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# The Relationship Between Selective Aspects of Metalinguistic Awareness and Degree of Second Language Acquisition in Emergent Readers 

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A thesis submitted to the Department of Education in partial fulfilment of the requirements for the degree of Masters of Arts in School Psychology

September, 2001

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#### Abstract

The purpose of this study was to determine whether knowing a second language would be related to having greater phonological and word awareness skills than their monolingual peers. Three groups of kindergarten children, of varying levels of second language experience participated in a variety of tasks examining their phonological and word awareness skills. One group was fluent in French and English (bilingual), one group was in a French immersion program (immersion), and the other group spoke English and had no exposure to a second language (monolingual). Results indicated similar abilities among the three groups of children in terms of their phonological awareness abilities, with the exception of segmenting syllables and phonemes. The bilingual group scored significantly higher than the immersion group when manipulating syllables and the immersion and monolingual group scored significantly higher than the bilingual group when manipulating phonemes. In the "moving word" word awareness task, both groups of children with a second language background performed significantly better than chance, whereas the monolingual group did not differ from chance. The findings suggest that by the end of the child's first year of formal literacy instruction, second language advantage may only exist in the area of manipulating syllables and increased awareness of print. Therefore, children possessing a second language have some increased metalinguistic skills which may be beneficial in learning to read.


## Acknowledgements

I would first like to thank Michelle for all her help, support, and patience. This would never have been completed so quickly without your hard work and dedication. To my other committee members, Randy Lynn and Fred, thank you for all your helpful suggestions and encouragement. I would also like to thank the schools, parents, and children from the Halifax area who participated in this study. Everyone was so cooperative and eager to help me in any way possible. As always, to Laura and RL for always being there to listen and give me a push when needed. To my parents, thanks for being there every step of the way. I would have never made it here without all your love, support, and encouragement. Finally, to Sean, who was always there to guide me through all the tough times during this program. Your patience and love was much appreciated.

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## CHAPTER 1

## General Introduction and Literature Review

A multitude of cognitive abilities are involved in the beginning reading process. (Adams, 1990). Determining which of these factors predict the development of early reading acquisition has been addressed by many reading researchers. The difficulty in this task is that children present a wide range of abilities before formal reading instruction occurs (Adams, 1990). Some students may be able to recognize letters, some are aware of the specific letter sounds, and others are able to read simple words. Some children do not possess any of these reading skills. As reading instruction continue, these skills improve, thereby causing difficulty in determining which of these skills are predictive of early reading acquisition. However, by establishing the cognitive abilities contributing to beginning reading, researchers can more accurately help identify children at risk for reading disabilities as well as understand the reading process.

One area receiving empirical support for one of these abilities and its link to early reading success is the relationship between reading acquisition and metalinguistic awareness. Metalinguistic awareness is defined as the ability to reflect on and manipulate the structural features of spoken language (Campbell \& Sais, 1995). The form of metalinguistic awareness most frequently researched is the area of phonological awareness. Phonological awareness is defined as the knowledge that the spoken word is composed of distinct units of sound at both the subsyllabic and phonetic levels (Yelland, Pollard, \& Mercuri, 1993). A second, less researched area involves word awareness. Word awareness is the awareness that the speech stream is composed of discrete units
called words and that words are the units of speech which carry meaning (Yelland, Pollard, \& Mercuri, 1993). Research in both these areas of metalinguistic awareness are discussed in turn.

## Phonological Awareness

Much of the reading research in the last two decades has focussed on the importance of phonological awareness in predicting early reading success (Stanovich, 1988; Wagner \& Torgesen, 1987; Bradley \& Bryant, 1983). There is a progression of development of a child's phonological skills (Bryant, MacLean, Bradley, \& Crossland, 1990). The ability to make judgements about small phonological segments improve as children get older. At an early age, before formal reading instruction begins, children are able to recognize rhymes and detect and isolate large units of speech, such as syllables. Smaller units, such as phonemes, are more difficult for children to detect and manipulate and therefore development of these skills do not occur until the child is exposed to formal reading instruction (Bryant et al., 1990). Phonological awareness is measured by a variety of tasks. At a lower level, rhyme and alliteration activities are used as children are required to identify words either beginning (onset) or ending (rime) with the same sound as a presented target word. More difficult tasks require children to isolate and delete phonemes or sounds from words. For example, a child may be asked to isolate the initial sound of a target word or produce the new word if a particular sound was deleted from the target word. These more difficult skills of phonological awareness usually do not emerge until reading instruction begins and therefore children in grade one are generally proficient on these tasks (Torgesen, Wagner, \& Rashotte, 1994).

Bryant and his colleagues found the skills of rhyming and alliteration were predictive of early reading success in 3-and 4-year-olds. This relationship was also found to be independent of the child's individual language abilities (Bradley \& Bryant, 1983; Bryant, MacLean, \& Bradley, 1990; MacLean, Bryant, \& Bradley, 1987). Research has also shown that children in kindergarten who are strong in phonological awareness tasks typically learn to read more easily than those having difficulty with the same tasks (Bradley \& Bryant, 1985; Byrne, Freebody, \& Gates, 1992). A knowledge of the phonological sound units in language is necessary in order to make sense of the sound-symbol relationship used by our alphabetic writing system. These findings suggest knowledge of the sounds of the language may be important in early reading acquisition.

## Word Awareness

There has been less research in the area of word awareness and its impact on beginning reading. Adams (1990) discusses that it is not only an awareness of the sounds of language that is important in the beginning reading process, but equally important is the child's conscious awareness of the nature of print. It does not matter the child's level of phonological awareness, to make use of it the child must learn the identities of the individual letters and an awareness that these strings of letters are words which represent speech. Tunmer (1989) suggested that phonological awareness is essentially an extension of word awareness, since both refer to the ability to reflect on and manipulate the subunits of the spoken language (i.e. the words, syllables, and phonemes). Until a child is aware that a spoken word has its own physical attributes
such as size, number of syllables, and pitch, it is unlikely the phonological structures (subsyllables and phonemic subunits) will be discovered (Yelland et al., 1993).

The ability to understand that printed words are symbols for linguistic elements is part of one's metalinguistic awareness (Bialystok, 2000). Knowledge that the printed form of the word is what carries the meaning is essential in learning to read. Children understanding this symbolic relationship between letters and meaning are able to develop their literary skills (Bialystok, 2000). Homer and Olson (1998) found evidence that young children are able to understand that written text is composed of words before they are able to read and write. They have suggested that this understanding of words is the basis for their awareness of the properties of their speech. Comprehending the relationship between written text being composed of words and written words representing speech is necessary in learming to read (Homer \& Olson, 1998).

## Bilingualism

Some researchers believe that children with a bilingual background have increased metalinguistic abilities (Bialystok, 1986, 1987, 1988, 2000; Cummins, 1987; Yelland et al., 1993). Research in this area suggests bilingualism improves metalinguistic awareness because children having a knowledge in a second language are able to compare and contrast the structural components of both languages, lending to a stronger appreciation of the formal aspects of both languages than their monolingual peers (Cummins, 1978). This is thought to have an impact on reading acquisition and school performance (Wally, 1993; Campbell \& Sais, 1995; Rubin \& Turner, 1985;

Bruck \& Genesee, 1995; Yelland et al., 1993). As an aspect of metalinguistic
awareness, phonological awareness has not received much research attention with its relation to bilingualism. This is surprising given its relation to prediction of early reading acquisition and its strong focus in the monolingual literature.

## Bilingualism and Phonological Awareness

Phonological awareness has been found to be heightened in bilinguals because of the increased attention to sound unit discrimination when mentally discriminating between two languages (Wally, 1993). In a study by Campbell and Sais (1995), two groups of kindergarten children of similar background were tested in their phonological awareness abilities. The monolingual group spoke only English and the second group, the bilingual group, spoke Italian and English. Tests of phonological awareness included sorting by meaning and initial sound and morpheme, syllable, and letter deletion. Results indicated the bilingual children attending bilingual school were better at both the semantic and phonologically based tasks.

Other research examined whether the amount of second language knowledge affects phonological awareness skills. Rubin and Turner (1989) examined overall phonological awareness in grade one French immersion students receiving all instruction in French since the beginning of kindergarten. Results indicated the that French immersion children had stronger phonological skills than their matched monolingual English peers.

However, if phonological awareness is not interpreted to be a unified skill and is broken down into more specific levels such as the syllable, onset-rime, and the phoneme, a different set of findings arise. Research supports the notion that monolingual English
speakers first develop an awareness of syllables, then onset and rimes, and finally phonemes in their reading acquisition (Treiman \& Zukowski, 1991). If this is the case, second language acquisition may not increase phonological awareness as a whole but may influence particular aspects of the phonological units (Bruck \& Genesee, 1995). This particular aspect of examining more specific levels of phonological awareness has not been researched with bilingual children but has with French immersion children.

Bruck and Genesee (1995) compared different phonological awareness skills in French immersion and English students. They tested both groups of children in kindergarten and later in grade one on tasks of syllable awareness, onset-rime awareness, and phoneme awareness. Bruck and Genesee found that French immersion has selective rather than universal effects on the development of phonological awareness. For example, in kindergarten, the French immersion children had a higher level of onsetrime awareness. There was no difference in the two other measures of phonological awareness (syllable and phoneme) between the groups. In grade one the pattern changed. The French immersion group was higher in syllable awareness than their monolingual peers and the monolingual group was higher in phonemic awareness than their French immersion peers. There was no difference in the onset-rime awareness tasks. Bruck and Genesee addressed this finding by indicating that French immersion children's abilities reflect the salient features in both languages learned. Since the syllable is more salient in French, the grade one French immersion group demonstrated proficiency as they learned their second language. Increased ability in phonemic awareness in the monolingual group was accounted for by increased reading instruction
at the beginning of grade one in the English classes.

## Bilingualism and Word Awareness

Unlike studies on phonological awareness, many studies have been conducted on the effects of childhood bilingualism on word awareness. Researchers have suggested that bilingual children have a better appreciation that an object and its name or phonological label share no more than an arbitrary relationship (Ben Zeev, 1977; Bialystok, 1986, 1988). This superiority in word awareness may be a natural consequence of learning two language vocabularies. By learning that objects have two names or phonological referents, one in each language, bilingual children realize earlier in their language development that an object may have more than one name (Yelland et al., 1993).

Early evidence for word awareness advantage in young bilingual children came from experiments on an adaptation of Piaget's (1929) "sun-moon problem." This task was developed to test whether children understand that words are not intrinsic features of their referents (Yelland et al., 1993). Ben Zeev (1977) used this test to compare EnglishHebrew bilinguals with matched control groups of both monolingual English and Hebrew children aged 5 to 8 years of age on their word awareness ability. Children were required to replace the name of a familiar object with another and then were asked questions about the object, such as, "Can a turtle fly?", or "How does the turtle fly?" If the child has word awareness they should understand that changing the object's name does not alter its properties. Results found that bilingual children made fewer errors with having the target object's name replaced than the monolingual children. The
monolingual children's responses showed more interference from the new name associated with the target object, thereby indicating less word awareness than their bilingual peers.

Many different assessment measures with several different languages have resulted in similar findings (Bialystok, 1986, 1987, 1988; Ianco-Worrall, 1972). It also appears that the amount of exposure to a second language does not make a large difference (Yelland et al., 1993). Often French immersion students are found to be more proficient in metalinguistic awareness tasks. For example, Bialystok (1986) compared the performances of matched grade one students in a French immersion program with English monolinguals on a variety of word awareness tasks such as sentence segmentation (word count) and word judgement (similarity and size). When counting polysyllabic words presented in both intact and scrambled sentences, the French immersion children consistently performed better than the monolingual children.

The word judgement similarity task focussed more on the child's ability to manipulate their knowledge of words. They were either required to make judgements on the semantic similarity or the phonological similarity between words. The children also participated in a word size task. They were asked to indicate the bigger word in a pair of words presented to them. In one condition the bigger word referred to the bigger object (e.g. hippopotamus /skunk) and in the other condition the bigger word referred to the smaller object (e.g. train/caterpillar). If the child made the correct judgement in the condition where the word size was incongruous (e.g. train/caterpillar) they would have greater word knowledge since they would be required to not focus on the size of the
object but on the size of the word (Bialystok, 1986). Results on the judgement tasks only indicated a trend toward an advantage for the French immersions on the word similarity tasks but a greater advantage on the word size tasks compared to their monolingual peers.

A second experiment by Bialystok (1988) further examined the difference between full and partial bilinguals in their word awareness skills. She tested three groups of 6-and 7-year-old children: fluent French-English bilinguals, English monolinguals, and French-English partial bilinguals (i.e., received French immersion for two years) on tasks of word and syntactic awareness (grammatical structure). Bialystok found the partial bilinguals performed at the same level as the fluent bilinguals and both of these bilingual groups outperformed the monolingual children on tasks similar to Piaget's (1929) "sun-moon problem." However, on tasks such as defining what a word is or correcting grammatical errors in sentences, the pattern of performance was different. Both bilingual groups scored higher on both word awareness tests than the monolingual group but on the test of syntactic awareness, the fluent bilingual group scored higher then the partial bilingual group. Yelland et al. (1993) further investigated the word awareness ability of children with limited contact with a second language with a procedure similar to Bialystok's (1988) word size procedure and found similar results with the partial bilingual group of children showing a significantly higher level of word awareness than the monolingual children.

## Present Study

The present study will further examine two aspects of metalinguistic awareness
skills of emergent readers. Previous research on the benefits of second language acquisition in the phonological and word awareness skills of young children have used a variety of measures and definitions of bilingualism. Furthermore, previous research has not measured both phonological and word awareness skills in children beginning to read. Therefore, the present study will attempt to measure both phonological and word awareness abilities in the same population of emergent readers, at the end of kindergarten.

This study will compare a group of monolingual English students, a group of French immersion students, and a group of French-English bilingual students in kindergarten attending regular public school. Previous research has not examined phonological awareness in these three language groups together. In Nova Scotia early French immersion begins in kindergarten and all instruction in the classroom is in French until grade three when the children then begin to receive one hour of English instruction per day. Prior to this experience most children do not have any knowledge of a second language as English is the sole language used in the home. The French-English bilingual students will be fluent in both languages since an early age with both languages used in the home. A better understanding of how second language acquisition can affect metalinguistic awareness can be obtained by examining all three groups of children with differing levels of second language abilities and two different aspects of metalinguistic awareness in this study. A variety of phonological tests including rhyming, segmenting, blending, and deletion will be used to investigate the various areas of phonological awareness achieved by each group. Also, two word awareness tasks, the word size and
the moving word problem used by Bialystok (1988), will be used to measure the children's word awareness abilities.

As suggested by previous research, it is hypothesized that both the French immersion and bilingual groups will score higher on their phonological and word awareness tests than their monolingual peers. Along with research by Bialystok, it is expected the bilingual and immersion group will not differ in their word awareness skills. However, whether these two second language groups will differ in their phonological awareness skills is unknown.

## CHAPTER 2

## Method

## Participants

Sixty-three children ( $\underline{M}$ age $=6.1$ years, $\underline{S D}=0.3$ ) attending kindergarten in the Halifax area participated in the study. Testing took place in the Halifax public school system in June. There were 21 children in each group of monolingual English, French Immersion, and bilingual English-French. The first group, monolingual, were English speaking children with no second language experience. These children receive all classroom instruction in English. The second group, French immersion, were also English speaking children with no second language experience at home but began receiving all classroom instruction in French at the beginning of the school year. The third group were bilingual children fluent in both French and English since an early age. They attended an all French school, and receive all instruction in French.

To ensure the amount of second language experience, information on the primary language used in the child's home was also collected on the background questionnaire (see Appendix A). Monolingual (English) and immersion children were included in the study only if the primary language used at home by both parents and other members of the family was English. Bilingual (French-English) children were included in the study only if both French and English were spoken in the home. If a third language was used in the home the child was excluded from the analysis because of the added variables of languages which use different symbolic systems, such as Arabic or Chinese, may add to
the results. Six children were excluded from the bilingual group because they spoke Arabic, Chinese, and Persian. Also, two children were eliminated from the immersion group because their parents spoke French to them at home. The parent's level of education was also collected on the background questionnaire which was sent home with the consent form (see Appendix A). The participants were treated ethically according to Tricouncil Policy (Tricouncil, 1998).

## Materials

The Kaufman Brief Intelligence Test (K-BIT) (Kaufman \& Kaufman, 1990) was administered in order to measure the child's verbal and non-verbal abilities. The K-BIT was used to factor out any differences due to intellectual ability. It requires the student name pictures of familiar objects and to solve matrices.

Phonological awareness was measured by five sections of The Phonological Awareness Test (Robertson \& Salter, 1995). Sections included Rhyming (discrimination and production), Segmenting (syllables and phonemes), Isolation (initial and final sounds), Deletion (syllables and phonemes), and Blending (syllables and phonemes). There were ten items in each subset.

Word awareness was measured by two tasks assessing the child's understanding of the concept of a word. The first task, word size problem, was similar to that used by Yelland et al. (1993) (see Appendix B). The stimuli for the word size problem consisted of 24 simple color pictures of familiar objects (see Appendix B). The objects were of four types: 1) little objects whose name is a little word (e.g. ant, pin); 2) little object whose name is a big word (e.g. caterpillar, thermometer); 3) big objects whose name is a
big word (e.g. hippopotamus, airplane); 4) big objects whose name is a little word (e.g. whale, car). This provided two stimulus conditions in which object size and word size were congruous and two in which they were incongruous. Word size was defined as the number of syllables in the word. Little words were considered monosyllabic and big words were multisyllabic (2-5 syllables) (Yelland et al., 1993).

A second word awareness task, the moving word problem, assessed the child's understanding of the invariance of symbolic relations and is similar to the procedure used by Bialystok (1997). Four pairs of pictures (see Appendix C) along with the corresponding word for one of the pictures was used to assess the child's understanding of a word.

## Procedure

Testing with the English monolingual children and the French immersion children was performed in English. The bilingual French-English group was tested in French at the request of the principal. For this group, responses in both English and French were acceptable. Testing lasted approximately 30 minutes for each child.

The K-BIT was administered first, followed by The Phonological Awareness Test, and the two word awareness tasks. Administration of the K-BIT and The Phonological Awareness Test was as instructed in the manual. For the K-BIT, standard scores were used when comparing abilities.

For the word size problem, the child participated in a brief training phase where he/she was required to learn the distinction between big and little words (big words take a long time to say and little words take very little time to say) and one example was
given for each. The child was then encouraged to give at least one example of a big and little word to the examiner. Then a picture of one of the four stimulus conditions was presented to the child on a card. The child was required to identify the picture and then decide if it represented a big or little word. Words from each of the four stimulus conditions were presented randomly.

In the moving word problem, the child was introduced to a puppet. The child was then randomly shown two pictures of familiar objects (out of six sets of pictures) and asked to identify them. A card with the name of one of the pictures was then brought out and the child was asked if they could read the word. The words were chosen to be difficult for the child and only two of the bilingual children were able to read one of the words so another word was presented to the child (six stimuli to choose from). The card was then read to the child and was placed under the corresponding picture. The child was asked what the card says. The card was then picked up by the puppet and the child was again asked what the card says. The child's attention was then distracted by the puppet messing up the pictures and card and the card ended up under the other picture. The child was again asked what the card said. Again, the puppet tried to restore the mess while the card was again placed under the correct picture and the child is required to say what the card says. This procedure was repeated with other familiar words and pictures until the child participated in the task four times.

## Scoring

The parent's level of education was calculated by giving each level a number: 1=Junior High, 2=High School, 3=College, 4=Bachelor Degree, 5=Master's Degree,

6=Ph.D. The level of education for the mothers and fathers were averaged for each of the three groups.

The phonological awareness tests were scored according to the manual of the Phonological Awareness Test. Raw scores for each of the ten separate phonological awareness tests and composite scores for each of the five tasks (rhyming, segmenting, isolation, deletion, blending) were used in the analysis because standard scores for raw scores of " 0 " were not given in the norms tables and therefore the groups could not be compared.

For the word size problem each child was given 12 trials where the word size and object size were the same (congruent condition) and 12 trials where the word size and object size were different (incongruent condition). The important feature of this data was the magnitude of difference in the percentage of correct word size judgments between congruous and incongruous items; referred to as the congruity effect (Yelland et al., 1993). The smaller the difference between the congruent and incongruent trials the lower the congruity effect and therefore the higher the word awareness skills.

The condition of interest in the word moving problem was when the word was placed under the incorrect picture. The child scored a 1 or 0 for each trial depending on whether they read the word correctly or indicated the name of the non-corresponding picture. Therefore, the total score for this word awareness test was out of four.

## CHAPTER 3

## Results

## Preliminary Analysis

From the background questionnaire, the parents level of education was calculated. See Table 1 for means and standard deviations. Two one-way ANOVA's were used to analyse the mother's and father's level of education. Significant differences resulted among the groups for the father's level of education $\mathbf{( F}(2,59)=$ $3.41, \mathrm{p}<.05)$. Tukey HSD indicated that the fathers of the bilingual and immersion children had a higher level of education than the monolingual fathers $(\mathrm{p}<0.5)$. There were no significant differences among the three groups for mother's level of education.

There was a trend towards significance among the three language groups on their overall scores on the $\operatorname{K-BIT}(\underline{F}(2,60)=3.06, p=0.054)$. When the verbal and nonverbal sections were analysed separately, a significant difference was found in the verbal abilities of the children, $(\underset{F}{ }(2,60)=8.07, p<0.001)$ but not in the non-verbal abilities. Table 2 shows the means and standard deviations for the scores on the K-BIT. This difference in cognitive ability among the three groups was in their verbal skill and therefore further analyses covaried out verbal IQ to factor out any differences which may be due to verbal intelligence.

## Phonological awareness test results

All raw scores from each of the ten phonological awareness tests were converted into proportion of correct responses for ease of comparison. See Table 3 for means and standard deviations of each phonological test. A separate one-way ANCOVA was

Table 1
Mean Level of Education for the Parents of the Bilingual, Immersion, and Monolingual Groups.

|  | Language |  |  |
| :--- | :---: | :---: | :---: |
|  | Bilingual | Monolingual | Immersion |
| Mother | $3.05(0.85)$ | $2.71(0.91)$ | $3.60(0.51)$ |
| Father | $3.24(1.09)$ | $2.55(0.50)$ | $3.29(1.22)$ |

Table 2
Mean Standard Scores for the Monolingual, Bilingual, and Immersion Groups on the KBIT.

|  | Language |  |  |
| :--- | :--- | :--- | :--- |
|  | Bilingual | Monolingual | Immersion |
| Overall IQ | $99.14(08.86)$ | $104.76(11.06)$ | $107.19(12.26)$ |
| Verbal IQ | $94.19(12.67)$ | $107.14(14.09)$ | $107.86(10.14)$ |
| Nonverbal IQ | $104.14(07.14)$ | $101.05(09.48)$ | $106.48(16.61)$ |

performed to compare the three groups on each of the ten phonological awareness tests, with the verbal score from the K-BIT covaried out (see Appendix D for ANCOVA source tables).

For the segmenting subtest, significant differences were found between the groups on their ability to segment syllables $(\mathbf{F}(2,60)=3.76, \mathrm{p}<0.05)$ and their ability to segment phonemes $(\mathbf{F}(2,60)=4.35, \underline{p}<0.05)$. Tukey HSD $(\underline{p}<0.05)$ indicated that the bilingual group scored significantly higher than the immersion group on the subtest of segmenting syllables. On the test of segmenting phonemes, the immersion and monolingual group scored significantly higher than the bilingual group. Figure 1 shows the higher score by the bilingual group when manipulating syllables and the higher score by the monolingual and immersion group when manipulating phonemes on both segmenting tasks.

A trend towards significant differences was also found on the discrimination of rhymes subtest $(\mathbf{F}(2,60)=2.94, p=0.06)$. In the isolation (initial and final sounds), deletion (syllables and phonemes), and blending (syllables and phonemes) subtests there were no significant differences between the groups.

## Word Size Results

For both the 12 congruous and incongruous trials, the percentage correct was calculated. A one-way ANCOVA was conducted using the difference (congruity effect) between these percentages as the dependent measure and the group (monolingual, bilingual, immersion) as the independent variable with the verbal IQ score covaried out. Results indicated that there was no significant differences among the three groups in

Table 3
Mean Percentage of Correct Responses for the Monolingual, Bilingual, and Immersion Groups on the Phonological Awareness Tests.

|  | Language |  |  |
| :---: | :---: | :---: | :---: |
|  | Bilingual | Monolingual | Immersion |
| Rhyming Total | 66 (31) | 82 (18) | 90 (10) |
| Discrimination | 78 (30) | 94 (12) | 94 (10) |
| Production | 54 (41) | 71 (28) | 86 (13) |
| Segmenting | 43 (15) | 50 (21) | 47 (12) |
| Syllables | 81 (25) | 72 (30) | 68 (21) |
| Phonemes | 04 (14) | 28 (22) | 27 (20) |
| Isolation | 60 (32) | 70 (33) | 63 (24) |
| Initial Sounds | 82 (31) | 83 (34) | 83 (24) |
| Final Sounds | 37 (44) | 57 (40) | 44 (32) |
| Deletion | 46 (29) | 59 (23) | 56 (18) |
| Syllables | 62 (33) | 70 (21) | 77 (12) |
| Phonemes | 30 (36) | 48 (35) | 35 (34) |
| Blending | 52 (24) | 63 (24) | 66 (13) |
| Syllables | 78 (34) | 85 (21) | 95 (06) |
| Phonemes | 26 (33) | 41 (34) | 37 (25) |



Figure 1. Mean Percentage of Correct Responses for the Monolingual, Bilingual, and Immersion Groups on the segmenting section for the Phonological Awareness Test.
congruity effect. Table 4 displays the congruity effects for the three language groups.

## Word Moving Problem

The dependent measure for the word moving problem was whether the child indicated the correct word when it was placed under the incorrect picture. A chi-square test determined if the children's performance in each group was significantly greater than chance. Children passed the trial if they named the correct word at least three times out of the four trials, whereas they failed if the child incorrectly named the picture rather than the word in less than three of the four trials. Results indicated that the bilingual group $\left(\underline{X^{2}}(1)=10.71, \mathrm{p}<0.001\right)$ and French immersion group $\left(\underline{X^{2}}(1)=10.71, \mathrm{p}<0.001\right)$ differed significantly from chance on their performance on the task. However, the monolingual group did not differ significantly from chance on the word moving problem. Figure 2 illustrates the greater number of bilingual and French immersion children compared to the monolingual children who passed the moving word task.

## Table 4

Mean Percentage of Correct Responses for the Monolingual, Bilingual, and Immersion Groups on the Word Size Problem.

|  | Language |  |  |
| :--- | :--- | :--- | :--- |
|  | French | English | Fr. <br> Immersion |
| Total (24 items) | $76(14)$ | $78(16)$ | $71(14)$ |
| Congruent (12 items) | $81(15)$ | $79(15)$ | $74(12)$ |
| Incongruent (12 items) | $71(17)$ | $77(19)$ | $68(17)$ |
| Congruity Effect $10(15)$ $02(13)$ $06(13)$ <br> (difference)    |  |  |  |



Figure 2. Total number of children passing or failing the moving word problem for monolingual, bilingual, and immersion groups.

## Discussion

In examining the effects of second language acquisition on a child's phonological and word awareness abilities, it was hypothesized that both the bilingual and French immersion group would be stronger in their phonological and word awareness abilities than their monolingual peers. Results indicated that the groups differed on very few of the phonological awareness tests. The bilingual group scored significantly higher than the French immersion group on a task of segmenting syllables. However, when the children were required to segment phonemes, the monolingual and French immersion groups scored significantly higher than the bilingual group. .

These results were similar to those found by Bruck and Genesee (1995) when they tested a group of French immersion and monolingual children on tasks of onset/rime, syllables, and phonemes. In kindergarten, the French immersion children were better at onset/rime tasks but no difference existed in the tasks involving manipulation of syllables or phonemes. In grade one the pattern changed with the monolingual group becoming more proficient in phonemes and French immersion becoming more proficient in syllables, with no differences in the rhyming tasks. The children in the present study were between these ages, near the end of kindergarten. Results with the bilingual group scoring higher in the syllable task and the monolingual group scoring higher in the phoneme task match well with Bruck and Genesee's results. They attribute the monolingual's advanced abilities manipulating phonemes to an increase in literacy instruction and the second language group to be more advanced in detecting syllables because the syllable is more salient in French than English and
therefore once the child can detect this difference, it increases their awareness of the syllable.

From these findings, it seems that learning a second language can influence the development of a child's phonological awareness skills in certain areas. This also depends on the amount of reading instruction and age of the child. The findings of the present study indicate that at the end of kindergarten children were very similar in their phonological awareness skills, except in the area of segmenting syllables and phonemes. One possible reason for the bilingual group being able to count syllables better than the immersion children may be explained in that the immersion children have not been exposed to the second language enough for them to detect the salience of the syllable in the French language. Bruck and Genesee (1995) did not detect this advantage for their French immersion children until mid grade one. Possible explanations for the increased ability to segment phonemes for the monolingual and immersion group are unclear. All three groups were exposed to formal reading instruction for a complete school year. The differences in teaching methods among the three groups could account for these findings if the bilingual children did not receive as much formal instruction in literacy as the two other groups. Future research is necessary to further explain these findings.

An explanation as to why significant differences were not found among the three groups in tests of isolation, deletion, and blending may be the age of the children when tested. Campbell and Sais (1995) found advantages for bilingual children in pre-school (mean age 4.8 years) on tasks of morpheme deletion and sorting pictures with the same initial phoneme. On these types of tasks bilingual children may in fact have an
advantage at an early age but these advantages may level out by the end of kindergarten since the present study did not find differences on these types of tasks. Rubin and Turner (1989) did find differences with an older age group (grade 1) but their tasks involved syllable segmentation and did not include more complex tasks involving phonemes. Along with results from the present study and with Bruck and Genesee (1995), the second language children did not illustrate this syllable advantage until they have developed experience with their second language.

Therefore advantages in phonological awareness for the children possessing a second language seem to be limited to segmenting syllables at the end of the first year of formal literacy instruction. Whether other advantages exist prior to kindergarten need to be researched by conducting a longitudinal study following children from pre-school to middle elementary and involving many different phonological tasks. Regardless, it is interesting to note that with the addition of formal reading instruction in kindergarten, the phonological awareness skills of children seem to level out. Also, within these phonological scores, it is interesting to note the pattern of results. The children had much less difficulty on the rhyming and manipulating syllables tasks than when manipulating phonemes. These findings correspond to the literature which suggest phonological skills follow a certain pattern of development (Bryant et al., 1990). Children are able to detect rhyme and manipulate syllables earlier in their development. More difficulty tasks of manipulating phonemes usually do not develop until the end of grade one when the child has been exposed to more formal reading instruction (Torgesen, Wagner, \& Rashotte, 1994). Some theorists (e.g. Olsen, 1996) suggest that
phonological awareness is also a product of learning to read.
A possible alternative explanation for these findings may be that the phonological testing was conducted in English and the bilingual students may not transfer their phonological skills to English. English was used to ensure equal comparisons between the groups. However, Comeau, Cormier, Grandmaison, and Lacroix (1999) looked at whether phonological awareness skills transfer across to both languages of French and English. Results provided evidence that cross-language transfer occurs for phonological awareness and word decoding. Therefore the phonological test results for the bilingual children should be representative of their phonological skills in French since phonological skills transfer between the languages. This is consistent with the notion that phonological awareness is a general cognitive mechanism, not language specific (Cisero \& Royer, 1995).

Another possible altemative explanation is difference among the group's verbal abilities. In designing the study it was important to include a measure of intelligence to ensure all three groups were similar in their verbal abilities before comparing their phonological and word awareness skills. The Kaufman Brief Intelligence Test (K-BIT) was used because of its quick administration time and inclusion of both verbal and nonverbal measures. Results indicated that the three groups did not differ in the overall score on the K-BIT but when separated, differed in their verbal score. The bilingual children scored significantly lower on this verbal subtest compared to the other two groups. It is not clear the reason for this since the fathers of the bilingual children had a significantly higher level of education than the other two groups, as reported in the
background questionnaire. A possible explanation is that the bilingual children may have been hesitant to respond in English when naming the pictures. The school speaks entirely in French and encouraged all testing to be conducted in French. The children were told by the examiner they could respond in either English or French but the majority would not respond in English. Therefore, it is not sure whether the child knew the correct answer in English or not. When examining the non-verbal data, there were not differences between the groups. On this subtest the children were able to give their answers to the questions by pointing and therefore language ability did not have any effect. It is not known whether the bilingual group was lower in their verbal abilities or this difference was due to their reluctance to answer in English. Therefore, the verbal intelligence score was used as a covariable in the analysis to either eliminate the groups' possible differences in verbal intelligence or to help eliminate the bilingual group's reluctance to answer in English throughout the testing. Future research should address the issue of the student's comfort in speaking both languages in the test setting to ensure this reluctance does not occur.

The first word awareness task, the word size problem, did not result in any differences among the three language groups. Previous research on this task has found conflicting results. When Yelland et al. (1993) tested monolingual and immersion children in kindergarten and grade one on the word size task, the immersion children outperformed the monolingual children in kindergarten, but there were no differences in grade one, as the children approached ceiling on the task. The children in the present study did not approach ceiling on the task. Also, Bialystok (1986) looked at word
awareness skills of three groups of children: monolingual four-year olds, monolingual six year olds, and French immersion six-year olds. In the word size task she did not find any differences between the two older groups but both were significantly better on the task than the four year old group. This indicates the large development of skills in the two years from pre-school to grade one. Also, the older children had received much more formalized reading instruction at this time and this may be why the bilingual group did not show an advantage in word awareness. However, Bialystok (2000) did find significant advantages for bilinguals when she tested four and five year olds in the word size problem. These findings may suggest an advantage for bilingual or immersion children at an early age but as the children are exposed to print and reading, this advantage lessens to the point of similar abilities on this task for both language groups, and would explain the results of the present study.

It seems for the word size problem, age is an important factor when suggesting the advantage for word awareness skills for children possessing a second language. This task is very similar to the phonological tests as it requires the child to pay attention to the length of the spoken word. By testing the children at the end of kindergarten, the amount of formal literacy instruction may impact the results. Testing children before reading instruction begins offers a chance to see differences before the children become more familiar with words and print. If differences in word awareness exist at this early age, reading acquisition may be easier for these children, since having an awareness of words relates to learning to read (Templeton \& Spivey, 1980).

Results of the moving word problem replicated those found by Bialystok (1986,

1987, 2000). The majority of the bilingual and immersion children performed significantly better than chance across the trials. However, the monolingual group did not significantly differ from chance, indicating that many of the monolingual children were unable to understand the word did not change when placed under the wrong picture. Bialystok $(1986,1987,2000)$ has used this procedure to measure a child's awareness of a word and has found similar results using bilingual children of various languages and of various ages (4-6 years). Consistently, bilingual children out perform monolingual children in this word awareness task, indicating a higher awareness of print for those children with second language experience.

Overall results of the present study indicate that children of monolingual, bilingual, and immersion background nearing the end of kindergarten possess similar phonological skills except in the area of segmenting syllables and phonemes. Also, a task requiring the child to decide if a picture represents a big word or a little word resulted in similar abilities for all three groups. Interestingly, a task illustrating an advantage for children acquiring a second language involved the use of printed words. The other tasks did not involve symbolic representations of the spoken words. It seems children at this stage of literacy have learned how to manipulate sounds and realize that big words contain more syllables (take a long time to say) than little words. However, when understanding that a printed word does not change when moved under a noncorresponding picture, children possessing a second language have less difficulty. Bialystok (2000) discusses the possible advantage of bilingual children may be due to selective attention. The moving word problem requires that children understand
symbolic representation in its general sense. The meaning in written language is encoded in the text, in the pattern of graphemes that represent the spoken forms. To know what is written, one must attend to only that text, even if other distracting information seems as though it might be helpful. The children with second language experience were more advanced in understanding this representational principle than were the monolinguals. They knew that the written form carried the meaning and that the picture was irrelevant. Bilingual children are familiar with the idea that words invariantly designate objects in a manner that is immune to the appearance of those objects (dog and chien refer to the same thing although neither word resembles an animal). Because things can have two names, that is, in different languages, bilingual children may be less likely than monolingual children to endow words with properties of their referents. The separation of form and meaning makes it easier for bilingual children to selectively attend to form and ignore meaning (Bialystok, 2000).

Bialystok (1997) also discusses the importance of the child's concept of print in early reading acquisition. In addition to phonological awareness, reading requires development of understanding symbolic representation. "A symbolic relationship is one in which an entity is arbitrarily designated to stand for another. A symbolic representation is the mental encoding of such a relationship" (Bialystok, 1997, p.429). Written language is a symbolic system in which letters represent sounds to indicate the phonological structure of a word. The letters are symbols because they have no meaning and do not resemble the sounds they represent. Previous to this, children's experiences with symbolic representation are more direct. When a child sees a picture of a dog, it's
called a dog, so it's meaning is much more clear. In order for this symbolic representation of letters to sounds to spoken words can occur, a child must be exposed to print and reading instruction (Bialystok, 2000). Adams (1990) also addresses the importance in children's awareness of print before they are able to read. Along with phonological awareness, a child must be able to identify letters, realize that each letter has its own sounds, know that letters make up words, and that words represent speech. By putting all these abilities together, the child is then able to understand the relationship between sound and print. In an earlier study, Bialystok (1991) conducted the moving word problem with non-readers, and the majority of the children did not know than when the word was moved under the wrong picture it remained unchanged. If symbolic representation is a necessary component for reading acquisition, it may be that children possessing a second language may be quicker in learning to read when they understand the symbolic representation of words. It is surprising the little research in this area and further research in reading achievement and symbolic representation is required to more fully understand its importance in early reading.

The present study measured the phonological and word awareness skills of three groups of kindergarten children of different language abilities. Overall results indicated the three groups were similar in their phonological awareness skills except when segmenting phonemes and syllables. These results contribute to the scarce research in the area of phonological awareness and second language acquisition. The two word awareness tasks replicated those by Bialystok and the advantage of children learning a second language in their symbolic representation skills is an important finding in the
area of reading acquisition. If children having experience with a second language have a higher awareness of print and similar phonological awareness skills as their monolingual peers, learning to read may develop at a faster rate. There are many factors which combine together to allow the child to begin to read and a combination of these abilities will help the young reader along in the beginning reading process. Research has found that having increased phonological and word awareness skills is predictive of early reading success (Stanovich, 1988; Wagner \& Torgesen, 1987; Bradley \& Bryant, 1983; Adams, 1990; Bialystok 1991). Other factors which influence the beginning process are the child's early experience with print and invented spelling skills (Lazo, Pumfrey, \& Peers, 1997). The advantage of second language leamers in learning to read may exist prior to formal reading instruction. However, as the results of the present study indicate, by the end of the child's first year of formal reading instruction these advantages seem to level out with the exception of print awareness and syllable manipulation. It is therefore unsure as to the advantages children with second language experience have in terms of reading acquisition in the later years of schooling. Further research should examine the area of word awareness and its ability to predict early reading success, and whether these word awareness advantages lead to better reading achievement later on for second language learners. Also, these issues need to be addressed longitudinally in order to assess the effects of second language knowledge on metalinguistic awareness advantages and later reading achievement.

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## APPENDIX A

The following pages contain copies of the ethics approval for the thesis, consent forms, and background questionnaire. The consent form is included in both French and English. Both versions were given to the parents of the bilingual children. The first ethical approval is from the Mount Saint Vincent University Ethics Committee. The second is from the Halifax Regional School Board Committee.

## Dear Parents/Guardians,

I am working on my Masters thesis as part of a course requirement for the Masters of Arts in School Psychology Program at Mount Saint Vincent University. I am presently conducting a study at your child's school and I was wondering if you would give permission for your son/daughter to participate.

The purpose of this study is to learn more about early reading acquisition. Research has found that learning a second language might benefit the child in learning to read. This study will examine early reading abilities in children of three language backgrounds: bilingual, French immersion, and English monolingual. Understanding the abilities involved in the early reading process and their relation to second language knowledge is helpful in understanding how children learn to read.

Your child would participate in different tasks which have been shown to influence the reading process. The first task is a measure of cognitive development in vocabulary, by having the child name pictures of familiar objects, and in spatial organization, by having the child put puzzles together. Other tasks involve rhyming, answering questions about sounds in words, identifying pictures, and playing games with words, for example using different coloured blocks to sound out words. The session should only take about thirty minutes and would be very enjoyable for your child.

The session will take place at your child's school. All information regarding each child's performance will be confidential, and your child may withdraw from the study at any time. All group results of this study will be available to you when the study is completed. If you have any concerns or questions please contact me at 443-7969, my Supervisor, Dr. Michelle Eskritt at 457-6593, or Cynthia Mathieson, Director of Research at Mount Saint Vincent University at 457-6293. If you choose to not let your child participate in this study it will have no bearing on your child's academic program. Thank you for your cooperation.

Please complete the following page and return it to the school with your child. If you give consent to have your child participate in the study please fill out the background questionnaire.

Sincerely,
Lauren Clare

## Consent To Participate

$\qquad$ give permission for my son/daughter, $\qquad$ , to participate in this study.

- NO I don't give permission for my child to participate in this study.

Date of birth: D $\qquad$ M $\qquad$ Y $\qquad$

Signature of Parent/Guardian $\qquad$ Date: $\qquad$

## Background Questionnaire

Date of birth: $D$ $\qquad$ M $\qquad$ $Y$ $\qquad$
Sex: Male $\qquad$ Female $\qquad$
Highest level of education obtained by Mother $\qquad$
Highest level of education obtained by Father: $\qquad$

Languages spoken by mother to child: $\qquad$
If a language other than English is spoken to the child, please indicate the frequency:
$\qquad$ occ. word $\qquad$ rarely $\qquad$ often $\qquad$ half of the time $\qquad$ more than half of the time

Languages spoken by father to child: $\qquad$
If a language other than English is spoken to the child, please indicate the frequency:
$\qquad$ occ. word $\qquad$ rarely $\qquad$ often $\qquad$ half of the time $\qquad$ more than half of the time

Languages spoken by other family members to child: $\qquad$
If a language other than English is spoken to the child, please indicate the frequency:
$\qquad$ occ. word $\qquad$ rarely $\qquad$ often $\qquad$ half of the time $\qquad$ more than half of the time

Primary language used at home with child: $\qquad$

## Chers Parents,

Je suis étudiante faisant la recherche pour obtenir le degré de Maîtrise d'Arts en Psychologie Scolaire à l'Université de Mount Saint Vincent. Présentement, je recherche à l'école de votre enfant et j'aimerais vous demander la permission pour la participation de votre fils/fille.

## Sujet de l'étude?

Le but de cette étude est d'obtenir de l'information au sujet de l'apprentissage des enfants liée à la lecture. La recherche à trouvé qu'apprendre une deuxième langue pourrait aider les enfants débutant la lecture. Cette étude va déterminer les habiletés des enfants ayant trois expériences differentes: bilingue, immersion, et anglais monolingue. La compréhension des habiletés jouant un rôle important des les stages primaires en relation avec une deuxième langue aidant à la compréhension de l'apprentissage des enfants liée à la lecture.

## Ce qui est demendé de mon enfant pour l'étude?

Votre enfant pourra participer à une variété d'activités qui influencent la lecture. La première activité measure le dévelopement du vocabulaire. Cette activité demande à l'enfant de décrire des photos. Le dévelopement des habiletés d'organisation spatiale sera measuré en demandant aux élèves de faire des casse-têtes. Les autres activités demandent aux enfants de jouer des jeux avec les mots. La session aura une longeur d'environs trente minutes et sera amusante pour votre enfant.


#### Abstract

Autre?

La session sera à l'école de votre enfant. Toute information sera confidentielle, et votre enfant est permis de laisser l'étude s'il désire. Les résultats du groupe serons disponsibles à la completion de l'étude. Si vous avez des questions, n'hésitez pas de me contacter au 443-7969, ma superviseure, Dr. Michelle Eskritt au 457-6593, ou Cynthia Mathieson, la Directrice de la Recherche à l'Université de Mount Saint Vincent au 4576293. Si vous faites le choix de ne pas laisser votre enfant participer à cette étude, cela n'influencera pas à son programme scolaire. Merci pour votre colaboration.

S'il vous plaît completez la page ci-joint et l'envoyez à l'école avec votre enfant. Si permettez votre enfant de participer à cette étude, s'il vous plaît complétez le questionnaire pour parents.


Sincèrement,
Lauren Clare

## Permission de participer

_OUI Je, $\qquad$ , donne permet mon enfant, de participerà cette étude.
NON Je permet pas mon enfant de participer à cette étude.

Signature du parent: $\qquad$ Date: $\qquad$

## Questionnaire pour parents

Jour de naissance: J $\qquad$ M $\qquad$ A

Sexe: Male $\qquad$ Female $\qquad$
Niveau d'education atteint par la mère: $\qquad$

Niveau d'education atteint par le père: $\qquad$
Quelles langues la mère parle-t'elle avec l'enfant: $\qquad$

Indiquez autres(s) langue(s) parlée(s) avec l'enfant, s'il y a lieu
$\qquad$ rarement $\qquad$ souvent $\qquad$ la moitié du temps $\qquad$ la plupart du temps
Quelles langues le père parle-t'il avec l'enfant: $\qquad$
Indiquez autres(s) langue(s) parlée(s) avec l'enfant, s'il y a lieu
$\qquad$ quelques mots $\qquad$ rarement $\qquad$ souvent $\qquad$ la moitié du temps $\qquad$ la plupart du temps
Quelle(s) langue(s) les autres membres de la famille parie-t'ils avec l'enfant: $\qquad$

Indiquez autres(s) langue(s) parlée(s) avec l'enfant, s'il y a lieu
$\square$ rarement $\qquad$ souven $\qquad$ la moitié du temps $\qquad$ la plupart du temps

Chez soi, quelle est la langue parlée le plus souvent avec l'enfant:

Office of the Dean of Professional Studies

Ms. Lauren Clare
57 Westgrove Place, Apt. 21
Halifax, NS
B3M 3L7

Dear Ms. Clare:
The Graduate Studies Committee met on April 17 ${ }^{\text {th }}$ and has approved your submission for ethics review based upon the following changes being completed:
a French copy of the consent letter and background questionnaire should be available for parents-whose mother tongue is French.
you need to include the name of a third party at arm's length from the research as a contact person.
concern was raised over the fact that it appears an intelligence test is being performed on the children but this information is not conveyed in the consent letter.

Once you have addressed the above noted comments would you please submit a revised copy of your proposal to our office for our files.

Sincerely,


RS:ch
cc: Michelle Eskritt, Supervisor
Paula Mayich, Graduate Education Secretary

June 12, 2001

## Ms. Lauren Clare

57 Westorove Place Apt. 21
Halifax, N.S.
B3M 3L7
Dear Ms. Clare:
Thank you for choosing the Hallfax Regional School Board to be partners in your proposed research, which is part of your Masters Program in School Psychology at Mount St Vincent University. Your research project entited "The Relationship Eetween Selective Aspects of Awareness and Degree of Second Language Acquistion in Emergent Readers", has been approved subject to the concitions outlined.


#### Abstract

Principal at has agreed to support your project. Your research, which is directed towards participants in both grade primary English and French Immersion classes, will require informed consent from parents or guardians. Please contact the Principal to make necessary arrengements to commence your project. Should you have any questions regarding this approval please contact Donna Rowe, Manager Administrative Services at 464-2185.


You are reminded that the personal identity of alf participants must remain confidential and may not be disclosed to the compeny or organization sponsoring the research, nor included in any publication or communication describing the research; nor released to any other party. The Board will retain the right to review the results of the study prior to publication to ensure that such confidentiality is maintained to the Board's satisfaction.

We look forward to your report and wish you every success with this effort.


David Reid, Superintendent

## Copy: Donna Rowe

Sharon Aucoin

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## APPENDIX B

Item set for word awareness task - word size problem ( Yelland, Pollard, \& Mercuri, 1993)

| Little Word |  | Big Word |  |
| :--- | :--- | :--- | :--- |
| Little Object | Big Object | Big Object | Little Object |
| ant | bed | airplane | butterfly |
| bee | car | crocodile | caterpillar |
| frog | sun | elephant | envelope |
| keys | train | giraffe | mushroom |
| leaf | tree | hippopotamus | strawberry |
| pin | whale | policeman | thermometer |

## APPENDIX C

Six pairs of pictures for the moving word problem. Each child was required to participate in four trials. The extra pairs of pictures were in case the child could read one of the target words. The first picture has the corresponding word.

1. caterpillar
2. hippopotamus
3. guitar
4. strawberry
5. penguin
6. doughnut
castle
helicopter
giraffe
sandwich
piano
dolphin

## APPENDIX D

## ANOVA Tables

Table 1. Parent's Level of Education on Group Effects

|  | Effect |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | df | MS | $\underline{\mathbf{F}}$ | $\underline{\mathbf{p}}$ |
| Mothers | 2 | 0.59 | 0.41 | .663 |
| Fathers | 2 | 5.78 | 3.41 | .040 |

Table 1. K-BIT Intelligence Scores on Group Effects.

|  | Effect |  | df | MS | Error <br> MS |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Full Scale IQ | 2 | 357.82 | 60 | 117.06 | 3.06 | .054 |
| Verbal IQ | 2 | 1242.68 | 60 | 153.97 | 8.07 | .001 |
| Nonverbal IQ | 2 | 155.73 | 60 | 138.85 | 1.12 | .332 |

Table 2. Phonological Awareness Test Scores on Group Effects.

|  | Effect |  | Error |  | $\frac{\mathrm{F}}{\mathrm{MS}}$ | p |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | df | MS | df |  |  |
| Rhyming | 2 | . 112 | 59 | . 040 | 2.82 | . 067 |
| Discrimination | 2 | . 115 | 59 | . 040 | 2.93 | . 060 |
| Production | 2 | . 170 | 59 | . 071 | 2.40 | . 100 |
| Segmenting | 2 | . 008 | 59 | . 021 | 0.35 | . 709 |
| Syllables | 2 | . 224 | 59 | . 060 | 3.76 | . 029 |
| Phonemes | 2 | . 129 | 59 | . 030 | 4.40 | . 017 |
| Isolation | 2 | . 031 | 59 | . 083 | 0.38 | . 687 |
| Initial | 2 | . 025 | 59 | . 086 | 0.29 | . 749 |
| Final | 2 | . 096 | 59 | . 142 | 0.68 | . 510 |
| Deletion | 2 | . 013 | 59 | . 054 | 0.25 | . 782 |
| Syllables | 2 | . 026 | 59 | . 050 | 0.52 | . 598 |
| Phonemes | 2 | . 107 | 59 | . 121 | 0.89 | . 418 |
| Blending | 2 | . 019 | 59 | . 040 | 0.47 | . 628 |
| Syllables | 2 | . 091 | 59 | . 053 | 1.72 | . 188 |
| Phonemes | 2 | . 015 | 59 | . 087 | 0.17 | . 839 |

Table 3. Word Size Problem Scores on Group Effects.

|  | Effect |  | Error |  | $\underline{F}$ | [ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | df | MS | df | MS |  |  |
| Congruity effect | 2 | . 024 | 59 | . 019 | 1.27 | . 288 |


[^0]:    Web Site: wmw.hreb.ns.ca

