dal/hup	_____	78/79/80
40. ____untroikest un/troik/est	_____	81/82/83
41. ____lunap lōō/nap	_____	84/85
42. ____cedge s-e-j	_____	17-29-8
43. ____pnir n-ər	_____	13-41
44. ____ceisminadolt sēz/min/ə/dolt;	_____	86/87/88/89
45. ____byrcal bər/kal	_____	90/91

TOTAL _____

One Minute Word Reading

- We want to find out how quickly you can read.
- When I turn over this page you will see some words.
- I want you to read them as quickly as you can, starting with the first row and moving down the page.
- If you come across a word that you don't know, skip it and go on to the next word.
- When I say begin, start reading and don't stop until I tell you to do so.

1. _____	see	22. _____	deny
2. _____	red	23. _____	quarantine
3. _____	milk	24. _____	deteriorate
4. _____	was	25. _____	rudimentary
5. _____	then	26. _____	mosaic
6. _____	jar	27. _____	rescinded
7. _____	letter	28. _____	audacious
8. _____	city	29. _____	mitosis
9. _____	between	30. _____	protuberance
10. _____	cliff	31. _____	longevity
11. _____	stalk	32. _____	predilection
12. _____	grunt	33. _____	regime
13. _____	huge	34. _____	beatify
14. _____	plot	35. _____	internecine
15. _____	sour	36. _____	regicidal
16. _____	humidity	37. _____	puerile
17. _____	clarify	38. _____	factitious
18. _____	residence	39. _____	lucubration
19. _____	urge	40. _____	epithalamion
20. _____	rancid	41. _____	inefficacious
21. _____	conspiracy	42. _____	synecdoche

TOTAL _____/42

Picture Naming
(Rapid Automatized Naming)

Show the child the 8x 5 table of pictures and say:

"I want you to look at these pictures and tell me what they are. Let's look at the first row. I'll point to each picture, and then you can tell me what it's a picture of. Let's start."

Point (from left to right) to the pear, the bird, the tree, the chair, and the house.

Once the child can successfully name each picture, say:

"Now let's see how fast you can tell me the names of all these pictures. I want you to go from here (point to the top left picture) to here (point to the top right picture), and then go to the next row and go from here (left) to here (right). Start when I say go. Ready? Set. Go!" Record how long it takes the child to name all the pictures from the time you say "Go," and the number of uncorrected errors. Both the time (in seconds) and the number of uncorrected errors should be recorded on the coversheet. If children consistently misname one of the pictures (such as calling the pear an apple) despite instructions to the contrary during practice, let them continue.

However, make a note of it on the coversheet.

RAN Task
(Speeded number Naming)

When I turn over this piece of paper you are going to see some numbers. I want you to name them as quickly as you can. Start by going across the page and then do the next row.

Keep going and don't stop.

(Use stopwatch to time and circle uncorrected errors)

4 1 3 2 5

9 4 2 7 5

3 6 1 9 3

6 8 9 4 8

3 1 5 2 6

Time (to the nearest second): _____

Number of uncorrected errors: _____

Oral Cloze Task- Kindergarten

Instruction: I will read something to you and there will be one word missing. Where the word is missing, I will say "beep." I want you to think of a word that would sound right in the "beep." For example, I might say, "The moon shines bright in the "beep." (pause and repeat) and I want you to say "sky", etc. O.K. Let's try another one. I'll say, "The children "beep" with the toys." (pause and repeat). What is the missing word? If the child fails to respond, say, "How about play?" Then it would be "The children play with the toys." Let's try another one. "The puppy wags its "beep." (pause and repeat). Good! Let's try some more.

Discontinue: if the child fails the practice items and the first three task items.

1. The _____ little pigs ate corn.
2. Fred put the big turkey _____ the oven.
3. The _____ put his dairy cows in the barn.
4. Jane _____ her sister ran up the hill.
5. It was sunny day with a pretty _____ sky.
6. Betty _____ a hole with her shovel.
7. Jim set the lamp on the desk so he could _____.
8. The boy had a big brown eyes and a pleasant _____.
9. The children put on their boots _____ it snows.
10. Jeffrey wanted to go _____ the roller coaster.
11. When we go _____ the building, we must be quiet.
12. Dad _____ Bobby a letter several weeks ago.

Oral Cloze Task – Grade 1

Instructions: I will read something to you and there will be one word missing. Where the word is missing, I will say "blank". I want you to think of a word that would sound right in the blank. For example: I might say, "The moon shines bright in the _____" (pause and repeat) and I want you to say "sky". So it would be "The moon shines bright in the sky". OK. Let's try another one. "The puppy wags its _____", (pause and repeat). Good! Let's try some more.

Discontinue if the child fails the practice items and the first four task items.

1. Sally has a party dress and a school dress. She has two _____.
2. We have done the work already. We _____ it yesterday.
3. John is a good player. Bill is a better player than John. But tom is the _____ player of them all.
4. Bob is a child. Mary is a child. They are two _____.
5. The brown dog is small; the gray dog is smaller; but the white one is the _____.
6. I have one mouse here and one mouse there. I have two _____.
7. Yesterday, Tina and Marie _____ walking down the street.
8. Yesterday, Joe _____ the ball.
9. The hungry dogs have _____ all the food.
10. Jane _____ her sister ran up the hill.
11. It was a sunny day with a _____ sky.
12. Jim set the lamp on the desk so he could _____.
13. Jeffrey wanted to go _____ the roller coaster.
14. Dad _____ Bobby a letter last week.

Oral Cloze Task – Grades 2 and 3

Instructions: This time I will read something to you and there will be a word missing. Where the word is missing, I will say “beep.” I want you to think of a word that would sound right in the spot where I say “beep”. For example, I might say “The moon shines bright in the “beep”. (pause and repeat) and I want you to say “sky.” O.K. Let’s try another one. I’ll say “The children “beep” with the toys.” (pause and repeat). What’s the missing word? (if the child fails to respond, say “How about, play? Then it would be “The children play with the toys.” Let’s try another one. “The little puppy wags its “beep.” (pause and repeat). Good!

Practice items:

The moon shines bright in the _____.

The children _____ with the toys.

The little puppy wags its _____.

1. We have done the work already. We _____ it yesterday.
2. John is a good player. Bill is a better player than John. But Tom is the _____ player of them all.
3. Jane _____ her sister ran up the hill.
4. The brown dog is small; the gray dog is smaller; but the white one is the _____
5. Betty _____ a hole with her shovel.
6. Yesterday, Tina and Marie _____ walking down the street.
7. The girl _____ is tall plays basketball well.
8. The hungry dogs have _____ all the food.
9. Jeffrey wanted to go _____ the roller coaster.
10. Dad _____ Bobby a letter several weeks ago.
11. Yesterday, Joe _____ the ball.

Memory for Sentences

Working Memory for Words

Instructions:

I am going to say some sentences and the last word in each sentence will be missing. I want you to tell me what you think the last word should be. Let's try one.

"For breakfast the little girl had orange_____." Now I am going to read two sentences. After each sentence, I want you to tell me the word that should go at the end of the sentence. When I finish the two sentences, I want you to tell me the two words that you said for the end of each sentence. Please tell me the words in the order that you said them. Let's try it. "When we go swimming, we wear a bathing _____." "Cars have to stop at a red _____."

Discontinue when the child has failed an entire level (i.e. all three items-A,B, C of a particular number).

Note: announce each new level. Record the words in the order the child has said them.

- 2A 1) In a baseball game, the pitcher throws the _____
 2) On my two hands, I have ten _____
 Child's responses: _____ (ball, fingers)
- 2B 1) In the fall, we need to rake _____
 2) When we are sick, we often go to the _____
 Child's responses: _____ (leaves, doctor)
- 2C 1) An elephant is big, a mouse is _____
 2) A saw is used to cut _____
 Child's responses: _____ (small, wood)
- 3A 1) Running is fast, walking is _____
 2) At the library people read _____
 3) An apple is red, a banana is _____
 Child's responses: _____ (slow, books, yellow)
- 3B 1) The sun shines during the day, the moon at _____
 2) In the spring, the farmer plows the _____
 3) The young child had black hair and brown _____
 Child's responses: _____ (night, field, eyes)
- 3C 1) In the summer it is very _____
 2) People go to see monkeys in a _____
 3) With dinner, we sometimes drink _____
 Child responses: _____ (hot, zoo, milk)

- 4A 1) Please pass the salt and _____
 2) When our hands are cold we wear _____
 3) On the way to school I mailed a _____
 4) After swimming, I was soaking _____
 Child's responses: _____ (pepper, gloves, letter, wet)
- 4B 1) Snow is white, grass is _____
 2) After school, the children walked _____
 3) A bird flies, a fish _____
 4) In the barn, the farmer milked the _____
 Child's responses: _____ (green, home, swims, cow)
- 4C 1) In the autumn, the leaves fall off the _____
 2) We eat soup with a _____
 3) I go to the pool to _____
 4) We brush and comb our _____
 Child's responses: _____
 _____ (trees, spoon, swim, hair)
- 5A 1) For the part, the girl wore a pretty pink _____
 2) Cotton is soft, and rocks are _____
 3) Once a week, we wash the _____
 4) In the spring it is very _____
 5) I throw the ball up and then it comes _____
 Child's responses: _____
 _____ (dress, hard, car, rainy, down)
- 5B 1) The snail is slow, the rabbit is _____
 2) At a birthday party, we usually eat ice cream and _____
 3) Sandpaper is rough but glass is _____
 4) In a garden, we pick _____
 5) Over the field, the girl rode the galloping _____
 Child's responses: _____
 _____ (fast, cake, smooth, flower, horse)
- 5C 1) To cut meat we use a sharp _____
 2) In the daytime it is light, and at night it is _____
 3) Dogs have four _____
 4) At the grocery store, we buy _____
 5) A man is big, a baby is _____
 Child's responses: _____
 _____ (Knife, dark, legs, food, small)

Working Memory for Numbers

Procedure: place card A in front of child. After child finishes counting, immediately turn card over on a stack near yourself, not the child.

Using the card A, teach the child to count the yellow dots, ignoring the blue ones.

"Count the yellow dots. Try not to pay attention to the blue dots. Just count the yellow dots. You should touch each dot with your finger while you count out loud. Now you can practice counting the yellow dots."

"How many yellow dots were there?"

Using card B and C:

"Now I want you to count the yellow dots on one card and then on another card. Be sure to touch each yellow dot and to count out loud. Then I want you to tell me how many dots there were on the first card and then on the second card."

"Okay, let's try it."

"Now we are going to count yellow dots on some more cards. You should start to count as soon as you see a new card. When you see a blank card, you should tell me how many yellow dots were on each card in that set. In the beginning, you will only count 1 card at a time, then 2 cards at a time, and then even more cards. Each time you see the blank card you should tell me the numbers for each card you counted. You should tell me the numbers in the order in which you saw the cards- that is, how many yellow dots on the first card, the second, and so on."

Discontinue when child has failed an entire level (i.e. all three items-A, B, C, of a particular number).

Note: Announce each new level. Record numbers in the order the child has said them.

Practice:

1. Card A _____ 1b. Cards B, C _____

Test Items:

2. A. _____ B. _____ C. _____	4. A. _____ B. _____ C. _____
3. A. _____ B. _____ C. _____	5. A. _____ B. _____ C. _____

Total _____/12

Real Word Spelling Kindergarten

"I would like you to show me how to write your name. Will you write your name here for me?" (Have the child write his or her name on the top line of the page.)

"Now I would like you to write some more words for me. I am going to read some words to you, and I would like you to print them for me. Try to spell them as best you can. I will say the word, then read a sentence with the word in it, and then say the word again. You only have to write the word once. Try your best. If you are not sure how to spell a word, it's okay to guess."

1.	no	There are no wrong answers	no
2.	dad	My dad is happy	dad
3.	mom	My mom played with me.	Mom
4.	I	I live at home	I
5.	cat	The cat played with the string	cat

Real Word Spelling

men	The men are talking.	men
did	I did the work yesterday.	did
him	The book belongs to him.	him
sad	The movie made me.	sad
good	The chocolate tasted good.	good
love	I love to ski.	love
toy	He has a toy train.	toy
said	She said, "good morning."	said
head	His head hurt.	head
some	Some people came to visit.	Some

Nonwords Spelling

1. fid (like hid)
2. pem
3. gan (like man)
4. het (like wet)
5. sog (like dog)
6. vood (like food) other acceptable spelling: vude
7. tave (like have) other acceptable spelling: tav, talvev
8. vone (like gone) other acceptable spelling: vaun, Vaughan, vawn
9. coth (like both) other acceptable spelling: koth, cothe, kothe, coath
10. gead (like head) other acceptable spelling: ged

GFW Nonword Spelling**Grade 3**

1. nad
2. gog
3. lev
4. besh
5. poe, po
6. yoy, yoi
7. jesh
8. abfim other acceptable spelling: abphim, abphym
9. imbaf other acceptable spelling imbaff
10. quibbest other acceptable spelling: quibest
11. wush other acceptable spelling: whush
12. ull
13. shenning
14. bofmib other acceptable spelling boffmib
15. etborn other acceptable spelling etbomb