THE DEVELOPMENT OF ORTHOGRAPHIC AWARENESS
IN YOUNG CHILDREN

by

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A thesis submitted in conformity with the requirements
for the degree of Master of Arts
Graduate Department of Education
University of Toronto

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The Development of Orthographic Awareness in Young Children

by Miriam Eisen, Master of Arts, 1997

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Abstract

The present study investigated young children's early orthographic and metaorthographic awareness. A total of 122 children were sampled from junior kindergarten (JK), senior kindergarten (SK), and grade 1. A script awareness task which required children to look at different languages and determine whether each language was English was administered. The languages included non-Latin based orthographies (e.g., Chinese), mixed orthographies (e.g., Greek), and Latin-based orthographies (e.g., French). In order to evaluate children's metaorthographic awareness, for some items, children were asked to explain how they knew the language was or was not English.

The findings suggest that there is an intermediary "pre-orthographic" stage that is a precursor to children's orthographic awareness. During this visually based pre-orthographic knowledge stage, children attend to the global but not to fine-tuned visual distinctive features of each language. The findings showed that with development there is a gradual improvement in children's ability to differentiate English script from other non-English orthographies, and their explanations as to why a script is or is not English become more articulated. The extent to which children are able to articulate how they make these distinctions and how this relates to reading ability was also discussed. As well, the effect of bilingualism on the development of metaorthographic awareness was examined.
This thesis is dedicated to the memory of the late Dr. Judith Rosner-Siegel
of York University, whose faith in me as a first year undergraduate set me on a course
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The Development of Orthographic Awareness in Young Children

Introduction

Although for years researchers have examined different aspects of orthographic processing (e.g., Ehri, 1980; Lavine, 1972, 1977; Taylor, 1981; Venezky, 1970;), this component of reading has received little attention until quite recently. Several reasons have been given to explain this. First, much of the research involving the visual processes in reading has been scattered throughout different literatures (Willows, Kruk & Corcos, 1993). Another explanation is that a clear distinction has not been made between non-orthographic visual processes and orthographic processes; visual processing is not synonymous with orthographic processing which involves visual processing with written words (Berninger, 1991). In addition, during the 1980's there was a shift in focus from research dealing with visual perceptual deficits of dyslexics to research dealing with linguistic deficits of dyslexics (Liberman, Shankweiler, Fischer & Carter, 1974). Furthermore, unlike phonological processing, an established theory of how orthography is connected to reading and writing acquisition does not exist (Berninger, 1994). Finally, there have been methodological problems in determining the independent role of orthographic processing, since phonological and orthographic processing are confounded when reading and writing processes are measured (Berninger, 1994).

Perhaps one main reason that an established theory has not emerged in the literature that explains the relationship between orthographic processing and reading is that a variety of definitions of orthographic processing have been offered by researchers, each with a
slightly different focus. According to Barker, Torgesen and Wagner (1992), “orthographic knowledge involves memory for specific visual/spelling patterns that identify individual words, or word parts, on the printed page” (p. 335). Stanovich (1993) described orthographic processing as the “ability to use familiar orthographic sequences to access the lexicon without phonological mediation” (p. 16). Perfetti (1984) considers orthographic knowledge as “the knowledge a reader has about permissible letter patterns” (p. 47). In general, phonological processing has been referred to as an indirect route in which the sound structure of spoken language is utilized when processing written or oral language (Wagner & Torgesen, 1987), whereas orthographic processing is considered a direct visual route in which orthographic information is used to process spoken and written language (Wagner & Barker, 1994).

Recently research has begun to focus once again on the visual aspects of reading (e.g., Willows, Kruk & Corcos, 1993). Although phonological processing is necessary, it is not sufficient for accurate word recognition; orthographic processing is also needed for efficient reading (Tunmer & Nesdale, 1985).

**Phonological and Orthographic Processing**

It is not always clear whether phonological and orthographic processes are separate or integrated. According to Barron (1986) both phonological processing, which is considered an indirect route to word recognition, and orthographic processing, which is referred to as a direct route to word recognition, are operating at the same time, but they are independent of each other. As children become more fluent readers, the direct route
eventually replaces the indirect route. In Perfetti's model (1991) he differentiates between the functional and autonomous lexicons and maintains that the functional lexicon includes all the words that can be accessed through reading. When these words become part of the autonomous lexicon, spelling patterns are recognized automatically. Ehri (1992) concluded that "connections are established between letters in the word's spellings and phonemes in its pronunciation, making direct access to that specific word possible. Recoding rules may be used to set up this sight route. However, once the word has been recoded several times, the rules and the translation and phonological matching routines drop out to be supplanted by specific connections linking the spelling directly to its pronunciation in memory" (p.120). Perhaps Foorman (1994) is correct to argue that phonological and orthographic processing skills are integrated, even though in the course of development they seem separate.

**Measuring Orthographic Knowledge**

There are, however, certain obstacles in studying orthographic processing. Not only is there a lack of agreement regarding how to define orthographic processes but also how to measure them. Researchers have used a variety of tasks to measure orthographic knowledge. For example, some researchers have examined orthographic structure (e.g., Leslie & Shannon, 1981), which includes spatial redundancy (letters appearing more often in certain positions in words) and sequential redundancy (letter sequences). Other investigators have looked at orthographic coding which focuses on the size of the unit used to code written words into mental representations (e.g., Berninger, 1987).
Several measures have been used to study orthographic processing (Foorman, 1994). In the word-pseudohomophone choice task, subjects are shown two words (e.g., rain, rane) and are told to press a button as quickly as they can to indicate which word is orthographically correct. The nonlexical choice task involves quickly selecting the word whose spelling is most similar to English (e.g., filv, filk). Tasks which involve detecting letter clusters in words have also been used to measure orthographic knowledge. For example, the word “clock” will appear briefly on a screen. Then subjects will see “cl” or “co” appear, and they have to decide which letter cluster had appeared in the word. Bowers, Golden, Kennedy and Young (1994) state that the speed of subjects responses is important, because an individual with good orthographic ability is someone who “is familiar with the specific letter patterns in the real word which permits him/her to decide more quickly that for example ‘salmon’ is a word and ‘samnon’ is not a word, without pondering the decision” (p.195).

Vellutino, Scanlon and Tanzman (1994) critique the orthographic tasks that have been used. They argue that the tasks such as those described above are really investigating the word identification ability or spelling skills instead of examining orthographic coding ability. For example, when a child correctly chooses the word “salmon” when given two choices “salmon, samnon,” this indicates that this individual can identify words, but it does not tell us anything about orthographic coding.

**Orthographic Processing and Word Recognition Skill**

Despite the methodological issues raised, there is converging evidence that
orthographic processing plays a major role in reading ability (e.g., Berninger, 1987; Ehri, 1992). Frith (1985) offers a stage model that outlines how orthographic knowledge contributes to word recognition skill. In the logographic stage, some words are recognized based on partial spelling information. In the alphabetic stage, phonological information is used to read words. The analytic knowledge of words acquired in this second stage has an influence on the third stage- the orthographic stage. It is at this point that the spelling units of words are automatically recognized without the use of the phonological route.

Ehri (1992) has a similar view of the development of orthographic knowledge. In the first stage, also called the logographic stage, an individual uses visual cues to form connections that are arbitrarily connected to the meaning of the word but have no relationship to how the word is pronounced. For example, the visual cue for the word “hero”, may be the circle at the end. At this stage, children begin to attend to the words in their environment (e.g., logos) but have little or no letter knowledge. In the phonetic cue reading stage, visual-phonological associations between letters and their sounds are formed. Thus, the connections are no longer arbitrary, but they are still not complete. By the time they reach the cipher reading stage, individuals are recalling the systematic associations between spelling and pronunciations of word; thus connections are established in memory “between whole sequence of letters in spellings and phonemic constituents in the word’s pronunciation”(p. 132). In this stage, sight word learning develops, and familiar words are read automatically.
Factors Affecting Orthographic Knowledge

Poor phoneme knowledge (Ehri, 1992), limited print exposure (Stanovich, 1992) and slow lexical access (Bowers, Golden, Kennedy, & Young, 1994) have all been shown to influence an individual’s orthographic processing ability. Adams (1981) states that with increasing exposure to print, letters are not seen as independent units but as letter pattern units. The strength of the association between letters depends on how often these letters are seen together in a child’s reading. Letters facilitate each other’s recognition when they are frequently seen together in print.

Several studies have found that print exposure plays a major role in orthographic processing of children who are already reading (Cunningham & Stanovich, 1990; Stanovich & West, 1989). Based on studies done in this area, Stanovich, West and Cunningham (1992) came to three conclusions regarding individual differences in orthographic processing. First, there are individual differences in orthographic processing which predict word reading ability independently of the individual differences in phonological processing skills. Second, individual differences in orthographic processing abilities are partly due to individual differences in print exposure. Third, print exposure does not account for all of the individual differences in orthographic processing ability; thus, although orthographic processing and print exposure are related there are other factors that might be contributing to orthographic processing ability.

Print Awareness in Young Children

Before children begin formal instruction of reading and spelling in school, they
know a great deal about print. With programs such as Sesame Street on television and parents and teachers reading more to preschoolers, many children are exposed to several thousands of hours of written language before they are taught how to read (Adams, 1990). Barron (1991) calls this knowledge protoliterate knowledge, which encompasses knowledge of letter names and sounds and recognition of familiar logos, such as McDonald's. Even with letter-sound knowledge, these children cannot yet pronounce or spell words (Barron, 1995). Many researchers have found that young child have substantial print awareness (e.g., Hiebert, 1983; Kontos, 1988). Print awareness includes knowledge about reading terminology, the purposes of print and reading and understanding how one goes about reading (e.g., Huba & Kontos, 1985). In fact Chall (1977) includes print awareness in her first stage of reading.

Day, Spicola and Griffen (1981) measured kindergarten children's knowledge of print conventions, which they call "orthographic linguistic awareness," using the Concepts About Print test which was developed by Clay (1972). In this task, an interviewer asks a child to help him/her read a book and asks questions to see the child's comprehension of directionality, the differences between letters and words and the use of capital letters and punctuation. After testing children in kindergarten and then grade one, Day and her colleagues found that all children at the beginning of kindergarten knew the correct orientation of the book for reading. In early kindergarten, approximately half of the children knew print-direction rules (start reading at top left of page and going from left to right), whereas twenty percent did not know this at the beginning of grade one. Few
children could recognize whether a word sequence in a sentence or the letter order of a word was rearranged. Overall, about three fourths of children began grade one with orthographic linguistic awareness. Furthermore, Day and her colleagues found that there was a high positive correlation between orthographic linguistic knowledge in kindergarten and grade one, and reading ability at the end of grade one.

Lomax and McGee (1987) gave children in preschool (ages 3 and 4), kindergarten and grade one, 18 print related measures. There were 5 components: concepts about print, graphic awareness (discriminating between letters), phonemic awareness, letter/sound correspondences and word reading. All subjects, even the younger children, knew a great deal about language and reading. Children as young as three years were excellent environmental print readers, were beginning to recognize what could be read, and were differentiating between some letters and between some words. In general, whereas three year olds had not grasped concepts about print, children’s knowledge and understanding of the 5 areas tested gradually increased with age.

Another study by Hiebert (1981) tested children who were 3, 4 and 5 years old on reading readiness skills (letter names, visual and auditory discrimination of letters), and on the processes and purposes of print. Three year olds had some competence on all the measures, but there was significant increase in children’s knowledge from the beginning to the end of preschool. Five year olds performed significantly better than the youngest children.

The findings from these studies indicate that although young children’s knowledge
about print is not fully developed, children as young as three are beginning to acquire basic knowledge about print, and this print awareness in preschool children correlates with reading ability. Print awareness, however, should be distinguished from orthographic processing ability. Print awareness focuses on children’s global knowledge about print involving book handling skills and children’s ability to discriminate between the letters of the alphabet, whereas the area of orthographic processing goes beyond this global knowledge and focuses on how children attend to the visual patterns in words (Barker, Torgesen, & Wagner, 1992).

Development of Orthographic Processing in Young Children

Berninger (1987) compared nonreaders who were at the end of kindergarten and early readers at the end of grade one on the visual processing of words. Berninger used Kolers and Roediger’s (1984) framework which outlines three procedures that explain how visual information is extracted from printed words. With the global procedure, the whole word unit is coded. With the component procedure, the letters is the unit attended to, and in the serial procedure, the letter sequences in the word are coded. Berninger found that each of these procedures was important at different phases of reading development. When children are acquiring a sight vocabulary, the global procedure is most important, because nonreaders use the shape information of the word to classify it. As children move from being nonreaders to beginning readers, the component procedure is essential for learning letter/sound correspondences for word decoding. The serial procedure is significant when children are no longer using letter/sound knowledge to
decode words but are recognizing words quickly and automatically. The ability to code a complete word is acquired before coding a letter in a word, which develops before the ability to code a letter cluster in a word.

In another study, Rosinski and Wheeler (1972) gave children pairs of nonsense words, one of which was pronounceable. Children had to point to the one that was more like a real word. Grade 1 children performed at chance level, whereas in grade 3 and 5, children were 70% to 80% correct. Older children not only based their judgements on whether the word had permissible letter strings, but also on whether the word was pronounceable.

In a similar study, Berninger (1988) found that throughout grade one, children were gradually becoming more accurate in their ability to reject letter strings that were not regular in English orthography than they were in rejecting nonwords that were pronounceable but did not follow orthographic regularity. Thus, they were aware that real words need permissible letter sequences, but had less of an understanding that a real word is not only pronounceable but also has to have meaning.

Pick, Unze, Brownell, Drozdal, and Hopmann (1978) showed children between the ages of 3 and 8 cards with different letter strings and asked them to identify which ones were words. Among the letter strings used were cards with single letter words (a, i), single letter nonwords (e, u), consonant clusters (mptc), pronounceable long and short words (bias, encyclopaedia), and real words with misoriented letters. The results showed that the youngest children accepted a large proportion of the letter strings as words. As
children got older there was a decline in the acceptance of single letters as words; older nursery children felt that there had to be more than one letter in a word. Kindergarten children were less likely to accept as words those strings which had misoriented letters, vowel and consonant clusters and nonwords that have meaning when they are pronounced; therefore, by kindergarten children had developed more sophistication for differentiating words from nonwords. They had an awareness that letters have a certain orientation and that words consist of a combination of letters. By grade one, children’s understanding of words became even more sophisticated. They were less likely to accept vowel and consonant clusters and pronounceable nonwords. As well, they used their newly acquired reading skills to sound out the words.

Children’s knowledge of orthographic structure was studied by Leslie and Shannon (1981). Three tasks were given to children completing preschool, kindergarten, grade one and grade two. Children were shown pairs of letter strings in upper-case and had to say which one resembled a word. On the first task, the pairs of letter strings had either two letters and a number (G8P) or three letters (GSP). On the second task, the set of pairs had either three consonants (RSD) or 2 consonants and a vowel (WOC), and on the third task the set of pairs had either consonant clusters that occur at certain positions in English orthography (grisp) or letter patterns that never occur in words (tsacl). Subjects were also given a letter naming and word recognition task. The researchers found that orthographic structure knowledge was correlated with reading achievement. Interestingly, knowledge of letter names was the best predictor of knowledge of orthographic structure. Those
children who knew fewer than half of the letter names did not perform above chance on any of the orthographic tasks. Furthermore, only children who were able to read primer level and some difficult grade one words performed above chance on the second and third task. Leslie and Shannon conclude that “knowledge of structure of vowel presence and legal consonant clusters develops during the acquisition of a reading vocabulary.” (p. 322)

Wagner and Barker (1994) point out that letter knowledge is a good measure of pre-readers’ and readers’ early orthographic knowledge. Letter name knowledge in kindergarten and grade one has been the best predictor of beginning reading achievement (e.g., Bond & Dykstra, 1967). Foorman (1994) suggests that if children can accurately name letters then they are able to discriminate the unique features of the letters, such as in the case of “b” and “d” which have few distinctive features.

Two studies that Lavine did in the 1970’s focussed on how children perceive writing as writing. Lavine’s study in 1972 (cited by Gibson & Levin, 1975) examined the types of features preschool children (between 3-6.5 years) use as criteria in deciding what is writing. Children were shown two items and asked which one resembled writing. Several categories were used: pictorial vs. conventional writing, multiple units vs. single units, linear vs. non-linear units, variety of units vs. repetitive units and graphic characteristics of specific writing systems, such as Hebrew and Chinese. Lavine found that children as young as three years old were able to differentiate pictures from writing. Although the older children (4 and 5 year olds) used the global features (such as linear
units, multiple units, repetitive units) to classify the string as writing or nonwriting, it was
the visually distinctive features of the letters that mainly influenced children's decisions.
This is evident from the results which showed that by age 5, nonreaders who had English
print exposure, classified 100% of items with Roman and Hebrew letters as writing; this is
not surprising since Hebrew letters and Roman letters share some general visual features.
Furthermore, children classified as writing 73% of strings with characters that were not
real but had distinguishing features similar to Roman letters. Yet, only 20% of Chinese
script was categorized as writing.

In a pilot experiment, Lavine (1977) found similar results. Three to 6 year olds
were shown 23 graphic displays, which included line drawings, geometric figures, letters,
words, numbers and scribbles. Children were asked "what is it?" All 3 year olds could
differentiate between pictures and other displays. They could not distinguish scribbles,
foreign writing, English writing and numbers; all of these items were considered writing.
Any item with Roman letters or script was identified by all children as writing. Some 4
year olds could differentiate between writing-like scribbles and actual writing, and some
of the 5 year olds could distinguish numbers from letters. Although none of the subjects
were readers they were able, especially as they got older, to differentiate visual features.

Lavine's results were consistent with Gibson's early theory (1969) which proposed
that a child's perception of writing develops from an undifferentiated state to a more
differentiated state. Gibson described perceptual learning as "an increase of specificity of
discrimination to stimulus input, an increase in differentiation of stimulus information"
(Gibson & Levin, 1975, p.13). This learning occurs naturally as can be seen by children’s ability to discriminate writing from pictures even before they have been taught how to read. Children may begin by distinguishing pictorial displays from nonpictorial displays (writing and math symbols). Then the child might associate writing with linear, nonpictorial graphic displays, or with those displays that appear in a book or a magazine. Later children will use more specific features to decide what is writing, such as whether the letter string is divided into units. Finally, they might recognize as writing individual units that occur with regularity in varied displays. Based on Lavin’s 1972 findings, Gibson and Levin (1975) concluded that young children first become aware of distinguishing features that define a graphic display as writing and then discriminate between individual letters.

A recent longitudinal study by Geva and Wade-Woolley (1995) looked at how preschool children come to know that different languages have different writing systems, and whether this knowledge leads to the development of early reading skills in one’s first language, English, and one’s second language, in this case, Hebrew. A script-awareness task called the Cricket Task was designed by the researchers. When they were in senior kindergarten, children attending a private English-Hebrew bilingual school were shown several black and white drawings of a cricket standing next to a flip-board, each drawing with a different script on the flip-board. Some of the scripts had Roman alphabet letters (English, Russian, Spanish), whereas others had non-Roman based alphabets (Hebrew, Cree, Chinese). For each script children were asked whether the cricket was reading
English.

Geva and Wade-Woolley found that children’s scores on the Cricket Task predicted reading achievement one and two years later in their first and second language. In addition, the authors noted that development of script-awareness seemed to occur in 3 stages in preschool children. Children who were in the first stage said the script was English regardless of the orthography. At this point, there was no awareness that different languages have different writing systems. Children in stage two were able to discriminate between global Roman alphabet features and non-Roman alphabet features. Thus, they would say that Hebrew and Chinese were not English, but they believed that Spanish and Russian were English. Presumably here, children were basing their judgements on the global characteristics of the Roman alphabet, and did not attend to specific visual distinctive features. Presumably, they focussed on features in Russian and Spanish which are similar to English letters and ignored features that make them quite distinct from the Roman letters. Children in the final stage were more attentive to the fine-tuned visual distinctive features, and some children were able to tell that French and Spanish were not English even though the alphabet is identical.

Geva and Wade-Woolley hypothesize that it is this last stage that may indicate early orthographic awareness, where children’s knowledge of permissible letter strings, word recognition, and spelling are beginning to develop. Willows and Geva (1995), however, point out that although young children begin to attend to the visual features of writing, phonological processing also plays a significant role; they state that “parallel to,
or perhaps prior to the development of phonological and orthographic knowledge, children must gradually learn to extract and fine-tune the visual-spatial features of the writing system. This essential differentiation may initially entail purely visual-perceptual learning, but it gradually becomes linked up with the growing awareness of the essential features of the spoken language and knowledge of how letters and letters strings map onto this acoustic information” (p. 361). This is consistent with Foorman’s (1994) view that phonological and orthographic processes are integrated.

The Present Study

The present study explores further orthographic development in young children in junior kindergarten, senior kindergarten and grade 1. Much of the research that has looked at orthographic knowledge has focussed on school aged children who have already had a great deal of exposure to print and who are more advanced readers (e.g., Berninger, 1988), and those studies which have used preschool children have tended to look less at orthographic awareness and more at either children’s knowledge of print conventions, such as directionality (e.g., Day, Spicola & Griffen, 1981) or children’s reading readiness skills, such as letter naming and auditory discrimination (e.g., Hiebert, 1981). As well, although there are different theories as to how children acquire orthographic awareness, few studies have looked at how orthographic awareness actually develops in young children who are pre-readers or beginning readers.

Furthermore, there has been little research on how children articulate their metaorthographic awareness, and how this awareness develops. There is no shortage of
studies that look at children's metalinguistic awareness, but these studies have usually focussed on areas such as phonemic awareness and syntactic and semantic awareness. Studies that look at children's ability to distinguish words from nonwords have not examined the extent to which children are able to articulate how they make these distinctions and how this relates to reading achievement.

The present study used the Cricket Task designed by Geva and Wade-Woolley (1995) to expand on their findings and to address several issues surrounding orthographic development. The first question addressed was How does orthographic awareness develop in young children? Based on Geva and Wade-Woolley's findings, it was hypothesized that as children get older their orthographic awareness will gradually increase. By age 7, children should reach Geva and Woolley's third stage of script awareness, where they are able to not only distinguish between Latin and non-Latin based orthographies, but also between Latin-based orthographies, such as English and French.

Since the sample used in this study included children who were part of a systematic phonics program, the study explored whether method of instruction can influence children's performance on the Cricket Task. If children who are exposed to a systematic phonics program which emphasizes phonological processing skills, such as phonemic awareness, perform better on the Cricket Task, then one could argue that the Cricket Task is merely measuring phonological processing ability or, perhaps it reflects the combined effects of phonological and orthographic processing ability. If, on the other hand, method of reading instruction does not play a significant role, this would indicate basic
developmental milestones in orthographic awareness.

The second main issue addressed in this study is children's development of "metaorthographic" knowledge. It was hypothesized that as children become older not only will they be better able to attend to specific visual distinctive features of writing systems and to attend to sublexical clusters in words, but they will also be better able to articulate this awareness.

Further, it was hypothesized that those children who are second language learners would be better able to articulate their metaorthographic knowledge than children who have English as a first language. Some researchers maintain that since bilingual children are exposed to two languages, they have a better awareness of language than monolinguals (e.g., Ben-Zeev 1977; Cummins, 1978; Hakuta, 1986). Early support for this position comes from Werner Leopold (1949, cited in Hakuta, 1984), a linguist in the 1930's, who kept a detailed account of his bilingual daughter's language development. Based on his observations, Leopold concluded that there was an advantage to being bilingual. When an individual is exposed to two languages, realization that words are arbitrarily assigned meaning is more salient; there can be two words, one in each language, for an object. Later researchers confirmed Leopold's findings. Vygostky (1962) pointed out that one's ability to express the same idea in two languages results in a child being able to see "his language as one particular system among many, to view its phenomena under more general categories, and this leads to awareness of his linguistic operations..." (p. 110).
Researchers have tried to determine the point at which an individual’s first language has a facilitating effect on one’s second language. Cummins (1977) stressed that the benefits of being bilingual are evident only after an individual has achieved a certain threshold level of proficiency in his/her second language. Diaz (1985), however, maintains that children have a high level of metalinguistic awareness at the beginning of second language learning. Some researchers, however, have found that second language learning has an inhibiting effect (e.g., Palmer, 1972) or no effect at all (e.g., Rosenblum & Pinker, 1983) on metalinguistic ability. Bialystock (1988) addresses the conflicting findings in this area and suggests that the level of bilingualism and the type of metalinguistic task in these studies determine the extent to which bilingualism will have a facilitating effect on metalinguistic awareness. Recent support for this contention comes from Geva and Alony (1996) who examined the development of language awareness in young bilingual children. Despite the conflicting results, there is converging evidence that bilingualism does facilitate the development of metalinguistic awareness. Consequently, in this study, it was hypothesized that those children who are exposed to two languages will be better able to articulate their metaorthographic knowledge than monolingual children.

The study examined children’s general knowledge about languages and whether this knowledge correlates with performance on the Cricket Task. Clearly as children get older they become more aware that there are many languages in the world. We wanted to examine the extent to which performance on the Cricket Task might merely reflect such
general knowledge about languages, or whether it captures a distinct aspect of the
development of orthographic knowledge which is distinct from such general knowledge.

Finally, the study examined the relationships between the Cricket Task and
children’s reading ability. Based on Geva and Wade-Woolley’s (1995) study, it was
hypothesized that there should be a significant, positive correlation between the Cricket
Task and word recognition.
CHAPTER 2

Method

Subjects

This was a cross-sectional study of 122 children. There were 25 children sampled from junior kindergarten (JK). The average age of these children was 58 months. Of the 25 children, 18 had English as their first language. Forty-nine children were sampled from senior kindergarten (SK), and their average age was 71 months. Of the 49 SK children, 36 had English as their first language. In grade 1, 48 children were sampled, and their average age was 83 months. Thirty-five children in grade 1 had English as their first language. There was a wide range of second languages spoken in the sample. Some of these languages included, Punjabi, Chinese, Tamil, French and Korean. Overall, there were 60 males and 62 females in the study. The children were sampled from 5 schools in the Toronto area, each of which was in a working class, urban neighbourhood.

The children sampled were part of a larger study in which the researchers Sumbler and Willows (1996) were examining the effectiveness of a phonics program developed by Sue Lloyd, a British educator. The basic premise of the program is that young children who learn the 43 phonemes in the English language systematically will learn to read more easily. Using Lloyd’s Phonics Handbook (1993) which includes sound sheets, flashcards and games of the 43 phonemes, as well as other supplementary materials (sound books, freezes), teachers were trained to teach the letter/sound correspondences in a fun and
enjoyable way. For example, for each phoneme children learned the sound as well as an action. As children learned the sounds, phonological awareness was also emphasized through a variety of blending, segmentation and deletion tasks. In addition, a great deal of time in these classrooms was spent on language and literacy activities, such as reading and writing.

In the present study, children in JK were sampled from two classes, one experimental class where the phonics program was implemented, and one control class where teachers were not using this particular phonics program. In both SK and grade 1, children were sampled from four classrooms. Half the subjects in SK and grade 1 were in experimental classes; the other half were in control classes. It should be noted that although teachers in the control classes were not trained to use Lloyd's phonics program, they still may have been exposing their classes to some phonics instruction, though in a less systematic fashion.

**Instruments**

**Early Orthographic Development**

The Cricket Task (Geva & Wade-Woolley, 1995) was used to examine children's early orthographic development. Children were shown 12 laminated 9 by 11 cards one at a time (see Appendix A). On each card was a cartoon drawing of a cricket pointing to a text on a flip-board. Each card had a text in a different language - French, Chinese, Spanish, Pseudo-English, Hebrew, Russian, German, Cree, English, Punjabi and Greek. On one card, instead of a text with an authentic orthography, children were shown a card
with symbols, such as, #, @, }). On the protocol this was referred to as “code.” The children were given the following introduction to the task. “Here is Mr. Cricket. Mr. Cricket is a smart young man. He likes to read and tell stories in different languages.” Then, for each card, the child was asked “Is Mr. Cricket reading English here?” The experimenter recorded the child’s response (yes, no, don’t know). If the child responded that the text was not English, then the child was asked “What do you think it is?” The experimenter recorded the child’s answer. The cricket score, which measured children’s orthographic development was based on the number of correct responses (out of 12) a child gave when asked whether Mr. Cricket was reading English.

Metaorthographic Knowledge

For 7 of the 12 items (Code, French, Pseudo-English, Hebrew, German English, Greek) children were asked to explain how they knew whether a language was or was not English. If a child said a text was English, then he/she was asked “How do you know that it is English?” If, however, a child said that the text was not English, then he/she was asked “How do you know that it is not English?”

A coding system was developed in order to examine children’s responses. The responses were divided into 8 categories. The first category, irrelevant responses, included meaningless explanations (“The letters are white”; “Mr. Cricket is wearing glasses”). The second category, global responses, included general, global remarks relevant to language processing (“I understand it”), very general remarks related to oral language or learning (“My teacher taught me it”), and “don’t know” responses.
All of the other explanations that children gave were divided between analyzed and unanalyzed responses. Unanalyzed responses included children’s vague and general reference to letters, words or the text. **Letters-unanalyzed** responses included references to letters (“I see the letters”; “Because of the letters”), and references to the shapes of letters (“The letters are shaped like people write them”). **Words-unanalyzed** responses included vague unspecified references to words (“I see the words”; “Because of the words”), vague comments on spelling (“The words are spelled different”), appeal to authority (“These weird words my parents don’t write”), and nonspecific references to another language (“Punjabi words are spelled like this”). **Text-unanalyzed** responses include appeals to authority, oral or written (“That’s the way my parents do it on the computer”; “That’s the way it is in my books”), vague awareness of other languages (“It’s different than China one”), references to the connection between written and oral language, but in a global way (“Only people who know the language can read it”), references to other writing samples on task (“It wasn’t like that one[child points to previous card]”), and pointing to some part of the text without specifying (“Because of that part”).

Analyzed responses included children’s specific references to letters, words or writing conventions in the text. **Letters-analyzed** responses included references to specific letters by name (“This is a g”), identification of parts or components of letters (“S doesn’t look like an ‘s’ because it has a line through it”; “that doesn’t look like an m”), and knowledge of letter cases (“It has capital and little letters”). **Words-analyzed** responses included pointing to specific words and reading or spelling them (“Because of ‘and’”),
knowledge of spelling patterns ("English doesn’t have ‘a u’ by itself"; “it has a 3 in it”), awareness of diacritics ("Because of these things over the words"), and awareness that words can be read ("Let’s try to read it"). Text-analyzed responses included knowledge of writing conventions ("The words are all attached together"; “There’s a comma”).

When the results were analyzed each of these components were examined separately. As well, a composite of the percent of analyzed responses was computed based on the number of letters analyzed, words analyzed and text analyzed responses a child gave. Likewise the percent of unanalyzed responses was also computed based on the number of letters unanalyzed, words unanalyzed and text unanalyzed responses a child gave.

Interrater reliability was determined by taking all the explanations children gave and having two raters independently code each response. The percent of complete agreement was 77%.

Children’s Awareness of Other Languages

Before the Cricket Task was administered, each child was asked 4 questions to assess their general awareness of other languages (see Appendix B). First, children were asked “Do you know what language you speak at school?” The experimenter recorded their response (yes/no). The second part of the question was “What language is it?” If children did not know what language they spoke at school, then the experimenter probed a bit further and asked “Is it Spanish” “Is it Punjabi? “Is it English?” If a child knew immediately the language he/spoke at school, the question was given a score of 2. If the
child could answer when probed, the response received a score of 1. If, despite the probes, the child still did not know what language he/she spoke at school, the question received a score of 0. Next children were asked “Do all the people in the world speak English?” A yes/no response was recorded. Then the child was asked “What are some of the other languages people in the world speak?” If children could name one or more languages other than English, their response was scored as correct. Finally, children were asked whether they knew someone who spoke another language, and what language that person spoke. A total score on this interview was computed based on the number of correct responses. The possible range of scores was 0-4. The last question, “Do you know someone who speaks another language?” was not included in the total score.

**Phonological Measures**

The Rosner Test of Auditory Analysis (1971) was given in a standardized way to measure children’s ability to manipulate phonemes in words (see Appendix C). On this task, the examiner said a word, and the child repeated the word but had to leave out a particular phoneme. For example, a child was presented with the word ‘meat’ and was asked to repeat the word without the ‘m’ sound (“eat”). The possible range of scores was 0-13.

A rhyming task developed by Sumbler and Willows (1996) which included 24 pairs of words that were verbally presented to a child was used (see Appendix D). For each pair of words, children had to give a yes/no response as to whether the words rhymed. This task measured children’s ability to differentiate between short vowel sounds, their
ability to differentiate between short and long vowel sounds, their ability to differentiate between long vowel sounds, and their ability to differentiate between different digraphs. The first pairs on the list had CVC words, such as get/pet, or CVCC words, such as lick/sock, which really sound like CVC words. The last 12 pairs included consonant blends or digraphs. The possible range of scores on this task was 0-24.

**Speed of Processing Measure**

A version of the Rapid Automatized Naming Task (RAN), which has been shown to predict reading ability was used. Sumbler and Willows (1996) adapted Denckla and Rudel’s (1974) version of the RAN. It consisted of 5 rows of digits with 10 digits in each row (see Appendix E). Five digits were used: 2, 3, 4, 5, and 6. Each digit appeared 10 times in a random order. Before beginning the task, the examiner made sure the child could name these digits. If a child had difficulty, the RAN was not administered. Children were then shown a card with 50 numbers and were told to read the numbers as quickly as possible. The score on the RAN was based on the number of digits read, minus the number of digits that were either misread and not self-corrected and/or the digits that were entirely skipped. This total was divided by 60 seconds to yield a ratio of digits per minute.

**Reading Measures**

The blue test form of the reading subtest of the Wide Range Achievement Test (WRAT-3, 1993) was given in a standardized manner. Children were first asked to name 15 letters, and then to read 42 words. The examiner discontinued after 10 consecutive
errors on the words. Since, for the purpose of this study, the examiner was only interested in word recognition ability, the raw score used was the number of words read correctly on the WRAT-3.

The scores on 3 pseudo word naming tasks were combined to obtain a pseudo word reading composite. The Word Attack subtest of the Woodcock Reading Mastery Test-Revised (WRMT-R, 1977), which examined decoding ability was administered in a standardized way. The discontinue rule, however, was modified. Instead of discontinuing after a total of 6 errors on one page, the examiner discontinued at any point on the test that a child made a total of 6 errors; these errors did not have to be on one page or consecutive. The words on this subtest were not recognizable and, therefore, children had to use their decoding ability to read them accurately.

Two additional pseudo word naming tasks were designed by Sumbler and Willows (1996). Nonword Task 1 consists of 24 nonwords that were presented to the child one at a time (see Appendix F). The examiner read a word, and the child determined whether the word said was the same as or different from the word that he/she had in front of him/her. There were 3 levels of difficulty. The first six words included all the short vowel sounds. The next ten words were more difficult and included digraphs (ai, oa, ee, or, ch, sh, th, oi, er, ar, ou). The next eight words were the most difficult, as they included consonant blends (pl, lt, nd, mp, cr, rb, sm, mp, gl, sn, nt). The total score was the number of correctly identified words.

Nonword Task 2, consisted of 24 nonwords which the children had to read (see
Appendix G. Eight words contained all the short vowel sounds (CVC). Another eight words had some consonant phonemes and the digraphs that appear at the beginning of Sue Lloyd's *The Phonics Handbook* (e.g., g, m, ai, oa). The last eight words included the digraph that appear towards the end of *The Phonics Handbook* (e.g., oi, ar, ou). The examiner discontinued after 10 non-consecutive errors. To obtain a total score, the number of nonwords read correctly and the number of nonwords with at least two phonemes read correctly and the number of words with the initial phoneme read correctly were added to yield an overall combined pseudo word score.

**Procedure**

Children in the experimental classrooms who were part of the systematic phonics program were tested on the Rosner and the rhyming task in April, and children in the control classrooms were tested on these measures in early June. In one session, in the middle of June, the WRAT-R, the Word Attack, Nonword task 1 and Nonword task 2 were administered. In another session, the RAN and the Cricket Task were administered to subjects between the beginning of May and the beginning of June. Five different examiners administered the phonological tasks and the reading tasks. The same examiner administered the RAN and the Cricket Task. All tasks were individually administered.
CHAPTER 3

Results

For normal distributions, one-way ANOVA’s with an alpha of .05 were used, along with post hoc Tukey tests. Due to the very skewed distributions of many of the variables examined in the study, non-parametric statistical tests were used primarily. For those skewed distributions, Kruskal-Wallis one-way ANOVA’s (K-W) with an alpha of .05 were used, followed by Mann Whitney tests (M-W) used in as post-hoc tests, with an adjusted Bonferroni significance level of .017.

It was hypothesized that orthographic development, as measured with the Cricket Task, would show gradual improvement as children get older. The results showed that children’s ability to determine whether a script was or was not English improved with age. Figure 1 presents the results graphically. A one-way ANOVA showed a significant grade effect ($F(2, 119) = 6.53, p < .01$). A post hoc Tukey test confirmed that grade 1 children performed significantly better on the Cricket Task than JK and SK children. There was no significant difference in performance between JK and SK children. The means are reported in Table 1.

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Insert Table 1 and Figure 1 about here

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There was no significant difference in performance on the Cricket Task between
children in the experimental classrooms, who were part of a systematic phonics program and children who were in the control classrooms \( (F(1, 120) = .958, \text{ ns}) \). Thus, hereafter we will assume that the method of instruction did not influence children's performance on the Cricket Task.

To further analyse children's ability to distinguish English scripts from non-English scripts, the languages used in the Cricket Task were divided into 3 orthographic categories: Latin-based orthographies (English, French, German, Spanish and Pseudo-English), non-Latin based orthographies (Chinese, Hebrew, Cree, Punjabi) and mixed orthographies (Greek and Russian). The % correct in each of these categories was compared. The results are presented graphically in Figure 2, and the means are reported in Table 1. On the non Latin-based orthographies the K-W test showed a significant grade effect \( (\chi^2 = 21.62, \df = 2, p < .05) \). The M-W tests confirmed that SK children performed significantly better than JK children. Children in grade 1 performed significantly better than children in both JK and SK. In fact, as can be seen in Figure 2, their performance on non-Latin items reached ceiling. Overall, as children get older there is a gradual improvement in their ability to determine that non-Latin based orthographies are not English. On mixed orthographies (Russian and Greek), the K-W test also showed a significant grade effect \( (\chi^2 = 8.70, \df = 2, p < .05) \). M-W tests confirmed that grade 1 children performed significantly better than children in SK at determining that Greek and Russian were not English, but there was no significant difference between children in JK and SK. On Latin-based orthographies there was no significant grade effect. This result is
contrary to the researcher's hypothesis that by grade 1, children should be able to
differentiate between Latin orthographies. Even the majority of children in grade 1, who
were beginning to read and develop a sight vocabulary, were unable to distinguish English
from the other Latin-based orthographies.

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It was hypothesized that metaorthographic knowledge would improve as children
got older, and that second language learners would have a higher level of
metaorthographic awareness due to their exposure to two languages. As mentioned
earlier, children's verbal explanations were divided into 8 categories: global, irrelevant,
letters unanalyzed, letters analyzed, words unanalyzed, words analyzed, text unanalyzed
and text analyzed. The percent of analyzed responses was computed for each child, based
on the number of letters analyzed, words analyzed and text analyzed. As well, the percent
of unanalyzed responses was based on the number of letters unanalyzed, words
unanalyzed and text unanalyzed. The results are graphically represented in Figure 3. The
means are reported in Table 2. There was a significant grade effect on each of the four
main categories. The K-W test showed a significant grade effect on the percent of global
responses ($\chi^2 = 15.42$, df=2, $p<.05$). M-W tests confirmed that JK children gave more
global responses than SK and Grade 1 children. The differences between SK and grade 1
children were not significant. There was a significant grade effect on the percent of
irrelevant responses ($\chi^2 = 6.67, \text{df} = 2, \ p < .05$). JK children gave more irrelevant responses than grade 1 children. There was also a significant grade effect on the percent of unanalyzed responses ($\chi^2 = 14.06, \text{df} = 2, \ p < .05$). SK children gave more unanalyzed responses than JK children, whereas grade 1 children gave fewer unanalyzed responses than SK children. A significant grade effect was also found on the percent of analyzed responses ($\chi^2 = 31.77, \text{df} = 2, \ p < .05$). Grade 1 children gave more analyzed responses than JK and SK children.

Insert Figure 3 about here

When the 3 components (letters analyzed, words analyzed and text analyzed) were examined separately, there was only a significant grade effect for the words analyzed ($\chi^2 = 62.57, \text{df} = 2, \ p < .05$). A M-W showed that children in SK gave more “words analyzed” explanations than JK children, and grade 1 children gave more “words analyzed” responses than both JK and SK children. The means are reported in Table 3.

Insert Table 3 about here

In grade 1 there was a significant difference in the number of “words analyzed” responses provided by children for whom English was a first language and those for whom English was a second language. Second language learners gave more “word analyzed”
responses ($M = 3.00, SD = .99$) than first language children ($M = 1.69, SD = 1.53$) ($t\ (46) = -3.50, p < .05$). It is important to note that there was no significant difference between first and second language learners on the Rosner ($t\ (56) = .90, ns$), on the RAN ($t\ (46) = 1.95, ns$), and on word recognition ($t\ (46) = -.64, ns$). In fact, children with English as their first language performed significantly better than second language learners on the rhyming task ($t\ (46) = 2.81, p < .05$).

Based on Geva and Wade-Woolley’s (1995) study, it was hypothesized that there would be a significant positive correlation between performance on the Cricket Task and performance on the word recognition tasks. In SK, there was a significant positive correlation between performance on the Cricket Task and the pseudo word naming tasks ($r = .32, p < .05$). In grade 1, there was a positive and significant correlation between the Cricket Task and performance on word recognition ($r = .56, p < .05$) and pseudo-word reading tasks ($r = .33, p < .05$).

Finally, it was hypothesized that as children get older their awareness that there are other languages in the world (other than English) increases. A one-way ANOVA showed a significant grade effect ($F\ (1, 118) = 20.70, p < .05$). A post hoc Tukey test confirmed that SK children did significantly better on the oral interview than JK children. Children in grade 1 performed significantly better than children in JK and SK. Furthermore, there was a positive and moderate correlation in SK between the Cricket Task and awareness of other languages ($r = .30, p < .05$). There was no significant correlation between these factors in SK and grade 1.
| Table 4 about here |
CHAPTER 4

Discussion

This study adds a new dimension to the area of orthographic processing. The results suggest that there is an intermediary stage of "pre-orthographic" awareness that follows children's print awareness abilities but is a precursor to children's orthographic awareness. Researchers have tended to focus on children's print awareness, using tasks such as Clay's Concept About Print test (1972). These studies have looked mainly at children's book handling skills, asking questions such as: Does a child know the correct orientation of a book? Does a child know what side of a page to start reading from?

Other researchers, such as Berninger (1988), have looked at children's already developed orthographic processing by using, for example, tasks that require school-aged children to detect words that are not permissible in English orthography; the children in these studies were already attending to the sublexical clusters in words. Often these studies include school-aged children who were already reading. While some children in the present study were at the stage of orthographic awareness and, thus were attending to the sublexical clusters in words, these children were an exception. Most of children's orthographic awareness was global in that they were not yet attending to the fine-tuned visual distinctive features of each language. Thus, a child could look at French and state that it was English based on the English letters, but ignore the accents over the words.

Gradually, this kind of visually based pre-orthographic knowledge will be replaced with orthographic knowledge, as children develop a larger sight vocabulary and better decoding.
skills and a stronger conviction that accents are not used in English. It is at the orthographic stage that children are able to “look inside words” and note sublexical clusters. Ultimately, their attention to sublexical clusters will result in efficient word recognition ability.

The Cricket Task detected developmental differences in the acquisition of early orthographic awareness. As children develop there was a gradual improvement in their ability to differentiate English script from other non-English orthographies. The results were consistent with the researcher’s expectations that as children get older they are better able to determine that non-Latin based orthographies, such as Chinese and Hebrew, as well as mixed orthographies, such as Russian and Greek, “are not English.” Surprisingly, however, children in grade one, many of whom were decoding words and developing a sight vocabulary, were not yet able to differentiate English from other Latin-based orthographies, such as French. By the end of grade 1, children still tended to base their judgements on partial information. For example, if a text, such as German has English (i.e., Latin-based) letters in it, children assumed that the text was English, but they did not attend to permissible letter clusters. The German word “zwei,” (two) for example, contains the letter cluster “zw” which does not exist in English orthography. Children were inattentive to this aspect of orthographic information. They were also inattentive to the two dots above the word, “für,” (for) which might suggest that the orthography they are contemplating is not English. Thus, although by the end of grade one children’s orthographic awareness was more advanced than that of their younger counterparts, this
orthographic awareness was only partial in that children seem to process only part of the visual display. Most have not reached Geva and Wade-Woolley’s (1995) third stage of script-awareness which entails an ability to differentiate English from other Latin-based orthographies, as well.

The results showed that there was a significant positive correlation in SK between the Cricket task and pseudo word naming tasks. As well, there were significant positive correlations between the Cricket Task and word recognition and pseudo word reading tasks. The Cricket Task, however, is not a measure of reading ability. If this were the case, then children in grade 1, some of whom are reading, would try to read the texts, and then would realize that German and French texts are not English. Even children who are reading are not able to differentiate between Latin-based orthographies; therefore, the Cricket Task is not merely a measure of reading ability. Instead, we argue, that it is a measure of a specific aspect of reading development, namely, early orthographic awareness.

An important aspect of orthographic awareness which was examined in this study and which has not been sufficiently looked at before, is children’s ability to articulate their metaorthographic knowledge. Although many children were inaccurate when asked if a text was English, their explanations of how they came to their decision showed that there are systematic developmental differences in children’s articulation of metaorthographic awareness. The results indicated that along with the development of pre-literacy skills, including orthographic awareness, their explanations as to why a script is or is not English
become more sophisticated. Younger children, between 4-5 years of age, gave primarily global ("I don't know;" "I understand it;" "My teacher taught me it") and irrelevant responses ("All of these letters are typed;" "All the words are dark;" "Because everyone in school have to speak English"). In the 5-7 age group, on the other hand, some children begin to look "inside" words ("That 'y' is upside down;" "There's an 'm' and a '3' together. That doesn't say anything").

After almost a year of systematic exposure to literacy instruction in grade 1, children were giving significantly more analyzed responses with regard to words. For example, young children would often say the script was English, "because of the letters, or because of the words." Older children gave more refined responses and based their judgements on specific words they could read or spell ("Because I can read that word"). As well, they used their knowledge of spelling patterns ("It has a 3 in it") to determine if a script is English. Still, even in grade 1, very few children could give the sophisticated response one grade one child gave when asked why French was not English: "In English we don't have "a" "u" by itself." Here the child said the letter names "a" and "u" while looking at the French word "au" (meaning "in the"). This child already had an awareness of permissible letter combinations in the English orthography, and he could articulate this knowledge. Clearly, as children's decoding skills improve and their sight vocabulary grows, their repertoire of permissible sublexical units in words increases, and their ability to articulate their awareness of these units becomes more refined.

Most interestingly, by grade one, second language children were giving
significantly more "word analyzed" responses than first language children. This was not simply the result of the second language learners in grade 1 being more intelligent or better readers. As the results indicate, there was not a significant difference between first and second language learners on the Rosner or on the word recognition task. If fact, first language learners performed significantly better than second language learners on the RAN and the rhyming task. The results suggest that children exposed to two languages may attend more to languages and may be better able to articulate this knowledge. These findings are consistent with results of research on metalinguistic awareness and second language learning (e.g., Bialystock, 1988). These results, however, may be hard to generalize since children's level of bilingualism was not explored, and there was a wide range of languages spoken in the sample. However, the results do suggest that children who are exposed to two language will be better able to articulate their metaorthographic awareness.

The results of the study also revealed that as children get older they develop general knowledge about languages. They know the language they speak at school, they know that not everybody in the world speaks English, and they can name other languages in the world. By contrast, many young children in the study did not know that English is the language they speak at school, and many believed that everybody in the world speaks English. As well, there was a positive and significant correlation in SK between orthographic awareness, measured with the Cricket Task, and children's general knowledge about languages. There was no significant correlations between these factors
in the two other age groups, presumably because in JK their general knowledge about languages is very poor, whereas in grade one, children reach a ceiling on this measure. To argue, therefore, that children who do well on the Cricket Task are those children who have a better awareness of languages, would be incorrect. By grade 1, there is not a significant correlation between general knowledge about languages and performance on the Cricket Task. Thus, the Cricket Task is not measuring one’s awareness of other languages, but rather children’s early orthographic awareness.

Based on the results of this study, one important question remains unanswered, namely, when do children reach a level of orthographic awareness that enables them to look at the sublexical clusters of Latin-based languages and determine that French, for example, is not English? Answering this question will give us insight into when children are ready to process words at an orthographic level. Children who look inside words at the sublexical clusters will develop a repertoire of sublexical units in words and, consequently, will process words without relying solely on the phonological route. It is at this point that a child will become a more fluent reader and will recognize words quickly and accurately. One area that should also be examined in more detail is the relationship between second language learning and the development of orthographic and metaorthographic awareness. This was only dealt with briefly in this study.

Orthographic processing has received little attention over the years in comparison to phonological processing, but it should not be considered of secondary importance. Although researchers (e.g., Berninger, 1994) have pointed out that there are
methodological problems in determining the independent role of orthographic processing, since phonological and orthographic processing are often confounded when they are measured, the Cricket Task may avoid these methodological issues. The fact that children, who received systematic phonics training, did not perform significantly better on the Cricket Task, suggests that the Cricket Task is tapping an aspect of pre-orthographic awareness and not phonological processing ability.

In order to gain insight into how children attend to written language, both phonological and orthographic processing need to be examined. As researchers focus more of their attention on the role that orthographic processing plays in the reading development of young children, a more complete picture of reading development will emerge.
REFERENCES


Berninger, V.W. (1994). *The varieties of orthographic knowledge I: Theoretical and...*


Table 1
Means (in %) and Standard Deviations on the Cricket Task

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JK

(n = 25)

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SK

(n = 49)

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Table 2

Means (in %) and Standard Deviations on Metaorthographic Knowledge

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<td>SD = 43.35</td>
<td>SD = 25.03</td>
<td>SD = 14.72</td>
</tr>
<tr>
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<td>M = 32.00</td>
<td>M = 59.48</td>
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<tr>
<td></td>
<td>SD = 37.63</td>
<td>SD = 31.04</td>
<td>SD = 23.91</td>
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<tr>
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<tr>
<td></td>
<td>SD = 24.22</td>
<td>SD = 26.86</td>
<td>SD = 23.35</td>
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<tr>
<td>Responses</td>
<td>JK (n = 25)</td>
<td>SK (n = 49)</td>
<td>1 (n = 48)</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------</td>
<td>-------------</td>
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<tr>
<td>Text unanalyzed</td>
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<td></td>
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<tr>
<td>M</td>
<td>.48</td>
<td>.61</td>
<td>.44</td>
</tr>
<tr>
<td>SD</td>
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<td>1.26</td>
<td>.71</td>
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<tr>
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<tr>
<td>M</td>
<td>.56</td>
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<td>SD</td>
<td>1.26</td>
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<tr>
<td>M</td>
<td>1.00</td>
<td>1.12</td>
<td>1.08</td>
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<td>SD</td>
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<td>1.90</td>
<td>1.75</td>
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<td></td>
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</tr>
<tr>
<td>M</td>
<td>.04</td>
<td>.49</td>
<td>2.04</td>
</tr>
<tr>
<td>SD</td>
<td>.20</td>
<td>.87</td>
<td>1.29</td>
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</tbody>
</table>
Table 4

**Mean Performance on Oral Interview - Children's Awareness of Other Languages**

<table>
<thead>
<tr>
<th>Grade</th>
<th>JK</th>
<th>SK</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 25)</td>
<td>(n = 49)</td>
<td>(n = 48)</td>
</tr>
</tbody>
</table>

Interview (range 0 - 4)

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.80</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td>2.92</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>3.42</td>
<td>.80</td>
</tr>
</tbody>
</table>
Figure 1. Mean Performance on the Cricket Task

![Bar chart showing mean performance on the cricket task for JK, SK, and grade 1.]

Mean Cricket Task

JK | SK | grade 1

Values range from 6.0 to 12.0.
Figure 2: Mean performance (in %) on Non-Latin, Mixed, and Latin-based Orthographies.
Figure 3. Mean Performance (in %) on Metaorthographic Awareness
Mr. Cricket

Here is Mr. Cricket. Do you know him? Mr. Cricket is a smart young man. He likes to read and tell stories in different languages. Can you tell me what languages he likes to read stories in?

<table>
<thead>
<tr>
<th>Language</th>
<th>Is Mr. Cricket reading it?</th>
<th>What do you think it is?</th>
<th>How do you know that it is ...?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>y/n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>y/n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>y/n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>y/n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo-Eng</td>
<td>y/n</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Hebrew  y/n  
   
   Reason:

7. Russian  y/n  
   
   Reason:

8. German  y/n  
   
   Reason:

9. Cree  y/n  
   
   
10. English  y/n  
    
    Reason:

11. Punjabi  y/n  
    
    
12. Greek  y/n  
    
    Reason:
Céline a décidé d'informer le commandant de cette conversation. Mais comment pouvait-on passer près des sentinelles? Comme une bonne fermière elle a guidé sa vache à travers les lignes. Personne ne l'a arrêtée. Après vingt-deux milles elle est arrivée au quartier général où elle a donné au commandant son secret.
學習語言主要是通過與他人的交

知知道兒童和家人互相溝通越多

的語言能力就越強。在兒童的生

中，除了學校之外，很少有機會

們的祖輩語言能力。因此，在家

祖輩語言就顯得尤為重要。

在溝通時，談話的次數和談話的

樣重要，甚至有時，內容更加重

年人所用的語言能幫助兒童觀察

各種事物。例如，帶兒童去水果

他店子購買時，成年人能協助他
Hasta hace poco tiempo la investigación disponible para contestar a estas preguntas era limitada. No obstante, en los últimos diez años hemos aprendido muchísimo acerca de cómo se desarrollan las habilidades lingüísticas de los niños en hogares monolingües y bilingües. También hemos descubierto algunas de las formas más importantes en que los padres pueden estimular el
Vome exolienced poters, olreany hantly pogmented ap sheir plaiming, vay bot feep i lighly fructured adipten ti dremare tor i jong ploke. Thi criniple pogind dremaring tor iny jong ploke ig ti crubally pruird flontel glough pont incleades id purdage, inblating ane jong besk teap voal.
ל塵ר על כיתותー והן קיים על
יידך, עץ אמט אל עטיה זי עמי
в первом звоне курантов караульные встанут на гранитные ступени Мавзолея, встанут лицом к лицу перед двумя часами, стоящими на почётном посту до них; двое сделают шаг в сторону, двое — шаг вперёд; первые пойдут на выход; вторые развернутся и застанут у входа в Мавзолей — и всё это произойдёт так слаженно и быстро, что люди, стоящие у барьера, не успеют вздохнуть...
Für uns, die wir eine zweitsprache unterrichten, ist das buch aus zwei gründen nicht unwichtig. Anders ausgedrückt, wir sind für den fremdsprachenunterricht noch nicht über die uns allen wohl vertraute formel hinaus: motivierte und korrigierte wiederholung.
Workload distribution shall be in accordance with this consultation with faculty members in unit policies.
भावना देते देते बिह भिन्न बिखाँ। टिकट ते बिख बेटी भा दही। येवन देते पुढ़ा दिखाई। दुध दुध दोहटने आपदी मंडे बेड़ा बेड़ा बालो मुंडे मुंडे में भावना दे बिख भा दिखाई। डिल्ली दिले दिखे अला जाती।

इतने देते देश देते बिखें।

इस देश आप दुध दोहट दिखाई। दुध दुध देते देश देते बिख भा दिखे। वेकेबेद दे दिखाई।

“इसे दुध देते हो? अजी मारने बिखाँ। ही भा है। मैं निपट ना दिखाई हो।”

भावना दे दोहट देते दिखाई। "मैं निपट ना दिखाई दे।"
Πρώτα διάβασε την πρόταση που σου δίνονται. Διάλεξε την απάντηση. Όταν αποφασίσεις, ποιά είναι η σωστή επιλογή σου. Με τον ίδιο τρόπο συντονίζεις στόιχεις από το φυλλάδιο. Εάν σου να διαγράψεις το λάθος και να δούμε, πόσο καλά μπορείς να ολοκληρώσεις.
Appendix B

ID # Name
Grade School Group: E/C
First language:

1. Do you know what language you speak at school? yes/no
   a. What language? 
   *- Is it Spanish? yes-no
   *- Is it Punjabi? yes-no
   *- Is it English? yes-no

2. Do all people in the world speak English? yes/no

3. What are some other languages people in the world speak?

4. Do you know someone who speaks another language? What language does he/she speak?
Appendix C

DEMONSTRATION ITEMS:
A. Teacher says, "Say cowboy." Teacher pauses and lets child reply. Then say, "Now say it again but don't say boy." If child does not reply within short while explain it to him. If it requires more than a simple explanation, stop test.

B. Teacher says, "Say steamboat." (Pause) "Now, say it again, but don't say steam." If both items answered correctly, go on to item 1. If incorrect, stop test.

A. Say cowboy. Now, say it again, but don't say boy. cow
B. Say steamboat. Now, say it again, but don't say steam. boat

1. Say sunshine. Now, say it again, but don't say shine. sun
2. Say picnic. Now say it again, but don't say pic. nic
3. Say cucumber. Now, say it again, but don't say cu(q). cu(mber
4. Say coat. Now, say it again, but don't say k/ (the k sound) eat
5. Say meat. Now, say it again, but don't say m/ (the m sound) eat
6. Say take. Now, say it again, but don't say t/ (the t sound) ache
7. Say same. Now say it again, but don't say m/. say
8. Say wrote. Now, say it again, but don't say t/. row
9. Say please. Now, say it again, but don't say z/. plea
10. Say clap. Now, say it again, but don't say k/. lap
11. Say play. Now, say it again, but don't say p/. lay
12. Say stale. Now, say it again, but don't say t/. sale
13. Say smack. Now, say it again, but don't say m/. sack

Stop testing after child has made 2 incorrects in a row. Record the number of the last correct item before those 2 errors. This is his TAAS score.

**TAAS SCORE** | **EXPECTED FOR CHILDREN IN:** | **LEVEL** | **Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
---|---|---|---
1 | Kindergarten | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
2 | Kindergarten | 11 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
3 | Kindergarten | 111 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
4 | Grade 1 | 111 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
5 | Grade 1 | 111 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
6 | Grade 1 | 11 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
7 | Grade 1 | 11 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
8 | Grade 1 | 11 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
9 | Grade 1 | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
10 | Grade 1 | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
11 | Grade II | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
12 | Grade III | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
13 | Grade III | 1 | Find child's score in left column. If his score is 2 and he is Kindergarten we can assume that his auditory perceptual skills are normal. If he is in grade 1 or above either auditory analytical skills or intellectual limitaations may be the needed culprit.**
Rhyming Task Instructions  Sumbler and Willows (1996)

Do you know what rhyming means? Two words that rhyme are two words that sound alike. Hear are some words that rhyme:

mop, top, hop, stop.

Can you hear how they sound alike? (mop sounds like top. and hop. and stop)
Here are some words that don't rhyme:

mop, tape, hope, step. Accentuate the vowel sounds when pronouncing these

Mop and step don't rhyme, but mop and stop do.

EXAMPLE #1

"Do these 2 words rhyme: cop cape"
(if the child responds correctly. say "that's right...cop and cape don't rhyme...BUT cop and mop do."
If incorrect say "No... cop and cape don't rhyme...BUT cop and mop do."

EXAMPLE #2

"Do these 2 words rhyme: pack pick"
(if the child responds correctly. say "that's right...pack and pick don't rhyme,...BUT pack and sack do."
If incorrect say :"No... pack and pick don't rhyme, BUT pack and sack do."

EXAMPLE #3

"Do these 2 words rhyme: cake lake"
(if the child responds correctly. say "that's right...lake and cake rhyme. Lake and rock don't rhyme, but lake and cake do."
If incorrect say: "No...lake and cake rhyme. Lake and rock don't rhyme, but lake and cake do."

Go to test items.
RHYMING TASK

Name: ___________________________ Date: _______________________

The child is told that the examiner is going to say 2 words and the child must say whether or not
the 2 words rhyme... whether they sound alike. The child is to give a yes or no answer.
Examples are given, (see instruction sheet) followed by the test items listed here.
Score "y" OR "n" for yes or no. Give all 24 pairs.

"Do these 2 words rhyme:"

1. ran cane ___ 13. block shock ___
2. get pet ___ 14. drug drag ___
3. wet seat ___ 15. clock trick ___
4. pit sit ___ 16. scream dream ___
5. tan pan ___ 17. steam stem ___
6. hit bite ___ 18. shrug hug ___
7. got not ___ 19. nail trial ___
8. pick kick ___ 20. shark work ___
9. lick sock ___ 21. soon skin ___
10. hot wet ___ 22. park dark ___
11. bug pig ___ 23. moon spoon ___
12. rug jug ___ 24. pail sail ___
4 3 5 4 6 3 2 5 2 6

5 2 4 6 3 6 3 4 5 2

3 5 2 5 6 4 6 3 2 4

6 2 5 4 3 5 4 6 3 2

4 3 4 2 6 3 6 5 2 5
May 1/95

*ALWAYS ADMINISTER "WORD ATTACK" FIRST*; THEN MY TASK #1, AND MY TASK = 2

NONWORD TASK #1
In this task, the child looks at a word while you read the corresponding word off your score sheet. Some of the words are the same as the ones on the child's list, ad some are different. The child must determine by saying "yes" or "no" whether or not the word you read is the same as the one she/his is looking at.

Introduce this task by saying: "Now we are going to do something kind of the same, but this time I will read the silly nonsense words. I will show you a word, and while you are looking at that word I will say a word. I want you to tell me if the word I say is the same as the word you are looking at."

"Sometimes the word I say will be EXACTLY the same as the one I show you,... and sometime the word I say will be just a LITTLE BIT different. So you are going to have to listen very carefully... and look very closely at the word in front of you, so you can tell me whether or not the word I say is the same as the word you are looking at."

"If it is the same....you say yes. If it is not the same....you say no. Let's do a practise one"

Show the child the word on the top of list 2a (dop), and keep all the other words covered. Say:
"I'm going to say a word, and I want you to tell me if it is the same as the one here. Dap! Is Dap the same as this word? If the child says no, say "That's right... this word says dop (emphasise the short "o" sound) and the word I said was dap." (emphasise the short a sound).

If the child says yes, point out why the two words are different, and tell the child to look and listen very carefully.

Go on to the second example (trop) whether the child was right or wrong on the first example. Read this one correctly and ask if it is the same as the one the kid is looking at. If the child is right, explain why she/he is right by slowly sounding out the word (e.g., "That's right. The word is t-r-o-p...trop." If the child is wrong, explain why, and slowly sound out the word while pointing at the letters.

In either case, go on to the test items.
1. Show the child list 2a and 2b ONE WORD AT A TIME, keeping the remaining words covered, and read carefully the corresponding word from your score sheet (as some are the same, and some are different from the child's list).

2. Go through the whole list...there is no discontinue rule.

3. Mark a "y" n the box if the kid answers yes, and an "n" if the answer is no.
Zout shain Jerb heer pit Lund Kimp crob snap gled snut tent

Ion turp warm firk dit neph Yart chum folt thing dodd port

Top
dop
<table>
<thead>
<tr>
<th>NAME</th>
<th>DATE</th>
</tr>
</thead>
</table>

**NONWORD TASK SCORE SHEET**

**MY TASK "#1" (YOU READ WORDS..CHILD ANSWERS "NO" OR "YES")**

You read the words on this sheet and show the child the words from list 2a and 2b. The child must determine whether each word you read is the same or different than the corresponding one on the list. Mark "Y" or "N" on score sheet.

**DO PRACTISE WORDS FIRST: DOP...read as DAP; TROP...read as TROP**

Go through the ENTIRE list (2a AND 2b). There is no discontinue rule.

<table>
<thead>
<tr>
<th>lun</th>
<th>tup</th>
<th>wam</th>
<th>feck</th>
<th>dit</th>
<th>neep</th>
<th>yat</th>
<th>chun</th>
</tr>
</thead>
<tbody>
<tr>
<td>foit</td>
<td>tig</td>
<td>doab</td>
<td>pob</td>
<td>zote</td>
<td>shain</td>
<td>jerb</td>
<td>heff</td>
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<tr>
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<td>kimp</td>
<td>corb</td>
<td>samp</td>
<td>gled</td>
<td>snut</td>
<td>fent</td>
</tr>
</tbody>
</table>
Appendix G

NONWORD TASK #2
This is the same type of task as WORD ATTACK

Introduce the task by saying "We are going to do the same kind of thing like we did a little while ago. I want you to try to read the nonsense words that I am going to show you. Remember, these aren't real words....they're silly words that don't make any sense...words, like snap...or lurp. BUT remember, that letters make sounds, and when you put the sounds together, you can make words...even silly nonsense words"

"I'm going to show you a practise silly word, and I will sound it out for you."

Show the child the first word (ip) on the top of list #1a, keeping all the other words covered. Sound it out "i-p" and then put it together..."ip". Say:

"This word says ip. See, it doesn't make any sense, but that's what I want you to do... sound out these silly nonsense words. We will try the next one together."

Help the child sound out the next practise word (bap), and then say:

"Now I want you to try the next silly words by yourself. Some may be kind of hard, but don't worry,... just try your best."

1. Show the child list 1a (and 1 b if the discontinue criterion has not been met) ONE WORD AT A TIME, keeping the remaining words covered.

2. Allow 10 seconds before moving on to the next word (as the child may be silently or orally sounding out the word).

3. DISCONTINUE AFTER 10 ERRORS...TEY DO NOT HAVE TO BE CONSECUTIVE.

4. BE SURE to write a phonetic approximation of what the child says if the word is read incorrectly as we may score the number of phonemes the child does get reight.
**MY TASK "2" (CHILD READS WORDS)**

**START WITH PRACTISE WORDS "IP" AND "BAP"**

Allow 10 seconds (if needed) before moving on.

Check mark if right, circle word if wrong and write in phonetic approximation of what kid said.

**STOP testing after 10 errors (they don't have to be consecutive)**

<table>
<thead>
<tr>
<th>lod</th>
<th>sim</th>
<th>jat</th>
<th>kug</th>
<th>tep</th>
<th>yub</th>
<th>wid</th>
<th>ven</th>
</tr>
</thead>
<tbody>
<tr>
<td>gack</td>
<td>meed</td>
<td>hosh</td>
<td>saip</td>
<td>foap</td>
<td>corf</td>
<td>roop</td>
<td>rax</td>
</tr>
<tr>
<td>quim</td>
<td>zoit</td>
<td>shang</td>
<td>chig</td>
<td>thap</td>
<td>parn</td>
<td>vout</td>
<td>sarker</td>
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