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Phonological Awareness and Early Reading Achievement

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Abstract

Converging research has begun to inform us how children acquire and use written language in reading and writing. Specifically, research suggests that, regardless of the forms of measurement, phonological awareness is related to reading achievement. While many tasks have been used to operationalize the concept of phonological awareness, few studies have included a sufficiently wide range of items or multiple reading tests within one study. The present study examined a battery of phonological awareness measures to determine the predictive ability of early reading achievement in grade one students (N = 110). The results indicated statistically significant positive correlations between the set of phonological awareness measures and the set of reading achievement measures used. Two of the measures were found to be statistically more powerful in predicting overall reading achievement. The performance profiles of skilled and poor readers indicated significant differences within the phonological awareness measures included in the assessment battery. Limitations of the study, as well as implications for future research and practical applications are discussed.
DEDICATION

This thesis is dedicated with love to my husband, Garry, for his never-ending support, patience, encouragement, and devotion throughout this arduous endeavor.
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Chapter I
Introduction

Since the early 1970s, a convergence of research from a variety of disciplines supports the contention that reading is a language-based activity. From this perspective, reading is viewed as first building upon and extending, then elaborating, and finally modifying the cognitive and language skills that have been developing in tandem during the preschool years (Day, French & Hall, 1987; Juel, 1990; Stoel-Gammon & Dunn, 1985; Sulzby & Teale, 1990; Vygotsky, 1986; Zaporozhets & Elkonin, 1971; Zelazo, 1984). Children bring to the reading task a large pool of linguistic and cognitive resources that need to be orchestrated if the task of deciphering the "squiggles" of written language is to be meaningful. They must learn to suspend the meaning-based processes which have become fine-tuned during oral language development, and focus on the structure of the words. This focus means selectively attending to abstract, acoustically coarticulated units of sound called phonemes which are encoded by the letters used in the alphabetic script of the English language. Most children are able to do this with relative ease and apparent spontaneity which seems to defy the complexity and dynamic nature of the task. This apparent ease of reading acquisition provides support for the language-based theory of reading which maintains that
children draw on and use their language competencies in learning to read.

Experimental evidence and practical experience using diverse approaches to reading instruction continue to indicate that the vast majority of students accomplish the task of transforming the visual cues of written language into verbal communication in a considerably short period of time (Adams, 1990; Clay, 1991, 1993; Ehri, 1990).

Unfortunately, this same body of evidence suggests that a small number of students struggle with reading acquisition, even though they receive the same instructional opportunities and enter the school system fully capable of using and understanding the complexities of oral language. These children do not seem to lack cognitive resources or enthusiasm to continue learning but instead seem to stall when trying to disentangle the communication code contained within our written language system (Stanovich, 1986).

Research from language development, reading acquisition and reading disabilities suggests that phonological processing problems may substantially impede reading acquisition (Johnson, 1979; Mann, 1986; Stanovich, 1988, 1992; Wagner & Torgesen, 1987; Willows, 1992). Apparently, children who are not phonologically aware by the end of kindergarten have difficulty acquiring adequate reading levels by the end of grade two (Blachman, 1991; Juel, 1990; Stanovich, 1988). Further, longitudinal studies of intermediate-grade students and those with learning
disabilities (LD) conclude that those classified as poor readers consistently perform poorly on tasks requiring phonological awareness and verbatim recall (Stanovich, 1988; Torgesen, 1988). Thus, it seems that young children who have problems learning to read, older students who continue to have problems becoming proficient readers, and students with learning disabilities (LD) who struggle continuously to become successful all display an inability to perform well on tasks that require awareness of the tacit phonological information they used so successfully during oral communication.

Fortunately, many early intervention studies using preschool, kindergarten and grade one children have provided evidence to suggest that the development of phonological awareness and more specifically, phoneme awareness can be enhanced through direct instruction. These studies have concluded that early phonological awareness intervention can increase and maintain children's reading achievement levels (Blachman, 1991). However, they also suggest that children who already possess some level of phonological knowledge (e.g. segmentation or blending) do not benefit from participating in direct instructional interventions that focus on these skills (Blachman, 1987). This information supports theoretical claims that children who do not possess initial phonological awareness may be academically "at risk", but also suggests that these children can be helped through early and direct instruction.
Need for the Study

It would appear that there exists a need to assess children's performance on tasks that require phonological awareness. Studies have demonstrated that, as most children grow older, their phonological skills become more refined (Adams, 1990; Fowler, 1991; Liberman & Shankweiler, 1979; Stoel-Gammon & Dunn, 1985; Wagner & Torgesen, 1987). This progressive awareness enables children to analyze and manipulate smaller and smaller segments in the speech stream. While many studies have produced information about the phonological performance of preschool and kindergarten children and how this performance predicts future reading achievement, few studies have focused on the phonological skills of the student who is in the process of acquiring reading proficiency. By identifying children before they enter the negative cycle associated with reading failure and providing them with early, intense and appropriate intervention programs, educators may be able to move children out of their "at risk" status.

Statement of the Problem

The problem is to find a phonological awareness battery that predicts reading achievement and successfully identifies those children who may be at risk. The question
that needs to be answered is: Are there specific phonological processing characteristics that can serve this objective?

The purpose of this study was to examine a battery of phonological processing measures to determine which predict early reading achievement. It was hypothesized that skilled and poor readers in the early stages of acquiring reading would differ in their phonological awareness abilities.

Research Questions

The thesis explores the following research questions:

1. Are phonological awareness skills related to reading achievement in Grade One students?
2. Which phonological tasks are more discriminative in predicting the reading achievement of these students?
3. Are there different profiles of phonological skills between skilled and poor readers?
Chapter II
Review of the Literature

A Changing Perspective on Reading Acquisition

Over the past fifteen to twenty years, converging research has begun to inform us on how children acquire and come to use written language functionally in reading and writing. These researchers have conceptualized reading acquisition, in its most simplistic terms, as either a bottom-up process driven by decoding or a top-down process driven by comprehension, or as Resnick (1979) suggests "...reading as translation (and) reading as language positions..." (p. 322). The question of how children acquire the ability to read has fluctuated between these two aspects without either one being able to fully explain the complex process of early reading (see Adams, 1990). Most recently, there has been a movement toward synthesizing these two processes into an interactive contextual model rather than viewing them in opposition (Adams, 1990; Clay, 1990, 1991; Day, French & Hall, 1985; Ehri, 1990; Gelzheiser & Clark, 1991; Goodman, 1986; Gough & Tunmer, 1986; Johnson & Croasmun, 1991; Juel, 1990; Kamhi & Catts, 1987; Liberman, 1983; McNamara, Miller & Bransford, 1990; Mann, 1986, 1991; Paris & Turner, 1990; Stanovich, 1986b, 1990; Sulzby & Teale, 1990; Wells, 1986; Willow, 1992). For example, current literature discusses the interactive linguistic
components of oral language that the neophyte reader must bring to the task of reading—phonological, morphological, syntactic, and semantic cues (Blachman, 1992; Builder, 1992; Garner, Alexander, & Hare, 1991; Gelzheiser & Clark, 1991; Mann, 1991; Stanovich, 1992). The literature also supports the argument that during their interactions with text, children use their knowledge of oral language to extract meaning through experimentation and approximations of voice to print (Baker, 1986; Clay, 1991; Kamhi & Catts, 1987; Nicholson, Lillas, & Rzoske, 1986; Wells, 1986). When children begin their experimentation with print (either through direct instruction or by discovery), they use their oral language skills to help predict and interpret the visual cues included in the pictures, words, and letters on the page (Clay, 1975, 1985; Ehri, 1990; Stanovich, 1990; Vellutina & Denckla, 1990; Willows, 1991, 1992; Wixson & Lipson, 1990). As they become successful at using oral language cues to monitor for sense and grammar, they begin to integrate the letter cues contained in the text, thus adding orthographic knowledge to their repertoire (Juel, 1990; Liberman, 1983; Stanovich & West, 1989; Sulzby & Teale, 1990; Wagner & Torgesen, 1987; Williams, 1986; Willow, 1991, 1992). As this coordination of processes continues the children begin to develop automaticity: "To think quickly with little awareness of processing information consciously..." (Jones, Palincsar, Ogle & Carr, 1987, p. 22). This automatic processing will be
distinguishable as fluent and reasonably effortless decoding (Garner, Alexander & Hare, 1991; Stanovich, 1990, 1992; Vellutina & Denckla, 1990). Automaticity allows the reader to allocate cognitive resources to text integration, comprehension, and comprehension monitoring which, in turn, provides the neophyte with new information (Bialystok & Ryan, 1985; Builder, 1991; Garner, Alexander & Hare, 1991; Stanovich, 1992).

The neophyte reader brings to the reading process an active and individualistic set of cognitive attributes that have been developing throughout the first five to six years of life (Clay, 1990; Wells, 1986; Vygotsky, 1987). These intra-individual variables include: attention, beliefs, memory, motivation, and social cognition which are considered to be "...skills under construction..."

(Paris, Wasik & Turner, 1990, p. 611). These processes have been gained through experience with social interactions and through oral language during the preschool years. Therefore, children bring to the formal reading activity a complex set of cognitive and language components which assists them in manipulating, interpreting and controlling the components of reading. Moreover, as Groteluschen, Borkowski and Hale (1990) succinctly stated:

Ideally, these components interact during the course of cognitive-social development so as to produce efficient and effective learners who possess a vast repertoire of strategic skills and firmly-held beliefs about their ability to control academic outcomes. (p. 87)
Willows (1992) suggests that the individual differences in the ability to integrate these components should be viewed as part of the "normal variation" of the learning process.

**A Developmental Theory of Reading Acquisition**

Children use oral language skills to help predict and interpret the visual cues or squiggles on the page. These skills help them learn to read in various ways: by rote, by decoding, through contextual guessing, through analogy, and orthographic structure (Adams, 1991; Clay, 1991; Stanovich, 1990). According to Ehri's (1990) theory, these different ways of reading words are not dependent upon how reading is taught but are dependent upon the developmental changes in children as they become more familiar with print. These changes occur during three developmental phases of reading acquisition: logographic, phonologic and orthographic.

The first phase is called logographic because children use "logos" or some visual cue to aid in recalling the word. At this stage, children choose salient features or visual shapes to help them identify words. For example, they may remember the word McDonald, when driving by the restaurant, by using the golden arches symbol; or they may choose salient features like the two eyes in the middle of look. In this way, children learn to read whole words, however, the sight words they develop are limited and context bound. Unknown words cannot be decoded because children have not
yet mastered the letter names or their sounds. Therefore, any change in the context produces either guessing or refusal to read. Any increase in sight vocabulary is generated through paired-associate learning which allows words to be retrieved from memory. However, these words must be practiced frequently and in context because the associated cues are unsystematic and arbitrary. Consequently, it is not unusual to find beginning readers producing synonyms or semantic associations for words that they are learning to read.

As children become more familiar with the new words, they slowly begin to choose more salient features for recognition. The most salient features, according to Treiman (1992), are the onset (initial consonant) and rime (remaining vowel stem). She contends that this division is psychologically natural and easier for children. This may also be the time when children begin to use analogies to known words in order to read (Goswami & Bryant, 1991). Consequently, the initial reading miscues may be meaningless words in the context of what is read. As more letter-sound associations are made the reading errors will contain either some initial or final element depending on which features are deemed most important. This is the time when children begin to use invented spellings for words. These words however, only contain letters that are associated with known sounds. The letters have been connected to words in memory by association with sounds in pronunciation.
The second or phonologic cue phase of reading acquisition occurs when children begin to use grapho-phonemic correspondence rules to assist in pronouncing novel words. This is the time when readers begin to map the individual letters contained in the word to the sounds associated with the letter. The least mature readers will be able to sound out words using their knowledge of the correspondence rules, but will not be able to blend the sounds into words. This means they will be able to segment words into constituent sounds. As they become more familiar with the letter-sound relationship they begin to blend. At first, this procedure is very slow and overt. The children typically progress from overt vocalizing to voiceless lip movements before pronouncing the word. Finally, they are able to produce the word covertly, with rapid and automatic precision. As children generate these letter-sound correspondence rules, they must practice reading words that exemplify these rules. This practice is viewed as building access routes to the words in memory. The letters become visual symbols for the phonemes which are associated with the pronunciation of the words. Consequently, "...the sequence of letters is retained in memory as an alphabetic, phonological representation of the word..." (Ehri, 1990, p.402).

The final or orthographic phase of reading acquisition occurs when letter sequences are pronounced automatically when read. When words learned through the phonological cues
phase are continually practiced and the access routes strengthened, they finally become read as sight words. These sight words are not dependent on unsystematic and arbitrary cues as in the logographic phase but are dependent on systematic phonological cues that access pronunciations quickly and effortlessly. The word is accessed through "...word-specific visual-phonological connections in memory..." (Ehri, 1990, p. 403). At this stage, novel words are read by applying a phonological recoding routine (i.e., sounding out and blending).

Ehri’s theory suggests that researchers should use tasks that can reveal information about the developmental reading phases when trying to predict reading. Her theory suggests that word recognition is the foundation of reading and comprehension should be seen as building upon this foundation. Recent research on word recognition supports this premise (Daneman, 1990; Juel, 1990; McNamara, Miller, & Bransford, 1990; Stanovich, 1990; Sulzby & Teale, 1990).

A Study of Phonological Awareness in Preschool Children

The origins of phonological awareness are not well known. However, one theory is that young children learn about the functional use of language through common linguistic routines during social discourse in the family environment (MacLean, Bryant, & Bradley, 1987). During these common routines they learn to analyze component sound
in words. One example of such a routine is the incidental learning of nursery rhymes during the preschool years.

MacLean, Bryant, and Bradley (1987) undertook a longitudinal study to investigate whether knowledge of nursery rhymes and rhyming was related to phonological awareness skills. Further, they wanted to know if phonological awareness was predictive of reading achievement. The study took place over a 15 month period and included 65 preschool children who were assessed over five sessions. The assessment was done on a one-to-one basis. Information on each family's social and educational history was documented.

Approximately every three months during the 15 month study a session took place in the child's home. During all the sessions, documentation on the child's knowledge of nursery rhymes and the phonological skills of detection and production of rhyme and alliteration were collected. In addition to collecting this information, the British Picture Vocabulary Scale (BPVS) was administered during the first session. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI), which includes an arithmetic subtest, was also given during the third and fourth sessions. A word reading task and a letter recognition task were also administered during the fourth session of the study. When the scores for all the information were analyzed in a five-step fixed order multiple regression, the following results became apparent: IQ and social status did not predict
performance on the phonological skills assessed; there was a significant relationship between a child's knowledge of nursery rhymes and the development of the phonological skills; and the scores of rhyme and alliteration detection were "...related to the beginning of reading words but not to the recognition of alphabetic letters or to early arithmetic skills" (MacLean, Bryant, & Bradley, 1987, p. 278).

This longitudinal study of 3 year olds provides documentation that phonological awareness exists in children as young as three years of age and that these children could make "...judgments about the component sounds in words that they heard or spoke..." (MacLean, Bryant, & Bradley, 1987, p. 266). This study also provided documentation of the predictive power of the phonological skills assessed while casting doubt on the view that phonological awareness is a result of learning to read. These findings have largely been supported by a number of other studies investigating phonological awareness in children (Blachman, 1991; Bryant, MacLean, Bradley, & Crossland, 1990; Lundberg, Frost, & Peterson, 1988; Stanovich, Cunningham, & Cramer, 1984). However, more recent research, also using a longitudinal design, suggests a bi-directional relationship exists between phonological awareness and reading achievement (Torgesen, Wagner, & Rashotte, 1994). That is, the analysis indicated that phonological skills had a significant effect on reading and the prereading skills assessed in
kindergarten were related to subsequent development of phonological skills.

A Longitudinal Study of Phonological Awareness with an Intervention Component

In the early 1980's, Bradley and Bryant (1985) began a four-year longitudinal study to assess whether rhyming skills developed before entering school were related to reading progress, and whether training in these skills would improve reading levels. This study involved 365 children from 43 different schools. These children were divided into two age groups: the Nursery group (N = 104), with a mean age of 4 years, 11 months; and the Primary group (N = 264), with a mean age of 5 years, 6 months. This division was necessary because the phonological test had to be adjusted to meet the cognitive abilities of the two groups. At the beginning of the study, the children were individually assessed on the English Picture Vocabulary (EPVT) and were given the Test of Sound Categorization which had been designed by the researchers. This was a test for detection of alliteration and rhyme and used an oddity measure. For example, the experimenter said two or three words that shared one common sound--initial, medial or final. One word was inserted into the series that did not share the common sound. The task for the child was to choose the odd one. The difference between the tests given to the two groups was
in number only: four year olds were presented with a three word series, while five year olds were presented with four. This was to ensure that the series was not beyond the child's memory capacity and could be eliminated as a factor when considering the results. The researchers asked the child to repeat back the same set of words immediately. Each child, who by the end of the study was eight years of age or older, was given a battery of standardized tests. These included: the Neale Analysis of Reading, which was used to assess accuracy and comprehension; the Schonell Test of Reading, which was used to assess word recognition; the Schonell Test of Spelling; the Wechsler Intelligence Scale for Children Revised (WISC-R); and the National Foundation for Educational Research Test of Mathematical Skills (NFER). The researchers also reassessed the child on the Test of Sound Categorization and memory using the four word lists that were originally given.

The results of this study are somewhat different than those in MacLean et al.'s (1987) study. The results of sound categorization again support the premise that children are aware of sounds in words before they began their formal education in reading and writing. The measure of this phonological skill was consistently related to the reading levels assessed three years later. This relationship existed even after multiple regression was used to remove the influence of IQ and verbal ability. The Nursery group's scores on the sound categorization test were only related to
reading while the Primary groups' scores were related to both the reading and mathematical levels attained by these children.

The researchers also looked at the initial, medial, and final sound scores (called sound conditions by the authors) contained in the categorization test and found that all three accounted for a statistically significant amount of variance in reading. However, there were some variations in the level of influence between the initial and final sound conditions. In the Nursery group, the final condition accounted for most of the variance while, in the Primary group it was the initial condition that accounted for this variance. Again, the researchers found this condition in the Primary group also related to mathematical achievement. Therefore, they concluded that sound categorization is predictive of reading and that the alliterative or initial condition may well act as a measure of ability to learn. This last suggestion, however, needs further empirical support.

As was stated previously, Bradley and Bryant's (1985) study assessed whether specific training of phonological skills would improve reading achievement. The training took place during the second and third year of the longitudinal study and included 40 sessions on a one-to-one basis. Sixty-five children, who scored less than 15 out of 30 on the categorization tests, were selected and placed into four groups: Experimental I (N = 13), Experimental II (N = 13),
Control I \( (N = 26) \), and Control II \( (N = 13) \). The children in all the groups were matched on: sound categorization scores, EPVT scores, sex, and inclusion in either the Primary or Nursery group at the beginning of the project.

Experimental I and II received the same sound categorization training during all 40 sessions. However, the Experimental II group used plastic alphabet letters for the last 20 training sessions. Control I was trained using the same words and pictures as Experimental I and II but, instead of sound categorization, this group was trained to use conceptual categories. The Control II group received no training. The tests administered at the completion of this training component were the same tests used at the end of the longitudinal study.

When IQ and age were controlled the results of the training component displayed statistically significant differences among the groups in reading achievement but not in mathematics. The experimental groups scored significantly better than both the control groups in reading. There were no significant differences between the Experimental I and Experimental II groups in reading, but the Experimental II group surpassed the Experimental I group in spelling. Thus, training in sound categorization had a significant effect on the children's learning to read.

The results of the studies by Bradley and Bryant (1985) and MacLean, Bryant, and Bradley (1987) suggest that phonological awareness is positively related to learning to
read. Bradley and Bryant's (1985) study suggests that when phonological awareness is limited, training in sound categorization can help ameliorate this limited development as well as enhance reading achievement. Findings of these two studies corroborate previous findings on the relationship between reading achievement and phonological awareness (Blachman, 1984; Liberman & Shankweiler, 1979; Mann & Liberman, 1984; Rosner, 1974; Yopp, 1988).

**Phonological Awareness and Reading**

Even though it is now generally accepted that successful reading acquisition entails phonological awareness (Adams, 1990), there remains considerable debate on how these two are linked. The main thrust of this debate comes from the research studies of Bradley and Bryant (1991), Goswami (1988) and Morais (1991). These researchers advance different theories to explain the links between phonological awareness and reading. Bradley and Bryant (1991) maintain that the development of rhyme and alliteration is the antecedent of phoneme awareness which, in turn, plays a role in children's ability to read. This view has been supported by the research of Lundberg, Frost, & Peterson (1988) and Stanovich, Cunningham, & Cramer (1984) and suggests that phonological awareness is a precursor to reading. Goswami's research (1988), on the other hand, suggests that rhyming has a distinct link to reading which
is quite separate from the link between phoneme awareness and reading. Goswami, like Bradley and Bryant, suggests that early sensitivity to rhyme precedes phoneme awareness but maintains that phoneme awareness may have its developmental roots formed during reading instruction. Finally, Morais (1991) proposes that experience with print is the link to phoneme awareness: Phoneme awareness is developed as a direct result of learning to read. He concludes that phoneme awareness will not be evident until reading instruction has begun. These distinct theories based on the development of phonological awareness skills suggest specific predictions about reading. The first theory suggests that rhyme, alliteration and phoneme awareness skills will be related to reading achievement. The second theory suggests that rhyme and phoneme awareness will be related to reading achievement but in distinctly different ways. The third theory suggests that only phoneme awareness will be related to reading.

Assessment Tasks

Blachman (1991) concluded, after an extensive review of intervention research, that assessment tools should include rhyme detection and production tasks when assessing young children. She also suggested that, while kindergarten children may have difficulty tapping or counting out phonemes, grade one students should be able to count
phonemes, segment two- and three-phoneme items, and delete phonemes from CVC words. According to Blachman, grade one students should have these skills well established and should be able to manipulate words above the three-phoneme level.

From a practical aspect, an assessment battery should include tasks that are useful in determining which students have acquired the necessary skills to promote successful reading. Phonological awareness skills that have been related to reading achievement included tasks of rhyming, alliteration and phoneme detection. The present study included two rhyming tasks (rhyme recognition and production), two alliteration tasks (alliteration recognition and production) and three phoneme detection tasks (segmentation, blending and deletion). They were determined to be relevant to the study after a review of the literature that used phonological tasks to operationalize phonological awareness (Blachman, 1991; Lewkowicz, 1980; Wagner & Torgesen, 1987; Yopp, 1988). Specifically, they are tasks that have previously been used to assess phonological awareness and were linked to successful remedial interventions. Although blending tasks are seldom used in studies addressing phonological awareness, researchers suggest that if relationships to word decoding or recoding are being determined, then blending along with segmentation are essential tasks to include (Ehri, 1992; Lewkowicz, 1980).
Two memory tasks were included in the study. Research on older skilled and poor readers has shown that many of the poor readers who exhibit difficulty with the phonological awareness tasks also have problems with short-term memory tasks (Stanovich, 1988). Studies using digit span tasks suggests that these measures can identify students whose reading problems are associated with poor recall of verbally presented information (Torgesen, 1988). Therefore, a memory component including a digit span measure and sequenced verbal information was included to assist in the analysis.

A concern has been raised in the research on reading behaviors. It revolves around the narrow focus used to assess reading performance in many of the studies (Blachman, 1987). These studies operationalize reading as scores obtained on an isolated word recognition task. Many researchers maintain that this is not the only appropriate measure of reading (Adams, 1990; Clay, 1992; Daneman, 1990; Ehri, 1990; McNarmara, Miller & Bransford, 1990; Stanovich, 1990). Few studies include information on other reading behaviors such as word recognition in context or accurate and fluent oral reading (Blachman, 1987). These are the general behaviors that classroom teachers use as indicators of a student's reading ability; therefore, tasks that assess these reading behaviors were included as achievement variables in the study.
Chapter III

Method

Students

The grade one students in this study were drawn from two schools located within a mile of each other in the city of Surrey, British Columbia. These two schools were selected on the basis of being neighborhood schools of similar size, servicing multicultural communities and having similar socio-economic strata. Both of the schools had a student population slightly above five hundred and had support programs to meet the needs of English as a Second Language students and special needs students.

The students' teachers varied in experience and years of service, although both schools had a fairly high proportion of veteran teachers. At any given grade level there were two or more classroom teachers using a variety of teaching methods. One school had six family-grouped classrooms composed of grade one and two students while the other school had four self-contained grade one classrooms. All ten classrooms had female teachers. Two classrooms, one from each school, had teachers who were job-sharing. Some of the teachers had decided to teach reading using a literature-based approach while some had decided to use a more traditional phonics oriented approach. All the teachers were accepting of each other's style and teaching
choices, and the climate of the two schools was warm and friendly.

The student sample was chosen from the grade one population at both schools. All the English speaking students not identified for either of the support programs were selected. Originally this selection was composed of 120 students. A few moved and others were not present for both sessions, so the sample was reduced to 110 students whose average age was 6 years 3 months. Of these, 57 were male and 53 were female.

**Measures**

**Phonological Awareness Tasks**

1. *Rhyme Oddity* (MacLean, Bryant, & Bradley, 1987). This measures whether the child can detect rhyme. This was a 10-item measure in which each item presented three words represented as drawings to reduce memory load (see Appendix A). Line drawings representing the three words were pasted onto 5 cm X 8 cm tag board and these were pasted in a line onto a large sheet of paper. (This facilitated sequencing the sets of pictures for each presentation.)

The game was introduced according to a protocol (see Appendix B). The researcher placed a covered sheet containing the sequenced cards in front of the child. When the first row of cards was exposed, the researcher pointed
to each word as the word was spoken. The child was told to repeat each word after the researcher. The child was then prompted, "Which one doesn't rhyme?" Prompting was not given if the child independently responded after repeating the three words.

Two practice trials were presented to ensure that the child understood the task. During the practice trials, corrective feedback was given. However, feedback was not given for any of the 10 test items. Each child's response was recorded and a score of 1 was given for a correct choice and 0 for an incorrect choice. This created a scoring range of 0 to 10.

2. **Rhyme Production** (MacLean, Bryant, & Bradley, 1987). This task measures if the child can produce rhyme. This task included a total of five rhyming words and was presented to the child as, "Now we are going to play another game. This time I'm going to say a word and ask you to tell me a word that rhymes with it." The trials began when the child was asked "Tell me a word that rhymes with (e.g., goat)." Each child's response was recorded and a score of 1 was given for a rhyme, regardless of sense, and 0 for no rhyme production. The scoring range for this task was 0 to 5.

3. **Alliteration Oddity** (MacLean, Bryant, & Bradley, 1987). This task measures if the child can detect alliteration. The procedure was identical to the rhyme detection task with the exception of the words (see Appendix A). Two practice trials were presented to ensure that the child understood
the task. During the practice trials, corrective feedback was given. However, feedback was not given for any of the 10 test items. The game was introduced with "This next game is a little different. We are going to play a game with three pictures, like the first game we played. This time, two of the picture words have the same sound at the beginning and one doesn't. Your job is to find the one that doesn't start with the same sound as the others. Let's try some." Each child's response was recorded and a score of 1 was given for a correct response and 0 for an incorrect response. The scoring range for this task was 0 to 10.

4. Alliteration Production (MacLean, Bryant & Bradley, 1987). This task measures if the child can produce a word that begins like the target word. Again, the same procedure was followed as with the rhyme production with the exception of the words. The game trials began with "Tell me a word that begins like (e.g., fox)." Each child's response was recorded and a score of 1 was given for a word that began the same as the target word and 0 for no alliteration. The scoring range for this task was 0 to 5.

5. Blending (Sturn modification). This task was adapted for the present study from the Roswell-Chall Auditory Blending Test (1963) to measure the child's ability to blend isolated sounds into words. It consisted of five CVC words (i.e., consonant-vowel-consonant words), three CCVC words which were presented as three phonemes and two CCVC that were presented as four phonemes. The blending game was presented
as the researcher said, "Listen. I can say a word slowly, /HAM/ /BUR/ /GER/. I can say it fast, /HAMBURGER/. I'll say it slowly, /HAM/ /BUR/ /GER/. You say it fast." The researcher began with practice trials of three- then two-syllable blending (see Appendix B). After these practice trials the researcher proceeded to the blending task. The two practice trials of CVC blending began with "I can say a word slowly /m/, /o/, /m/. Now I can say it fast, mom. I'll say it again slowly, /m/, /o/, /m/. Now you say it fast." This was repeated for the word, dad. A 10 item test began immediately after this presentation. Each child's response was recorded and a score of 1 was given for a correct response and 0 for an incorrect response. The scoring range for this task was 0 to 10.

6. *Segmentation* (Warrick & Rubin, 1992). This task measures if the child can isolate the phonemes in two-, three- and four-phoneme words. Prior to presenting this task the child was given a four single-colored multifix-cube stack and asked to break it apart and count the cubes for the researcher. This preamble was provided to ensure that the child had the concept of 1:1 correspondence. The blocks used in this task provided a visual-tactile aid to assist in segmenting phonemes. The words were non-words and were presented orally to the child. The game was introduced with the researcher saying, "Now we are going to play a word game using the blocks. Here, I'll show you. I can say /at/. Now I'll show you how many parts /at/ has. (The researcher
moved one block for each phoneme as she repeated the word.)
Okay, now it's your turn. Say /at/. Now say it again and
show me how many parts it has." This procedure was repeated
for /fat/. The practice session was followed by a 10 item
test using non-words. Each child's response was recorded
and a score of 1 was given for each word segmented correctly
and 0 for each incorrectly segmented word. The scoring
range for this task was 0 to 10.
7. Deletion (Rosner, 1975). This task measures the child's
ability to delete phonemes from the beginning, middle and
end of words. The two practice trials included deleting one
syllable from a two-syllable word and followed this model,
"Say sunshine. Now say it again, but don't say shine."
These syllable deletion trials were immediately followed by
10 items using the model "Say meat. Now say it again, but
don't say /m/." Each child's response was recorded and a
score of 1 was given for a correct response and 0 for an
incorrect response. The scoring range for this task was 0 to
10.

Memory Tasks

1. Digit Span Memory (Spencer, 1958). This test was
selected because it parallels the Wechsler Intelligence
Scale for Children (WISC-III, 1991) without jeopardizing
copyright laws, and school psychologists have reported that
the results are comparable to the scores on the digit span measures of the WISC-III (see Appendix C).

The researcher read aloud a series of number sequences. Each block consisted of three items that contained the same number of digits but used different numbers. For the digits forward items, the child repeated the numbers in the same order as presented by the researcher. For the digits backward, the child was asked to recall the digits backward. The digits were presented at one second intervals in a clear voice with uniform emphasis on all digits. To begin the digits forward task, the researcher said, "I am going to say some numbers. Listen carefully and when I am finished, you say them." The researcher prepared the child with "Let's try some. If I say 2 - 9, you say __." To begin the digits backward task, the researcher said, "Now I am going to say some more numbers, but this time when I stop, I want you to say them backwards. Let's try some. If I say 8 - 2, you say __." If the reply was correct, one more sample was given to ensure that the child understood the task. If the response was incorrect, then the researcher modeled the response required and continued with the second example. After two samples were tried, the researcher administered the test. The test was discontinued after the child failed two items in any block. The child's responses were recorded and a score of 1 was given for each correct trial and 0 for each incorrect trial. The ranges of scores for this task were 0 to 10.
2. *Sentence Memory* (Spencer & MacGrady, 1964). This test was selected because it parallels the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-R, 1990) without jeopardizing copyright laws and produces scores comparable to those on the Sentence measures of the WPPSI-R.

The sentence memory task required the student to repeat verbatim a sentence that was read aloud. After making sure that the student was attending, the researcher read a sentence slowly and distinctly with a natural intonation. Each sentence was read once. Testing was stopped after three consecutive failures. The researcher began the test sample by saying "I want you to say something for me. Say 'big boy' (for a male student)/ 'big girl' (for a female student)." Time was allowed for a response. The researcher then said, "Now say, I am a big boy (girl)." Again, response time was provided. Then the first sentence of the test was presented by saying, "Now, say __." The child's responses were recorded and a score of 1 was given for each sentence correctly repeated and 0 for an incorrect sentence. Changes in word order, omissions, substitutions or additions were considered to be errors. The range of scores for this task was 0 to 10.

**Achievement Measures**

1. *San Diego Quick Assessment* (LaPray & Ross, 1969). This is a graded word list that is used in many local school
districts as a quick method of gauging a student's reading level and to detect word analysis difficulties (see Appendix D). A quotation from the cover sheet provided by the district says "...The list is said to be remarkably accurate when used for these purposes...", although information on standardization, norming sample, validity and reliability is not available. (This test is very similar to the Word Identification subtest of the Woodcock Reading Mastery Tests.) It was used as a measure of word recognition in this study.

The test begins when the researcher presents the first of three graded lists to the student. As the first word list was presented, the researcher said, "I would like you to read some words for me. You tell me the word when I point to it." If the student was unable to produce a word by sight, the student was asked if (s)he could figure out the word. When three consecutive words were missed in a list, the test was discontinued. The responses were recorded and the student was given a score of 1 for each correctly read word and 0 for any words that needed to be analyzed. Because the children were assessed during February of the school year, only the preprimer, primer and grade one word lists were used. Therefore, a scoring range from 0 to 30 was used.

2. Story was the 1A Oral Reading subtest from the Durrell Analysis of Reading Difficulties (Durrell & Catterson, 1980). Although the norms for this test are out-dated, it
is used locally as a prereferral reading test. The subtest contains 21 words of connected prose, has five comprehension questions to answer, and is timed. The researcher recorded the student's errors, timed the student's reading, and asked the comprehension questions that were attached to the passage. For this study, the number of words read correctly in context was used as a score for reading. This provided a scoring range for Story of 0 to 21.

3. **Cloze** was the first nine sentences from the Passage Comprehension Subtest of the B. C. QUIET (Wormeli, 1983). The B. C. QUIET was normed on 150 British Columbia pupils at each elementary grade level. The Passage Comprehension subtest uses items selected from the Ginn 720 series which was the required reading series at the time the B. C. Quiet was designed. The internal consistency reliability coefficient for the Grade 2 level is $r = .90$ but there were no reliability coefficients provided for Grade 1.

The test began when the researcher placed the booklet in front of the student saying, "On this test you are going to read some sentences to yourself and figure out the missing word. I want you to read this sentence silently and print the word that will go in the blank and make sense." If the student did not comply with the directions within a few seconds, the researcher asked the child to read the sentence orally and then print the word. Each word that matched the key for the sentence was given a score of 1 if it contained enough recognizable letters to distinguish the
word (e.g., pond for pond or water). This provided a scoring range of 0 to 9.

**Procedure**

The phonological assessment battery along with two memory tasks were administered to the students in each school on an individual basis during a one week period. After all the grade one students in the first school had been tested, the researcher tested the students at the second school. A period of three weeks between the first session and the second session was allowed to lapse. At the second session, the researcher re-administered the phonological assessment battery to the students and then administered the achievement tests to each student.

Before the students were pulled-out of their respective classrooms, their teachers met the researcher and were asked to tell the students that the researcher was a teacher who was going to play some word games with them. Before the children were taken from the room by the researcher, they were asked if they would like to play some games and given an opportunity to decline. None of the students declined and each came willingly and participated enthusiastically.

The session began with a warm-up activity using Nursery Rhymes. The researcher said to each child "Children who are learning to read usually know a lot of things about reading. One of the things they know is Nursery Rhymes."
Can you say the Jack and Jill nursery rhyme?" If there was no response, the researcher asked the child if (s)he knew Humpty Dumpty or Twinkle, Twinkle Little Star. When the child repeated one of the nursery rhymes, the researcher reviewed the rhyming words with the child using the Protocol in Appendix C. Each child knew at least one of the nursery rhymes selected and was only rehearsed on one nursery rhyme. The child was then presented with the tasks.

None of the children showed any undue concern with errors nor did they hesitate telling the researcher that they couldn't do a specific task. They willingly tried to continue when asked to attempt one or two more items and none of them asked to return to the classroom before the session concluded. Each student came back during the second session, happily expecting to play the games and some even asked if they could do it again when the session was over.

Some students were absent during the days that their classmates were being tested. On the other days that the researcher was at the school, every effort was made to include those formerly absent students in the current group of students being tested.
Chapter IV
Results and Discussion

Test Reliabilities

It seemed prudent to determine each measure's reliability before investigating the predictive validity of the phonological awareness tasks used in this study. A Cronbach's coefficient alpha was computed using data from each of the tasks. The results are displayed in the diagonal of Table 1. The reliabilities of the phonological awareness measures ranged from .66 to .88 at time 1. Reliabilities for the second administration of the tasks (time 2) closely resemble those at time 1. In general, the internal consistency of each of the seven phonological awareness tasks ranged from low-moderate .66 to high .91 with a median reliability of .80 at both time 1 and time 2.

The phonological awareness tasks were administered twice with a delay of approximately three weeks, thereby allowing a test-retest reliability to be calculated. Furthermore, a t-test for correlated means was calculated to determine whether there were any statistically significant differences between the mean scores at time 1 and time 2. The test-retest coefficients exhibit the same magnitudes and range as the Cronbach alphas (i.e., low-moderate, $r = .66$, to high, $r = .91$). All the coefficients were statistically significant ($p < .01$). The only task on which means were
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Alpha reliability coefficients are on the diagonal.  
* p < .05.  
** p = .01.
statistically different across administrations was MacLean, Bryant, and Bradley's (1987) alliteration oddity test, \( t(109) = -2.45, p < .02 \). The other tasks, however, displayed no statistically detectable differences between the mean scores from time 1 to time 2. The generally moderate to high internal consistency and stability of these measures over time, and the general absence of differences between the means suggest that the tasks exhibit reliability and stability. Therefore, only data from tasks at time 1 will be examined.

Yopp (1988), in her study to determine the reliability of a wide array of phonological awareness tests, suggests that test reliability should be an important consideration when selecting tests for research use. She further suggests that only measures with a reliability coefficient of .85 or higher should be used when making decisions about individuals. She does not, however, provide information about measures that would be relevant for making group predictions. Borg and Gall (1983), on the other hand, suggest that educational studies rarely yield reliability coefficients of this magnitude. Consequently, they suggest those predictor variables with reliability coefficients ranging between .65 and .85 are sufficiently accurate for most group prediction purposes, noting that coefficients closer to the top end of this range are more useful and provide a greater degree of accuracy. Borg and Gall's advice was adopted for this study.
Task Comparisons

Descriptive statistics describing the distribution of scores on each of the independent measures are presented in Table 2. These statistics reveal several features. The first feature concerns the two memory component tasks that were administered only once in the study. The means and standard deviations for both digit span and sentence memory suggest that the students participating in this study can recall verbal information fairly accurately. These tasks are characterized by a negative skew indicating that most of the students found these tasks to be fairly easy but some of

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</tr>
<tr>
<td>SENTMem</td>
<td>7.39</td>
<td>1.50</td>
<td>1.83</td>
<td>-.65</td>
</tr>
<tr>
<td>RHYming</td>
<td>7.25</td>
<td>2.33</td>
<td>-.01</td>
<td>-.85</td>
</tr>
<tr>
<td>RHYming2</td>
<td>7.55</td>
<td>2.20</td>
<td>.05</td>
<td>-.84</td>
</tr>
<tr>
<td>Rhyme PROduction</td>
<td>3.66</td>
<td>1.40</td>
<td>.50</td>
<td>-1.10</td>
</tr>
<tr>
<td>Rhyme PROduction2</td>
<td>4.20</td>
<td>1.25</td>
<td>.46</td>
<td>-1.89</td>
</tr>
<tr>
<td>ALL ITERATION</td>
<td>7.80</td>
<td>2.30</td>
<td>-.03</td>
<td>-.93</td>
</tr>
<tr>
<td>ALL ITERATION2</td>
<td>8.23</td>
<td>2.23</td>
<td>.23</td>
<td>-1.17</td>
</tr>
<tr>
<td>Allit PROduction</td>
<td>2.24</td>
<td>1.59</td>
<td>-1.50</td>
<td>-.23</td>
</tr>
<tr>
<td>Allit PROduction2</td>
<td>2.80</td>
<td>1.84</td>
<td>-1.40</td>
<td>-.30</td>
</tr>
<tr>
<td>BLENDING</td>
<td>4.70</td>
<td>3.38</td>
<td>-1.41</td>
<td>-.22</td>
</tr>
<tr>
<td>BLENDING2</td>
<td>5.81</td>
<td>3.54</td>
<td>-1.22</td>
<td>-.54</td>
</tr>
<tr>
<td>SEGMENTING</td>
<td>4.61</td>
<td>2.75</td>
<td>-.93</td>
<td>-.01</td>
</tr>
<tr>
<td>SEGMENTING2</td>
<td>5.49</td>
<td>2.43</td>
<td>-.66</td>
<td>-.43</td>
</tr>
<tr>
<td>DELETION</td>
<td>3.88</td>
<td>3.17</td>
<td>-1.05</td>
<td>.37</td>
</tr>
<tr>
<td>DELETION2</td>
<td>4.84</td>
<td>2.90</td>
<td>-.89</td>
<td>-.08</td>
</tr>
</tbody>
</table>
the students' scores fell within the lower tail of the distribution.

The descriptive statistics for the first four phonological tasks at time 1 suggest a somewhat different pattern of distribution from the memory tasks. The easiest tasks in the phonological awareness battery are, in order of ease: alliteration oddity, rhyme production, rhyme oddity and alliteration production. Alliteration oddity, rhyme production and rhyme oddity are characterized by larger negative skews than the memory tasks. This, again, suggests that these tasks were easy for the majority of the students. The kurtosis for each of these tasks is rather small, suggesting a distribution curve representative of a low sloping J. The mean score for the tasks along with the skew and kurtosis provides evidence to suspect that the students' performance on these tasks was close to ceiling. The modal score for alliteration oddity was 10 and was achieved by 35 students while the next most frequent score was 9, achieved by 21 students. Altogether, 51% of the students scored 9 or more on this task while 36% scored 9 or more on the rhyme oddity task. The modal score for rhyme production was 5, the maximum score for this task, and was reached by 35% of the students. Although alliteration production does not appear to exhibit a ceiling effect with a mean of 2.24 (SD = 1.59) out of a possible 5, an examination of the frequency distribution suggests otherwise. The median score was 3 while the modal score was 5, which was achieved by 33% of
the sample population. These results, generally, indicate a superior performance by the students on the rhyme and alliteration tasks contained in this battery.

The last three phonological awareness tasks administered to the subjects present a third pattern. The tasks, in order of ease, are: blending, segmentation and deletion. Although blending appears to be the easiest, the modal score of 0 suggests that a large number of the subjects found this task extremely difficult: 22% of the students scored zero while 50% scored at or above the median score of 5. Segmentation, on the other hand, produced a lower median score of 4.5 with only 9% scoring zero. These scores suggest a more symmetric, although platykurtic distribution, and this is corroborated by the skew and kurtosis. The median score for deletion was 3.5 with 21% achieving zero. This pattern of heavy loading on the lower scores is similar to the blending task, however, the skew and kurtosis for this task suggest it may be more evenly distributed than blending. These scores imply that blending, segmentation and deletion are more difficult than rhyme, rhyme production, alliteration and alliteration production for a majority of the students.

These patterns of apparent ease on the rhyming and alliteration tasks followed by progressive difficulty on tasks that require specific phonemic awareness are also reported in previous research (Bryant, Bradley, MacLean, & Crossland, 1990; Lundberg, Frost, & Peterson, 1988:}
Stanovich, Cunningham, & Cramer 1984; Yopp, 1988).
Stanovich and associates (1984) found that three of their rhyming tasks produced ceiling effects while the strip consonant test, which is a type of deletion task, clearly exceeded the kindergarten children's "... cognitive and phonological analysis capabilities...." (p. 182). In the present study, the deletion task did not exceed the students' capabilities but it appears to be the hardest task for them to perform successfully. Yopp (1988) found that the beginning readers in her study had more difficulty with blending, segmentation and deletion. This pattern of more difficulty with phonemic management is also reported by Rosner (1975), Bryant, Bradley, MacLean and Crossland (1990), and Warrick and Rubin (1992). Therefore, it is not surprising to find that the majority of the students at the grade one level should find blending, segmentation and deletion tasks more difficult than those of rhyming and alliteration. Given the moderate reliability of the tasks and the restricted range of the first four tasks due to suspected ceiling effects, the intercorrelations of these tasks may be somewhat lower than anticipated based on previous studies.

The negative skews for many of the measures called for a re-examination of the data. An examination of each measure's frequency distribution and all bivariate scatterplots revealed that there were a few students who could be considered univariate outliers when scores at ±3
standard deviations were used. Unfortunately, the students did not consistently demonstrate outlier status across all the tasks. A review of the responses to the tasks revealed that the students were not demonstrating an inability to follow directions nor had they misinterpreted the requirements of the task. They were, however, demonstrating an inability to carry out the specifics of the given task. A recalculation, with these students removed, did not change the correlations of the tasks by more than a few tenths. Therefore, it was determined not to remove these students from the study.

**Interrelationship of the Phonological Tasks**

The correlation matrix in Table 1 shows that almost all the phonological awareness tasks are statistically and significantly interrelated. The phonological awareness tasks exhibited small to moderate relationships with each other. The only exception was rhyme production which did not correlate detectably with alliteration production ($r = .09$). The tasks that correlate the highest at time 1 were blending with segmentation ($r = .62$) and deletion ($r = .58$). The blending task produced the most stable set of correlations with the rhyme and alliteration tasks: rhyme oddity ($r = .31$), alliteration oddity ($r = .34$), rhyme production ($r = .34$), and alliteration production ($r = .39$). Deletion, on the other hand, seemed to exhibit less
consistent interrelationships ranging from .34 to .52. Generally, the phonological awareness tasks displayed small to moderately high correlations suggesting that they shared some common variance.

In order to understand the pattern of interrelationship among the observed variables, a principal component analysis with a varimax rotation was carried out using the statistics in Table 1. Table 3 displays the factor loadings, which converged in three iterations. Only the first two factors exceeded the eigenvalue >1.0 criterion. (The eigenvalue of

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Factor Loadings of Phonological Awareness Tasks after Varimax Rotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Factor 1</td>
</tr>
<tr>
<td>Rhyme Oddity (MacLean, Bryant &amp; Bradley, 1987)</td>
<td>.74</td>
</tr>
<tr>
<td>Rhyme Production (MacLean, Bryant &amp; Bradley, 1987)</td>
<td>.06</td>
</tr>
<tr>
<td>Alliteration Oddity (MacLean, Bryant &amp; Bradley, 1987)</td>
<td>.82</td>
</tr>
<tr>
<td>Alliteration Production (MacLean, Bryant &amp; Bradley, 1987)</td>
<td>.72</td>
</tr>
<tr>
<td>Blending (Sturn Modification)</td>
<td>.35</td>
</tr>
<tr>
<td>Segmentation (Warrick &amp; Rubin, 1992)</td>
<td>.21</td>
</tr>
<tr>
<td>Deletion (Rosner, 1975)</td>
<td>.65</td>
</tr>
<tr>
<td>Total Variance</td>
<td>47.7</td>
</tr>
</tbody>
</table>
the third factor was .853.) Together these two factors accounted for 47.7% and 14.9% (total 62.7%) of the common variance in the variables.

MacLean, Bryant and Bradley's (1987) rhyme oddity, alliteration oddity, and alliteration production tasks all load highly on Factor 1 and only slightly on Factor 2. Their rhyme production, Sturn's modification of blending, and Warrick and Rubin's (1992) segmentation task all load highly on Factor 2 and slightly on Factor 1. Rosner's (1975) deletion task, on the other hand, is the only task to load moderately on both factors.

The above finding replicates previous findings by Yopp (1988) and Lundberg and associates (1984) but not those of Stanovich and colleagues (1984) who reported finding only one underlying factor. Yopp (1988) reported that rhyming ability was minimally involved with two factors while deletion was heavily loaded on a factor reflecting compound phonemic awareness. This contradicts the present results.

An examination of the cognitive requirements of the tasks was carried out to understand the discrepancies (see Yopp, 1988, p. 173). This examination revealed that each of the phonological tasks used in this study required more steps than Yopp's simple phonological awareness tasks and should be considered as compound phonological awareness tasks. Three processes seem to differentiate the tasks in Factor 1 from those in Factor 2: blending, sequencing and discriminating sounds. This differentiation seems to
suggest a cognitive difference in the way the words are being analyzed (Adam, 1990; Ehri, 1990; Hume, 1989; Liberman & Shankweiler, 1979; Nichelli & Cubelli, 1989; Snowling, 1989). All the tasks required the students to mentally manipulate individual sounds within words but the tasks loading on Factor 1 rely on a quick, immediate phonological access to a word while those loading on Factor 2 require quick and immediate analysis of a word at the phonetic articulation level. Deletion, which loaded moderately on both factors, relied first on the ability to recognize a word and then on the ability to analyze it. Moreover, a sound had to be deleted before blending the remaining sounds together to produce a new word. This further supports the assertion that there may be two different although related processes being used to recognize words: Phonological access for familiar words and phonetic articulation for novel words.

Generally, the correlations and the statistics that describe the difficulty of tasks parallel results from previous research on phonological awareness in young and school-aged children. All the tests were significantly and positively correlated. Rhyming and alliteration were the easiest tasks for these students while phonemic blending, segmentation, and deletion were the most difficult. However, the study differs in the interpretation of the two underlying factors associated with the construct of phonological awareness.
Canonical Correlational Analysis

Canonical correlational analysis, like multiple regression, is useful in answering questions about the strength and nature of relationships. However, unlike multiple regression that determines relationships between a set of predictor variables and one criterion measure, canonical analysis is the multivariate model that facilitates the study of interrelationships among a set of predictors and multiple criterion measures. The canonical correlational analysis was generated by SPSS (Statistical Package for the Social Sciences, Nie, 1983), and was used to investigate the research questions of this study.

1. Are phonological awareness skills related to reading achievement in grade one students?

The phonological awareness set measured the ability to recognize rhyme (Rhyme), produce rhyme (RhyPro), recognize alliteration (Alliteration), and produce alliteration (AllPro). It also measured the ability to blend two-, three- and four-phoneme words (Blending), segment two-, three and four-phoneme words (Segment) and delete a phoneme from the beginning, middle or end of words (Deletion). The reading achievement set measured the ability to decode words from a graded word list (Word), read words in connected
prose (Story) and generate and print a meaningful word to complete a sentence (Cloze).

Multivariate tests of significance were calculated within the canonical analysis. With all three canonical functions included, the F approximation to Wilks' Lambda multivariate test was significant, $F(21, 288) = 4.90, p < .001$. When the first canonical function was removed, the F approximation to Wilks' Lambda was still significant, $F(12, 202) = 2.28, p = .01$. However, with the first two canonical functions removed the F value for the third function was not significant, $F(5, 102) = 1.17, p = .33$. Therefore, only the first two pair of canonical variates were used to interpret the strength of the relationship between the phonological awareness set and the reading achievement set.

The canonical correlations, which measure the strength of the overall relationship, represent the bivariate correlation between the two linear composites contained within each canonical function (Hair, Anderson, Tatham, & Grablewsky, 1984, p. 179). The correlation for the first pair of canonical variates was .68 which represented 46% of the overlapping variance between the phonological and achievement sets. The canonical correlation for the second pair of canonical variates was .42 which represented 18% of the overlapping variance between the pair of variates. These results suggest a relatively strong relationship between the set of phonological awareness tasks and the
reading achievement tasks. Table 4 displays the results of the canonical correlational analysis. The correlations between the original measures and the canonical variates are provided as well as the standardized canonical weights for each of the variables. Percent of variable-variates variance and a redundancy index for each variate are also provided to assist in interpreting the relationships.

Table 4
Results of the Canonical Correlational Analysis between the Phonological Awareness Set and the Reading Achievement Set

<table>
<thead>
<tr>
<th></th>
<th>First function</th>
<th>Second function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correlation</td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phonological Set</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyme</td>
<td>.56</td>
<td>.20</td>
</tr>
<tr>
<td>Rhyme Production</td>
<td>.64</td>
<td>.30</td>
</tr>
<tr>
<td>Alliteration</td>
<td>.44</td>
<td>-.13</td>
</tr>
<tr>
<td>Alliteration Production</td>
<td>.54</td>
<td>.19</td>
</tr>
<tr>
<td>Blending</td>
<td>.76</td>
<td>.17</td>
</tr>
<tr>
<td>Segmentation</td>
<td>.83</td>
<td>.42</td>
</tr>
<tr>
<td>Deletion</td>
<td>.73</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td><strong>Percent of Variance</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td><strong>Achievement Set</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td>.79</td>
<td>-.36</td>
</tr>
<tr>
<td>Story</td>
<td>.97</td>
<td>1.05</td>
</tr>
<tr>
<td>Cloze</td>
<td>.78</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td><strong>Percent of variance</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Canonical Correlation</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.46</td>
<td></td>
</tr>
</tbody>
</table>
The first canonical variates account for 43% of the total variance in the phonological awareness set and 72% of the total variance in the achievement set. The second canonical variates account for an additional 11% of the total variance in the phonological set and an additional 16% in the achievement set. In all, both pairs of canonical variates account for 54% of the total variance in the phonological awareness set and 88% of the total variance in the reading achievement set.

The redundancy indices for the first canonical variates reveal that the phonological awareness set helps to explain 20% of the variance in the achievement set while the achievement set explains 34% of the variance in the phonological set. The redundancy indices for the second canonical variates reveal that the phonological set helps to explain only 2% more of the variance in the achievement set while only explaining 3% more of the variance in the phonological set. In all, the redundancy index for the phonological awareness set helps to explain 22% of the variance of the achievement set while 37% of the total variance in the phonological set is explained by the redundancy index for the achievement set.

The size of the canonical correlation for the first variate (.68) along with the percent of variance and redundancy indices suggests that the canonical analysis is more efficient for the phonological and achievement sets in this function. Although the size of the canonical
correlation of the second function suggests that a statistically detectable relationship exists between the phonological set and the achievement set, the variates add limited amounts to the total variance and negligible amounts to the total redundancy index. The interpretation of the second pair of canonical variates, which are derived from residual variance, should proceed with caution.

Thus, taking the magnitude of canonical correlations, the proportion of shared variance and the redundancy indices into consideration, the set of phonological awareness variables was able to predict the set of reading achievement variables included in this study.

2. Which phonological awareness tasks in the assessment battery are most discriminative in predicting the reading achievement in grade one students?

The coefficient weights in Table 4 were used to compare the relative importance of the phonological variables to the canonical relationship. Noting the sign and magnitude of each standardized canonical weight assigned to the phonological variables and using rank order of importance, it appears that segmentation (.42) contributes more to the predictive accuracy of the first canonical function than do the other phonological measures. The phonological variables that contribute most to the predictive accuracy of the second function are deletion (.72) and segmentation (-.70).
These two significant predictors have previously been found to be more powerful in predicting reading achievement in students at the grade one level (Blachman, 1984; Bryant, MacLean, Bradley, & Crossland, 1990; Goswani & Bryant, 1991; Mann & Liberman, 1984; Yopp, 1988). Collectively, these two variables were more discriminative in predicting the reading achievement of these grade one students.

3. Are there differential profiles between skilled and poor readers?

Poor readers are usually identified by classroom teachers as those who can only read a few sight words in isolation, who read only familiar words in context and cannot systematically represent (i.e., print) the words they read. Scores that reflect these behaviors should be used as criteria for selecting poor readers from a heterogeneous reading group. Therefore, Word (reading words in isolation) was the first criterion. Students scoring 10 or less, which is the ceiling score on the preprimer list, were identified. The second variable was Story (reading words in context). Again, scores of 10 or less were identified, which should reflect limited ability to read familiar words in context. Finally, Cloze (printing a word to complete a sentence) was used. Students who scored 3 or less, which is the lowest percentile score given in the manual, were identified.
Twenty-four students (18 male and 6 female) were identified using these three criteria simultaneously.

In order to provide a similar number of students for the skilled reading group, a similar selection process was used. Skilled readers are usually defined as those who have a large sight vocabulary, read words accurately in context, and can systematically represent the words they read. The scores on the achievement measures should reflect these behaviors. Therefore, scores of 22 or more on Word were used, which reflects the basal score for the Grade 1 word list. The scores on Story were 20 or more, which reflects the ability to accurately read all but two words in the Grade 1 reading passage, while the scores on Cloze were 6 or more, which is the 25th percentile score for this measure. This produced a composite skilled readers' group of 23 students (10 male and 13 female). The remaining 63 students (29 male and 34 female) were included in the average readers' group. An inspection of the frequency distribution supports the use of these arbitrarily selected scores. Table 5 displays a summary of the mean scores and standard deviations for each identified group on each of the achievement variables.
TABLE 5
Summary of Reading Groups Mean Scores on the Achievement Variables

<table>
<thead>
<tr>
<th>Achievement Variables</th>
<th>WORD</th>
<th>STORy</th>
<th>CLOZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Groups</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Skilled</td>
<td>26.69</td>
<td>2.68</td>
<td>20.65</td>
</tr>
<tr>
<td>Average</td>
<td>15.17</td>
<td>5.46</td>
<td>15.46</td>
</tr>
<tr>
<td>Poor</td>
<td>4.70</td>
<td>2.98</td>
<td>5.67</td>
</tr>
</tbody>
</table>

A multivariate profile analysis of the achievement scores from the groups of skilled, average and poor readers revealed that the profiles of the three reading group means were not parallel, $F(4, 212) = 51.57, p < .001$. Figure 1 suggests that the difference between the groups' means becomes less apparent on comparing Word to Story to Cloze, respectively.

Figure 1
Mean Scores of Reading Groups on Achievement Variables
The descriptive statistics for the performances of skilled, average, and poor readers on the phonological awareness variables are displayed in Table 6.

<table>
<thead>
<tr>
<th>Task</th>
<th>Skilled</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhyme</td>
<td>8.48</td>
<td>7.04</td>
<td>6.62</td>
</tr>
<tr>
<td>Rhyme Production</td>
<td>4.22</td>
<td>3.75</td>
<td>2.92</td>
</tr>
<tr>
<td>Alliteration</td>
<td>8.91</td>
<td>7.48</td>
<td>7.58</td>
</tr>
<tr>
<td>Alliteration Production</td>
<td>2.65</td>
<td>2.28</td>
<td>1.75</td>
</tr>
<tr>
<td>Blending</td>
<td>7.87</td>
<td>4.28</td>
<td>2.75</td>
</tr>
<tr>
<td>Segmentation</td>
<td>5.86</td>
<td>5.01</td>
<td>2.33</td>
</tr>
<tr>
<td>Deletion</td>
<td>6.65</td>
<td>3.46</td>
<td>2.33</td>
</tr>
</tbody>
</table>

A profile analysis on the scores from the phonological measures was computed and again the performance profiles were not parallel, $F (12, 204) = 4.91$, $p < .001$.

A graphic display of the differential performance profiles of the skilled, average, and poor readers is provided in Figure 2.
The performances of the groups, although statistically different, are somewhat similar on the four tasks that required whole word analysis while the performances on the phonemic analysis tasks deviated considerably (see Figure 2). As was discussed earlier, these profiles are statistically significantly non-parallel.

To identify differences among reading groups within each task, a review of the responses on the phonological awareness tasks was conducted and a summary by task is provided. The performances of the skilled and poor readers differed dramatically in the percentage of students who scored 9 or above on the rhyme and alliteration oddity tasks. Of the 23 students in the skilled reading group, 13 (56%) were able to achieve these scores on rhyme oddity while only four (17%) of the 24 poor readers achieved this...
level. The performance on alliteration oddity was somewhat less distinctive with 15 (65%) of the skilled reader scoring 9 or above while nine (37%) of the poor readers were as successful. It was noted, that some of the students in the poor reading group consistently selected either the last or middle stimulus throughout both tasks. Thus, it appears that some of the poor readers were being strategic but that the strategies being used were ineffective for successful completion of these tasks.

The rhyme and alliteration production performances again differed in the percentage of children successfully completing the tasks. (It should be remembered that each of these tasks had a maximum score of 5.) Eighteen (78%) of the skilled readers scored 4 or more on rhyme production while 11 (46%) of the poor readers achieved these scores. Twelve (52%) of the skilled readers scored 4 or more on the alliteration production task while only six (25%) of the poor readers were able to produce equally high scores.

The three phonemic awareness tasks provided the most discrepant scores in the assessment battery. None of the poor readers were able to achieve 9 or more on any of the tasks. On the blending task, 22 (96%) of the skilled readers scored 5 or more while only five (21%) of the poor readers scored as high. Sixteen (69%) of the skilled readers and five (21%) of the poor readers scored 5 or more on the segmentation task. Deletion, which appeared to be the hardest task for the group as a whole, did not appear to
be as difficult for the skilled reading group as it did for the poor readers. Nineteen (83%) of the skilled group scored 5 or above while only five (21%) of the poor readers were as successful.

Generally, the poor readers in this study were beginning to segment words by using onset and rime but were unable to fully segment words by phonemes (see Figure 2). This pattern of response supports not only Treiman's (1992) research on the psychological development of syllable segmentation but also Ehri's (1990) theory that children go through a transitional phase before being able to use phonological cues to analyze words.

Because eleven students with relatively extreme scores were identified early in the study and included in the data analysis, it seemed important to determine if their performances had unduly affected the reading group profiles. Three of these students appeared in the poor reading group while two appeared in the skilled group. The other six were in the average reading group. So maintaining these students in the study did not unduly effect the reading group profiles.

In summary, skilled and poor readers differ significantly in their ability to perform the tasks included in this battery. Consequently, it appears that students identified as poor readers may be considered to be slower in acquiring language-based skills used by their more skilled reading peers in early reading development.
Chapter V
Conclusions

The purpose of this study was to investigate whether a battery that included a broad range of phonological awareness measures could successfully predict the achievement of children at the acquisitional stages of reading. A sample group, composed of 110 grade one students, was selected in order to determine if the tasks in the battery could distinguish poor readers from a heterogeneous group of beginning readers. The results of the investigation indicate that the battery was able to identify differences in phonological awareness skills and provide diagnostic information about the phonological awareness ability of the students. This diagnostic information was directly related to the subsequent reading performance of the students that were selected. The study, which compared the tasks and determined their predictive ability, adds to the substantial body of research information which indicates that phonological awareness, as measured by these language-based skills, correlates with skills that contribute to reading acquisition.

The data, which consisted of 140 separate items, was collected over two administration sessions. One session was
used to administer the predictor variables while the second session was used to administer the achievement tests and to re-administer the phonological awareness measures. The assessment battery included seven phonological awareness tasks (i.e., five with a maximum score of 10 and two with a maximum score of 5) that had not been used together before this study. A Cronbach's coefficient alpha was used to assess the internal consistency of the individual tasks and the resulting reliabilities were within the moderate to high magnitude range. These reliability coefficients were well within the recommended range for use in group prediction studies (Borg & Gall, 1983). The Pearson r coefficients were calculated for the phonological awareness tasks given at both sessions and the magnitudes of these coefficients were also in the moderate and high range. A set of t-tests for correlated means revealed that six sets of mean differences were not statistically significant. On the other hand, the means for the alliteration oddity tasks were found to be significant, thus suggesting that the alliteration oddity data was less reliable.

Descriptive statistics which included mean, standard deviation, skew and kurtosis were calculated for all the measures used in the study. The memory component measures, each with a maximum score of 10, were negatively skewed indicating that these verbal short-term memory tasks were not difficult for the majority of the students. Ceiling effects were apparent on rhyme, rhyme production,
alliteration and alliteration production. Each of the tasks displayed a high negative skew and the variance was restricted. The modal scores were close to or at the maximum range for these tasks. Blending, segmentation, and deletion were less skewed and displayed modal scores closer to the mean. Although the scores on these tasks were not subject to a floor effect, they do suggest that the tasks were considerably more difficult for these students to perform. Stanovich, Cunnigham, and Cramer (1984) reported similar findings when using a wide variety of phonological tasks to assess kindergarten children. The conclusions drawn from the reliability and descriptive statistics suggested that the intercorrelations of the tasks would be lower than previous studies due to the restriction of range. This conclusion was supported when the correlations were calculated.

The seven phonological tasks were statistically significantly intercorrelated but displayed small to moderate absolute values of correlation suggesting that some common variance was being shared. A factor analysis was used to investigate the hypothesis that there was significant covariance shared among the variables. Two factors were extracted from the analysis—phonological access and phonetic articulation. Phonological access was defined by the high loadings involving the rhyme, alliteration and alliteration production tasks that required whole-word responses with limited analysis. Pho
articulation, on the other hand, was defined by the high loadings involving the rhyme production, blending and segmentation tasks that required conscious manipulation of phonemes. These results support the contention that two factors underlie phonological awareness (Torgesen, Wagner & Rashotte, 1994; Yopp, 1988).

Canonical correlational analysis provided information about the relationship between the phonological awareness measures and the reading achievement measures. The magnitude of the correlations, the proportion of variance and the redundancy indices indicated that the set of phonological awareness measures were positively correlated with the set of reading achievement measures. The standardized canonical weights suggest that the segmentation and deletion measures added to the predictive accuracy of the phonological set. This result is also supported by previous research (see Goswami & Bryant, 1991). Finally, the performance profiles on the reading tasks indicated that all three reading groups (skilled, average and poor) functioned at different levels on the various phonological tasks.

Implications

The findings of the study add to the substantial body of evidence that confirms the language-based theories of reading. The results suggest that phonological awareness
skills are indeed necessary but not sufficient for successful reading. The students who produced the highest scores on the phonological measures were later found to be skilled at the reading tasks while those who produced the lowest scores were subsequently identified as poor readers. These findings tend to support Stanovich's (1988) theory that posits quantitative differences in phonological awareness as the basis for reading problems. However, the factor analysis that extracted two orthogonal factors from the phonological awareness battery suggests that qualitative differences may also contribute to the different performance profiles.

The canonical correlational analysis tends to support Bradley and Bryant's (1991) theory that rhyme, alliteration and phoneme detection tasks are related to reading achievement. The different phonological awareness performance profiles of the skilled and poor readers along with the factor analysis suggests that Goswami's (1988) model of the links between phonological awareness and reading may be more appropriate than Morias' (1991) assertion that only phoneme awareness will be related to reading. Goswami suggests that rhyme has a distinct link to reading which is qualitatively different than the link between phoneme awareness and reading. The factor analysis would tend to support this claim. Furthermore, the students in this study displayed the most depressed scores on the phoneme detection tasks. However, the findings do not
dispel Morias' claim that phoneme awareness develops as a direct result of learning to read.

The results of the study propose that phonological awareness is a necessary component for early reading achievement and suggest that it is a complex construct that will need further investigating before its relationship to reading will be entirely understood.

**Practical Applications**

The results of the study have practical implications for the educational system. They suggest that the educational system can no longer assume that children entering school have acquired proficiency in the linguistic skills associated with reading acquisition. The assumption that all children will spontaneously develop these skills without some direct intervention seems questionable. The children in the study were being provided with an adequate opportunity to learn to read. It is evident, however, from the results, that these opportunities were not appropriate for the needs of some of these students.

The assessment battery is easy to administer and captures the interest of the students. Used as a unit, it provides comprehensive information about the present phonological awareness ability of students. Therefore, the most practical application for education would be to use the entire assessment battery to identify students who have
instructional needs in phonological processing. Direct instruction using interventions such as those described by Benita Blachman (1991) and Torgesen, Wagner and Rashotte (1994) could be used to target these skills. Phonological awareness skills could also be incorporated into the reading and writing activities of the classroom: Specifically, the relationship between the letters and sounds in words needs to be made explicit within the context of reading. This integrative approach is recommended by many practitioners in the field and is the backbone of such reading programs as Reading Recovery (Clay, 1991).

Another practical application would be to use the battery as a screening device to determine which phonological awareness skills are missing from the students' repertoire. Teachers can then design activities that focus on the missing skills. Many indirect methods, such as games, songs and choral reading, can be used to facilitate phonological awareness skills and can readily be incorporated into daily classroom routines.

Using an assessment battery that is associated with successful intervention techniques may assist the education system in curbing the ever increasing population of poor readers. The poor readers in this study are in need of intervention strategies that stimulate their phonological awareness development. To assume that all the children have acquired these language-based skills and provide instruction that builds upon this assumption is an equation that may
produce academic failure instead of success. It appears that the skills assessed with this battery had not developed with time, so the next necessary step is to provide intervention in phonological awareness skills which would enable these students to succeed in learning to read.

**Limitations and Suggestions for Future Research**

There were three limitations to the study. The first limitation pertains to the design of the study. Extraneous variables such as intelligence and instructional methods were not controlled for in the study. As the study was designed to test the predictive ability of the tasks and the ability to select "at risk" students within a heterogeneous group, these variables were allowed to occur concomitantly within the study. Additional research, using these same tasks, but controlling for these variables, is warranted.

The second limitation pertains to the restricted range of performance on the tasks that required whole-word analysis. Ceiling effects may have placed artificial restrictions on the correlations obtained from the data. The correlations were significant but the strengths of the correlations were, generally, lower than the results obtained from the cited research. Therefore, replicative research using other representative samples seems necessary.
The third limitation pertains to the reliability of the tasks. The strengths of the reliabilities were moderate to high suggesting a fairly consistent estimate of reliability. However, these estimates were determined on a battery that took 15 minutes to administer and was re-administered within a three week time frame. Further research using extended time frames would add to our knowledge about the reliabilities of these specific tasks.
References


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Appendix A

Words used in the Rhyme and Alliteration Oddity Tasks

<table>
<thead>
<tr>
<th>Trials</th>
<th>Rhyme Oddity</th>
<th>Alliteration Oddity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice</td>
<td>sail nail boot</td>
<td>band shell shoe*</td>
</tr>
<tr>
<td></td>
<td>pig mat bat</td>
<td>cat car hen</td>
</tr>
<tr>
<td>Test</td>
<td>cat hat bell</td>
<td>pin pig tree</td>
</tr>
<tr>
<td>1</td>
<td>peg cot leg</td>
<td>bed wig* bell</td>
</tr>
<tr>
<td>2</td>
<td>fish dish book</td>
<td>box tray train</td>
</tr>
<tr>
<td>3</td>
<td>bus arm farm</td>
<td>coast* farm coat</td>
</tr>
<tr>
<td>4</td>
<td>cup sand hand</td>
<td>dog doll sun</td>
</tr>
<tr>
<td>5</td>
<td>hen car pen</td>
<td>book hand hat</td>
</tr>
<tr>
<td>6</td>
<td>gun sun tap</td>
<td>man fish mat</td>
</tr>
<tr>
<td>7</td>
<td>wall dog ball</td>
<td>nail peg pen</td>
</tr>
<tr>
<td>8</td>
<td>pipe* boat goat</td>
<td>toad toast girl</td>
</tr>
<tr>
<td>9</td>
<td>hill duck pill</td>
<td>sock bag bat</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* denotes words that were substituted in order to provide appropriate pictures.

From Bryant & Bradley (1985) Rhyme and Reason in Reading and Spelling.
KNOWLEDGE OF NURSERY RHYME

Children who are learning to read usually know a lot of things about reading. One of the things is Nursery Rhymes.

Can you say the _________ nursery rhyme?
Request Jack and Jill, Humpty Dumpty or Twinkle, Twinkle Little Star.

Rhyme practice example:

You know _____.
Jack and Jill
Went up the ____. You're right!
Jill and hill rhyme.

Can you tell me another word that rhymes with Jill?
If incorrect, say Jill, hill, ______. Do they sound the same? No, but Jill, hill and pill do, don't they?

Continue in this manner until the child produces rhymes correctly.
RHYME ODDITY

Now we are going to play a game that has three picture word cards. Two of the pictures rhyme and one doesn't.

Your job is to find the word that doesn't rhyme with the other two words.

Let's try some. (Present the first set of Rhyme Oddity practice cards.)

SAIL, NAIL, BOOT (Point to the word and have the student repeat each target word.)

PROMPT: Which one doesn't rhyme with the other two words. (Provide corrective feedback, if necessary.)

Let's try another one. (Present the second set of practice cards.)

PIG, MAT, BAT (Point to the word and have the student repeat the target word.)

Now let's play the game. (Present the Rhyme Oddity Trials in Appendix A.)

RHYME PRODUCTION

We are going to play another game. This time I'm going to say a word and ask you to tell me a word that rhymes with it.

Tell me a word that rhymes with _____.

Present the rhyming trials: land, goat, shop, tail, hen.
ALLITERATION ODDITY

This next word game is a little different.

We are going to play a game with three pictures, like the first game we played. This time, two of the picture words have the same sound at the beginning and one doesn't.

Your job is to find the one that doesn't start with the same sound as the others.

Let's try some. (Present the first set of Alliteration Oddity practice cards.)

BAND, SHELL, SHOE (Point to the word and have the student repeat the target word.)

PROMPT: Which one doesn't have the same beginning sound as the other two words. (Provide corrective feedback, if necessary.)

Let's try another one. (Present the second set of practice cards.)

CAT, CAR, HEN (Point to word and have student repeat the target word.)

Now let's play the game. (Present the Alliteration Oddity Trials in Appendix A).

ALLITERATION PRODUCTION

Now I want you to tell me a word.

Tell me a word that begins like ____.

Present the alliteration trials: hand, fox, sail, cook, tap.
Introduction to Blending

Listen.

I can say a word slowly, /HAM/ /BUR/ /GER/. I can say it fast, /HAMBURGER/.

I will say it slowly, /HAM/ /BUR/ /GER/. You say it fast.

Continue with two more examples of three-syllable blending using /LOL/ /LI/ /POP/ and /AF/ /TER/ /NOON/.

Proceed to two-syllable practice blending using /CUR/ /TAIN/, /DAN/ /GER/ and /BA/ /LOON/.

BLENDING

Now we're going to practice with small words.

I will say a small word slowly, /M/ /O/ /M/. You say it fast.

Let's try another one. /D/ /A/ /D/. You say it fast.

Present the blending trials: ran, cot, tin, gum, hen, ship, black, chop, drug, step.
Introduction to Segmentation

Here are some cubes that we are going to need for the next game.

Can you break them apart and count them for me?
(Make sure they are pointing to each cube as they count. If they don't point, ask them to recount pointing to each cube as they count.)

Good! Now we're going to play a word game using the blocks.

SEGMENTATION

Here I'll show you.

I can say /AT/.
Now I'll show you how many parts it has.

/A/ (Drag one cube towards yourself.)
/T/ (Drag another cube towards yourself.)

Now, it's your turn.
Say /AT/.
Say it again and show me how many parts it has.

(If incorrect: Model until child can do this task correctly.)

I can say /FAT/.
Now I'll show you how many parts it has.

/F/ (Drag one cube towards yourself.)
/A/ (Drag one cube towards yourself.)
/T/ (Drag one cube towards yourself.)

Now, it's your turn.
Sat /FAT/.
Say it again and show me how many parts it has.

Present the segmentation trials: wug, ap, zan, polt, kI, sput, fe, kEst, piv, yob.
Introduction to Deletion

We are going to play another word game.

In this game, I'm going to ask you to say a word and then I'm going to ask you to say the word again but with a part missing.

Let's try some.

Say COWBOY.
Now say it again, but don't say BOY.
Say SUNSHINE.
Now say it again, but don't say SHINE.
Say PICNIC.
Now say it again, but don't say PIC.
Say CUCUMBER.
Now say it again, but don't say CU.

DELETION

Now we're going to play the game.

Say COAT.
Now say it again, but don't say /K/.
Say MEAT.
Now say it again, but don't say /M/.
Say TAKE.
Now say it again, but don't say /T/.

Say GAME.
Now say it again, but don't say /M/.
Say WROTE.
Now say it again, but don't say /T/.
Say PLEASE.
Now say it again, but don't say /Z/.

Say CLAP.
Now say it again, but don't say /K/.
Say PLAY.
Now say it again, but don't say /P/.
Say STAIE.
Now say it again, but don't say /T/.
Say SMACK.
Now say it again, but don't say /M/.
Appendix C

AUDITORY MEMORY SPAN FOR DIGITS

DIGITS FORWARD

1. 6-4-1  ____  2. 3-5-2  ____
3. 4-7-2-9  ____  4. 3-8-5-2  ____
5. 3-1-8-5-9  ____  6. 4-8-3-7-2  ____

DIGITS BACKWARDS

7. 5-2  ____  8. 3-8  ____
9. 2-9-3  ____  10. 8-1-6  ____

TOTAL ____/10

SENTENCES

1. I went downtown.
2. Mom is in the car.
3. I am going home.
4. I went outside to pick some flowers.
5. We are going to buy some candy.
6. Jack likes to feed the little puppies.
7. Jane wants to build a big castle in her playhouse.
8. Tom has lots of fun playing ball with his sister.
9. Mom asked Nancy to bring the brown dog in the house.
10. Fred asked his father to take him to see the clowns in the circus.

TOTAL ____/10

Appendix D

SAN DIEGO QUICK ASSESSMENT

<table>
<thead>
<tr>
<th>PP</th>
<th>PRIMER</th>
<th>GRADE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. see</td>
<td>1. you</td>
<td>1. road</td>
</tr>
<tr>
<td>2. play</td>
<td>2. come</td>
<td>2. live</td>
</tr>
<tr>
<td>3. me</td>
<td>3. not</td>
<td>3. thank</td>
</tr>
<tr>
<td>4. at</td>
<td>4. with</td>
<td>4. live</td>
</tr>
<tr>
<td>5. run</td>
<td>5. jump</td>
<td>5. when</td>
</tr>
<tr>
<td>6. go</td>
<td>6. help</td>
<td>6. how</td>
</tr>
<tr>
<td>7. and</td>
<td>7. is</td>
<td>7. always</td>
</tr>
<tr>
<td>8. look</td>
<td>8. work</td>
<td>8. night</td>
</tr>
<tr>
<td>9. can</td>
<td>9. are</td>
<td>9. spring</td>
</tr>
<tr>
<td>10. here</td>
<td>10. this</td>
<td>10. today</td>
</tr>
</tbody>
</table>

TOTAL ____/10  TOTAL ____/10  TOTAL ____/10

STORY

MY CAT

I have a big white cat.

She drinks milk.

She sleeps in a chair.

She does not like to get wet.

1. What does the child have?  ______________________
2. What color is the cat?  ______________________
3. What does she drink?  ______________________
4. Where does she sleep?  ______________________
5. What doesn't she like?  ______________________

TOTAL COMPREHENSION: ____/5

TIME: _______ seconds.