PHONEMIC SEGMENTATION ABILITY IN YOUNG CHILDREN:
A COMPARISON OF TASKS

by

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Abstract

The primary purpose of this study was to compare performance on phonemic awareness tasks while controlling for variables including the linguistic complexity of word and nonword stimuli, and administration and scoring procedures. Twenty-five kindergarten and 25 grade one students were administered five phonemic awareness tasks including four different phoneme segmentation tasks and a blending task, a vocabulary test, and real word identification and nonword decoding tasks. The relationship among the phonemic awareness tasks was analyzed through intercorrelations, factor analyses, and examination of relative degree of difficulty. There was a high degree of convergence among tasks, particularly those with similar task demands. The relationship between performance on phonemic awareness tasks and real word and nonword reading tasks was also compared. In most cases, students who were able to decode nonwords also performed well on the phonemic awareness tasks. A multiple regression revealed that the best predictor of nonword decoding was an oral phonemic segmentation task. Theoretical and practical implications of these findings were discussed.
# Table Of Contents

Abstract

Table of Contents

List of Tables

List of Figures

Acknowledgment

Introduction 1

Literature Review
- Phonemic Awareness 5
- Taxonomy of Tasks 10
- Phonemic Segmentation Tasks 12
- Overview of Present Study 27

Method
- Participants 30
- Measures 30
- Procedure 37

Results
- Overview 39
- Preliminary Analyses 39
- Relations Among Phonemic Awareness Tasks 44
- Phonemic Awareness and Reading 50

Discussion
- Overview 59
- Discussion and Implications of Findings 59
- Limitations of Study 66
- Future Directions 67

References 69

Appendix A  Phoneme Counting Task Instructions 74
Appendix B  Oral Segmentation Task Instructions 75
Appendix C  Combination Segmentation Task Instructions 76
Appendix D  Partial Segmentation Task Instructions 77
Appendix E  Phoneme Blending Task Instructions 78
Appendix F  Phonemic Awareness Tasks Word Lists 79
List of Tables

Table 1  Phonemic Awareness Task Analysis  
Table 2  Phonemic Awareness Task Reliabilities  
Table 3  Correlations Between Real Words and Nonwords, By Task  
Table 4  Task Variations as a Function of Grade Level.  
Table 5  Correlations Among Phonemic Awareness Tasks, by Grade  
Table 6  Principal Components Analyses  
Table 7  Intercorrelations Between Phonemic Awareness Tasks and WRMT-R Subtests for Kindergarten and Grade One Students
List of Figures

Figure 1 Raw score correct on partial segmentation task and Word Attack subtest 54
Figure 2 Raw score correct on blending task and Word Attack subtest 55
Figure 3 Raw score correct on oral segmentation task and Word Attack subtest 56
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Introduction

Phonemic awareness\(^1\) refers to the ability to perceive a spoken word as a sequence of individual sounds (Lewkowicz, 1980). Research conducted over the last three decades has firmly established the importance of phonemic awareness in the acquisition of reading skills, a discovery that some researchers (e.g., Stanovich, 1991; Bryant and Goswami, 1987) have hailed as one of the more notable scientific success stories in the recent past. Additionally exciting is the finding that phonemic awareness training can make a lasting difference in reading and spelling achievement (Blachman, 1991; Lundberg, Frost, Petersen, 1988); and findings in this area are serving to clarify some of the issues in the ongoing debate regarding the teaching of beginning reading (Stanovich, 1991). In light of the importance of phonemic awareness in reading acquisition, it is not surprising that persistent difficulty with phonemic processing has been implicated in reading difficulties (Mann, 1991a).

Despite the significant contributions of phonemic awareness research, the field is not beyond reproach. One general criticism has been the lack of a systematic approach to the measurement of phonemic awareness (Lewkowicz, 1980; Stahl & Murray, 1994; Stanovich, Cunningham, & Cramer, 1984). According to McBride-Chang (1995), in

\(^1\) In this paper, the term phonemic awareness will be used to denote awareness of the phonemes in speech, while the term phonological awareness will be used to denote awareness of the sounds in speech (including phonemes, the smallest unit of sound). Based on this distinction, phonemic awareness may be considered one type of phonological awareness. Since the focus of this paper is phonemic awareness, this term will be used throughout although some claims made about phonemic awareness may also apply to phonological awareness. The term phonological awareness will be used when referring to awareness of the sounds in language in general.
most published investigations researchers have used their own experimental tasks to measure phonemic awareness, resulting in a vast array of tasks that vary along a number of dimensions. As a consequence, researchers have commented on the difficulty this has created in trying to interpret, consolidate, and compare findings across different studies (Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988).

The existence of a variety of tasks, however, is indicative of the fact that phonemic awareness is a multidimensional construct, and as such, cannot be measured by a single task. As will be discussed in subsequent sections of this paper, several reliable and valid tasks of phonemic awareness have been designed. Moreover, the differences between these tasks make unique contributions to our understanding of issues critical to the field such as the development of phonemic awareness and its relationship to reading. Additionally, those experiments that have varied the linguistic, analytic, or memory demands of phonemic awareness tasks have provided us with valuable insights into the factors that influence performance on phonemic awareness tasks. Thus, a situation is created whereby a variety of tasks is necessary and provides us with useful information, on one hand, but makes it difficult to sort through the myriad tasks and task variations in order to compare findings across studies, on the other hand.

In order to begin consolidating knowledge, the measurement of phonemic awareness is being evaluated in a more systematic fashion. Studies that have addressed the issue of the measurement of phonemic awareness (e.g., McBride-Chang, 1995; Stahl & Murray, 1994; Tunmer & Nesdale, 1985) have varied one or more aspects of a task in order to evaluate the influence of a particular variable, or have given the same group of
children several phonemic awareness tasks and compared performance across tasks (e.g., Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988). Support for this approach comes from researchers such as Wagner, Torgesen, Laughon, Simmons and Rashotte (1993), who suggest that the systematic manipulation of task and stimulus features is the most promising way to extend our knowledge of young children’s phonemic processing ability; and Stanovich, Cunningham, and Cramer (1984), who suggest that attempts must be made to assess the relationships between phonemic awareness tasks in order to determine their degree of convergence.

In this study, it is argued that measurement issues are inextricably linked to our understanding and evaluation of phonemic awareness research. As Flavell, Miller and Miller (1993) point out, any claim made about a construct such as phonemic awareness is being made on the basis of performance (or lack of performance) on a particular task or tasks. As such, a child’s “assessed level of phonemic awareness will depend greatly on the task” (Nesdale, Herriman, & Tunmer, 1984, p. 60). Despite the robustness of the finding that phonemic awareness is related to learning to read virtually regardless of how it is measured, there is considerable debate about more specific issues, such as the nature of the relationship between phonemic awareness and reading (i.e., whether or not phonemic awareness is a cause or a consequence of reading), and the age at which phonemic awareness can be acquired. In many instances, differing claims about these aspects of phonemic awareness are made on the basis of performance on tasks that differ on several dimensions, rendering it impossible to evaluate claims independent of the task.

The present study was undertaken in response to the call for more systematic assessment of phonemic awareness in order to evaluate the influence of task on claims
made regarding phonemic awareness ability. Of particular interest is the variation in young children’s performance on phonemic segmentation tasks that may be due to task differences. Segmentation tasks are one important class of phonemic awareness tasks and require the analysis and then manipulation of part or all of a segment of speech. Based on differences in performance on various segmentation tasks, there appears to be lack of convergence regarding the ability of prereaders and beginning readers to perform phonemic segmentation tasks and uncertainty regarding the relationship between segmentation ability and reading ability. In studies with conflicting findings however, segmentation task formats have varied, creating the possibility that discrepancies in findings may be due to the differences between task formats; and reading has often been inadequately defined and assessed, or not assessed at all.

The purpose of the present study then, was to compare the performance of two groups of students of different reading abilities, kindergarten and grade one students, across different segmentation task formats while controlling for extraneous features such as scoring and the linguistic complexity of stimuli. To date, few studies have examined performance on these tasks in order to evaluate the task comparability, and those that have (e.g., Yopp, 1988) have failed to control for variables such as the linguistic complexity of stimuli. Before presenting this research, a review of relevant theoretical and empirical research is presented. In particular, a discussion of the theoretical importance of phonemic awareness in beginning reading is presented, followed by a discussion of phonemic segmentation tasks as one important type of phonemic awareness task. This chapter concludes with an overview of the present research.
Literature Review

Phonemic Awareness

Relationship to Reading

The notion that phonemic awareness is regarded by reading researchers as being fundamental to reading acquisition is readily apparent upon an examination of the literature. Many textbooks on reading acquisition devote at least one chapter to phonemic awareness, and entire textbooks have also been written on the topic of phonemic awareness and beginning reading (e.g., Goswami & Bryant, 1990; Sawyer & Fox, 1991). In addition, journals such as the Merrill-Palmer Quarterly (1987) and Cahiers de Psychologie Cognitive (1987) have devoted entire volumes to the topic of phonemic awareness. In order to understand the importance of phonemic awareness in beginning reading, it is helpful to frame phonemic awareness as one type of metalinguistic awareness.

Metalinguistic awareness refers to the ability to manipulate the form of spoken language (Tunmer & Rohl, 1988), which requires the ability to shift away from the content of speech to the structure of speech (Yopp, 1988). While normal language processing operates at an automatic, subconscious level, metalinguistic operations require the ability to invoke what Tunmer, Herriman, and Nesdale (1988) refer to as control processing, or the deliberate processing of the structure of language. Like reading, phonemic awareness does not come automatically with language acquisition. Thus, while even young children are able to pronounce most phonemes directly and to discriminate between words that vary by a single phoneme, such as “bad” and “bed”, in order to understand language; phonemic awareness requires taking a step back and actually
analyzing or specifically manipulating the phonemes in language. This difference has been characterized by some researchers as the transition from implicit to explicit control of phonemes (Lundberg, 1991).

The ability to reflect on the structure of language at the phonemic level raises an awareness that spoken words are comprised of smaller units. An understanding of the way that spoken language is structured is of great benefit to reading, for reading is the written representation of speech. Since a majority of written words are initially unfamiliar to the beginning reader, the ability to decode, or break down words into their component parts, is one aspect of reading that is essential in learning to read an alphabetic system like English.

Unlike a logographic system (e.g., Chinese), which requires the memorization of thousands of characters, the English alphabet requires the knowledge of the twenty-six letters which in turn can be used to represent any speakable expression in the language (Adams, 1990). In a logographic system, there is one-to-one correspondence between a symbol and a word, while in the English alphabetic system there is no one-to-one correspondence between letters and sounds, rather the letters in words stand for particular sounds, and these sounds are determined by the particular placement of letters in a word. While there is considerable economy in the alphabetic system, the difficulty inherent in learning this system of reading and writing is experienced by all children who struggle, for example, over the difference in pronunciation between “bead” and “dead”.

The role of phonemic awareness in learning to read is suggested by the title of an article by Griffith and Olson (1992): “Phonemic awareness helps beginning readers break the code.” In short, knowledge and awareness of the fact that words are comprised of
individual sounds or segments can help a child to understand how spoken language maps onto written language. Most researchers agree that the mechanism by which phonemic skills impact on reading acquisition is in the ease with which sound-symbol relationships can be understood and used. Research has shown that children who lack phonemic awareness have difficulty understanding the systematic correspondences between sounds and letters that make up an alphabetic writing system and thus have difficulty benefiting from reading instruction (Ball, 1993; Stanovich, 1986; Tunmer & Hoover, 1992).

Phonemic awareness, then, "bootstraps" orthographic knowledge to promote gains in the beginning stages of reading and is considered to be a necessary, but not sufficient, requirement for reading (Juel, Griffith, & Gough, 1986).

Support for these theoretical claims comes from studies that have examined the relationship between beginning reading and phonemic awareness. Among the findings of phonemic awareness studies are the following: phonological awareness is a powerful predictor of reading (Hoien, Lundberg, Stanovich, & Bjaalid, 1995; Stanovich, Cunningham, & Cramer, 1984); some level of phonological awareness needs to be in place in order to develop word decoding skills (Ball, 1993; Skjelfjord, 1987); and individuals with adequate word decoding skills can perform a wider range of phonological awareness tasks (including complex phonemic awareness tasks) than their nondecoding peers (Alegria & Morais, 1991; Tunmer & Nesdale, 1985).

In summary then, there exists compelling theoretical and empirical support for the role of phonemic awareness in beginning reading. These findings have been discovered through, and have served as, the impetus for the assessment of phonemic awareness which is the focus of the next section.
Assessment of Phonemic Awareness

The assessment of phonemic awareness is of importance to both educators and reading researchers. As mentioned in the introduction, interest in the assessment of phonemic awareness has led to the development of a plethora of tasks and task variations. The first part of this section provides an overview of the range of tasks designed to assess phonemic awareness followed by a focus on segmentation tasks as a unique type of phonemic awareness task.

According to Morais (1991), phonological awareness is a term that encompasses at least the following: awareness of syllables, awareness of phonemes, and awareness of intra-syllabic units (onset-rime, e.g., “/t/ /op/”). There appears to be an incremental pattern in the development of phonological awareness, with the development of syllable awareness preceding the development of phoneme awareness, and the development of intrasyllabic awareness falling in-between (Treiman, 1991).

Of these different types of phonological awareness, awareness of phonemes has been found to be a particularly powerful predictor of reading. For example, Stanovich, Cunningham and Cramer (1984) found that phonemic awareness tasks correlated more highly than rhyming tasks on subsequent reading measures. Hoien, Lundberg, Stanovich and Bjaalid (1995) demonstrated similar findings with a much larger sample of 1509 grade one children. In this study, a principal components analysis on six phonological awareness tasks revealed three components: a phoneme factor, a syllable factor, and a rhyme factor; with the phonemic factor being the most difficult task and the most potent predictor of subsequent reading.
With regard to the difficulty inherent in becoming phonemically aware, Hoien and colleagues (1995) offer the following explanation:

"The unique characteristic of phonemic awareness and its emergence as a distinct factor within the domain of phonological sensitivity may be related to the fact that phonemes as basic linguistic units are not explicit control units in speech perception or speech production in the same way as syllables and word-units. They are rather abstract and elusive and seem to require special attentional resources to be grasped" (p.177).

Unlike syllables and words, phonemes cannot be acoustically isolated. Phonemes are not pronounced as acoustically discrete elements in words, but rather are merged into larger units, for example, syllables (Torgesen, Wagner, & Bryant, 1992). Thus, the /b/ in "bat" can only be approximated by the utterance "buh". This feature of phonemes creates a situation whereby the awareness of phonemes is the awareness of something inherently abstract; which in turn helps account for the fact that awareness of phonemes develops later than other forms of phonological awareness. The potency of awareness of phonemes as a predictor of reading, however, is accounted for by the fact that one important aspect of reading, decoding (the learning of letter-sound relationships), is performed at the level of the phoneme. Thus, phoneme awareness has a more direct relationship with decoding than syllable or rhyme awareness.

Owing to the difficulty in becoming phonemically aware, some researchers posit that phonemic awareness cannot be acquired independently of reading; that phonemic awareness is a consequence and not a cause of reading (e.g., Morais, 1991). The relationship between phoneme awareness and reading ability has been an ongoing debate
Phonemic Segmentation in the field (Fowler, 1991). While a thorough discussion of the arguments on both sides of this debate is beyond the scope of the present research (for a discussion see Ball, 1993); as discussed in the introduction, the issue can be addressed in part by examining the differences between the types of tasks and task variables used in position papers. As will be described in the next section, one pivotal type of task in this debate is the segmentation task. The importance of phoneme segmentation in the context of phonemic awareness in general is the focus of the next section.

**Taxonomy of Tasks**

In their discussion of the assessment of phonological awareness, Tunmer and Herriman (1984) focus on two things: what is measured and how it is measured. With regard to what is measured, commonly cited reviews by Adams (1990), Lewkowicz (1980), and Yopp (1988) have identified approximately 10 types of tasks including rhyme recognition; invented spellings; oddity tasks; phoneme and syllable blending and segmenting; as well as a variety of phoneme manipulation tasks including phoneme deletion and reversal. A brief description of each type of task is provided.

Rhyme recognition is self-explanatory and refers to the ability to compare words and state whether or not they rhyme. Invented spellings refer to children’s early attempts to “write” spoken words and according to Mann (1993) can be used to infer children’s ability to analyze the phonological structure of spoken words. Several variations of oddity tasks exist but in general they require a child to listen to three or four spoken words and state which of the words is different or does not belong (e.g., *pig, hill, pin*). Blending tasks require the child to listen to word segments (e.g., “/m/ ... /a/ ... /p/”) and put them together (“*map*”); while segmenting tasks require the opposite, that is, the
decomposition of words into their constituent parts. Phoneme manipulation tasks require the child to manipulate phonemes in a given word. For example, Rosner and Simon’s (1971) phoneme deletion task required children to pronounce a word after an initial, medial, or final phoneme has been deleted (e.g., say “hill” without the /hl/”), while a task used by Alegria, Pignot, and Morais (1982) required children to reverse the phonemes in a word (e.g., “pat” becomes “tap”).

As alluded to by the oddity task, the overall number of tasks is multiplied greatly by the variations that exist within each type of task. For example, some researchers have used either real words or nonwords or both, as well as words that vary in terms of linguistic complexity (e.g., Stahl & Murray, 1993). Likewise, some researchers target initial sounds, while others target medial or final sounds (Yopp, 1988).

In order to organize phonemic awareness tasks, some researchers have created classification schemes. One way is to classify tasks as tasks of analysis or synthesis (e.g., Lewkowicz, 1980; Torgesen, Wagner, & Rashotte, 1994). Analysis tasks require children to identify the sounds within words that are presented as wholes, whereas synthesis tasks are tasks that require the blending of separately presented phonemic segments into whole words. While there is some empirical support for this scheme (e.g., Wagner, Torgesen, Laughon, Simmons, and Rashotte, 1993), it becomes apparent from these definitions that while there is just a single synthesis task, the blending task; there are several tasks that can be considered analysis tasks. Yet other tasks, such as the phoneme substitution task, involve both analysis and synthesis.

Indeed, Lewkowicz (1980) criticizes the analysis classification by saying that the analysis task category is comprised of a “motley assortment” of tasks reducing its
usefulness as a category. Instead, she restates the argument that phonemic awareness skills are important because of their relationship to the task of decoding; and that based on the directness of their relationship to decoding, blending and segmenting tasks should be regarded as the basic tasks of phonemic awareness. With regard to other phonemic awareness tasks, Lewkowicz suggests that they are important only in their relationship to blending and segmenting. Lewkowicz’ definition of the phonemic segmentation task as the articulation of all the individual sounds in words, however, precludes the inclusion of task formats that other researchers have used to assess phonemic segmentation ability. The next section discusses different commonly used phonemic segmentation task formats.

**Phonemic Segmentation Tasks**

Based on the premise that the ability to segment words into their component sounds lies at the heart of phonemic awareness, segmentation tasks have often been used to assess phonemic awareness. For example, one of the pioneers in the field, Isabelle Liberman, and her colleagues (Liberman, Shankweiler, Fischer, & Carter, 1974) used a phoneme segmentation task in one of the initial explorations of young children’s phonemic awareness ability. In addition, Morais (1991) structures much of his argument regarding the relationship between reading and phonemic awareness around performance on segmentation tasks as do other researchers (e.g., Tunmer & Nesdale, 1985). Indeed, segmentation tasks have played a pivotal role in discussions of phonemic awareness and reading acquisition, although some researchers (e.g., Ball, 1993) acknowledge that the use of segmentation tasks alone may be too limited and that the relationship between reading and phonemic awareness actually depends on how phonemic awareness is measured.
In addition to assessment, phonemic segmentation plays a key role in phonemic awareness training. With the discovery that phonemic awareness can be successfully trained in order to facilitate reading and spelling acquisition, phonemic awareness training has been of interest to researchers. Lewkowicz (1980) and Skjelford (1987) both advocate phonemic awareness training programs that teach phonemic segmentation skills as they are viewed as the most important phonemic awareness task in learning to read.

In summary, phonemic segmentation is at the heart of the issues most important to phonemic awareness - its assessment, development, and relationship to reading. This importance merits the need to address issues related to the measurement of phonemic awareness in general, and phonemic segmentation in particular. The generality of the definition of phonemic segmentation (i.e., the ability to decompose or separate words into phonemes) has led to the development of several types of tasks that purport to measure phoneme segmentation ability, and a review of commonly used tasks is the focus of the next section. To preface this review, however, a breakdown of the sources for differences among tasks is presented.

When comparing task formats, Perfetti, Beck, Bell and Hughes (1987) suggest that tasks need to be analyzed in terms of task demands and subject “strategies”. Vandervelden and Siegel (1995), meanwhile, suggest that there are a number variables, or sources of differences among tasks which may provide a framework when comparing tasks. One variable to consider is whether or not the task requires partial or complete analysis of a spoken word or syllable. For example, a partial segmentation task would require a child to state the first sound in the word /sock/, whereas a full segmentation task would require a child to state each of the sounds in the word /sock/. Another variable to
consider is whether or not tasks require overt articulation of individual phonemes, or the recognition or perception of phonemes (although overt articulation may still be a strategy involved in these formats). For example, a child may be asked to say each of the sounds in a word (overt articulation), or may simply be asked to “count” the number of sounds in a word. A third task difference is how well the task controls confounding variables. For example, oddity tasks require a child to hold three or four words in short-term memory; a demand which may influence performance in addition to phonemic awareness per se. In the next section, four common types of segmentation tasks and a blending task used in the present study are compared using these variables. While the segmentation tasks may be labeled differently from study to study, in the present study, the segmentation tasks that will be examined are: phoneme counting, oral segmentation, combination segmentation, and partial segmentation.

**Phoneme Counting Task**

The phoneme counting task requires the analysis of a whole word and was developed by Liberman, Shankweiler, Fischer, and Carter (1974). The task is introduced to children under the guise of a tapping game and has come to be known as a type of phoneme counting task. In the Liberman et al. study, children were required to listen to the examiner say a one-, two-, or three- segment item and then tap out the number of sounds in the word using a wooden dowel. The ability to segment words into syllables and into phonemes was compared across three groups of children tested near the end of the school year: preschoolers (n = 46), kindergarten children (n = 49), and first graders (n = 40). Performance was scored by counting the number of trials taken to reach a criterion of six consecutive correct responses. Consistent across groups was the finding
that syllable segmentation was easier than phoneme segmentation. On the phoneme segmentation task, none of the preschool children, and only 17% of kindergartners reached criterion, while 70% of first graders were successful on this task. Based on the steep increase in performance that occurred in the first grade sample, the authors suggest that instruction, and not just maturation may be responsible for improvement in phoneme segmentation ability. Owing to the lack of inclusion of a reading measure, however, this claim could not be evaluated.

One study that did use the phoneme counting task to examine the relationship between reading and phonemic segmentation ability was conducted by Tunmer and Nesdale (1985). In their study, 63 Australian grade one children were administered the phoneme counting task using half high-frequency real words and half pseudowords; as well as pseudoword decoding and real word identification tasks. Analysis of the data using scatterplots and cutoff scores revealed that all the children who passed the decoding test also passed the segmentation test, whereas none of the children who failed the segmentation test passed the decoding test. Based on these results, the authors concluded that phonemic awareness is a necessary, but not sufficient condition for decoding (Tunmer & Nesdale, 1985).

Adams (1990) provides a rationale for the empirical finding that some degree of reading ability precedes segmentation ability. As previously discussed, she points to the inherent abstractness of phoneme awareness, saying that there is no way, for example, to know that the word cat is composed of three separate phonemes except by having somehow learned that it is. She argues that this learning takes place in the context of beginning reading instruction. Based on their excellent review of the research to date,
Phonemic Segmentation

Wagner and Torgesen (1987) also claim that while blending plays a causal role in the acquisition of beginning reading skills, decoding skills play a causal role in phoneme segmenting ability.

Despite these compelling, empirically-based arguments, Lundberg (1991) argues that phonemic segmentation ability can be observed in nonreaders. Citing his own research, Lundberg claims that in his studies, small percentages of children with no reading ability and virtually no letter recognition could nonetheless perform a phoneme counting task. In addition, a training study by Lundberg and his colleagues (Lundberg, Frost, & Petersen, 1988) revealed that exposing Danish preschool children (age six) to a variety of metaphonemic tasks independent of reading instruction resulted in the successful learning of segmentation ability. Based on this finding, Lundberg agrees that phonemic awareness may not develop without explicit guidance, but argues that the guidance does not necessarily have to take the form of alphabetic instruction. While Lundberg’s training study demonstrates an important point, namely that it is explicit guidance versus alphabetic instruction per se that develops phonemic awareness ability, for the majority of children this explicit instruction probably takes place under the guise of reading instruction.

Studies by Tunmer and Nesdale (1982, 1985) and Perfetti, Beck, Bell, and Hughes (1987) have addressed the issue of strategy use on the counting task. In their 1985 study, Tunmer and Nesdale argue for the use of the counting task based on the claim that it is a clean psychological test, a test that “measures a specific cognitive process as precisely as possible, with little or no involvement of extraneous cognitive operations” (p. 417). According to Tunmer and Nesdale then, the problem with a segmenting task that involves
a child uttering each of the sounds in a word is that it requires the child to recognize and manipulate units that are only "imprecise analogues" of the phonemes in the word. This is problematic because phonemes cannot be pronounced in isolation.

Their argument for the use of the phoneme counting test because it's a "clean" test of segmentation ability is curious, however, in light of the findings of their studies conducted in 1982 and 1985. In their 1982 study, Tunmer and Nesdale compared the performance of 20 kindergarten and 20 grade one students across digraph (letter pairs which represent single phonemes, for example /sh/, /th/, /ch/) and nondigraph real words and pseudowords in order to investigate whether or not children use a spelling strategy on the task. This was inferred by analyzing whether children counted the number of letters or the number of phonemes. Overall results indicated a bimodal distribution in the performance of kindergarten children, with five children scoring above 70% correct, and the rest \((n = 15)\) performing very poorly. The overall performance of first graders was significantly higher. In addition, the performance between digraph and nondigraph words on both real words and pseudo-words was significantly different for first graders but not kindergarten children. An analysis of the errors made on digraph words (where the number of phonemes does not equal the number of letters), revealed that children "overshoot" (i.e., overestimate) the number of phonemes, suggesting that children were counting the number of graphemes rather than phonemes. Based on this finding, they concluded that children with some spelling and reading ability use their orthographic knowledge and on the counting task report the number of phonemes as being equal to the number of letters and that "segmentation tests that include digraph words may provide inaccurate estimates of phonological awareness" (1985, p. 423). This finding, however,
suggests a general criticism of the counting task. That is, a spelling strategy may be used in place of a phonemic segmentation strategy in all cases on a counting task, but the strategy may only be revealed in the instance of a digraph word.

Another study with similar findings was conducted by Perfetti, Beck, Bell, and Hughes (1987). In this study, the performance of 82 first graders on tasks of phonemic segmentation, phoneme deletion, and phoneme blending assessed four times across the school year was analyzed. In their version of the segmentation task, children were required to tap a pencil once for each sound in real words and nonwords that ranged in length from two to four phonemes and included some digraphs. Consistent with the findings of Tunmer and Nesdale (1982, 1985), it was inferred that children resorted to a spelling strategy based on the number of “overshoot” responses in digraph words. Based on the observation that this also occurred in the nonword condition, they suggested that children extended their grapheme-phoneme knowledge to nonwords which calls into question the use of nonwords to control for this strategy. They also suggested that onset/rime ability was invoked in nonwords like “spif” which produced “three” as the most common response (i.e., /sp/ /i/ /f/). In comparison to the phoneme blending and phoneme deletion tasks, the correlations observed within and between tasks were lower and more variable for the counting task, a finding which limited the usefulness of the task as a measure of phonemic segmentation ability.

In summary, the general consensus regarding phoneme segmentation ability using the counting task is that, with a few exceptions, some reading precedes phoneme counting ability. In terms of task variables, the counting task requires analysis of the whole word,
but does not require articulation. With regard to confounding variables and the use of strategies, it appears that readers sometimes resort to using a spelling strategy.

**Oral Segmentation Task**

A more recently developed segmentation task is the oral segmentation task. Like the counting task, this task requires children to segment orally-presented words, and respond by saying each individual phoneme segment. While variations of this task have been used in several studies, Yopp (1995) touts her version of the task, which she calls the Yopp-Singer Test of Phoneme Segmentation, as a reliable and valid test of phonemic awareness for use with kindergarten children. This claim is based on the results of a study (Yopp, 1988) in which 108 kindergarten children were administered the Yopp-Singer Test of Phoneme Segmentation (1995) along with several other phonemic awareness tasks. The test is comprised of 22 real words, and every item is administered along with corrective feedback for each item (correct responses were acknowledged as such and incorrect responses were corrected). Based on this administration format, the mean percentage of items correct for the kindergarten sample was 53 percent.

One consideration of the Yopp-Singer format is that the administration of every item along with corrective feedback allows for the possibility that the task may be learned. Indirect evidence to suggest that Yopp’s administration format may have resulted in inflated scores comes from the reporting of lower mean scores in studies that have also used the oral segmentation task format, without corrective feedback. For example, Torgesen, Wagner, Laughon, Simmons, and Rashotte (1993) reported a much lower mean scores of 11 percent correct for a sample of 95 kindergarten and 38 percent correct for a sample of 89 grade two students, on a 15-item stimulus list. A study by
Vandervelden and Siegel (1995) used a scoring system whereby each correct phoneme in a list comprised of words and nonwords earned a score of one or two points. Using this scoring system, the mean percent correct scores reported for 36 kindergarten children and 36 grade one children were 31.55 ($SD = 30.20$) and 73.81 ($SD = 27.87$), respectively.

The comparison of results across these studies, however, is limited by additional differences that exist between studies with regard to procedures, instruction, and stimuli. Thus, the extent to which this segmentation task format is appropriate for use with kindergarten children is unknown. Likewise, the relationship between performance on this task and beginning reading is not clearly established; Yopp (1988) failed to include a reading measure in her study, while the study by Vandervelden and Siegel (1995) reported positive correlations between word reading and segmentation ability, although their study was not a prediction study.

In summary then, the oral segmentation task requires analysis of the entire word, and a verbal response consisting of each separate phoneme. This is problematic because, as previously mentioned, it is impossible to isolate a single phoneme. Thus, the response is an approximation, and one factor to consider when using the oral segmentation task is determining what type of oral response constitutes an acceptable segmentation of phonemes. For example, merely stretching the sounds in the word (e.g., saying “cccccaaaaattttt” for “cat”) does not conform to the conceptual definition of phoneme segmentation but may nevertheless be a given response. Thus, the use of this format requires the ability to reliably score oral responses. With regard to the strategies that may be used for this task, guessing or the use of a spelling strategy may not result in a correct utterance.
Combination Phoneme Segmentation Task

One task that has incorporated aspects of the counting task and the articulation (oral segmentation) task was developed by Sawyer (1987). Sawyer based her task on the Lindamood Test of Auditory Conceptualization (Lindamood & Lindamood, 1971), which assesses the ability to segment nonword syllables into phonemes through the use of coloured counters that are physically manipulated by the student. Sawyer’s test, called the Test of Awareness of Language Segments (TALS, 1987) is a published test designed to assess children’s segmentation ability at the word, syllable, and phoneme levels. The format is the same across levels; and at the phoneme level requires the child to listen to a real word and then use a coloured wooden blocks to represent each phoneme. In addition, the child is prompted to say the sound that each block represents, thus combining aspects of both the counting task and the oral segmentation task. The item is scored as correct only if the number of blocks and the sound for each block are both correct.

The advantage of this task is that it overcomes the flaws of the previously mentioned tasks by allowing for both unambiguous scoring (the number of blocks represents the number of phonemes) as well as the opportunity to analyze an oral response. Although the test was administered to over 1000 kindergarten and 1000 grade one children, Sawyer only includes the total test scores in her manual which are based on the sum of correct responses across the three conditions: word, syllable, and phoneme. Thus, performance on the phoneme segmentation condition is not independently specified. In the validity section of the TALS manual (1987), however, performance on the phoneme segmentation section is reported on a subsample of 168 kindergarten children and 128 grade one children tested in May. On the phoneme section, the mean
score for the kindergarten subsample was 53.75%, and the grade one sample was 80%. Reading ability, however, was not reported, leaving the extent to which reading ability influenced performance on the task unknown. In terms of task variables then, the combination phoneme segmentation task requires analysis of the entire word, and requires articulation of each phoneme in conjunction with the use of a block to represent each phoneme thereby allowing unambiguous scoring with regard to the number of phonemes a subject believes the word contains.

Partial Segmentation Tasks

In addition to a variety of full segmentation tasks (phoneme counting, oral phoneme segmentation, combination phoneme segmentation), there are also a variety of partial phoneme segmentation tasks. One type of partial segmentation task was used in the previously mentioned study by Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993) and required children to say the first, middle or last sound in a word (e.g., “What sound does “sock” begin with?”). Although both kindergarten and grade two children had some degree of difficulty on the oral phoneme segmentation task that required segmentation of the entire word; performance on the partial segmentation task was somewhat higher with a mean score of 27 percent for the kindergarten sample and 76 percent for the grade two sample. Owing to the fact that stimuli and scoring procedures were similar for the full and partial segmentation tasks, these findings suggest, not surprisingly, that the partial segmentation task is somewhat easier than the full segmentation task.
A second type of partial phoneme segmentation task, based on the oddity task by Bryant and Bradley (1985), was the task used by Stanovich, Cunningham, and Cramer (1984). In this study, kindergarten children were asked to listen to four words and then choose the word that had a beginning sound that was different for the other words. Based on a sample of 49 children, this task was found to be a reliable and powerful predictor of reading ability. Taken together, the results of these studies suggest that (kindergarten) children with limited decoding ability are able to perform partial phoneme segmentation tasks more readily than full phoneme segmentation tasks.

**Analysis of Phoneme Segmentation Tasks**

As an overview, Table I presents a variable analysis of the tasks discussed below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Task Demand</th>
<th>Partial/ Full Analysis</th>
<th>Verbal Response</th>
<th>Confounding Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoneme Counting</td>
<td>Count the number of phonemes</td>
<td>Full</td>
<td>Optional</td>
<td>Can use a spelling strategy</td>
</tr>
<tr>
<td>Oral segmentation</td>
<td>Say each of the sounds (phonemes) in a word</td>
<td>Full</td>
<td>Yes</td>
<td>Scoring is difficult</td>
</tr>
<tr>
<td>Combination phoneme</td>
<td>Use blocks to represent phonemes</td>
<td>Full</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>segmentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral partial phoneme</td>
<td>Say the first sound in a word</td>
<td>Partial</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>segmentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-segmenting task -</td>
<td>Blend segments to make a word</td>
<td>Full</td>
<td>Yes</td>
<td>Can use lexical knowledge</td>
</tr>
<tr>
<td>Blending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In looking at the differences across segmentation tasks, the articulation requirement of the oral segmentation task versus the counting task appears to be a significant task demand difference. Another significant difference between tasks is that the spelling strategy, found to be used by children on the counting task, cannot be used on
the articulation formats. With regard to scoring, however, the counting task can be unambiguously scored, whereas judging whether the phonemes have been acceptably segmented on the oral segmentation task may be problematic. Based on the definition of phoneme awareness as the awareness of and ability to manipulate phonemes, merely stretching the phonemes in a word does not conform with this definition. In this regard then, Sawyer’s combination task format combines both the oral response and counting formats, eliminating potential inaccurate scoring in the case of the oral response and an alternative solution in the case of the counting response.

Returning to articulation, its importance in phonemic awareness has been noted by several researchers. For example, in their study of phonological recoding and phoneme awareness, Vandervelden and Siegel (1995) conclude that “Further research is needed to investigate differences among tasks assessing phoneme awareness. Research into the possible role of overt articulation in the development of phoneme awareness may seem to be not only of theoretical interest but also of educational and clinical interest” (p. 872). Morais (1991) also provides evidence of the role of articulation during a task by saying that “Although phonemes are not represented as discrete units in the speech precept, articulatory cues to phonemic information could be exploited to reconstruct phonemic representations at a conscious level” (p. 23). Support for the importance of acoustic and articulatory cues in the performance of phonemic awareness tasks comes from the finding that continuous sounds (consonant sounds that can be “stretched out”, e.g., /m/, /l/) may be considered easier stimuli than stop sounds (sounds that end abruptly, e.g., /b/, /d/) owing to their extra acoustic length. Indeed, Skjelfjord (1987) states that in segmentation training, children must be taught to observe their own articulation when slowly uttering
the words. Likewise, Lewkowicz (1980) states that there are two aspects involved in teaching segmentation: (1) the slow stretched pronunciation of a word so that the child can hear the sounds, and (2) the slow pronunciation in order to learn to attend to articulatory clues.

An additional important aspect of articulation within the context of phonemic awareness tasks is that, unlike the counting task, it allows for the analysis of errors. For example, Perfetti, Beck, Bell and Hughes (1987) created a model of processing on a blending task based on the types of errors made by children on the task. Similarly, Vandervelden and Siegel (1995) compared performance on partial and complete analysis of words on segmentation tasks and from this made deductions about the development of segmentation ability. Thus, the responses made by children on phonemic awareness provide valuable insights into the ways in which children process and respond to meet task demands.

With regard to the relationship between the segmentation task formats, it appears that partial segmentation tasks are easier than full segmentation tasks. With regard to the relationship between full segmentation task formats, however, Torgesen, Wagner, and Bryant (1992) suggest the following: “A child with a slightly deeper level of awareness would be able to indicate that there are three separate sounds in the word cat rather than only one sound. Finally, a child with fully explicit phonological awareness would be able to separately pronounce the individual sounds in cat, given the word as a stimulus” (p. 113). Torgesen and his colleagues did not empirically investigate this claim, however, and based on the previous review of segmentation tasks, it should be evident that the accuracy of this claim cannot be evaluated by simply looking at results across studies for
differences in procedure, stimuli, and instructions, and participants may account for
differences in performance. Thus, the best way to explore the relationship between tasks
is within the context of a single study while controlling for other variables.

To date, only a few studies have compared multiple segmentation tasks. In the
study by Yopp (1988), 10 phonemic awareness tasks including the phoneme counting
task and the oral segmentation task (the Yopp-Singer task) were administered to
kindergarten children. Yopp failed, however, to equate phonemic awareness tasks in
terms of the number and linguistic complexity of stimuli, and administration and scoring
procedures. In addition, as previously mentioned, Yopp administered and gave feedback
on every item of every task, a procedure that is problematic for two reasons: (1) for
children who are unable to perform the task, having to go through all items may prove to
be a frustrating and unnecessary exercise, and (2) corrective feedback after every item
creates a learning component to the task. One indication that this format may have
inflated scores comes from the fact that the mean score for kindergarten students on the
counting task (using the exact same items and instructions) was 57% correct as opposed
to 17% correct in the original study (Liberman, Shankweiler, Fischer, & Carter, 1974).

An additional shortcoming of the study is failure to include a reading measure to evaluate
the effects of reading ability on phoneme task performance. Thus, while the study did
compare the performance of the same group of kindergarten children across several
phonemic awareness tasks, including segmentation tasks, the design of the study
precludes direct comparison across tasks and their relationship to reading owing to a
failure to control for different aspects of the tasks including word stimuli, and also the
absence of a reading measure.
In the study by Stanovich, Cunningham, and Cramer (1984), ten phonological awareness tasks were administered to a group of 58 kindergarten students. The tasks chosen included five Oddity tasks, thereby making memory and attention possible confounding variables (there were no assessments of memory). In addition, extraneous variables such as the word stimuli and administration were not controlled.

In summary, several tasks have been designed to assess phoneme segmentation ability. Tasks differ along several dimensions including the type of response and the strategies that may be used to solve the task. Owing to differences that exist in studies employing the same and different segmentation tasks, including the nature of word stimuli used, administration formats, and scoring procedures, comparisons across segmentation tasks are, for the most part, precluded. In addition, the lack of inclusion of a reading measure in some studies precludes the examination of the relationship between phoneme segmentation ability and reading.

Overview of Present Study

Phonemic segmentation ability is regarded as one important aspect of phonemic awareness, and as a result, several phonemic segmentation tasks have been designed. The use of different segmentation tasks has resulted in differing claims regarding children’s phonemic segmentation ability, and its relationship to reading. Currently, the degree to which these tasks converge is largely unknown. The primary purpose of the present study was to assess the relationship among different segmentation tasks by comparing the performance of two groups, kindergarten and grade one children, on the tasks. To date, no one has directly compared the relationship between different segmentation task formats, although several researchers have called for studies that focus on the comparison
Phonemic Segmentation


In the present study, kindergarten and grade one students were administered several phonemic awareness tasks as well as tasks related to reading. The phonemic awareness tasks used in the study were the segmentation tasks that were reviewed previously: phoneme counting task, oral segmentation task, combination segmentation task, and the partial segmentation task, as well as a phoneme blending task. Although specific task demands varied, the actual stimuli used, and the administration and scoring formats were held constant across tasks. The reading-related tasks administered included a letter identification task, Woodcock Reading Mastery Test - Revised (WRMT-R) Word Identification and Word Attack subtests. In addition, a vocabulary test, the Peabody Picture Vocabulary test - Revised (PPVT-R) was administered.

In the present study, two sets of research questions were addressed:

1) **What is the relationship among phonemic awareness tasks?**

By controlling for variables including stimuli, administration and scoring procedures, a relatively direct assessment of the relationships among these tasks could be performed. Given that the phonemic segmentation tasks purport to assess the same underlying ability, a considerable degree convergence among tasks was expected. However, a stronger relationship was predicted among the three full analysis tasks (oral segmentation, combination, and counting) because of a similarity in task demands. In addition, based on previous research findings, it was hypothesized that the order of difficulty of the phonemic awareness tasks, from easiest to most difficult, would be as
follows: partial segmentation, then blending, followed by the segmentation tasks, with no significant difference between the oral segmentation and combination segmentation tasks.

2) **What is the relationship between performance on the phonemic awareness tasks and reading ability?**

   In light of the findings of the first question, the relationship between performance on the phonemic awareness tasks and word reading ability was addressed. Performance on two types of word reading tasks, real word identification and nonword decoding, was compared to performance on each of the phonemic awareness tasks. It was hypothesized that if decoding is the aspect of reading most closely related to phonemic awareness, then the relationship between nonword decoding and phonemic awareness should be stronger than the relationship between real word identification and phonemic awareness.

   In addition, performance on the nonword decoding task and each of the phonemic awareness tasks was examined in order to evaluate the extent to which the debate regarding the relationship between phonemic awareness and word reading is task dependent. It was predicted that only those students with some decoding ability would perform well on the three full analysis tasks whereas nondecoders and decoders alike would be able to perform the blending and partial segmentation tasks (although performance was predicted to be higher for those students with decoding ability).

   In addition, an exploratory stepwise multiple regression was conducted in order to find out which phonemic awareness task or tasks accounted for the most variance in or were the best predictors of decoding ability.
Method

Participants

Participants were 25 kindergarten and 25 grade one students enrolled in two elementary schools in British Columbia School District #15 (Penticton). In the kindergarten sample, there were 14 girls and 11 boys, and in the grade one sample there were 11 girls and 14 boys. The mean ages for the kindergarten and grade one groups were 71 months (range = 65 - 80 months) and 84 months (range = 77 - 89 months), respectively. All participants spoke English as a first language and no participants had visual, auditory, or other physical disabilities.

To recruit participants, a letter describing the general purpose of the study and a consent form were sent home with students from two kindergarten and one grade one classroom. Parents were requested to read the letter, and sign and return the accompanying consent form to the school. The participation rates for kindergarten and grade one students were 76% and 96%, respectively. All students participated with the full written consent of the parent or legal guardian.

Measures

Vocabulary Test

Peabody Picture Vocabulary Test - Revised (PPVT-R), Form L. The Peabody Picture Vocabulary Test - Revised (PPVT-R, Dunn & Dunn, 1981) is an individually administered, norm-referenced test designed to measure the hearing (receptive) vocabulary of children and adults aged 2 1/2 through 40. The test is a nonverbal, multiple-choice format that requires no reading ability. The split-half reliabilities of the PPVT-R, Form L, for the subjects in the standardization sample aged 2 1/2 through 18
ranged from .67 to .88 (median .80). The PPVT-R correlates significantly with measures of reading, language and general achievement, and with standardized measures of intelligence (Sattler, 1992). In this study, the PPVT-R was administered to obtain an estimate and comparison of the receptive vocabulary ability of the kindergarten and grade one groups. The test was administered according to manual instructions and a standard score equivalent was computed for each participant, with higher scores reflecting higher vocabulary ability, relative to same-age peers.

**Word and Letter Identification Tasks**

**Letter Identification.** Participants were asked to name 9 lowercase and 9 uppercase letters printed on a laminated card. The uppercase and lowercase letters in order of administration were: A, J, S, D, M, V, G, P, Y, b, k, t, e, w, h, q, z. A child’s score for this task was the number of letters correctly identified out of a possible 18.

Share, Jorm, Maclean, and Matthews (1984) used a similar task which required children to give the names of 9 letters and reported a test-retest reliability (2 weeks) of .91. Like phonemic awareness, letter identification has been found to be a predictor of subsequent reading achievement (Share, Jorm, Maclean, & Matthews, 1984).

**Woodcock Reading Mastery Tests - Revised (WRMT-R, 1987), Word Identification and Word Attack subtests - Form G.** The Word Identification subtest of the WRMT-R required participants to identify words that appeared in large type on a stimulus page. The Word Attack subtest required participants to read nonsense words, or words with a very low frequency of occurrence in the English language, that also appeared in large type on a stimulus page. These tasks were administered according to manual directions and raw scores and standard scores were calculated and used in
analyses, with higher scores reflecting higher word reading ability. The Word Attack subtest was not administered if a participant was unable to correctly identify any words on the Word Identification subtest.

The WRMT-R manual (1987) reports split-half reliability coefficients of .98 and .94 for Form G Word Identification and Word Attack subtests, respectively. The concurrent validity of the two subtests for the age group in this study is demonstrated by moderate correlations with similar subtests on the Woodcock-Johnson Psycho-Educational Battery (WJ) for a grade one sample of 85 children. According to the WRMT-R manual, correlations between the WRMT-R Word Identification and WJ Letter-Word Identification subtests, and WRMT-R Word Attack and WJ Word Attack subtests were .69 and .64, respectively.

Phonemic Awareness Tasks and Task Features

Directions. The directions for each of the five phonemic awareness tasks were created by first reviewing and comparing the directions used in similar tasks in different studies to select or adapt instructions that were age-appropriate and reliable. The general direction format for each of the five tasks was modeled after the phonemic awareness tasks in the Comprehensive Test of Reading Related Phonological Processes (Torgesen & Wagner, 1996).

There were four practice trials for each real word condition and three practice trials for each nonword condition. In the real word condition, the investigator modeled the task on the initial practice trial, and corrective feedback was given on three practice trials. In the nonword condition, the examiner modeled the task on the initial practice trial, and corrective feedback was given on two practice trials.
Stimuli. There were five lists comprised of 10 words and 10 nonwords and words were administered before nonwords. However, nonwords were not administered if the participant was unable to respond to any real words. The five lists of words and nonwords were equivalent in terms of the number of words and nonwords per list and the linguistic complexity of the items in the list. These two features will be discussed in turn.

With regard to the number of items per task, there has been considerable variation across previous studies which utilize phonemic awareness tasks. For example, Liberman, Shankweiler, Fischer and Carter (1974) included 42 items in their phonemic segmentation task. Ehri (1979, as cited in Tunmer & Nesdale, 1982), however, has argued that "the ability to treat phonemes as objects of thought is a skill that is possessed or not possessed by children” (p. 305). Consistent with this argument, Stanovich, Cunningham and Cramer (1984) have demonstrated that inclusion of 10 items per phoneme awareness task was sufficient to provide a reliable assessment (the mean task reliability across 10 tasks was .81). Thus, a large number of items does not appear to be necessary to establish whether or not a child can perform a particular phoneme awareness task. Given this finding and the generally limited attention span of young children, 10 real words and 10 nonwords were selected for each of the five lists.

With regard to linguistic complexity, each word and nonword stimulus varied in length from two to four phonemes. The inclusion of both words and nonwords allowed for the evaluation of the influence of lexical knowledge (word knowledge) on performance in the real word condition. As well, across word lists, both word and nonword stimuli were equivalent in terms of the number of continuous ("stretched out") consonants (e.g., /l/, /m/) and "stop" (cut off) consonants (e.g., /b/, /c/), given previous
evidence that performance is higher when continuous versus stop consonants are used as stimuli (McBride-Chang, 1995). Consonant (C) and vowel (V) combinations (e.g., CVC,) were also controlled for given previous evidence that performance is influenced by the structure of words (McClure, Ferreira, & Bisanz, 1996; Stahl & Murray, 1994).

Finally, particular stimulus lists were counterbalanced across the five tasks to control for any word list effects. Thus, each participant was administered each of the five tasks and each of the five word lists although different word lists were used for each task across subjects (e.g., stimulus word list 1 was used for task 1 for subject A, but for task 2 for subject B, and task 3 for subject C). The word lists appear in Appendix F.

**Scoring.** The number of correct responses for the word and nonword conditions for each task were computed for each subject. Administration was discontinued after four consecutive incorrect responses, and the remaining (unattempted) stimuli were scored as incorrect. The maximum score for each task was 10 for the real word condition and 10 for the nonword condition, with higher scores reflecting greater accuracy.

**Phoneme Counting Task.** The phoneme counting task was adapted from the original counting task used originally by Liberman, Shankweiler, Fischer, and Carter (1974). This task required participants to "tap" each phoneme they hear in a given word (or nonword) using a pencil. Although Liberman et al. did not report a reliability in their study, Yopp (1988) used the same task in her study and reported an internal consistency coefficient of .83.

In the present study, participants were asked to "tap" once for each phoneme they heard in each of 10 words and 10 nonwords, each containing 2-4 phonemes. Responses
were recorded and scored as either correct (1) or incorrect (0), and summed for each of
the word/nonword conditions. Task instructions appear in Appendix A.

**Oral Phoneme Segmentation Task.** The oral phoneme segmentation task
employed in the present study was adapted from the one used by Yopp (1995). For this
task, participants were asked to listen to a word, and then say the sounds in the word.
Studies that have used this format have reported different estimates of reliability. In
Yopp's (1988) study, the Yopp-Singer Phoneme Segmentation Task had the highest
internal consistency, .95, of the 10 phonemic awareness tasks. However, in a study by
Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993), the internal consistency
obtained for a similar phoneme segmentation task was lower, .70.

In the present study, participants were asked to say the sounds in each of 10 words
and 10 nonwords, each containing 2-4 phonemes. Responses were recorded and scored as
either correct (1) or incorrect (0), and summed for each of the word/nonword conditions.
As previously mentioned, merely stretching the sounds in the word (e.g., saying
“ccccaaaat” for “cat”) did not conform to the definition of phoneme segmentation. A
response was scored correct only if there was a clear break between phonemes. The
instructions used for this task were similar to those used in the Yopp-Singer Phoneme
Segmentation Test (1995) and appear in Appendix B.

**Combination Phoneme Segmentation Task.** The combination phoneme
segmentation task was be adapted from Sawyer's Test of Awareness of Language
Segments (TALS, 1987). Participants were asked to use coloured blocks to represent
each sound in 10 words and 10 nonwords. Specifically, participants listened to a word or
nonword spoken by the examiner and asked to simultaneously: 1) select the same number
of blocks as there are phonemes in the word and 2) say the sound (i.e., phoneme) that each block represents. Responses were recorded and scored as either correct (1) or incorrect (0), and summed for each real word and nonword condition. In the TALS manual, internal reliabilities for the phoneme segmentation portion of the test were .80 and .83 based on a subsample of the normative group consisting of 199 kindergarten children and 132 grade one children, respectively. Instructions for this task appear in Appendix C.

**Partial Segmentation Task.** The partial segmentation task is a modification of the oral segmentation task. Participants were asked to say the first sound in 10 words and 10 nonwords. Responses were recorded and scored as either correct (1) or incorrect (0), and summed for each of the word/nonword conditions. Instructions appear in Appendix D.

**Phoneme Blending.** The blending task required participants to listen to separate sounds spoken by the examiner and put them together to make a word or nonword. Phonemes were read at a rate of approximately half a second interval between phonemes. Responses were recorded and scored as either correct (1) or incorrect (0), and summed for each of the word/nonword conditions. Instructions for the task appear in Appendix E.

Odd-even reliability coefficients reported in the Roswell-Chall Auditory Blending Test (1963) manual based on a cohort of 63 children tested in grades 1 - 4 ranged from .86 to .93. The internal consistency of the phoneme blending task in the study by Yopp (1988) was .96. A study by Torgesen, Laughon, Simmons, and Rashotte (1993) using a sample of 95 kindergarten children reported internal reliabilities of .88 on the real word blending task and .84 on the nonword task.
Task Reliabilities. Cronbach's alpha was used to evaluate the internal consistency of each of the five phonemic awareness tasks. As shown in Table 3, the reliabilities vary widely, but generally reflect adequate internal consistency for the tasks.

The reliability estimates should be interpreted with caution due to the fact that the design of the study involved counterbalancing five equivalent word lists across tasks. While an estimate of task reliability is not usually appropriate when the specific stimuli vary across subjects, the fact that word lists were designed to be equivalent across several dimensions was thought to merit the inclusion of an estimate of reliability. Again, however, these results must interpreted with caution.

Table 2
Phonemic Awareness Task Reliabilities

<table>
<thead>
<tr>
<th>Task</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td></td>
</tr>
<tr>
<td>Gr.1</td>
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<td>Blending</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>.87</td>
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<tr>
<td>Partial Segmentation</td>
<td>.99</td>
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<td></td>
<td>.71</td>
</tr>
<tr>
<td>Counting</td>
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<tr>
<td></td>
<td>.82</td>
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<tr>
<td>Oral Segmentation</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>.92</td>
</tr>
<tr>
<td>Combination Segmentation</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>.88</td>
</tr>
</tbody>
</table>

Procedure

Tasks were individually administered over the course of two testing sessions with each session lasting approximately 20 - 30 minutes. The time between testing sessions
varied from three to five days. Testing was conducted by the author during the school day in a quiet room in the school.

Procedures were identical for the kindergarten and grade one samples. In the first session, the tasks were administered in the following order: PPVT-R, Letter Identification, WRMT-R Word Identification and WRMT-R Word Attack (if a score of >1 was obtained on Word Identification), and either the Blending or Partial Segmentation task. In the second session, the remaining phonemic awareness tasks were administered. The order of administration of the remaining phonemic awareness tasks was randomized across participants to control for possible order effects. For each task, the real word condition preceded the nonword condition.
Results

Overview

The results chapter is divided into three sections. The first section consists of three sets of preliminary analyses. First, analyses were conducted to evaluate whether or not there were significant differences between boys and girls on any of the measures. Following this, the effect of word type (real word versus nonword) on performance on the five phonemic awareness tasks was examined. Third, the relative performance of the kindergarten and grade one groups across measures was evaluated. The subsequent two sections of this chapter include analyses which focus on the primary research questions of this study. Specifically, the next section focuses on analyses that examine the relations among phonemic awareness tasks, while the third section focuses on analyses that address the relationship between reading ability and performance on the phonemic awareness tasks. The chapter concludes with an overall summary of the findings.

Preliminary Analyses

The first preliminary analysis was conducted to evaluate whether there were significant sex differences in performance on any of the tasks. Based on the nonsignificant findings of previous research (e.g., Stanovich, Cunningham, & Cramer, 1984), no sex differences were anticipated. Sex differences were evaluated for each of the nine tasks (i.e., five phonemic awareness tasks, letter identification, two word reading tasks, PPVT-R) using multiple one-way analyses of variance (ANOVAs). Following recommendations by Huberty and Morris (1989), an adjusted alpha level was used to reduce the overall probability of Type I error. In this case, a Bonferroni adjustment was
computed whereby the adjusted alpha level for each test was set as the overall alpha level \((\alpha = .05)\) divided by the number of measures \((.05/ 9 = .0055)\). Results of these analyses revealed no significant sex differences for any of the measures. However, there was a tendency for males to perform better than females on the phonemic awareness tasks (maximum score = 20 on each task): combination task, boys \((M = 12.6, SD = 6.6)\) versus girls \((M = 10.36, SD = 7.0)\), \(F (1,48) = 3.3, p = .08\); counting task, boys \((M = 11.3, SD = 4.6)\) versus girls \((M = 7.7, SD = 5.1)\), \(F (1,48) = 6.9, p = .01\), oral segmentation task, boys \((M = 9.7, SD = 6.3)\) versus girls \((M = 5.5, SD = 6.2)\), \(F (1,48) = 5.8, p = .02\), and partial segmentation task boys \((M = 17.5, SD = 4.8)\) versus girls \((M = 14.1, SD = 8.2)\), \(F (1,48) = 3.3, p = .08\). The tendency toward stronger overall performance of boys is primarily attributable to the fact that there were more boys \((n = 14)\) than girls \((n = 11)\) in the grade one sample, resulting in higher overall scores for boys. Given the overall nonsignificant sex difference, sex of subject was not considered as a variable in subsequent analyses.

A second set of preliminary analyses evaluated the influence of word type (real word versus nonword) on phonemic awareness task performance. Paired sample t-tests using an adjusted alpha level, \(.05/ 5 = .01\), to control for Type I error indicated that although scores for the real word condition were generally higher than those of the nonword condition across tasks, the only score difference that approached significance was that of the blending task, \(t = -2.14, df = 49, p = .04\). This finding is different from Torgesen, Wagner, Balthazar, Davis, Morgan, Simmons, Stage and Zirps (1989) and Schreuder and van Bon (1989) who found that nonwords were more difficult than real words on a blending task. The failure to demonstrate differences across real and nonword tasks is likely attributable to the fact that real word tasks were administered before
nonword tasks resulting in a possible practice effect for the nonword condition (i.e., children had the opportunity to practice the task with real word stimuli before progressing to nonword stimuli).

Further evidence for the relationship between real word and nonword conditions across tasks was demonstrated in correlational analyses. As shown in Table 3, Pearson product-moment correlations (one-tailed) between real word and nonword conditions for each phonemic awareness task were high, suggesting that performance for each word type was similar. Given the lack of a significant word type effect on performance, as well as the strong relationships observed between real word and nonword performance across tasks, the real word and nonword conditions for each task were combined in subsequent analyses.

Table 3
Correlations Between Real Words and Nonwords, By Task

<table>
<thead>
<tr>
<th>Task</th>
<th>Total Sample (n = 50)</th>
<th>Kindergarten (n = 25)</th>
<th>Grade One (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blending</td>
<td>.88</td>
<td>.85</td>
<td>.80</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>.96</td>
<td>.68</td>
<td>.97</td>
</tr>
<tr>
<td>Counting</td>
<td>.80</td>
<td>.75</td>
<td>.66</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>.89</td>
<td>.88</td>
<td>.83</td>
</tr>
<tr>
<td>Combination</td>
<td>.86</td>
<td>.87</td>
<td>.73</td>
</tr>
</tbody>
</table>

Note: All correlations are significant at the .001 level.

An additional analysis involved comparing the performance of the kindergarten and grade one groups on each of the nine tasks using multiple one-way analyses of variance (ANOVAs) and an adjusted alpha level (.05/9 = .006) to control for Type I
error (Table 4). Results indicated that the scores of grade one students were significantly higher than the scores of kindergarten students on all tasks, with the exception of the PPVT-R.

On the PPVT-R, a measure of receptive vocabulary that is related to both reading and intelligence, the mean scores of the kindergarten and grade one samples did not differ significantly, $F_{[48]} = 1.14, ns$, suggesting that the vocabulary ability of both groups was average and similar relative to same-age peers. Thus, the significant differences in performance between the two groups are not attributable to relative group differences in general word knowledge, as reflected by vocabulary ability.

Given the significant differences observed in performance on both reading and phonemic awareness tasks, as shown in Table 4, the kindergarten and grade one samples may be considered two distinct groups with regard to performance on the tasks used in the study. According to their classroom teachers, children in the kindergarten sample had received no formal reading instruction in school while children in the grade one sample had received nearly one full year of reading instruction. Owing to these significant and relevant group differences, subsequent analyses are performed separately for both the grades unless otherwise noted.²

² In light of the significant differences between groups, the first two analyses that evaluated sex and word type differences, were repeated for each grade with the same findings. Results indicated no significant differences in performance between boys and girls at either the kindergarten or grade one level, nor were there significant differences between word type (real word versus nonword) at either grade level.
Table 4

Task Variations as a Function of Grade Level.

<table>
<thead>
<tr>
<th>Task</th>
<th>Max. Possible</th>
<th>Kindergarten (n = 25)</th>
<th>Grade 1 (n = 25)</th>
<th>F Ratio</th>
<th>F Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter Identification and Word Reading Tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letter Identification</td>
<td>18</td>
<td>14.8 (3.5)</td>
<td>17.6 (.7)</td>
<td>15.1</td>
<td>.000</td>
</tr>
<tr>
<td>Word Identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Score</td>
<td>N/A</td>
<td>94.6 (12.5)</td>
<td>109.8 (12.6)</td>
<td>331.0</td>
<td>.000</td>
</tr>
<tr>
<td>Raw score</td>
<td>106</td>
<td>4.0 (5.3)</td>
<td>42.32 (9.1)</td>
<td>18.4</td>
<td>.000</td>
</tr>
<tr>
<td>Word Attack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Score</td>
<td>N/A</td>
<td>83.32 (14.3)</td>
<td>96.32 (11.1)</td>
<td>12.9</td>
<td>.001</td>
</tr>
<tr>
<td>Raw score</td>
<td>.45</td>
<td>0.68 (1.31)</td>
<td>12.6 (8.9)</td>
<td>44.0</td>
<td>.000</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPVT-R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Score</td>
<td>N/A</td>
<td>103.0 (12.9)</td>
<td>107.4 (15.5)</td>
<td>1.14</td>
<td>.29</td>
</tr>
<tr>
<td>Phonemic Awareness Tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting</td>
<td>20</td>
<td>6.4 (4.0)</td>
<td>12.6 (4.3)</td>
<td>27.9</td>
<td>.000</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>20</td>
<td>4.4 (5.0)</td>
<td>10.8 (6.4)</td>
<td>15.1</td>
<td>.000</td>
</tr>
<tr>
<td>Combination</td>
<td>20</td>
<td>4.5 (5.1)</td>
<td>12.2 (5.0)</td>
<td>29.5</td>
<td>.000</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>20</td>
<td>13.1 (8.7)</td>
<td>18.4 (2.2)</td>
<td>8.8</td>
<td>.005</td>
</tr>
<tr>
<td>Blending</td>
<td>20</td>
<td>7.4 (6.3)</td>
<td>15.6 (4.4)</td>
<td>29.0</td>
<td>.000</td>
</tr>
</tbody>
</table>
Relations Among Phonemic Awareness Tasks

In this section, analyses that address the hypotheses concerning the relationship among phonemic awareness tasks are presented. Specifically, Pearson product-moment correlations were computed to evaluate the strength of relationships among the five phonemic awareness tasks, and factor analyses were conducted to explore these relationships. In addition, overall variations in scores on the tasks were examined to assess the relative difficulty of the five tasks.

Intercorrelations. The intercorrelations among phonemic awareness tasks, computed separately for kindergarten and grade one students, are presented in Table 5. Most correlations were highly significant, suggesting a strong relationship among the various phonemic awareness tasks. There is, however, a range in the magnitude of the correlations between pairs of measures which suggests some difference in the relationship among tasks. One exception to the pattern of high correlations is the partial segmentation task correlations at the grade one level. These nonsignificant correlations are most likely due to a ceiling effect on this task at the grade one level. As predicted, the highest correlation for both grades was between the oral segmentation and combination task, owing to similarities in task demands.
Table 5  
Correlations Among Phonemic Awareness Tasks, by Grade

<table>
<thead>
<tr>
<th>Task</th>
<th>Counting</th>
<th>Oral Segmentation</th>
<th>Combination</th>
<th>Partial Segmentation</th>
<th>Blending</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kindergarten (n = 25)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting</td>
<td>-</td>
<td>.63**</td>
<td>.52**</td>
<td>.43**</td>
<td>.71**</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>-</td>
<td>.86**</td>
<td>.75**</td>
<td>.64**</td>
<td></td>
</tr>
<tr>
<td>Combination</td>
<td>-</td>
<td></td>
<td>.69**</td>
<td></td>
<td>.68**</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>.67**</td>
</tr>
<tr>
<td>Blending</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade One (n = 25)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting</td>
<td>-</td>
<td>.73**</td>
<td>.69**</td>
<td>.19</td>
<td>.58**</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>-</td>
<td>.83**</td>
<td>.38</td>
<td></td>
<td>.76**</td>
</tr>
<tr>
<td>Combination</td>
<td>-</td>
<td></td>
<td>.30</td>
<td></td>
<td>.65**</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>.08</td>
</tr>
<tr>
<td>Blending</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: ** p < .001, * p < .05
Factor Analyses. A second way of exploring the relationships among tasks was through a factor analysis. In order to further investigate the underlying structure among the patterns of correlations, a principal component factor analysis with orthogonal (varimax) rotation was conducted for each grade. Across analyses, a scree test revealed a two-factor solution, and factor loadings are reported in Table 6. There is a different pattern of loadings for the kindergarten and grade one samples. For kindergarten students, three of the phonemic awareness tasks loaded significantly on the first factor (oral segmentation, combination, and blending), and both the partial segmentation and the counting tasks loaded on the second factor. For grade one students, four of the five phonemic awareness tasks loaded significantly on the first factor (oral segmentation, counting, combination, and blending), and only the partial segmentation tasks loaded on the second factor. The pattern of loadings for the grade one sample, when considered alongside the mean percent correct for each task, (to be discussed below) suggests that the first factor includes the more difficult subtests, those that require analysis of the whole word or all the word segments (in the case of the blending task), while the second factor includes the easiest task, partial segmentation, which requires analysis of only the first sound in the word. The same explanation does not apply to the kindergarten sample, however, for the factor loading for the counting task is higher for the second factor, a finding which is not readily interpretable and may simply be a spurious finding resulting from a sample size that fails to meet the guidelines of 10 subjects per variable (Kerlinger, 1986) or 20 subjects per factor (Kline, 1993). Unlike other studies (e.g., Torgesen, Wagner, & Rashotte, 1994), blending did not constitute a separate factor, which may again be accounted for by a small sample size.
### Table 6

#### Principal Components Analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Kindergarten</th>
<th></th>
<th>Grade One</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factor 1</td>
<td>Factor 2</td>
<td>Factor 1</td>
<td>Factor 2</td>
</tr>
<tr>
<td>Counting</td>
<td>.24</td>
<td>.94</td>
<td>.84</td>
<td>.11</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>.84</td>
<td>.41</td>
<td>.91</td>
<td>.29</td>
</tr>
<tr>
<td>Combination</td>
<td>.86</td>
<td>.34</td>
<td>.87</td>
<td>.24</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>.53</td>
<td>.73</td>
<td>.12</td>
<td>.98</td>
</tr>
<tr>
<td>Blending</td>
<td>.88</td>
<td>.23</td>
<td>.87</td>
<td>-.08</td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>3.65</td>
<td>.65</td>
<td>3.23</td>
<td>.95</td>
</tr>
<tr>
<td>% Variance</td>
<td>72.9</td>
<td>12.9</td>
<td>64.7</td>
<td>19</td>
</tr>
<tr>
<td>Cumulative % Variance</td>
<td>72.9</td>
<td>85.8</td>
<td>64.7</td>
<td>83.7</td>
</tr>
</tbody>
</table>

**Relative Task Difficulty.** In order to examine the hypothesis regarding the order of difficulty of tasks, the relative performance (accuracy) achieved on each of the five phonemic awareness tasks was examined for each grade. Using the mean scores previously reported in Table 2, a series of paired sample t-tests, using an adjusted alpha
level (.05/10 comparisons = .005), were conducted in order to evaluate which task means differed significantly from one another.

For the kindergarten sample, the mean scores for each task were significantly different from one another ($p < .005$) in six out of ten comparisons. As hypothesized, the order of tasks from easiest to most difficult is as follows: partial segmentation, blending, counting, combination, and oral segmentation. Specifically, the mean score on the easiest task, partial segmentation, was significantly higher than mean score on all the other tasks (all $p$ values <.001). Performance on the second easiest task, the blending task, was significantly higher than performance on two of the three full analysis tasks, oral segmentation and combination, however the difference in scores between the blending task and the third task, counting, was not significant, $t(24) = .82, p = .42$. The difference in scores on the comparisons between the three full analysis tasks, counting, oral segmentation and combination, were not significant, suggesting a similar level of performance on these three tasks (although the lower correlations between the counting task and both the oral segmentation and combination task suggests some differences in the relationship between these tasks).

For the grade one sample, the mean scores for each task were significantly different from one another ($p < .005$) in six out of ten comparisons. Again, as hypothesized, the order of tasks from easiest to most difficult is the same as that of the kindergarten sample and is as follows: partial segmentation, blending, counting, combination, and oral segmentation. Three out of ten nonsignificant comparisons were the comparisons between the three full analysis tasks, counting, oral segmentation and combination. As with the kindergarten sample, this finding suggests a similar level of
performance on these three tasks. The fourth nonsignificant comparison was between the blending task and the partial segmentation task. Although difference between the scores on the partial segmentation task and blending task neared significance, $t(24) = -2.96$, $p = .007$, high scores on both precluded the difference from being significant. For the grade one group, findings concerning the relative difficulty of the five phonemic awareness tasks support the factor analyses which suggests that performance on the partial segmentation task is higher, and significantly different, from that on the other phonemic awareness tasks. In turn, the blending task is easier than the three full analysis tasks, however at the kindergarten level, the distinction between the blending task and the counting task is not as strong.

To summarize, the first part of the results section consisted of preliminary analyses that demonstrated no gender effects or word type effects, and significant grade effects (with the exception of the control variable, PPVT-R score, which was not significantly different across grades). Following this, analyses focused on the relationships among the five phonemic awareness tasks for each grade. Results of correlational and factor analyses suggest strong relationships among the five phonemic awareness tasks, with the highest correlation, at both the kindergarten and grade one levels between the oral segmentation and combination task. Consistent with predictions, an examination of the relative difficulty of the five tasks revealed that the partial segmentation task was the easiest of the five tasks while the blending task was the second easiest task. Performance on the three full analysis tasks was similar, and scores were not significantly different from one another.
Phonemic Awareness and Reading

The second area addressed concerns about the relationship between phonemic awareness and reading ability. Through correlational analyses, the patterns of relationship between performance on the WRMT-R Word Identification (real word identification) and Word Attack (nonword decoding) subtests and performance on the phonemic awareness tasks were examined. It was hypothesized that correlations between nonword decoding and phonemic awareness task performance would be higher than those between real word identification and phonemic awareness task performance. Additionally, higher correlations between nonword decoding and the more difficult phonemic awareness tasks (i.e., oral segmentation, counting, combination) were predicted. As well, the relationship between the phonemic awareness and nonword decoding was further explored through examination of scatterplots. This analysis addressed the issue of whether or not phonemic awareness is a necessary but not sufficient condition for reading, or whether one can perform well on phonemic awareness tasks without being able to demonstrate decoding ability, as well as the extent to which this is dependent on the task. Lastly, a regression analysis was used to identify the task(s) that best predict nonword decoding.

To begin, correlations between the WRMT-T subtests and performance on the phonemic awareness tasks were examined. As shown in Table 7, for kindergarten students, who demonstrated less well-developed word recognition skills overall, significant correlations (with one exception) were observed between all five phonemic awareness tasks and performance on both the Word Identification and Word Attack
subtests, suggesting a relationship between phonemic awareness and reading performance even at this early level of reading skill.

In contrast, grade one students, who had more advanced word reading skills, displayed a different pattern of correlations. Correlations between performance on the phonemic awareness tasks and the Word Identification subtest were not significant, while correlations between performance on the phonemic awareness tasks and the Word Attack subtest were significant (with the exception of the partial segmentation subtest). Thus, for grade one students with more advanced word reading ability (at least relative to kindergarten students), the relationship between phonemic awareness and real word identification is not as strong as the relationship between phonemic awareness and nonword reading. Owing to a ceiling effect on the partial segmentation task, the correlation between partial segmentation and Word Attack scores was not significant. Additionally, the correlations between Word Attack scores and the three full analysis tasks, counting, oral segmentation, and combination were higher than the correlation between Word Attack and blending. Of the three full analysis tasks, the correlation between the oral segmentation task and Word Attack was highest.
Table 7

Intercorrelations Between Phonemic Awareness Tasks and WRMT-R Subtests for Kindergarten and Grade One Students.

<table>
<thead>
<tr>
<th>Task</th>
<th>Kindergarten</th>
<th>Grade One</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 25)</td>
<td>(n = 25)</td>
</tr>
<tr>
<td></td>
<td>WRMT-R Word Identification (Real words)</td>
<td>WRMT-R Word Attack (Nonwords)</td>
</tr>
<tr>
<td>Blending</td>
<td>.73**</td>
<td>.75**</td>
</tr>
<tr>
<td>Partial Segmentation</td>
<td>.56**</td>
<td>.41*</td>
</tr>
<tr>
<td>Counting</td>
<td>.41*</td>
<td>.43*</td>
</tr>
<tr>
<td>Oral Segmentation</td>
<td>.50**</td>
<td>.56**</td>
</tr>
<tr>
<td>Combination</td>
<td>.46*</td>
<td>.50**</td>
</tr>
</tbody>
</table>

* p < .05  **p < .01
Scatterplots. Examination of scatterplots was used to further describe the relationship between scores on the Word Attack subtest and performance on the five phonemic awareness tasks. The examination of scatterplots has been used by Stahl and Murray (1994) and Tunmer and Nesdale (1985) to evaluate the claim that phonemic awareness is a necessary but not sufficient prerequisite for decoding. Support for this claim would be evidenced by high scores on Word Attack accompanied by high scores on the phonemic awareness task. This observation would also support the notion that there is a reciprocal relationship between word decoding and phonemic awareness. Inferential statistics were not used in this analysis owing to the fact that the use of inferential statistics could be misleading, and are problematic owing to the difficulties inherent in deciding what scores definitively represent “decoding” and “phonemic awareness”.

In order to aid interpretation of the scatterplots, however, a horizontal line was drawn at the point that represents 80% performance on the phonemic awareness task, which is an appropriate cutoff score for a criterion-based measure. Although both kindergarten and grade one scores are included in the scatterplots, a vertical line was drawn to demark the mean score for Word Attack subtest at the grade one level. Owing to the fact that there was a floor effect on the Word Attack subtest at the kindergarten level, the mean score for grade one students may be used as a guideline to interpret the scatterplot findings.
Consistent with previous results, it appears that the relationship between phonemic awareness and nonword decoding is largely task dependent. In Figure 1, the relationship between Word Attack and partial segmentation is shown and, not surprisingly, there were no students who scored high on Word Attack, but low on partial segmentation. Consistent with other analyses, this observation suggests that the partial segmentation task is a phonemic awareness task that may be performed prior to the acquisition of decoding skills.

**Figure 1.** Raw score correct on partial segmentation task and Word Attack subtest.
On the blending task, one student scored above the grade one group mean of 12.6 on the Word Attack subtest, but below criterion on the blending subtest. In addition, there are a number of students with high scores on the blending task and low scores on the Word Attack subtest. Overall, these observations suggest that rather than a strictly reciprocal relationship, where high scores on the blending subtest are accompanied by high scores on Word Attack, blending ability is not necessarily predictive of decoding ability.

Figure 2. Raw score correct on blending task and Word Attack subtest.
The three scatterplots showing Word Attack scores and the analysis tasks, counting, oral segmentation, and combination, were virtually identical, and for this reason one scatterplot, oral segmentation, is presented. As shown in Figure 3, most scatterplot points fall below the cutoff scores suggesting that few students performed at 80% correct or higher on the phonemic awareness task, and above the grade on average on Word Attack. Of the students that performed at or above the grade one mean on Word Attack, three students performed below 80% correct or higher on the oral segmentation task. This observation, combined with the fact that no students performed high on the oral segmentation task and low on the Word Attack subtest, speaks to the difficulty of the oral segmentation task. On this task, the mean percent correct for kindergarten and grade one students was 22% and 54% respectively. Overall, this scatterplot supports the notion that there is a reciprocal relationship between phonemic awareness and decoding skills.

![Figure 3](image-url)
Regression Analyses. Regression analyses were conducted to further explore the relationship between performance on the Word Attack subtest and performance on the five phonemic awareness tasks. Owing to uniformly low scores on the Word Attack subtest at the kindergarten level, this analysis was only performed for the grade one sample. To begin, a standard multiple regression was performed with the five phonemic awareness tasks as the predictor variables and Word Attack raw score as the criterion variable. Owing to a high intercorrelations among the phonemic awareness tasks, the results of this analysis indicate that no single task was uniquely predictive of variance in the Word Attack subtest scores when the effects of the other variables were controlled for. Taken together, however, the variance accounted for by the five tasks was as follows: Multiple R = .70, $R^2 = .48$, and Adjusted $R^2 = .35$, $F = (5, 19) = 3.56, p = .02$. Nonsignificant beta weights range from .01 to .36.

As a follow-up, a stepwise regression was conducted in order to explore which variable, if any, accounted for significant variance under the statistical constraints of this analysis. Using the five phonemic awareness tasks as predictor variables and the Word Attack subtest as the criterion variable, only one variable accounted for a significant amount of variance, oral segmentation, with the following statistics: Multiple R = .67, $R^2 = .45$, Adjusted $R^2 = .42$, $F (1, 23) = 18.51, p = .0003$. The beta weight for the oral segmentation task was .67, $T = 4.3, p = .0003$. This finding confirms and expands the pattern of correlations between the phonemic awareness tasks and Word Attack presented in Table 7. Considered together, the results of the simultaneous and stepwise regressions suggest that there is a great deal of overlap between the variables in terms of the amount
of variance accounted for. Based on the small difference between the adjusted multiple correlations (Adjusted $R^2$) in the simultaneous regression and the stepwise regression, the oral segmentation task, however, appears to account for approximately as much of the variance in Word Attack scores as all five phoneme awareness tasks together.
Discussion

Overview

In the present study, two issues regarding phonemic awareness were explored. First, the relationship among five different phonemic awareness tasks was evaluated, and, second, the relationship between phonemic awareness and word reading ability was explored. In this chapter, the findings related to these issues are discussed along with their implications. The limitations of this study and future research directions are also considered.

Discussion and Implications of Findings

The primary contribution of the present study was to provide a comparison of performance on commonly used phonemic awareness tasks while controlling for such things as word stimuli, and administration and scoring procedures. Previous studies that have compared performance across tasks (e.g., Stanovich, Cunningham, & Cramer, 1984; Yopp, 1985) have not controlled the above-mentioned variables. Thus, the findings of the present study serve as a basis for reevaluating the findings from other studies with respect to the significance of task and task variables on performance, and the resulting claims made regarding phonemic awareness and its relationship to word reading.

In the present study, the performance on the phonemic awareness tasks was used to explicate the relationship among the phonemic awareness tasks. Hypotheses included the prediction that there would be a strong relationship between each of the phonemic awareness tasks owing to the fact that they assessed the same underlying ability. This prediction was only partly confirmed. While there were significant correlations between the five phonemic awareness tasks at the kindergarten level, the partial segmentation
tasks did not correlate significantly with the other tasks at the grade one level. This may be due to a ceiling effect on the partial segmentation tasks at the grade one level.

It was predicted that there would be a stronger relationship between tasks with similar tasks demands, and as predicted, the three full analysis tasks, counting, combination, and oral segmentation, were all significantly correlated. For both grades, the highest correlations were those between the oral segmentation and combination tasks. The strength of this relationship is most likely due to the fact that both tasks required articulation of the phonemes in the word or nonword. The counting task may not have correlated as highly with the two other full analysis tasks because of a difference in task demands including the fact that the articulation of phonemes was not required. On the counting task, a correct score could be earned simply by guessing or using an alternative strategy such as a spelling strategy (i.e., counting the number of letters in the word instead of the number of sounds).

Findings that further illustrate the similarities and differences between tasks include the range in the relative difficulty of the tasks. The order of difficulty of tasks was as predicted, with the order of difficulty from easiest to most difficult for both grades as follows: partial correlation, blending, counting, combination, and oral segmentation. In the case of the three analysis tasks however, the difference between task scores was not statistically significant. In general, however, this finding is consistent with previous experimental and conceptual research, including Yopp (1988), who reported the same order of task difficulty for three tasks common to both studies, blending, oral segmentation, and counting; and the claim made by Torgesen, Wagner and Bryant (1992)
regarding the development of phonemic segmentation ability which viewed phonemic counting ability as preceding oral segmentation ability.

Factor analyses were conducted in order to more fully explore the relationship among the tasks. The results of these analyses, conducted separately within each grade, revealed a two-factor solution. For both grades, the first factor may best be characterized as a more difficult phonemic awareness task factor, and the second factor may best be described as a simple phonemic awareness task factor. For the kindergarten and grade one samples, only the partial segmentation task loaded onto the second factor. For the kindergarten sample, however, the pattern of factor loading differed slightly as both the counting task and the partial segmentation task loaded higher on the second factor. Unfortunately, it is difficult to explain this finding, and it may simply be due to a small sample size that failed to account for the error variance in the analyses.

The characterization of factors along the lines of complexity is similar to that of Yopp (1988). In Yopp's study, 96-kindergarten students were administered ten phonemic awareness, and a factor analysis extracted two factors, described as Simple and Compound Phonemic Awareness. Simple phonemic awareness tasks included simple phoneme deletion (saying the sound that is missing from two otherwise identical words). Tasks included in Compound Phonemic awareness include blending, counting, and oral segmentation. Similar to the findings of the present study then, Yopp's Simple Phonemic awareness factor involved tasks that required analysis of part of a word.

In the present study, the blending (synthesis) and full analysis tasks both loaded onto the same factor and were highly correlated, whereas in the study by Wagner, Torgesen, Laughon, Simmons, and Rashotte (1993), analysis and synthesis tasks
constituted two separate factors. Again, a small sample size may have precluded an analysis that was powerful enough to partition tasks into analysis and synthesis. In the present study however, support for the distinction between blending and analysis tasks lies in the higher correlations between two analysis tasks, the oral segmentation task and the combination task. In addition, the blending task appears to differ from the analysis tasks in terms of degree of difficulty, with scores on the blending task significantly higher than scores on all three full analysis tasks.

In general then, despite strong relationships among tasks, as evidenced by high correlations; salient differences between the tasks did emerge. Differences between the tasks were evidenced by significant differences in the relative difficulty of the tasks and the finding that a two-factor versus single factor solution accounted for the most variance among variables on the factor analyses. The statistical results of this study may be supplemented by a discussion of observations made during the administration of tasks and a task by task breakdown of observations follows.

On the counting task, it became apparent that a correct score may be earned simply by guessing, resulting in elevated scores, particularly at the kindergarten level. The counting task differs from the other analysis tasks in that no articulation of the sounds in the word is required. This observation may explain the relatively lower (thought still adequate) internal reliability of the counting task (.80) at the kindergarten level, while the reliabilities obtained for the other tasks ranged from .92 to .99. It may also help to explain the counting task loading onto the second factor in the kindergarten factor analysis which included what appeared to be less difficult tasks; and the finding
that the counting task was less closely associated with the combination and oral segmentation tasks.

The oral segmentation task is difficult to score reliably and stringent guidelines for what constitutes a correct utterance must be created if this task is to be used. In both research and applied settings, there needs to be a concerted effort to carefully control the administration and scoring of an oral segmentation task. Interestingly, in this study, the oral segmentation task emerged as the single best predictor of Word Attack performance at the grade one level. Thus, while the oral segmentation task must be carefully administered and scored, it does turn out to be a strong predictor of decoding skills, accounting for 42 percent of the variance in Word Attack scores at the grade one level.

With regard to the combination task, the difficulty with the oral segmentation task is overcome by the use of manipulatives, for manipulatives allow for accurate scoring of the number of phonemes. Based on observations, it appears that the use of manipulatives may prove confusing for some children as some children resorted to a spelling approach, using one block to represent one letter versus one sound. Children adopting this approach were forced to deal with a mismatch between the number of letters and the number of phonemes in a word by adding an extra phoneme, for example, saying /uh/ at the end of “came”. This difficulty speaks to a general difficulty that has been discussed with regard to the use of phonemes, which are abstract and therefore challenging for young students. That is, attention to phonemes requires attention to sounds versus letters. Because of the simultaneous development of reading and spelling, the blocks used in a task like
Sawyer's may be confusing for the child who is learning to use symbols to represent sounds, although this would require some investigation to support this claim.

The partial segmentation task appears to be inappropriate for grade one students or students with some word reading skills, based on the ceiling effect on this task at the grade one level. For prereaders, however, this task appears to be an appropriate and reliable measure of simple phonemic awareness ability. The blending task appears to be an appropriate task of phonemic awareness at both the prereading and beginning reading levels. Overall, the observations support statistical findings, in that there are distinct differences between tasks.

In addition to looking at the relationship among phonemic awareness tasks, additional analyses examined the relationship between performance on phonemic awareness tasks and performance on the word reading tasks. Analyses included correlations, scatterplots, and multiple regressions.

Results of correlational analyses suggest that the relationship between phonemic awareness and word reading vary across task and skill level. In the present sample, at the kindergarten level, performance was uniformly lower than grade one students on both the phonemic awareness tasks and the reading subtests, as one might expect given that the kindergarten children had received no formal reading instruction. Nonetheless, significant correlations were observed between word reading skills and the phonemic awareness tasks, suggesting that beginning word reading ability, whether it be decoding or identification, is statistically associated with phonemic awareness. By grade one, however, overall results provide empirical support for the claim that decoding is that aspect of reading most strongly associated with phonemic awareness. This was shown by
the significant correlations between performance on the Word Attack subtest and performance on the phonemic awareness tasks versus the nonsignificant correlations between performance on the Word Identification subtest and performance on the phonemic awareness tasks. In addition, the more difficult phonemic awareness tasks, counting, oral segmentation and combination, were most highly correlated with the Word Attack scores, suggesting a reciprocal relationship between the two sets of skills.

Scatterplots were used to further evaluate the relationship between decoding and phonemic awareness. While scatterplots are not a powerful analysis, they were thought to be an appropriate inclusion owing to the fact that the use of inferential statistics, for example, chi-square analysis, may been misleading. Defining parameters, for example, determining what score constitutes “decoding ability” and “phonemic awareness” is problematic. In addition, the visual representation illustrates at a glance the relationship, and supplements other statistics in the results section.

Consistent with correlations, the scatterplots between phonemic awareness and decoding scores suggest that the relationship between phonemic awareness and decoding is not entirely uniform across tasks. For example, the blending task could be performed at an 80% or better criterion level by some students who were unable to decode words; while the most difficult tasks, counting, oral segmentation and combination, were performed at an 80% or better criterion level, by very few students. This observation points to the need to carefully consider the tasks used when making claims about the relationship between phonemic awareness and decoding.

A final regression analysis allowed for the relationship between phonemic awareness tasks and Word Attack performance to be further explored. Given the high
intercorrelations observed among the phonemic awareness tasks (Table 5), suggesting a
great deal of overlap among the five phonemic awareness tasks, it is not surprising that no
single variable emerged to account for a significant proportion of the variance in Word
Attack scores in the initial, simultaneous regression when the effects of the other
variables were accounted for. Results of this analysis, however, do support the notion
that performance on phonemic awareness tasks is predictive of word decoding skills, in
that 35 percent of the variance in Word Attack performance was accounted for by
phonemic awareness performance across all five tasks. These data, however, provide
little insight into the relative utility of the various phonemic tasks in predicting reading.
To this end, results of a subsequent stepwise regression demonstrated that the oral
segmentation task alone accounts for nearly as much of the variance as the five variables
considered together in the simultaneous multiple regression. Again, however, the
purpose of assessment and the grade and reading level of the student must be taken into
consideration when assessing phonemic awareness.

Limitations of Study

One limitation of this study relates to the relatively small sample size given the
statistics that were employed. For example, the factor analyses must be interpreted with
caution owing to the fact that the minimum 20 subjects per factor guideline (Kline, 1993)
was not met. In addition, the sample size is at a minimum for the regression analyses
used. Replication with larger samples would be needed to support the findings of this
study.

Other limitations relate to the administration of the phonemic awareness tasks.
While the order of administration of tasks was counterbalanced across students to control
for an order effect, the optimal administration would have been to space the administration over a greater number of days so that students were not overtaxed and to minimize any carry-over effects from one task to another. Another limitation was the lack of counterbalancing the order of presentation of real words and nonwords on the phonemic awareness tasks in order to control for a word order effect. This design feature may explain the lack of a significant difference in scores between real words and nonwords, and for this reason, real words and nonwords should not necessarily be regarded as equivalent. Indeed, there is considerable evidence to suggest that there is a difference in performance on real words versus nonwords on certain tasks, particularly blending task, where lexical knowledge may be used in the processing of the task (Torgesen, Wagner, Balthazar, Davis, Morgan, Simmons, Stage, & Zirps, 1989). Thus, if the influence of stimuli is to be examined, the order of presentation of word or nonwords must be considered.

Future Directions

Given the importance of phonemic awareness in the acquisition of reading and spelling skills, the accurate assessment of phonemic awareness will continue to be of interest to both researchers and practitioners. One suggestion for future research is based on a comparison of the findings reported in the study by Yopp (1995), and the findings of the present study and other studies (e.g., Vandervelden & Siegel, 1995). Yopp found that kindergarten students were able to perform an oral phoneme segmentation test at a mean level of performance that exceeded 50% correct, whereas most studies report lower means. Owing to the fact that Yopp provided feedback after every item whereas in other studies, feedback was not provided (with the exception of practice items), the role of
feedback on the assessment of phonemic awareness may be one area of future research. Future research may also focus on the relatively understudied area of the relationship between cognitive development and phonemic awareness. This suggestion is based on the observation that many of the children in this study had difficulty shifting (decentering) their attention away from the spelling of the word toward the sounds in the word. Research in this area may contribute to a better understanding of the factors that influence the development and training of phonemic awareness. An understanding of the relationship between cognitive development and phonemic awareness may have implications for phoneme awareness training and individual differences in phonemic awareness ability and development and corresponding reading and spelling acquisition.
REFERENCES


APPENDIX A
Phoneme Counting Task Instructions

Material: Pencil

Real Word Condition
Practice trials: 1 demonstrated + 3 with feedback.

(Now) We’re going to play a listening and tapping game. I’m going to say some words and then tap out the sounds in the word after I say it. Listen, so you’ll know how to play the game.

Here’s the first word, “XX”. XX has YY sounds, // //, so I’ll tap the pencil YY times. Now you try one. Say this word after me. XX. (Pause). Good, how many sounds in XX? Tap out the sounds.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. XX has YY sounds, // //, so you would tap YY times. Let’s try another one. (Repeat highlighted sentence).

Now let’s try some more. I’ll say a word, but I won’t tap because you know how to play the game yourself. So, I’ll say a word and you say the word after me and then tap it. After each word, be sure to put your pencil down, so I’ll know when you’ve finished. Any questions? Here’s the first word.

Nonword Condition
Practice trials: 1 demonstrated + 3 with feedback.

Now we’re going to try the same thing with pretend words. Let’s do a couple for practice. Say this pretend word after me. XX. (Pause) How many sounds in XX? Tap out the sounds.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. XX has YY sounds, so you would tap YY. Let’s try the next one. (Repeat highlighted sentence).

Now let’s try some more. I’ll say a pretend word, then you say the word after me and then tap the number of sounds. Be sure to put your pencil down, so I’ll know when you’ve finished. Any questions? Here’s the first pretend word.
APPENDIX B
Oral Segmentation Task Instructions

Real Word Condition
Practice trials: 1 demonstrated + 3 with feedback.

(Now) we’re going to play a (different) word game. I’m going to say a word and then break the word up into sounds. Listen, so you’ll know how to play the game.

Here’s the first word. XX. Here are the sounds in XX. // // //.
Okay, now you try one. Say this word after me. XX. (Pause). Good, now break the word up into sounds. Tell me each sound in the word.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. The sounds in XX are //, //, //. Let’s try another one. (Repeat highlighted sentence).

Now we’ll do some more. I’m going to say a word and I want you to say it back to me. Then I want you to break the word apart. Any questions? Here’s the first word:

Nonword Condition
Practice trials: 1 demonstrated + 3 with feedback.

Now we’re going to try the same thing with pretend words. Let’s do a couple for practice. Say this pretend word after me. XX. (Pause) Good, now break the word up into sounds. Tell me each sound in the word.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. The sounds in XX are //, //, //. Let’s try another one. (Repeat highlighted sentence).

Now we’ll do some more. I’m going to say a pretend word, and I want you to say it back to me. Then I want you to break the word apart. Any questions? Here’s the first pretend word:
APPENDIX C
Combination Segmentation Task Instructions
(adapted from Sawyer’s Test of Awareness of Language Segments, 1987)

Realword and Nonword Conditions
Materials: 7 coloured wooden blocks from TALS kit

Modeling the task
“I’m going to show you a way to use these blocks. I’m going to say a word, and I’ll use the blocks to show the different sounds in that word. I’m going to show you XXX.”
(Draw one block and say the sound it stands for, draw the second block and say the sound it stands for. Hold the three block together between thumb and fingers and repeat the word).
“Now, I’ll point to each block, and you tell me what sound it stands for.”
If the child does not respond when the examiner points to the first block, say, “XXX, what is the first sound we hear?”
If the child still does not respond or gives an incorrect response, examiner says, “I hear X, X, X” pointing to each block as the corresponding sound is produced.
Then ask, “What sound is this?” and point to the first block again. If necessary, the examiner says it with the child.
Examiner continues this procedure through the remaining blocks.

Engaging the child
Examiner says, “Now I’m going to say another word. Ready? YYY! Use the blocks to show me the sounds in YYY.
If the child draws a block and says the letter name, Y, examiner reminds the child that the letter “Y” begins “YYY”, but asks again what sound the letter “Y” makes.
If the child spells Y-Y-Y with the blocks, examiner again reminds the child to think of sounds, not letter, and demonstrates.
Examiner says, “I hear “Y” and draws one block from the pile.
Examiner says “Y” and draws a second block from the pile.
If there’s three sounds, draw a third block from the pile.
Examiner then points to the first block and asks, “What’s this sound?” If necessary, the examiner says it with the child.
Examiner reports this procedure with the next block.
Do two more practice trials.

Administering Part C
Examiner says, “Now I’m going to say some words. I want you to use the blocks to show me the different sounds you hear in each word. Ready?”
Examiner pronounces the first word in a natural way (i.e., as if it were within a sentence).
APPENDIX D
Partial Segmentation Task Instructions

Real Word Condition
Practice trials: 1 demonstrated + 3 with feedback.

(Now) we’re going to play a (different) word game. I’m going to say a word and then say only the first sound in the word. Listen, so you’ll know how to play the game.

Here’s the first word. XX. The first sound in the word is //.
Okay, now you try one. Say this word after me. XX. (Pause). Good, now tell me the first sound in the word.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. The first sound in XX is //. Let’s try another one.
(Repeat highlighted sentence).

Now we’ll do some more. I’m going to say a word and I want you to say it back to me. Then I want you to say the first sound in the word. Any questions? Here’s the first word:

Nonword Condition
Practice trials: 1 demonstrated + 3 with feedback.

Now we’re going to try the same thing with pretend words. Let’s do a couple for practice. Say this pretend word after me. XX. (Pause) Good, now tell me the first sound in the word.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. The first sound in XX is //. Let’s try another one.
(Repeat highlighted sentence).

Now we’ll do some more. I’m going to say a pretend word and I want you to say it back to me. Then I want you to say the first sound in the pretend word. Any questions? Here’s the first word:
APPENDIX E
Phoneme Blending Task Instructions

Real Word Condition
Practice trials: 1 demonstrated + 3 with feedback.

(Now) we’re going to play a (different) word game. I’m going to say a word in small parts, one part at a time. I want you to listen carefully, and then put these parts together to make a whole word. Ready? Let’s try one. What word do these sounds make?

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. When you put NN together, it makes NN. You try it: NN makes . Let’s try the next one.

Prompt: If child say the sound separately, prompt by saying Try to put the sounds together as a real word.

Let’s try some more words. Each time you will hear the word one part at a time. Listen carefully and put the parts together to make a whole word. Any questions? Here’s the first word:

Nonword Condition
Practice trials: 1 demonstrated + 3 with feedback.

Now let’s try some with pretend words. Each time you will hear a pretend word one part at a time. Listen carefully and put the parts together to make a whole pretend word.

If correct: That’s right. Let’s try the next one.
If incorrect: That’s not quite right. When you put NN together, it makes NN. You try it: NN makes . Let’s try the next one.

Prompt: If child say the sound separately, prompt by saying Try saying the sounds together quickly to make a pretend word.

Let’s try some more words. Listen carefully and put the parts together to make a whole word. Any questions? Here’s the first word:
## APPENDIX F

### Phonemic Awareness Tasks Word Lists

<table>
<thead>
<tr>
<th>Description</th>
<th>List 1</th>
<th>List 2</th>
<th>List 3</th>
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