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DOES PHONOLOGICAL AWARENESS PREDICT READING ACQUISITION?

A COMPARISON OF SCORES ON AUDITORY SUBTESTS OF THE PHONOLOGICAL AWARENESS TEST TO SCORES ON THE SLOSSON ORAL READING TEST AND THE GRADE 2 SCOTT FORESMAN CLASS PLACEMENT TEST: COMPEHENSION SUBTEST

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ABSTRACT

Does Phonological Awareness Predict Reading Acquisition?

A Comparison of Scores on Auditory Subtests of The Phonological Awareness Test to Scores on the Slosson Oral Reading Test-Revised and the Grade 2 Scott Foresman Class Placement Test: Comprehension Subtest

Susan W. Floyd

This study investigated phonological awareness skill as a predictor of word reading and comprehension using standardized, norm-referenced measures that employed the auditory modality only. A total of 172 students were administered the auditory subtests of the Phonological Awareness Test (PAT) and the Slosson Oral Reading Test-Revised (SORT-R) at the beginning of first grade, during first grade, and again at the beginning of second grade. In addition the students were given the reading comprehension subtest of the Scott Foresman Class Placement Test (SFCPT) at the beginning of second grade. Results revealed positive correlations between the scores on auditory subtests of the PAT, the SORT-R, and the reading comprehension subtest of the SFCPT. Phonological awareness and word reading were weakly to moderately correlated prior to reading instruction, and moderately correlated during and after a year of reading instruction. Phonological awareness and reading comprehension were weakly to moderately correlated after a year of reading instruction.

This study supports the use of a composite of standardized auditory measures, as opposed to isolated subtests, to determine phonological awareness skill. The correlations between the composite scores of the three administrations of the PAT were consistently strong, but there was a wide range of correlations between the isolated subtest scores.

A forward-seeking stepwise multiple regression procedure identified effective phonological awareness predictors of word reading and reading comprehension. The strongest predictors of word reading were the Blending Subtest prior to instruction, the Auditory Composite score during instruction, and the Isolation-Medial Position Subtest and Auditory Composite score after instruction. The strongest predictors of reading comprehension after instruction were the Auditory Composite and the Deletion Subtest.

These results suggest the need for research into phonological awareness training that is integrated into reading instruction with the at-risk, as well as the normal, population of students who are being taught to read. The results have implications for classroom teachers, speech-language pathologists, and reading specialists. Perhaps deficits in oral language which inhibit reading acquisition in young students can be ameliorated by phonological awareness training in an integrated format with reading instruction.

Dr. Tina Smith/Dissertation Director

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CHAPTER I

Introduction

The relationship between phonological awareness and reading acquisition in children has been widely investigated. The development of phonological awareness from the awareness of whole words (rhyming) to the awareness of the component parts of words (e.g. syllables, phonemes) is supported in the literature (Smith et al.1995). "It is the general rule of both phylogeny and ontogeny that complex structures evolve by differentiation of smaller structures from larger. Accordingly, we should expect phonemes to emerge from words" (Locke, 1993, p.383). Blachman (1994) stated that phonological awareness is an awareness of, and the ability to manipulate, the phonological segments represented in an alphabetic orthography through the auditory modality. This awareness involves recognition of rhyming words (Naslund & Schneider, 1996), segmentation of words into syllables and phonemes (Hoien, Lundberg, & Stanovich, 1995), isolation or categorization of phonemes in initial, medial, and final positions of words (Gilbertson & Bramlett, 1998), blending of syllables or phonemes into words (Leather & Henry, 1994), manipulation of phoneme segments of words through deletion and substitution (Swank and Catts, 1994), and invented spelling (Skoyles, 1997). Thus, phonological awareness is a conscious awareness of the auditory characteristics or spoken sounds of words.

A significant body of research indicates a positive correlation between phonological awareness and reading skill (Smith, Simmons, & Kameenui, 1995,1997). Nevertheless, the exact nature of the relationship between phonological awareness and reading remains controversial. Researchers have been interested in determining if phonological awareness is a precursor (antecedent) to reading or if it has a complementary (reciprocal) relationship with reading. Regardless, the question is whether phonological awareness skill predicts reading acquisition – a process that encompasses word reading and reading comprehension.

Blachman (1994) supported the view that phonological awareness is a precursor to reading; i.e. it develops prior to reading. Blachman (1991) described speaking as an evolutionary process which occurs naturally and reading as a cultural achievement which is taught. Furthermore, she indicated that children must develop an awareness that spoken language is segmented so that they can learn to decode the phonemic parts of words and thereby, read. Thus, Blachman believes that children must have good phonological awareness skills so that they can learn to read. Although the coarticulation of the phonemes in the stream of speech makes it difficult to decode (read) words, students who begin school with a conscious awareness of sounds in words have more success in reading (Smith, Simmons, & Kameenui, 1995).

Numerous studies support the idea that phonological awareness is a precursor or predictor of reading. That is, if children have good phonological awareness skills, they are more likely to be good readers. Likewise, children with poor phonological awareness skills might be poor readers. The results of 15 studies that examined the relationship between phonological awareness and reading in normal children, ranging from preschool

through second grade, report correlations that range from poor to strong between phonological awareness and reading. These studies are reviewed in Chapter II; information from them is presented in chart-form in Appendix A. Of the 15 studies, five are the most pertinent to this investigation because they describe the relationship between phonological awareness and reading for first and second grade students (Leather & Henry, 1994; Rohl & Pratt, 1995; Swank & Catts, 1994; Troia et al., 1996; Zifcak, 1981). The results of these five studies indicated that phonological awareness and reading are moderately to strongly correlated ($r = .51$ to $.79$).

The majority of the tasks used in these studies to investigate this relationship were not standardized, norm-referenced measures of phonological awareness skills. Because standardized, norm-referenced measures were not consistently used, the reliability and validity of the phonological awareness tasks employed in the studies is questionable. For example, a phonological awareness task in some of the studies reported might have been labeled as the same skill even though it actually measured two different skills or different levels of the same skill; or different studies may have used different protocols to test the same skill. Thus, it is difficult to generalize about the relationship between phonological awareness skills and reading from study to study. In addition, only eleven studies employed tasks that used the auditory modality exclusively; the remaining studies used pictures in addition to auditory stimuli. Since phonological awareness is defined as an awareness of the auditory components of spoken language, it seems plausible that the auditory modality should be used exclusively when assessing phonological awareness. Consequently, because the auditory modality was not always used exclusively, this relationship needs to be explored further.

Smith, Simmons, and Kameenui (1995,1997) support the view that phonological awareness development occurs concurrently with reading acquisition in a complementary relationship. This relationship involves a comprehensive and balanced approach of phonological awareness instruction along with letter-sound correspondence in the context of reading. For example, the students are taught to auditorily segment words as they are also taught the sound of the letters in a word. Smith et al. concluded that phonological awareness facilitates reading, and likewise, reading instruction facilitates phonological awareness.

Seven studies have investigated how training phonological awareness skills facilitates reading acquisition in children (Ball & Blachman, 1991; Brady et al., 1994; Lie, 1991; Lundberg et al., 1988; Torgesen & Davis, 1996; Torgesen et al., 1992; Uhry & Shepherd, 1993). These findings indicate that phonological awareness training positively affects reading acquisition by facilitating automaticity (defined as the quality of fluency implying an automatic level of response in the decoding of words), which results in improved reading comprehension ability during second grade (Lie, 1991). Children typically develop the skill of automaticity from ages six to eight years. Cornwall (1992) states that automaticity must occur in order for children to shift from a phonologically-mediated word recognition process to rapid recognition of words, which generally occurs at ages eight through ten years, thereby promoting reading speed and fluency.

Smith, et al.(1997) suggest that when phonological awareness training is provided concurrently with reading instruction, it facilitates reading acquisition. There is a question, however, about whether this training should be provided separately from reading instruction or in an integrated format with reading instruction. Studies of

children in pre-kindergarten and kindergarten (Ball & Blachman, 1998, 1991; Brady et al., 1994; Lundberg et al., 1988; Torgesen & Davis, 1996; Torgesen et al., 1992) and in grades 1 and 2 (Lie, 1991; Uhry & Shepherd, 1993) used direct training of phonological awareness skills in a separate instructional format that was not integrated into the reading curriculum (see Appendix A). The results of these studies show that phonological awareness training did facilitate reading instruction. However, no studies have been reported that investigated the integration of phonological awareness training into the reading curriculum. Thus, the question of whether phonological awareness training is more beneficial in a separate instructional format or in an integrated instructional format is unanswered.

In summary, many studies have investigated whether isolated phonological awareness skills predict reading acquisition, and how training these isolated skills in a separate instructional format affect learning to read. The results have shown a poor to moderate correlation between phonological awareness and reading. In addition the effect of training phonological awareness within the context of reading instruction has been inconclusive. However, no researchers have examined what effect being able to perform a composite of auditory-only phonological awareness skills (e.g. rhyming, segmentation, isolation, blending, deletion) has on reading acquisition when these skills are trained in an integrated instructional format. Moreover, in the majority of the studies, researchers have used phonological awareness tasks that were not standardized or norm-referenced. The measures were designed by the researchers and consisted of varying labels, levels, and procedures from study to study. The measures often did not use the auditory modality exclusively to test phonological awareness (which is, by definition, an

awareness of the auditory aspects of spoken language); visual stimuli were also used. Because of the varying modalities and methods used to assess phonological awareness skills, the results are hard to generalize from study to study.

The purpose of this study was to examine the relationship between phonological awareness and word reading, as well as reading comprehension, when the tasks are standardized, norm-referenced, and presented by the auditory modality only. Specifically, this study attempted to determine the relationship between phonological awareness and word reading ability prior to, during, and after one year of reading instruction that has been integrated with phonological awareness training. Additionally, the relationship between phonological awareness and reading comprehension skills after one year of reading instruction that was integrated with phonological awareness training was examined. In so doing, this study attempted to answer the following questions:

1) Do the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the Phonological Awareness Test (Test 1) correlate positively with the scores on the word reading task of the Slosson Oral Reading Test-Revised given prior to (#1), during (#2), and after (#3) reading instruction?
2) Do the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the Phonological Awareness Test #3 (given at the beginning of second grade) correlate positively with the word reading task of the Slosson Oral Reading Test-Revised #3 (given at the beginning of second grade) after one year of reading instruction?
3) Do the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the Phonological Awareness Test #1 versus the Phonological

Awareness Test #3 correlate positively with the reading comprehension tasks of the grade 2 Scott Foresman Class Placement Test after reading instruction?

4) What is the relationship between the scores on the Phonological Awareness Test subtests (Test 1 and Test 2) administered prior to reading instruction with the scores on the Phonological Awareness Test subtests (Test 3) administered after reading instruction?

5) Which Phonological Awareness Test subtests are effective predictors of the scores on the Slosson Oral Reading Test-Revised #1, #2, and #3 test administrations and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest?

CHAPTER II

Review of Literature

The literature is divided into studies of phonological awareness as a predictor of reading and studies of phonological awareness training as a facilitator of reading.

Phonological Awareness as a Predictor of Reading

Many studies have been conducted to investigate the relationship between students' phonological awareness skills and their ability to learn to read. In an effort to examine this relationship, researchers have generated a variety of phonological awareness tasks. The protocols for administering the tasks have varied from study to study, and the majority of the tasks used have not been standardized or norm-referenced. Moreover, many of the phonological awareness tasks required the participants to use a combination of the visual and tactile modalities in addition to the auditory modality.

Smith, Simmons, and Kameenui (1995) examined the studies done on phonological awareness and its implications for reading acquisition. Smith et al. reported that phonological awareness played a central role in the ease of reading acquisition, but noted that their review of the studies did not provide an in-depth examination of any one dimension of phonological awareness. They emphasized the importance of defining phonological awareness as an awareness of the auditory or spoken aspects of language.

The following review of the literature shows the diversity of protocols, modalities, and stimuli employed to assess phonological awareness skills. This review provides an overview of 10 studies that used non-standardized auditory-only phonological awareness tasks, 4 studies that used non-standardized multi-modality phonological awareness tasks, and 1 study that used a standardized auditory-only task that assessed one phonological awareness skill.

Non-Standardized Auditory-only Phonological Awareness Tasks

Zifcak (1981) administered a segmentation (non-standardized) and a deletion (standardized) task to 42 students in first grade representing a cross-section of cultural, racial, and socioeconomic groups. For the segmentation task the students were required to repeat the words presented by an examiner and to segment the words by tapping out each sound. In order to assess the students' abilities to delete phonemes, they were given the phoneme deletion subtests of the Test of Auditory Analysis Skills. The students' performance on the phoneme segmentation task correlated strongly with their word reading performance on the Wide Range Achievement Reading Subtest ($r = .78$) and the Galliston-Ellis Test of Coding Skills ($r = .71$); while the students' scores on the deletion tasks were moderately correlated with both reading tests ($r = .54, .56$ respectively).

Mann and Liberman (1984) conducted a two-year longitudinal study to compare 62 kindergarteners' syllable segmentation skills to their performance on the word recognition and word attack subtests of the Woodcock Reading Mastery Test (WRMT) given in first grade. On the syllable segmentation task (a non-standardized auditory task), the students were required to tap out the syllables of 42 monosyllabic, bisyllabic, and trisyllabic words. The results revealed that there was a weak correlation between the

students' abilities to segment syllables and their abilities to read words on the WRMT (r =.40).

Stanovich, Cunningham, and Cramer (1984) correlated the reading ability of 31 middle-class kindergarten students on the Metropolitan Achievement Test given to them in first grade with their performance on 10 phonological awareness tasks. The tasks were auditory and consisted of 10 items each. The students were engaged in 2 rhyming tasks, 5 discrimination tasks, 1 deletion task, and 2 substitution tasks. Of the phonological awareness measures assessed, the initial consonant different discrimination task was the most strongly correlated with the word reading task on the Reading Survey Test (r =.60), while the substitute initial consonant task was the most weakly correlated (r = .09). Stanovich et al. recommended further research using sets of these measures (composites) to predict reading accuracy. They also suggested that the relationship between reading ability and phonological awareness appears to be characterized by a reciprocal (complementary) relationship.

Badian (1994) added a measure of phonological awareness (syllable segmentation) to a preschool screening battery to use as a predictor of reading success. One hundred eighteen subjects (95% white) were tested six months prior to kindergarten entry on a non-standardized syllable-tapping task (which was used in the Mann & Liberman, 1984 study) employing the auditory modality only. In first grade these students were given the basic reading subtest (beginning/ending sounds, word recognition, word reading) of the Wechsler Individual Achievement Test (WIAT) and the reading comprehension subtest of the Stanford Achievement Test (SAT). Their performance on the syllable tapping task was then correlated with their performance on

the reading subtests of the WIAT and SAT. The findings revealed that syllable segmentation was weakly correlated with the reading subtest of the WIAT (r =.36) and with the reading comprehension subtest of the SAT (r =.33). These results support the findings of the Mann and Liberman (1984) study that showed that the ability to segment words into syllables was not a good predictor of word reading on the WIAT.

Leather and Henry (1994) correlated the phonological awareness skills of phoneme deletion, segmentation, and blending with the reading ability of seventy-one British students in second grade. For the phoneme deletion tasks, the students were required to delete both the initial and final consonants. On the blending and segmentation tasks the students were required to either blend sounds to make a word or segment words into phonemes. All four tasks were auditory and non-standardized, and were modeled after the tasks used by Stanovich et al. (1984). These tasks were correlated with the word reading and comprehension scores on the Neal Reading Ability Test. Leather and Henry reported that the initial and final phoneme deletion and the blending tasks were significantly correlated with reading accuracy (r = .73, .68, .51 respectively) and reading comprehension (r = .55, .56, .51 respectively). The phoneme segmentation task did not correlate significantly with reading accuracy or comprehension (r = .01, .13 respectively). Thus, the deletion measures were moderately correlated with both reading accuracy and reading comprehension. However, the composite of phonological awareness tasks (phoneme deletion, segmentation, and blending) was the strongest predictor of reading accuracy (accounting for 57% of the variance) and of comprehension (accounting for 48% of the variance). The authors concluded that although reading accuracy can be predicted by an isolated phonological awareness task like phoneme

deletion, both reading accuracy and comprehension are best predicted by a composite of phonological awareness tasks.

Torgesen, Wagner, and Rashotte (1994) studied 244 students in kindergarten and again at the beginning of first and second grades in order to determine how the phonological awareness skills of phoneme segmentation and blending affected the students' ability to decode words. These two auditory tasks were non-standardized. The results showed that the students' ability to segment phonemes was strongly correlated with their ability to decode words ($r = .82$) for both first and second graders. This finding is contradictory to that of Leather and Henry (1994) who found phoneme segmentation to be weakly correlated with reading acquisition. The students' ability to blend phonemes also correlated moderately strong with their ability to decode words at the second grade level ($r = .78$). This finding also contradicts those of Leather and Henry (1994) who found phoneme blending to be only moderately correlated with both word reading and comprehension. Torgesen et al. suggested that having good pre-reading skills in kindergarten has a significant effect on subsequent development of phonological awareness, and conversely, that good phonological awareness in kindergarten children is strongly related to subsequent reading skill. Because of this apparent reciprocal (complementary) relationship, the authors recommended intensive training in phonological awareness coupled with systematic instruction in word-level reading skill as a possible method to reduce the incidence of reading disabilities among young children.

Rohl and Pratt (1995) revisited the relationship between phonological awareness and the acquisition of literacy as investigated by Mann and Liberman (1984). They tested 76 children at the beginning and end of first grade and toward the latter part of

second grade, expanding upon the phonological awareness measures used by Mann and Liberman by including tests that assessed phoneme categorization, phonemic segmentation, and phoneme deletion. These tasks were adapted from previous studies; thus, they were not standardized but they did employ the auditory modality only. A composite of reading and spelling scores from the Neale Analysis of Reading Ability – Revised (Neale, 1988), the Real Word and Pseudoword Decoding Subtests of the Interactive Reading Assessment System (IRAS) (Calfee & Calfee, 1981), and the Real Word and Pseudoword Spelling Subtests of the Schonell Spelling Test (Schonell & Schonell, 1950) were found to be correlated moderately high with phonemic deletion (r =.70) and with phonemic segmentation (r =.60), and moderately with phonemic categorization/isolation (r =.55). As a result, Rohl and Pratt interpreted their findings as support for the theory that phonological awareness contributes to the early stages of literacy acquisition.

Johnston, Anderson, and Holligan (1996) found a significant association between letter naming and phoneme awareness in their study. They indicated that many of the earlier studies which examined the predictive power of preschool phonological awareness skills for later reading ability may be somewhat misleading because they did not measure letter knowledge. They found that an explicit awareness of phonemes emerged in 51 preschool children (mean age 4) after they started to learn the letters of the alphabet, whereas phonemic awareness was rarely displayed in the absence of alphabetic knowledge. Skill in rhyme generation (12 auditory items created by the authors), phoneme segmentation (22 auditory items from the Yopp-Singer Test), and syllable-phoneme deletion (9 auditory items from Rosner's Test of Auditory Analysis Skills)

correlated poorly with letter naming (r = .39, .48, .43 respectively). Thus, Johnson et al. surmised that there may not be a direct causal relationship between phonological awareness skills and later reading ability. Instead, there may be a reciprocal relationship between reading skill and phonemic awareness whereby the students' learning the alphabet facilitates their learning the phonemic awareness skills, and that both of these skills together boost later reading ability. The authors stated the need for research to determine if phonemic awareness ability emerges in students as they are taught the letters of the alphabet.

Naslund and Schneider (1996) followed 134 German children from age 4 through age 8. At age 4 the children were presented the following auditory tasks: rhyme detection, syllable segmentation, syllable blending, phoneme segmentation, phoneme blending, and phoneme oddity. There were weak correlations between all of the phonological awareness tasks and the reading measures administered in the first and second grades, with the correlation between phoneme oddity (isolation) and reading comprehension at age 8 being the strongest (r =.50). Nonetheless, Naslund and Schneider purported that the phonological awareness skills of many preliterate German children facilitate later reading performance. Thus, they supported the hypothesis that children can develop phonological awareness before they are familiar with grapheme-phoneme correspondence.

Gilbertson and Bramlett (1998) investigated phonological awareness measures as predictors of first-grade reading ability. The subjects were 91 former Head Start students who were given informal phonological awareness measures developed by Swank and Catts (1994) and reading measures (Letter-Word Identification, Word Attack, and

Passage Comprehension subtests) from the Woodcock-Johnson Psychoeducational Test Battery-Revised (WF-R, Woodcock & Johnson, 1990) during the first 6 weeks and again during the final 6 weeks of first grade. The auditorily-presented phonological awareness tasks consisted of Deletion, Categorization, Blending, Segmentation, and Invented Spelling. The word reading and comprehension measures were correlated weakly with Deletion (r = .45, .48 respectively) and Segmentation (r = .31, .37 respectively), and moderately with Categorization (r = .51, .50 respectively) and Blending (r = .53, .56 respectively). Although five different phonological awareness tasks were administered, a composite of the phonological awareness scores on these tasks was not correlated with reading. The authors suggested that these phonological awareness skills are associated with both word decoding ability and reading comprehension and recommended further research into this relationship. Moreover, they reported the need to use norm-referenced phonological awareness measures to identify students at risk for reading difficulties.

Other modalities in addition to the Auditory Modality

Mann (1993) correlated the performance of 100 white middle-class kindergarten children on phoneme segmentation with their scores as first graders on the word identification and word attack subtests of the Woodcock Reading Mastery Test. The Phoneme Segmentation Test (a non-standardized task developed by Mann) consisted of 10 items that depicted words through the use of picture stimuli to elicit discrimination of the initial phoneme. Although this test was labeled a segmentation task, it appeared to be an initial phoneme isolation/discrimination task. The phoneme segmentation/isolation scores correlated moderately with the word identification subtest (r =.58) and with the word attack subtest (r =.54).

Swank and Catts (1994) assessed the effectiveness of the four measures of phonological awareness they had developed (deletion, categorization, blending, and segmentation). These measures were given at the beginning of first grade to predict reading ability at the end of first grade. The subjects were 54 middle-class children. For the deletion task, picture stimuli were used; but for the categorization, blending, segmentation, and invented spelling tasks, only the auditory modality was used. All of the phonological awareness measures correlated moderately with the word identification subtest on the Woodcock Reading Mastery Tests. Of the measures given, the deletion task had the highest correlation with word identification (r =.58); a composite score correlation was not reported. The authors recommended that standardized, norm-referenced measures of phonological awareness be developed.

Hoien, Lundberg, and Stanovich (1995) investigated the relationship between phonological awareness skills and reading ability in two studies of children in Norway. The preliminary study examined the children's ability to perform phonological awareness skills. One hundred twenty-eight pre-school children, without any experience in formal reading instruction, were tested on rhyme recognition, syllable and phoneme segmentation, initial-phoneme deletion, and phoneme blending tasks. These tasks, created by the authors, were administered as group tests using picture stimuli which required written responses. The pre-school children performed best on the rhyme and syllable segmentation tasks. The second study, consisting of 1509 first graders, correlated rhyme recognition, syllable and phoneme segmentation, initial and final phoneme isolation/identification, and phoneme blending with 2 word reading tasks. These tasks were again administered in a group format using picture stimuli and required

written responses. Multiple regression analyses showed that the composite of phonemic level tasks (segmentation, isolation, blending) had a stronger correlation with the word reading tasks (r =.55), than either the syllable tasks (r = .14) or the rhyme task (r = .14). The authors concluded that the phonemic awareness level, rather than the rhyme or syllable levels, is a more potent predictor of reading acquisition. This study was different from others in that the tasks were presented in a group testing format. Also it was one of two studies that had a composite phonological awareness score.

Troia, Roth, and Yeni-Komshian (1996) correlated the phonological awareness skills of phoneme segmentation and blending with the reading ability of 11 second-grade students. The tasks, created by the authors, employed visual, kinesthetic, and auditory stimuli. On the sound segmentation task, the students were required to put chips on stimulus pictures when given an auditory cue. For the phoneme blending task, the students were required to imitate orally-presented sound segments while placing a peg into a pegboard and then to combine the sound segments into a word. Phoneme segmentation was correlated moderately-strong with single word reading on the Woodcock-Johnson Reading Mastery Test (r =.79) and with reading comprehension on the Peabody Individual Achievement Test (r =.75), while phoneme blending was moderately correlated with single word reading on the Woodcock-Johnson Reading Mastery Test (r =.64) and with reading comprehension on the Peabody Individual Achievement Test (r =.57).

Auditory-only Modality and Standardized Procedures

Scarborough (1989) examined longitudinal data for 66 lower to upper class children who were given a phonological awareness measure as preschoolers and a

reading measure as second graders. The children's phonological awareness skills, as assessed by the Stanford Early School Achievement Test: Sounds and Letters Subtest (20 items which test initial phoneme isolation) at age 5, were weakly predictive of reading on the Reading Cluster (word recognition, pseudoword pronunciation, and comprehension) subtests of the Woodcock-Johnson Psychoeducational Battery at the end of grade 2 ($r = .36$). Thus, this study correlated a single norm-referenced, standardized measure of phonological awareness (phoneme isolation), which used the auditory modality only, with a standardized reading measure. Scarborough recommended the use of composite measures in future research studies.

Summary of Studies

The importance of phonological awareness as a predictor of reading acquisition is evident in the 15 studies reviewed. Eleven of these studies investigated at least 2 phonological awareness skills each. The remaining 4 studies targeted only one isolated phonological awareness skill. Eleven of the studies also used tasks employing the auditory modality only. The remaining studies used tasks that employed visual and/or kinesthetic stimuli in addition to the auditory modality. Since phonological awareness is defined as an auditory skill, it appears that only the auditory modality should be used to assess it.

Three levels of phonological awareness were investigated – rhyme, syllable, and phoneme – which represented a continuum of phonological awareness skill from whole word (rhyme) to parts of words (syllables) to sounds of words (phonemes). Of the three levels of phonological awareness skills investigated, the majority of the studies found the phonemic level to be the most predictive of reading. The rhyme and syllable levels (each

tested in 6 of the studies) were not significantly related to reading, but were described by the researchers as early developing skills that contribute to, but do not significantly predict, reading. However, there is a wide range in the identification of significant phonemic predictors from study to study. For example, the correlations reported for the phoneme segmentation task and word reading have a diverse range: r = -.11 (Naslund & Schneider, 1996), r = .01 (Leather & Henry, 1994), r = .31 (Gilbertson and Bramlett, 1998), r = .37 (Swank & Catts, 1994), and r = .82 (Torgesen, et al., 1994).

Although many of the researchers recommended using a composite of phonological awareness tasks to predict word reading, all but two of the studies reported only the correlations of isolated phonological awareness tasks with word reading. Out of 15 studies, five studies found that phoneme segmentation had a moderate to strong correlation with word reading (Mann, 1993; Rohl & Pratt, 1995; Torgesen et al., 1994; Troia et al., 1996; Zifcak, 1981), while four studies found weak correlations between phoneme segmentation and word reading (Gilbertson & Bramlett, 1998; Leather & Henry, 1994; Naslund & Schneider, 1996; Swank & Catts, 1994). Thus, there is a wide range of correlations for phoneme segmentation. Five studies also found that phoneme deletion had a moderate to strong correlation with word reading (Gilbertson & Bramlett, 1998; Leather & Henry, 1994; Rohl & Pratt, 1995; Swank & Catts, 1994; Zifcak, 1981). This skill was identified as a good predictor of automaticity in reading (necessary for reading comprehension) for older students but was not recommended for kindergarten children because of its difficulty (Leather & Henry, 1994; Rohl & Pratt, 1995). Four studies reported that phoneme blending was moderately to strongly correlated with word reading (Gilbertson & Bramlett, 1998; Leather & Henry, 1994; Torgesen et al., 1994;

Troia, et al. 1996). Phoneme categorization/isolation was reported to be moderately correlated with word reading in 2 studies (Gilbertson & Bramlett, 1998; Rohl & Pratt, 1995). Thus, it appears that some isolated phonological awareness skills are predictors of reading, but there is a wide range of correlations between these isolated skills and reading. Many kinds of tasks and differing labels for the tasks, as well as the protocol for administering them, are described in the studies. Perhaps this is the reason for such varying results.

In contrast to the studies of isolated phonological awareness skills, two studies reported composite scores for phonological awareness skills. Hoien et al. (1995) reported a composite score for phoneme segmentation, isolation, and blending, which correlated moderately with word reading ($r = .55$). However, this study used a group administration format which consisted of multi-modality stimuli and non-standardized measures. Leather and Henry (1994) also reported a composite score for its phonemic level tasks that were strongly correlated with word reading and reading comprehension. Although this study used the auditory modality exclusively, it employed non-standardized measures.

The majority of the studies investigated the relationship between phonological awareness skills and word reading; they did not investigate the relationship between phonological awareness skills and reading comprehension. However, 6 studies did investigate this relationship (Badian, 1994; Gilbertson & Bramlett, 1998; Leather & Henry, 1994; Naslund & Schneider, 1996; Scarborough, 1989; Troia et al. 1996). Scarborough (1989) and Badian (1994) each investigated only 1 isolated phonological awareness skill, which was poorly correlated with reading comprehension. While 3

studies (Gilbertson & Bramlett, 1998; Leather & Henry,1994; Naslund & Schneider, 1996) found that phoneme segmentation was very weakly correlated with comprehension (r = .13, .32, .37 respectively), the Troia et al. Study (1996) found a strong correlation (r = .75). The phoneme blending skill was moderately correlated with comprehension in the studies by Gilbertson and Bramlett (1998), Leather and Henry (1994), and Troia et al. (1996) (r = .51, .57, .56 respectively). The phoneme deletion skill correlated moderately with reading comprehension in the Leather & Henry study (1994), but weakly in the Gilbertson and Bramlett study (1998).

Regarding the use of phonological awareness skills to predict reading acquisition, Johnston et al. (1996) recommended continued research into the possibility of a reciprocal or complementary relationship between phonological awareness skills and reading. This idea that phonological awareness skills develop along with, or concurrently, with reading skills was supported by Stanovich et al. (1994) and Torgesen et al. (1994).

Of the 15 studies cited, only one study (Scarborough, 1989) used norm-referenced, standardized auditory phonological awareness measures exclusively. (Scarborough investigated the initial phoneme isolation skill only.) However, authors of two studies recommended that norm-referenced, standardized phonological awareness measures be developed and used so that validity and reliability of phonological awareness assessment is established (Gilbertson & Bramlett, 1998; Swank & Catts, 1994). The literature indicates a wide range of procedures used in assessment. Additionally, the labels of some tasks cause confusion as to what skill is being assessed. For example,

Mann and Scarborough labeled a task as phoneme segmentation, but their descriptions of the task indicated that it was a phoneme isolation or discrimination task.

The non-standardized procedures, non-norm-referenced measures, wide-range of the content and labeling of the tasks, and the inconsistent use of the auditory modality indicate a need for a study which investigates a composite of phonological awareness tasks using norm-referenced, standardized measures employing the auditory modality exclusively.

Phonological Awareness Training

A review of the literature suggests that phonological awareness may develop in a complementary or reciprocal relationship with reading acquisition. This development may be dependent upon training. Researchers report that significant gains in phonological awareness can be achieved with training. Blachman (1991) stated that we should not assume that the child has phonological awareness; it must be trained within the regular classroom setting. Smith, Simmons, and Kameenui (1997) stated that phonological awareness instruction is "...obligatory, not optional". Moreover, for diverse learners, Smith, Simmons, and Kameenui reported that the strong effects of phonological awareness training on subsequent reading underscores the critical importance of early identification and intervention for phonological awareness development before reading instruction begins as well as along with reading instruction.

Experimental programs have been used in kindergarten and first grade classrooms, each exploring a variety of intervention models. They have differed in their instructional approaches, target student populations, and tasks. These studies were

divided into training prior to reading instruction and training concurrent with reading instruction.

Phonological Awareness Training Prior to Reading Instruction

Lundberg, Frost, and Petersen (1988) evaluated a preschool program in which Danish preschool children were given daily training in phonological awareness over a period of 8 months. The children received no reading instruction prior to or during training. The scores that the children obtained on pre- and posttest measures of word reading ability were compared to the word reading scores of 155 children who did not receive phonological awareness training. These training effects were subsequently assessed for reading and spelling in first and second grades. The results revealed that the experimental group significantly outperformed the control group on individually-administered non-standardized metaphonological tasks and a group-administered standardized word reading test, $F(1, 318) = 5.00, p < .05$. Small, but significant, effects were observed on rhyming and word–syllable manipulation tasks. Phoneme segmentation tasks improved dramatically. Lundberg et al. concluded that although rhyming and word-syllable segmentation apparently require less direct instruction, explicit instruction on phonemic segmentation outside of the context of the acquisition of an alphabetic writing system can have a facilitating effect on subsequent reading and spelling acquisition. Thus, this study indicated that training in phonological awareness prior to reading instruction facilitated reading acquisition.

Brady, Fowler, Stone, and Winbury (1994) conducted an 18-week phonological awareness training study with inner-city kindergarten children in four classrooms. Two of the classes received a phonological awareness training program which consisted of

activities that employed the rhyming, syllable, and phoneme levels of phonological awareness; the 2 control classes were engaged in a "whole language" curriculum. None of the classes had formal reading instruction. Follow-up evaluation included 3 non-standardized phonological awareness tasks (rhyme generation, phoneme segmentation, and phoneme deletion) which were presented auditorily, and the letter and word knowledge subtests of the Woodcock Reading Mastery Test. The children in the two experimental classes receiving training made significantly greater gains in phonological awareness at the end of kindergarten and exhibited a trend toward better reading skills than the control classes, $F\ (1,40) = 4.6$, $p = .04$. Thus, this study indicated that phonological awareness training prior to reading instruction facilitated reading acquisition. The authors advised that future studies use multiple measures, instead of a single task, to obtain more robust information about the effect of phonological awareness on reading acquisition.

Torgesen and Davis (1996) conducted a 12-week training program in phonological awareness with a sample of 100 predominately black kindergarten children. Sixty children received training in segmentation and blending skills, and 40 children received no-treatment. Growth in phonological awareness was assessed during the middle and at the end of the training period using the phoneme segmentation and sound isolation subtests of the Test of Phonological Awareness (TOPA), a phoneme blending task, and a group of reading tasks (letter-name, letter-sound, and decoding). Comparisons between the children in the two groups indicated that the children receiving phonological awareness training performed significantly better on phonological awareness tasks and letter sounds than those children in the control group. The

correlation between the TOPA (a standardized, group-administered test which uses picture and auditory stimuli) and the group of letter-sound tasks was moderately weak ($r = .44, p < .05$). Thus, in this study, phonological awareness training preceded reading instruction in letter names and sounds and resulted in a moderately low correlation.

Phonological Awareness Training concurrent with Reading Instruction

The majority of the studies describe phonological awareness training that is concurrent, but not integrated, with either reading readiness or formal reading instruction. Reading readiness instruction is employed in preschool and kindergarten classes. Formal reading instruction traditionally begins in first grade.

Ball and Blachman (1991) investigated the relationship between training in phonemic segmentation and instruction in letter names and sounds. Ninety kindergarten students were divided into three treatment groups. The groups were the phoneme segmentation group (the students were taught to segment phonemes of words), the letters and sounds activities group (the students received instruction in letter names and sounds), and the control group (the students received regular kindergarten instruction). The results of a non-standardized phoneme segmentation test, which used picture and tactile stimuli in addition to auditory stimuli, showed that the kindergarten students improved with training. Scores on the Woodcock Reading Mastery Test word identification subtest indicated that the segmentation training significantly improved word reading, $F(2,85) = 6.90, p < .001$. Thus, this study indicated that direct training in phoneme segmentation skills facilitated reading acquisition.

Torgesen, Morgan, and Davis (1992) evaluated the effects of two types of phonological awareness training on the word reading of kindergarten children. One of

the training programs provided explicit instruction in segmenting and blending tasks; the other program trained blending skills only. The effects of the direct training in segmentation and blending, which were not integrated into the reading instruction, were compared with no training received by a language-experience control group. Only the children receiving training in both segmentation and blending showed a significant increase in word reading, $t\ (9) = 2.61$, $p < .05$. Thus, this study indicated that direct training of both of these phonological awareness skills facilitated reading acquisition.

Lie (1991) reported the results of another longitudinal study in which Norwegian children received daily 15-minute training sessions in word analysis beginning in Grade 1 through the end of Grade 2. The three treatment groups were as follows: a) 60 children were taught to isolate individual phonemes and to identify position of the phonemes in target words; b) 52 children were taught to segment phonemes in target words; and c) 100 children (controls) participated in "neutral" activities in which they discussed illustrations. None of the phonological awareness training was integrated into the curriculum. Both forms of phonological awareness training had a facilitating effect on reading and spelling. At the end of Grade 1 and Grade 2, students who had received the phoneme segmentation and phoneme isolation training scored significantly higher than the control group on an auditory-only phonological awareness test (non-norm-referenced) and a standardized reading test, $F\ (2,135) = 3.34$, $p < .05$. A significant interaction between type of treatment and intelligence, suggested that students of lower ability profit the most from the phonological training. The results indicated that the segmentation training helped students reach automaticity in reading earlier (end of Grade 1). Lie suggested that this training facilitated the students' learning to read but was not definitely

demonstrated as a prerequisite for learning to read. Thus, this study indicated that phonological awareness develops in a complementary relationship with reading acquisition, although it was not integrated into the classroom instruction.

Uhry and Shepherd (1993) examined the effects of segmentation/spelling instruction using the cipher strategy (representing phonemes with small blocks and then spelling these phonemes with lettered blocks and computer keys). The subjects were 22 first graders from predominantly white, middle-class, college-educated, English-speaking families. Eleven subjects were randomly assigned to either the experimental (direct segmentation/spelling training) or control group. The groups were then compared after 6.5 months. The results showed that the experimental subjects were superior to the subjects in the control group on the word reading subtests of the Woodcock Reading Mastery Test, $F(1,20) = 1.08, p = .312$. The experimental subjects also made significant gains on the Rosner's Test of Auditory Analysis Skills, The Roscoell-Chall Auditory Blending Test, and the sound blending subtest of the Illinois Test of Psycholinguistic Ability (ITPA). Uhry and Shepherd suggested a causal role for training; they questioned whether sound blending preceded reading, but concluded that segmentation/spelling training facilitated sound blending and reading.

Summary of Training Studies

In summary, the results of four of the seven treatment studies indicated that phonological awareness training facilitates reading acquisition in a complementary relationship. The three studies that did not investigate phonological awareness training concurrent with reading instruction described phonological awareness skills as predictors of reading. These were studies of preschool/kindergarten children that found that

phonological awareness training prior to reading instruction facilitated subsequent reading acquisition. However, only one of these studies used norm-referenced, standardized phonological awareness measures to compare to the reading measures.

The four studies that investigated phonological awareness training concurrent with reading instruction used segmentation, blending, and isolation tasks. The majority of the studies found that training in segmentation of syllables and phonemes concurrent with reading instruction facilitated reading acquisition. However, these studies used direct training of phonological awareness skills; they were not integrated into the reading instruction. Moreover, only Uhry and Shepherd used norm-referenced, standardized measures employing the auditory modality exclusively to compare phonological awareness skills to reading acquisition.

Conclusions and Implications

The articles reviewed in the literature support the concept of phonological awareness and its importance in learning to read. The major implications are that phonological awareness skills predict reading acquisition, and that training in phonological awareness facilitates reading acquisition. However, the literature indicates that there is inconsistency in assessment and interpretation of phonological awareness skills.

One factor is the use of modalities other than the auditory modality to assess phonological awareness. Since phonological awareness is defined as an awareness of the auditory components of our spoken language, it appears that the auditory modality only should be used to assess it. However, visual and kinesthetic stimuli were often used in the studies.

Additionally, most of the studies did not use norm-referenced, standardized measures to test phonological awareness. The tests were usually tasks derived by the authors of each study, although several investigators (Swank & Catts, 1994; Gilbertson & Bramlett, 1998) recommended the development and use of norm-referenced, standardized measures. There was confusion in the labeling of the tasks, as well as diverse procedures for the administration of them. These factors may have contributed to the wide range of correlations for the same tasks from study to study. Therefore, these factors raise concerns about the validity and reliability of the tasks used.

Moreover, most of the studies investigated one or only a few isolated phonological awareness skills; only 2 studies reported how a composite of phonological awareness skills correlated with reading. Although these isolated phonological awareness tasks had positive correlations with reading (decoding) skills, the investigators recommended that a composite of phonological awareness tasks could better predict reading comprehension.

The literature suggests that phonological awareness may develop concurrently with reading acquisition. Studies of phonological awareness training are divided according to training done prior to formal reading instruction and training done concurrently with reading instruction. Regardless of when the training was done, all studies indicated that phonological awareness training facilitated reading acquisition. However, none of these studies indicated that phonological awareness skills were integrated into the curriculum; even though in some studies phonological awareness skills were trained concurrently with reading instruction, a direct isolated method of training in a separate format away from the reading instruction was used. Although the literature

purports the value of integrating phonological awareness training into literacy instruction to help students get the "whole picture" and to make the connection between what they are hearing and seeing in print, there were no studies that investigated this. Moreover, none of these studies used standardized, norm-referenced measures employing the auditory modality only to assess the phonological awareness skills.

In summary, the review of the literature indicates that the majority of the studies determined that phonological awareness is a predictor of reading, and that training for phonological awareness facilitates reading acquisition. However, the studies have not used standardized or norm-referenced measures of phonological awareness. These measures have been administered in a variety of formats and modalities. Moreover, these measures have not been reported as a composite of phonological awareness skills; most studies report only the results of isolated phonological awareness tasks. The training studies have indicated direct training of phonological awareness skills in an isolated, separate format away from reading instruction. No studies have described phonological awareness activities that are integrated into reading instruction. Moreover, the post-testing of phonological awareness training has not employed standardized, norm-referenced measures.

Because of these concerns, this study investigated phonological awareness as a predictor of reading acquisition and as a complement to reading acquisition using a norm-referenced, standardized test of phonological awareness. This norm-referenced, standardized test contains a composite of auditory subtests that assess a variety of phonological awareness skills that have been addressed in the literature. The score of each isolated auditory subtest and the composite score of the auditory subtests are

compared to another standardized, norm-referenced test of word reading to determine whether phonological awareness predicts the ability to read words. Additionally, the isolated auditory subtest scores and the auditory composite score are compared to reading comprehension scores on a standardized, norm-referenced reading comprehension subtest to determine whether phonological awareness predicts the ability to comprehend what is read. Thus, these comparisons should help determine whether standardized, norm-referenced measures of phonological awareness, using the auditory modality exclusively, support the findings of the prior studies.

CHAPTER III

Methodology

Subjects

The subjects for this study were 172 students who began the study as first graders having received no formal reading instruction. These students were followed over the course of one year and were tested prior to reading instruction, during reading instruction, and after reading instruction. At the beginning of this study, the students ranged in age from 6.0 to 6.11 years and attended either Lake City Primary or J. C. Lynch Elementary School, which are both located in Florence School District 3 in South Carolina. Of these participants, 40% were African-American Females; 30%, African-American Males; 17%, White Males; and 13%, White Females.

The median income of families in Florence School District 3 is $17,299; thus, the district is ranked 83 of 91 school districts in South Carolina according to income level. Those students participating in the free lunch program reside in homes in which the maximum income level is $20,865 based on a family of 4. Seventy-five percent of the subjects in this study received free lunch, thus indicating that they are of a low socioeconomic status.

To be included in this study, the subjects passed a visual, audiometric, and speech screening, indicating no visual, hearing, or speech problems. Parental consent for participation in this study was also obtained (Appendix B).

Materials

The materials for this study were the auditory subtests of The Phonological Awareness Test (PAT), the Slosson Oral Reading Test-Revised (SORT-R), and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest. These tests were selected in order to measure the participants' phonological awareness skills, word reading ability, and reading comprehension skills. The Cunningham Model of Reading Instruction was also used as part of the first grade reading curriculum. The tests and the reading instruction are described below.

The Phonological Awareness Test (PAT) was chosen for this study because its subtests using auditory stimuli only are cumulatively representative of the phonological awareness skills examined in the literature. These subtests contain tasks that assess rhyming, segmentation, isolation, deletion, and blending; these phonological awareness skills have been examined in other studies, but not collectively. Moreover, most of the tasks described in the literature were created by the authors of each study and thus not standardized as to protocol or content. Additionally, the literature describes the tasks as often using additional modalities (visual, kinesthetic) besides the auditory modality to test the skill. Therefore, there is a need for a standardized, norm-referenced collection of subtests using the auditory modality only that assesses the skills described in the literature. The PAT satisfies these conditions.

The PAT was developed by Robertson and Salter (1997) following an extensive review of the literature that indicated that the tasks are reflective of necessary phonological awareness skills. The empirical validity of the PAT was established by methods of internal consistency and contrasted groups. Internal consistency was

satisfactory with 99 percent of the items showing statistically significant average correlations with the total test scores. Contrasted groups validity was also satisfactory with 38 of 40 comparisons for each subtest indicating an ability of the PAT subtests to differentiate students with reading disorders from students developing reading skills normally. Robertson and Salter also found that the test-retest reliability for the normative population on the PAT ranged from .72 for the Isolation Subtest (lowest) to .79 for the Segmentation Subtest (highest).

The PAT assesses students' awareness of the oral language segments that comprise words. This individually-administered test is designed to assist in diagnosing deficits in phonological awareness and phoneme-grapheme correspondence in children 5 years, 0 months through 9 years, 11 months. Only the subtests of the PAT employing auditory stimuli were used to assess each student's phonological awareness skills. These subtests were as follows:

- Rhyming – This subtest consists of two levels that contain 10 tasks each. The *Discrimination Level* measures the student's ability to identify rhyming words presented in pairs. The *Production Level* assesses the student's ability to provide a rhyming word when given a stimulus word. Only the *Production Level* was measured in this study.
- Segmentation – This subtest consists of three levels containing 10 tasks each. The *Sentence Level* requires the student to divide sentences into their constituent words. The *Syllable Level* measures the student's ability to divide words into syllables. The *Phoneme Level* assesses the student's ability to

segment words by phoneme. Only the *Phoneme* Level was measured in this study.

- Isolation – This subtest also has three levels containing 10 tasks each. The *Initial Level* measures the student's ability to identify the initial phoneme in a word. The *Final Level* measures the student's ability to identify the final phoneme in a word. The *Medial Level* measures the student's ability to identify the medial phoneme in a one-syllable word. All levels were measured in this study.
- Deletion – This subtest has two levels containing 10 tasks each. The *Compounds and Syllables Level* measures the student's ability to say a word and then say it again, deleting one root word or syllable. The *Phoneme Level* measures the student's ability to say a word and then say it again, deleting one of its phonemes. Only the *Phoneme Level* was measured in this study.
- Blending – This subtest also has two levels containing 10 tasks each. The *Syllable Level* assesses the student's ability to blend syllables together to form a word when the syllables are presented individually. The *Phoneme Level* assesses the student's ability to blend phonemes together to form a word when the phonemes are presented individually. Only the *Phoneme Level* was measured in this study.

The Slosson Oral Reading Test-Revised (SORT-R) was given to determine each child's level of oral word recognition. Although the SORT-R has not been used in studies cited in the review of the literature, the majority of the studies used word-reading lists to examine the relationship between phonological awareness and reading.

Moreover, the SORT-R is accepted as a valid measure of word reading in the school population (Slosson & Nicholson, 1994).

The SORT-R is a nationally standardized test that provides information regarding grade and age equivalents, standard scores, national percentiles, and confidence intervals of 95% and 99%. It has high validity with the Peabody Individual Achievement Test-Reading Recognition (r =.90) and Woodcock-Johnson Tests of Achievement-*Letter* Word Identification (r =.90). Reliability, based on the Split-Half with the Spearman-Brown correction, the Rulon, the Kuder-Richardson formula 21, and test-retest after one week, was r =.98. The SORT-R contains 200 words arranged in ascending order of difficulty in groups of 20 words. These word groups approximate grade reading levels. Thus, group P is at approximately kindergarten level; group 1 is first grade level; and so on until the adult level.

The grade 2 Scott Foresman Class Placement Test: Comprehension Subtest was used to assess reading comprehension. This test was selected because it is a measure of reading comprehension using the reading series that is currently taught in grades one and two in Florence School District 3. This test is given upon entry to second grade to determine reading comprehension ability. A review of the literature indicated that phonological awareness skills impact the speed of acquisition of automaticity that determines the degree of comprehension. Thus, the grade 2 Scott-Foresman Class Placement Test: Comprehension Subtest was chosen to indicate whether automaticity in reading has been acquired, thereby facilitating reading comprehension (Cornwall, 1992).

The "4 Block" or Cunningham Model (Cunningham and Allington, 1994) of Reading Instruction employs a systematic, controlled method of reading instruction that

integrates phonological awareness training. This model consists of four blocks of reading instruction that last approximately 30 minutes each. The first block is called the "Working with Words Block" which has 2 components: 1) recognition of high frequency words in the reading material through clapping rhythmically and chanting the letters in the words; and 2) awareness of phonological aspects of words - phoneme isolation and rhyming patterns in words. The second block is the "Supported Reading Block" which consists of 3 parts: 1) the teacher and students share the reading of quality literature while identifying rhyming patterns, segmenting phonemes, and identifying beginning phonemes; 2) the students pair off as reading partners assisting each other with word recognition strategies; and 3) the students and teacher then focus on comprehension of the literature. The third block is the "Writing Block" in which the students use invented spelling to write and edit a paragraph. The fourth block is the "Self-Selected Reading Block" whereby the teacher consults with each student while he/she is reading his/her selected book, noting the student's use of picture clues, fluency, decoding, and self-correction. Cunningham and Allington state that some children have "an ear for sounds ...others labor over the letters and sounds and aren't able to blend the sounds they know into words that they know" (Cunningham & Allington, 1994, p.16). They support a "combination approach to literacy", using a variety of learning styles and modalities. This model of reading instruction is used in Florence School District 3 by all teachers. The Cunningham Model of Reading Instruction differs from those phonological awareness training models described in the literature that were concurrent with reading instruction, but were conducted in a separate format, isolated from reading instruction.

Thus, the Cunningham Model consists of phonological awareness training that is integrated into reading instruction.

Procedures

Nine speech-language pathologists were trained to administer the six auditory subtests of the PAT and the SORT-R according to the standardized directions in the examiner's manuals. Their training consisted of a demonstration of testing techniques, practice administration of the tests, and analysis of scoring responses prior to testing the children.

The PAT and the SORT-R were given individually to the 172 participants during a three-day period at the beginning of first grade as part of a pilot study. One week later the PAT was again administered individually to 142 of the original participants to determine test-retest reliability. These 142 students were given the SORT-R again after four months of reading instruction. As a final measure, 122 of these students were administered the PAT, the SORT-R, and the grade 2 Scott Foresman Reading Comprehension Subtest at the beginning of second grade (after 1 year of reading instruction). Once again, the PAT and the SORT-R were individually administered by the speech-language pathologists, but the Scott Foresman Reading Comprehension Subtest was given in a group format by the classroom teachers.

The auditory subtests of the PAT were given prior to the SORT-R and on a different day so that order and sequence effects were controlled. Each student had different examiners – one examiner for the PAT #1, another examiner for the SORT-R, and another examiner for PAT #2, thereby controlling for examiner effects. In order to ensure that the students were assessed in a distraction-free environment, the PAT and the

SORT-R were given by the speech-language pathologists in quiet offices located within their schools. The grade 2 Scott Foresman Class Placement Test: Comprehension Subtest was administered in a group format within the second grade classrooms by the classroom teachers at the beginning of the school year.

The procedures for and order of administration of each of the subtests of the PAT followed the standardized protocol. The procedures for administration of the SORT-R were as follows: the examiner presented the printed words one-by-one beginning with word list P and asked the child to read the words (allowing 5 seconds per word), continuing until the child was unable to read any words on a word list. The PAT and the SORT-R was then scored according to the procedures outlined in the manual.

The procedures for the administration of the Scott Foresman Reading Comprehension Subtest followed the standardized protocol. The classroom teachers administered and scored the test according to the procedures outlined in the manual.

The Cunningham Model of Reading Instruction was implemented at the beginning of first grade after the PAT and SORT-R were initially administered. The procedures for the administration of the Cunningham Model followed the protocol of training that the classroom teachers had received prior to this study. All first grade teachers used this method of reading instruction.

Intertester Reliability

The accuracy of raw score data was verified by an independent examiner. To determine test-retest reliability, 30 audiotaped samples were randomly selected for the three administrations of the PAT and the SORT-R and scored by the independent examiner who was skilled in the scoring of these tests. The Pearson product-moment

correlation between the examiners was 0.99 for scores on the PAT and the SORT-R. A statistical analysis was conducted using the paired t-test for dependent measures and the results revealed that the examiners' mean scores were not significantly different ($p>.19$).

Statistical Analysis

Raw scores were calculated for each subtest of the PAT, the SORT-R, and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest for each of the 122 students who remained in the study until the beginning of second grade. These raw scores (i.e. the sum of correct responses) were entered into the Statistical Analysis System (SAS), a computerized system for statistical analysis. The Pearson product-moment procedure was used to answer questions 1 – 4. A forward stepwise multiple regression procedure was employed to answer question 5.

CHAPTER IV

Results and Discussion

Results

The Statistical Analysis System (SAS), a computerized program, was employed to analyze the data. The five questions proposed by this study were answered using this system.

Question 1: The Relationship Between the PAT #1 and the SORT-R #1, #2, #3

To determine whether having good phonological awareness skills predicts a child's ability to read words, the Pearson product-moment correlation coefficient was employed. The auditory subtest raw scores, as well as the auditory composite raw score for the PAT #1 administered prior to reading instruction, were correlated with the raw scores on the SORT-R #1 which was also administered prior to reading instruction, SORT-R #2 given during reading instruction, and SORT-R #3 given after reading instruction. One outlier was removed from the analysis of SORT-R #1, and two outliers were removed from the analysis of SORT-R #2 because they were not representative of the test population.

PAT #1 correlated with SORT-R#1. Table 1 shows how each auditory subtest raw score, as well as the composite raw score for the PAT #1, correlated with the SORT-R #1. The correlations for the individual auditory subtest raw scores on the PAT #1 with the SORT-R #1 ranged from $r = .21$ for the Rhyming Subtest to $r = .54$ for the Blending

Subtest. The PAT #1 composite score correlated moderately with the SORT-R #1 (r = .53). This correlation indicates that, prior to reading instruction, phonological awareness is not a strong predictor of word reading skill.

Table 1
Pearson product moment correlations of the PAT #1 with SORT-R #1, #2, #3 (n = 121)

PAT #1	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
SORT-R #1	.21*	.48**	.32**	.40**	.52**	.44**	.54**	.53**
SORT-R #2	.33**	.51**	.55**	.62**	.67**	.61**	.60**	.73**
SORT-R #3	.27**	.41**	.40**	.58**	.61**	.54**	.53**	.63**

*$p < .05$ **$p < 003$
Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (composite score)

When the students were administered the SORT-R #1, they had received no formal reading instruction in first grade; consequently, 93% of the students' word reading scores on the SORT-R #1 were low (first quartile), although these same students scored in the middle to high range (second to fourth quartiles) on the PAT #1. An examination of the mean raw scores, standard deviations, range of student scores, and the total possible raw score on the PAT #1 and the SORT-R #1, #2, and #3 are presented in Table 2, which gives a clearer picture of the students' performance.

Table 2 shows that the students achieved the highest mean raw scores on the PAT #1 Rhyming Subtest ($\bar{X}$ = 7.81) and on the Isolation-Initial Position Subtest ($\bar{X}$ = 7.35). In comparison, the mean raw score for the SORT-R # 1 was low ($\bar{X}$ = 7.12) considering the range of student scores (0-53). Sixty to seventy percent of the students had high scores for the Rhyming and Isolation-Initial Position Subtests of the PAT #1, but low scores on the SORT-R #1. Thus, although the students were able to adequately rhyme and isolate phonemes in the initial position of words, having these skills did not necessarily help them to read words before they were given reading instruction.

Table 2

Mean Raw Scores, Standard Deviations, Range of Students' Raw Scores, and Possible Score for the PAT #1 auditory subtests and auditory composite and the SORT-R #1, #2, and #3.

Tests	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blen	TPAT	SORT 1	SORT 2	SORT 3
Mean	7.81	1.52	7.35	4.78	2.17	3.17	3.12	30.17	7.12	29.07	56.50
SD	3.20	2.37	3.43	3.66	2.64	2.87	3.12	16.01	9.10	16.10	28.85
Range	0-10	0-10	0-10	0-10	0-9	0-10	0-10	0-66	0-53	3-85	7-139
Pos Score	10	10	10	10	10	10	10	70	200	200	200

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (overall score); SORT1 = SORT-R #1; SORT2 = SORT-R #2; SORT3 = SORT-R #3.

The students performed poorest on the Segmentation Subtest ($\bar{X}$ =1.52) compared to their range of scores (0-10). The correlation between the Segmentation Subtest and the SORT-R #1 was weak (r = .48), indicating that, without reading instruction, the students' ability to segment phonemes in words weakly affected their ability to read words.

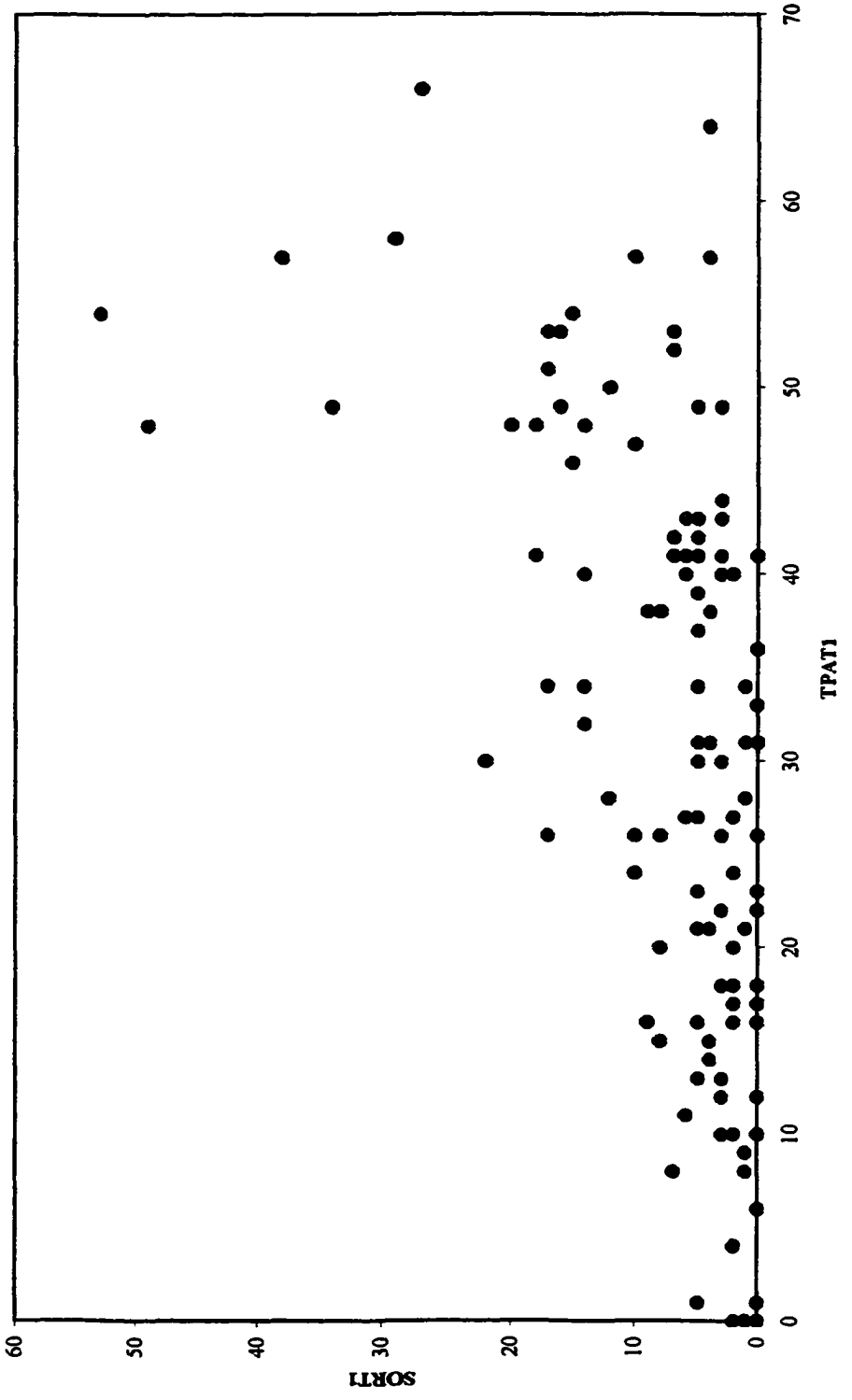
The ability to isolate the final and medial phonemes in words was more strongly related to word reading. The mean raw score for the Isolation - Final Position Subtest ($\bar{X}$ = 4.78) was in the middle of the range of the students' scores (0-10), while the Isolation - Medial Position Subtest mean raw score ($\bar{X}$ = 2.17) was low compared to the range of the students' scores (0-9). Both of these subtests were weakly correlated with the SORT-R #1. The Isolation – Final Position Subtest correlated weakly with the SORT-R #1 (r = .40), while the Isolation – Medial Position Subtest correlated more moderately with the SORT-R #1 (r = .52). Twenty-six percent of the students scored in the highest quartile on the Isolation-Final Position Subtest but in the lowest quartile on the SORT-R #1, indicating that even though one-fourth of the students could auditorily isolate final phonemes in words well, this ability did not help them to read words prior to reading instruction. However 62% of the students scored in the lowest quartile on both the

Isolation-Medial Position Subtest and the SORT-R #1, indicating that the students who couldn't isolate medial phonemes of words also had difficulty reading words prior to instruction.

Poor to moderate relationships were evidenced when the SORT-R #1 was correlated with the Deletion and Blending Subtests of the PAT #1. Forty-four percent of the students scored in the lowest quartile on both the Deletion Subtest and the SORT-R #1, while 53% scored in the lowest quartile on both the Blending Subtest and the SORT-R #1. The mean scores of both subtests were very close: Deletion ($\overline{X}$ = 3.22) and Blending ($\overline{X}$ = 3.13). The range of the students' scores on both of these subtests was 0-10; thus, the mean scores were below the median. The correlations for both of these subtests with the SORT-R #1 were low to moderate, respectively (Deletion: r = .44; Blending: r = .54).

The composite auditory score on the PAT #1 exhibited a moderate relationship with the SORT-R #1 (r = .53). The mean score for the PAT #1 auditory composite ($\overline{X}$ = 30.24) was slightly less than half of the range of the students' scores (0-66). Seventy-five percent of the students scored in the second through fourth quartiles on the PAT #1 auditory composite, but in the lowest 2 quartiles on the SORT-R #1 (see Figure 1). This indicates that even though some students had a good composite of phonological awareness skills prior to reading instruction, they had difficulty reading without formal instruction.

Figure 1
Slosson Oral Reading Test-Revised #1 (SORT1)
with Auditory Composite of Phonological Awareness Test #1 (TPAT1)

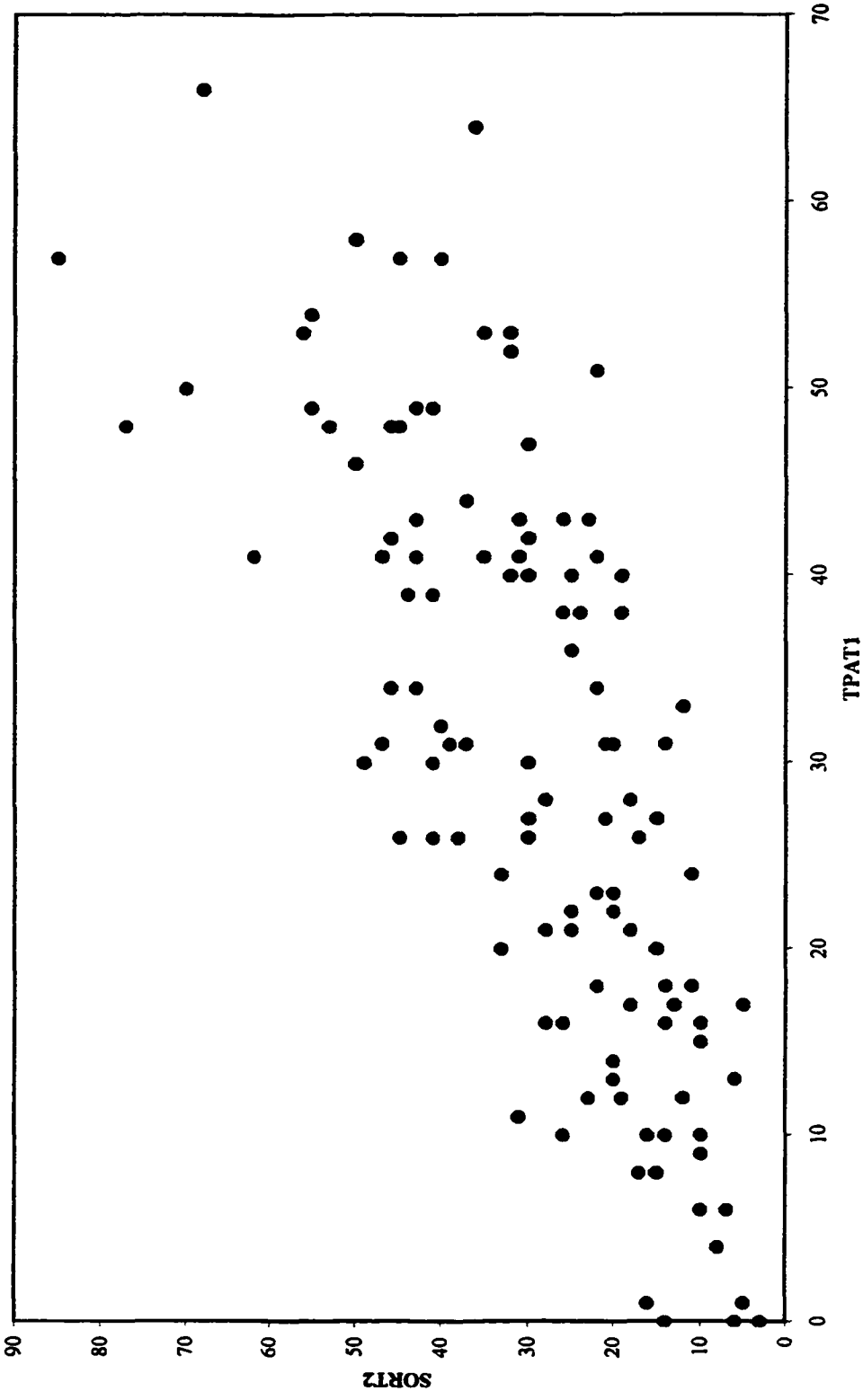


PAT #1 correlated with SORT-2. A stronger relationship between phonological awareness and reading acquisition was observed after four months of reading instruction. As shown in Table 1, the correlations for the individual auditory subtests of the PAT #1 with the SORT-R #2 ranged from r = .33 for the Rhyming Subtest to r = .67 for the Isolation-Medial Position Subtest. Table 2 shows that the students' performance increased fourfold on the SORT-R #2 from the SORT-R #1 ($\overline{X}$ = 29.07). The range of the students' scores also increased on the SORT-R #2 from 3 to 85. These findings indicate that the students' word reading ability improved through instruction using the Cunningham Model that integrates phonological awareness training into reading instruction.

The Isolation-Medial Position Subtest, on which the students achieved one of the lowest mean raw scores ($\overline{X}$ = 2.16), was the strongest predictor of the students' word reading ability after four months of reading instruction (r = .67). Therefore, the students who had difficulty isolating medial phonemes of words prior to reading instruction also had difficulty reading words after four months of reading instruction.

However, the strongest correlation occurred between the PAT #1 auditory composite and the SORT-R #2. As Table 1 reveals, the composite of auditory skills on the PAT #1 was strongly correlated with the SORT-R #2 (r = .73). This finding indicates that the students' ability to perform a composite of phonological awareness skills prior to reading instruction was a better predictor of their ability to read words after four months of reading instruction than any isolated phonological awareness skill (see Scatterplot in Figure 2).

Figure 2
Slosson Oral Reading Test-Revised #2 (SORT2)
with Auditory Composite of Phonological Awareness Test #1 (TPAT1)



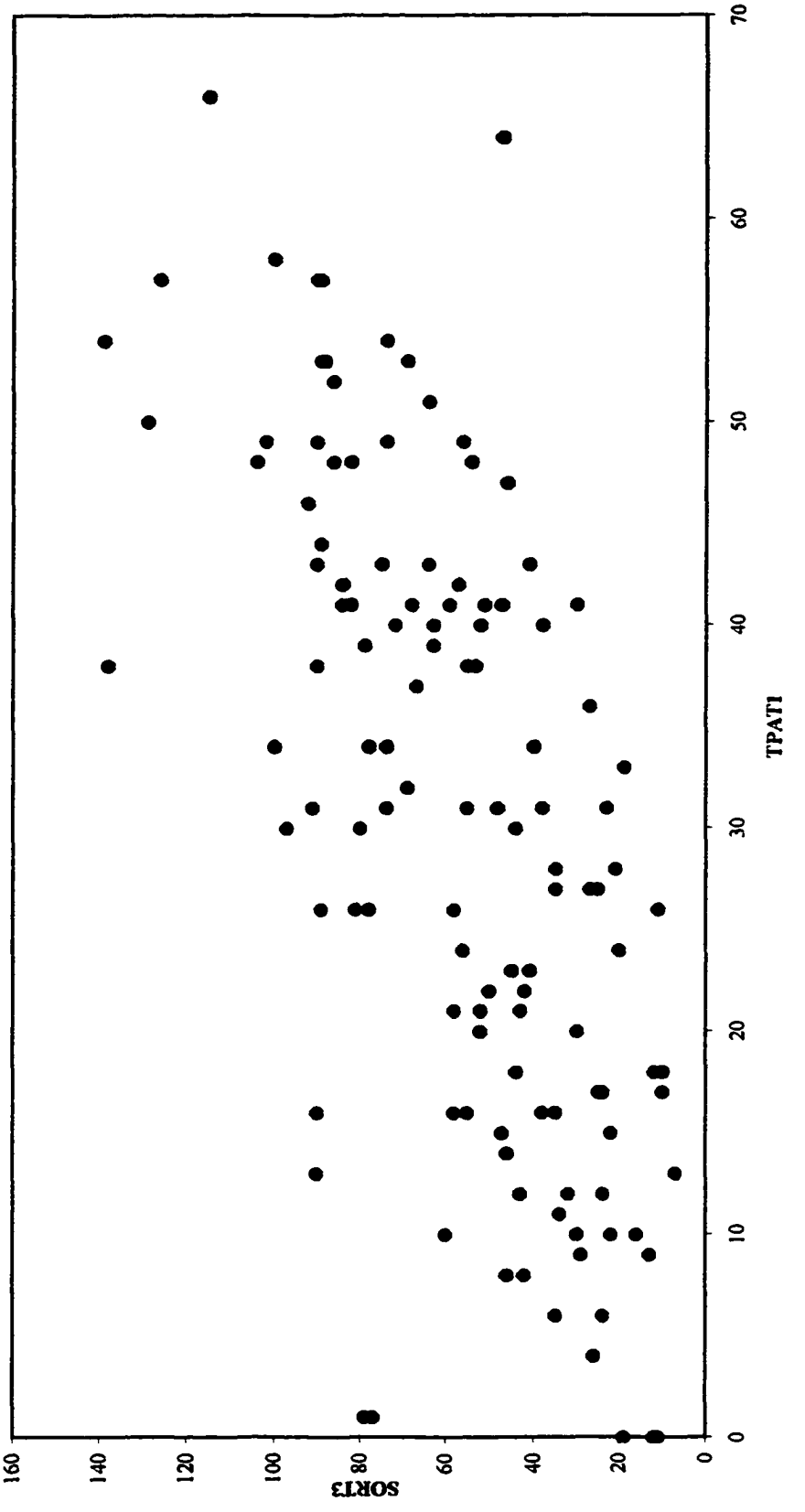
PAT #1 correlated with SORT-R #3. The relationship between phonological awareness and word reading ability appears to become stable after one year of reading instruction. As Table 1 shows, the correlations for the isolated auditory subtest scores of PAT #1 with the SORT-R #3 ranged from a low of r = .27 for the Rhyming Subtest to a high of r = .61 for the Isolation-Medial Position Subtest. Table 2 shows a large increase in the mean raw score from SORT-R #2 to SORT-R #3 (from 29.07 to 56.5) after reading instruction. These results, as can be seen in Table 1, indicate that the students' ability to isolate medial and final position phonemes, and to delete and blend phonemes in words, prior to reading instruction, was a moderate predictor of their word reading ability after one year of reading instruction.

However, the highest correlation occurred for the PAT #1 auditory composite with the SORT-R #3 (r = .63). This finding again indicates that a composite of phonological awareness skills in students prior to reading instruction, rather than any isolated skill, better predicts their word reading acquisition after one year of instruction (see Scatterplot in Figure 3).

As shown in Table 2, the mean raw scores for SORT-R #1, #2, #3 reveal that the students' performance increased from the first SORT-R test administration to the third SORT-R test administration: SORT1 = 7.12, SORT2 = 29.07, SORT3 = 56.5. This finding, though not surprising, indicates that the students improved in their word reading ability as they were given reading instruction with the Cunningham Model.

The correlations between the PAT #1 auditory composite and the SORT-R #1 (r = .53), SORT-R #2 (r = .73), and SORT-R #3 (r = .63) showed improvements in the relationship. Although the increase in correlations during and after reading instruction

Figure 3
Slosson Oral Reading Test-Revised #3 (SORT3)
with Auditory Composite of Phonological Awareness Test #1 (TPAT1)



indicated a positive relationship between the auditory subtests of the PAT #1 and the word reading task of the SORT-R, the strongest relationship was evidenced between the composite auditory score (total subtest scores) on the PAT #1 and the second administration of the SORT-R. This relationship supports the premise that overall phonological awareness skill better predicts reading acquisition.

Question 2: The Relationship Between the PAT #3 and the SORT-R #3

In order to address the relationship between the development of phonological awareness skills and reading skills, the PAT and the SORT-R were given again one year after instruction. The auditory subtest raw scores and composite raw score of the PAT #3 were correlated with the SORT-R #3.

Table 3 shows how the auditory subtests and auditory composites of the PAT #3 correlated with the SORT-R #3. The correlations for the auditory subtests range from .19 (Isolation-Initial Position Subtest) to .53 (Isolation-Final Position Subtest). The auditory composite score of the PAT #3 had the highest correlation with SORT-R #3 ($r = .55$). These subtest correlations indicate that the isolated phonological awareness skills are poorly to moderately correlated with word reading on the SORT-R. In addition, the auditory composite is moderately correlated to word reading after instruction. These results show that even after the students had developed better phonological awareness skills than they exhibited on the PAT #1, their ability to read words was only moderately related to their phonological awareness skills.

Table 3

Pearson product moment correlations of PAT #3 with SORT-R #3 (n=121).

PAT #3	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
SORT-R #3	. 28*	. 44**	.19*	.53**	.36**	.50**	.34 **	.55**

*$p < .03$ **$p < .0001$

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (overall score)

A look at the mean raw scores, standard deviations, range of the students' scores, and the total possible scores on the PAT #3 and the SORT-R #3 in Table 4 provides additional information. The subtest and composite mean raw scores on the PAT #3 all increased from the mean raw scores on the PAT #1 (shown in Table 2). The largest increase occurred for the Isolation-Medial Position Subtest on which the students on an average improved by 6 points (2.17 to 8.27). However, the correlation for the Isolation-Medial Position Subtest with word reading on the SORT-R #3 was only r = .36; thus, the students' learning to isolate medial phonemes of words only weakly predicted their ability to read words. Table 4 shows that the students scored highest on the Rhyming, Isolation-Initial Position, and Isolation-Medial Position Subtests. The SORT-R #3 score also improved over the SORT-R #1 and #2.

Table 4

Mean Raw Scores, Standard Deviations, Range of Raw Scores, and Possible Scores for the PAT #3 auditory subtests and overall auditory composite and the SORT-R #3.

Tests	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT3	SORT3
Mean	9.02	4.22	9.25	6.04	8.27	5.93	7.14	49.90	56.50
SD	1.73	2.55	1.50	2.52	2.16	2.41	2.61	11.16	28.85
Range	3-10	0-10	1-10	0-10	0-10	0-10	0-10	16-69	7-139
Possible Score	10	10	10	10	10	10	10	70	200

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT3 = Total PAT #3 (overall score); SORT3 = SORT-R #3

The majority of the students scored in the top quartile on the Rhyming (77%), Isolation-Initial Position (94%), and Isolation-Medial Position (77%) Subtests of the PAT #3 while scoring in the lowest quartiles on the SORT-R #3. Thus, while most of these students could rhyme and isolate the initial and medial phonemes of words well, they could not read words as well.

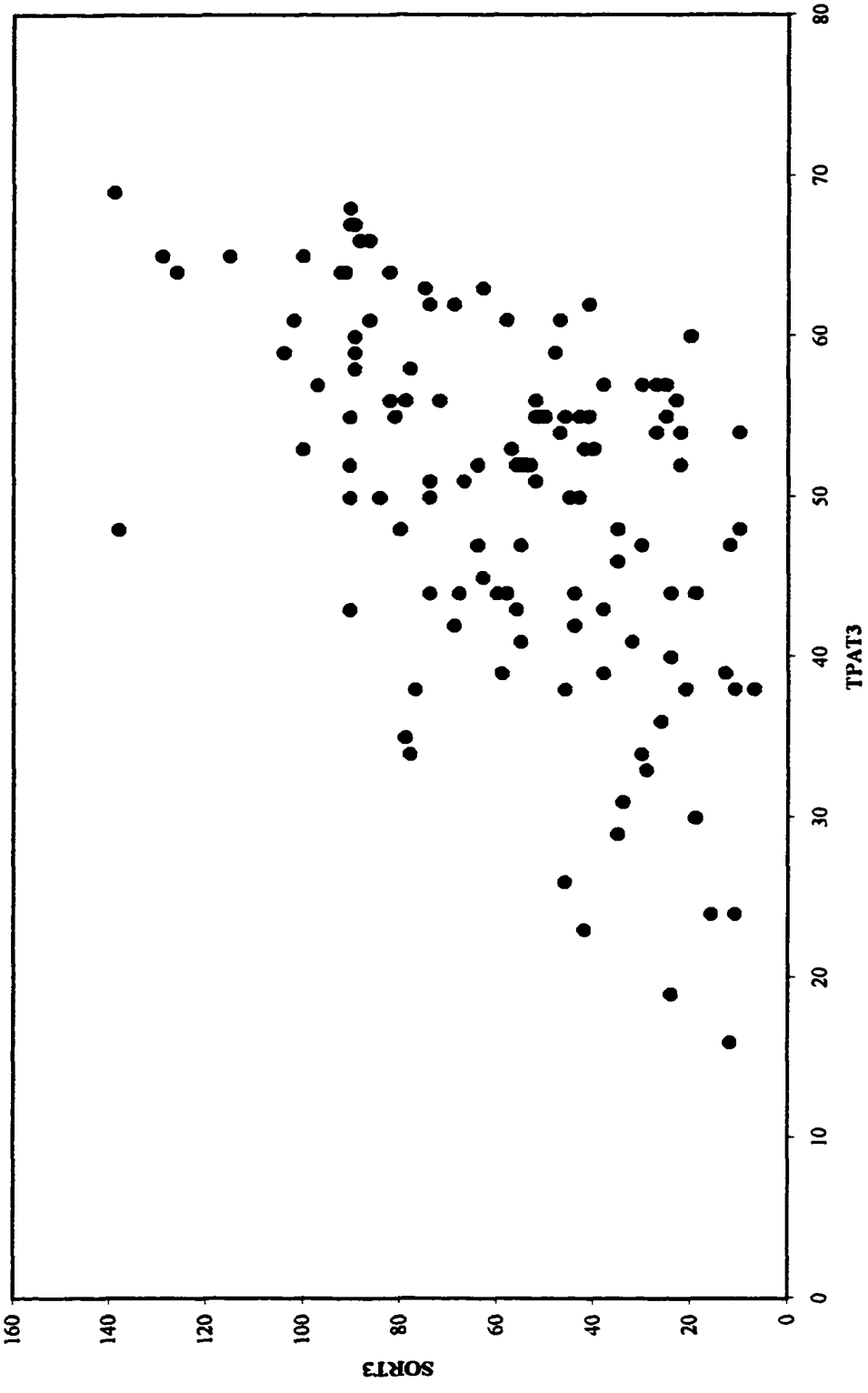
Fifty-two percent of the students scored in the second and third quartiles on both the Segmentation Subtest of the PAT #3 and the SORT-R #3. Thus, their ability to segment words into phonemes corresponded with their ability to read. .

Forty percent of the scores for the Isolation-Final Position and Deletion Subtests and the SORT-R #3 were within the second and third quartiles. These results indicate that the students' skill in isolating final phonemes and deleting phonemes of words also corresponded with their skill in reading words.

Eighty-three percent of the scores were in the top 2 quartiles for the Blending Subtest, but 50% of these scores were in the bottom 2 quartiles for word reading on the SORT-R #3. This finding indicates that learning how to auditorily blend phonemes well does not necessarily predict how well the students will be able to read words.

A somewhat linear relationship is seen in the scatter plot for the PAT #3 auditory composite and the SORT-R #3 (see Scatterplot in Figure 4). Sixty-two percent of the scores on both measures are clustered together in the second and third quartiles. Thus, the students' acquisition of a composite of phonological awareness skills was moderately correlated with their acquisition of reading skills.

Figure 4
Slosson Oral Reading Test-Revised #3 (SORT3)
with Auditory Composite of Phonological Awareness Test #3 (TPAT3)



Question 3: The Relationship Between the PAT #1 and PAT #3 with the Scott Foresman Reading Comprehension Subtest

To determine whether having good phonological awareness skills predicts students' ability to comprehend what they are reading, the Pearson product-moment coefficient was used to correlate the auditory subtests and auditory composite of the PAT #1 and #3 with the comprehension subtest of the grade 2 Scott Foresman Placement Test (given at the beginning of second grade).

PAT #1 correlated with the Scott Foresman Reading Comprehension Subtest. Table 5 shows how the auditory subtests and the auditory composite of the PAT #1 correlated with the Scott Foresman Comprehension Subtest. The auditory composite of the PAT #1 (before reading instruction) was the best predictor, although moderate, of reading comprehension (r = .54). This finding indicates that having a composite of phonological awareness skills prior to instruction moderately predicts reading comprehension skills at the beginning of second grade. Table 5 shows that correlations for the isolated subtests ranged from a low of r = .20 (Rhyming) to a high of r = .53 (Isolation-Medial Position).

Table 5

Pearson product moment correlations of PAT #1 with Scott Foresman Comprehension Subtest (n=121)

PAT #1	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
COMP	.20*	.36**	.35**	.47**	.53**	.45**	.42**	.54**

*$p < .05$ **$p < .001$

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (overall score); COMP = Scott Foresman Comprehension Subtest for Grade 2.

A look at the mean raw scores, standard deviations, range of the students' raw scores, and the total possible scores for the PAT #1 auditory subtests and auditory

composite, as well as the grade 2 Scott Foresman Reading Comprehension Subtest gives further insight into the students' performance. Table 6 provides this information.

Table 6

Mean Raw Scores, Standard Deviations, Range of the Students' Raw Scores, and Possible Scores for the PAT #1 auditory subtests and auditory composite and the Scott Foresman Grade 2 Reading Comprehension Subtest

Tests	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT1	COMP
Mean	7.81	1.52	7.34	4.78	2.16	3.17	3.12	30.17	14.74
SD	3.20	2.37	3.44	3.66	2.63	2.87	3.12	16.00	5.42
Range	0-10	0-10	1-10	0-10	0-9	0-10	0-10	0-66	2-23
Possible Score	10	10	10	10	10	10	10	70	25

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT1 = Total PAT #1 (overall score); COMP = Scott Foresman Grade 2 Reading Comprehension Subtest

The mean raw score for the grade 2 Scott Foresman Reading Comprehension Subtest was $\bar{X} = 14.80$, with raw scores ranging from 2 to 23. The comprehension subtest score was weakly correlated with all of the PAT #1 subtests except for the Isolation-Medial Position, with which it was moderately correlated. The students achieved the next-to-lowest mean raw score on this subtest, indicating that isolating medial phonemes of words was a difficult skill for them to achieve. In order to perform the Isolation-Medial Position subtest, the students were required to identify the medial phonemes in words. According to Gilbertson and Bramlett (1998), having the ability to perform this task aids the students' achievement of automaticity (automatic decoding of words while reading), which subsequently facilitates reading comprehension. Thus, the students' difficulty in auditorily isolating medial position phonemes in words at the beginning of first grade moderately predicted their ability to comprehend what they were reading at the beginning of second grade.

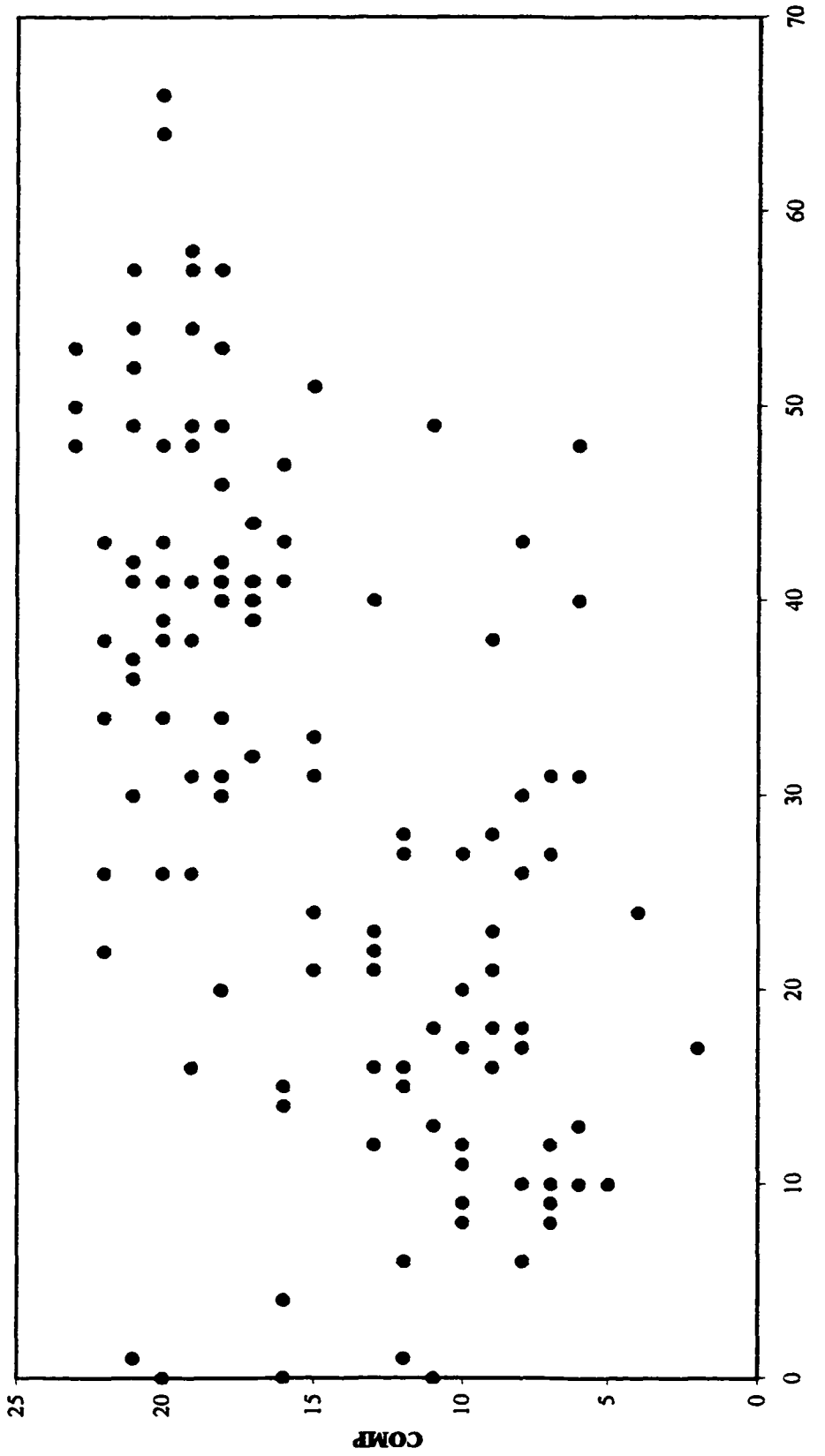
The Rhyming, Segmentation, and Isolation-Initial Position Subtests had the poorest correlations with the reading comprehension subtest (r = .20, .36, .35 respectively). These results indicate that the ability to rhyme, segment phonemes in words, or isolate initial phonemes in words at the beginning of first grade was a poor predictor of reading comprehension at the beginning of second grade. In addition, the Isolation-Final Position, Deletion, and Blending Subtests were also poorly correlated with reading comprehension (r = .47, .45, .42 respectively). These correlations indicate that the ability to isolate final phonemes, delete phonemes, and blend phonemes in words at the beginning of first grade had some, though weak, predictive power in determining ability to comprehend reading passages at the beginning of second grade.

The auditory composite scores on the PAT #1 showed the strongest correlation between phonological awareness skills at the beginning of first grade and reading comprehension skill at the beginning of second grade (r = .54). Although the scatter plot shows a wide scatter of scores, this relationship was more closely aligned than any of the isolated subtest correlations (see Scatterplot in Figure 5). This finding indicates that the use of a composite of phonological awareness tasks in beginning first grade students, rather than just an isolated phonological awareness task, is the best indicator of their reading comprehension ability at the beginning of second grade.

PAT #3 correlated with the Scott Foresman Reading Comprehension Subtest. To address the relationship between the development of phonological awareness skills and reading comprehension after one year of instruction, the auditory subtest raw scores and composite scores of the PAT #3 were correlated with the Scott Foresman Grade 2 Reading Comprehension Subtest. Both of these tests were administered at the beginning

Figure 5

Reading Comprehension Subtest of Scott Foresman Class Placement Test (COMP) with Auditory Composite of Phonological Awareness Test #1 (TPAT1)



of second grade after one year of reading instruction using the Cunningham Approach that incorporated phonological awareness training.

Table 7 shows how the individual auditory subtests and auditory composites of the PAT #3 correlated with the Scott Foresman Grade 2 Reading Comprehension Subtest. The correlations for the auditory subtests range from r = .08 (Isolation –Initial Position) to r = .45 (Deletion Subtest). The auditory composite score of the PAT #3 was also weakly correlated with the Reading Comprehension Subtest (r = .41). These correlations indicate that the development of any isolated phonological awareness skills, as well as a composite of phonological awareness skills, is weakly related to reading comprehension after instruction.

Table 7

Pearson product moment correlations of PAT #3 with Scott Foresman Comprehension Subtest (n=121).

PAT #3	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
COMP	.20*	.37**	.08~	.41**	.21*	.45**	.17~~	.41**

*$p < .05$ **$p < .001$ ~$p = .398$ ~~$p = .068$

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (overall score); COMP = Scott Foresman Comprehension Subtest for Grade 2.

The mean raw scores, standard deviations, range of the students' scores, and total possible scores on these tests are presented in Table 8 and provide additional information. As discussed previously, all mean raw scores on the PAT #3 auditory subtests and composite increased from the mean raw scores on the PAT #1. The biggest increase was for the Isolation-Medial Position Subtest which improved by 6 points ($\bar{X}$ = 2.16 to 8.27). However, this subtest was weakly correlated with the reading comprehension subtest (r = .21), indicating that the students' learning to isolate medial phonemes of words was a weak predictor of their reading comprehension ability. The Deletion Subtest mean raw score only increased by 2.7 points ($\bar{X}$ = 3.22 to 5.92), but this subtest

had the strongest, although still weak, correlation with the reading comprehension subtest (r = .45). The ceiling effect may be evidenced in the Rhyming and Isolation-Initial Subtests, which had mean raw scores greater than 9; these resulted in extremely poor correlations. The composite mean score on the PAT #3 increased 19 points from the PAT #1 ($\bar{X}$ = 30.17 to 49.93). However, the correlation between the PAT #3 auditory composite and reading comprehension was only r = .41, indicating that the students' development of a composite of phonological awareness skills only weakly predicts their reading comprehension after they have received reading instruction (see Scatterplot in Figure 6).

Table 8

Mean Raw Scores, Standard Deviations, Range of Students' Raw Scores, and Total Possible Scores for the PAT #3 auditory subtests and auditory composite and the Scott Foresman Grade 2 Reading Comprehension Subtest (n=121)

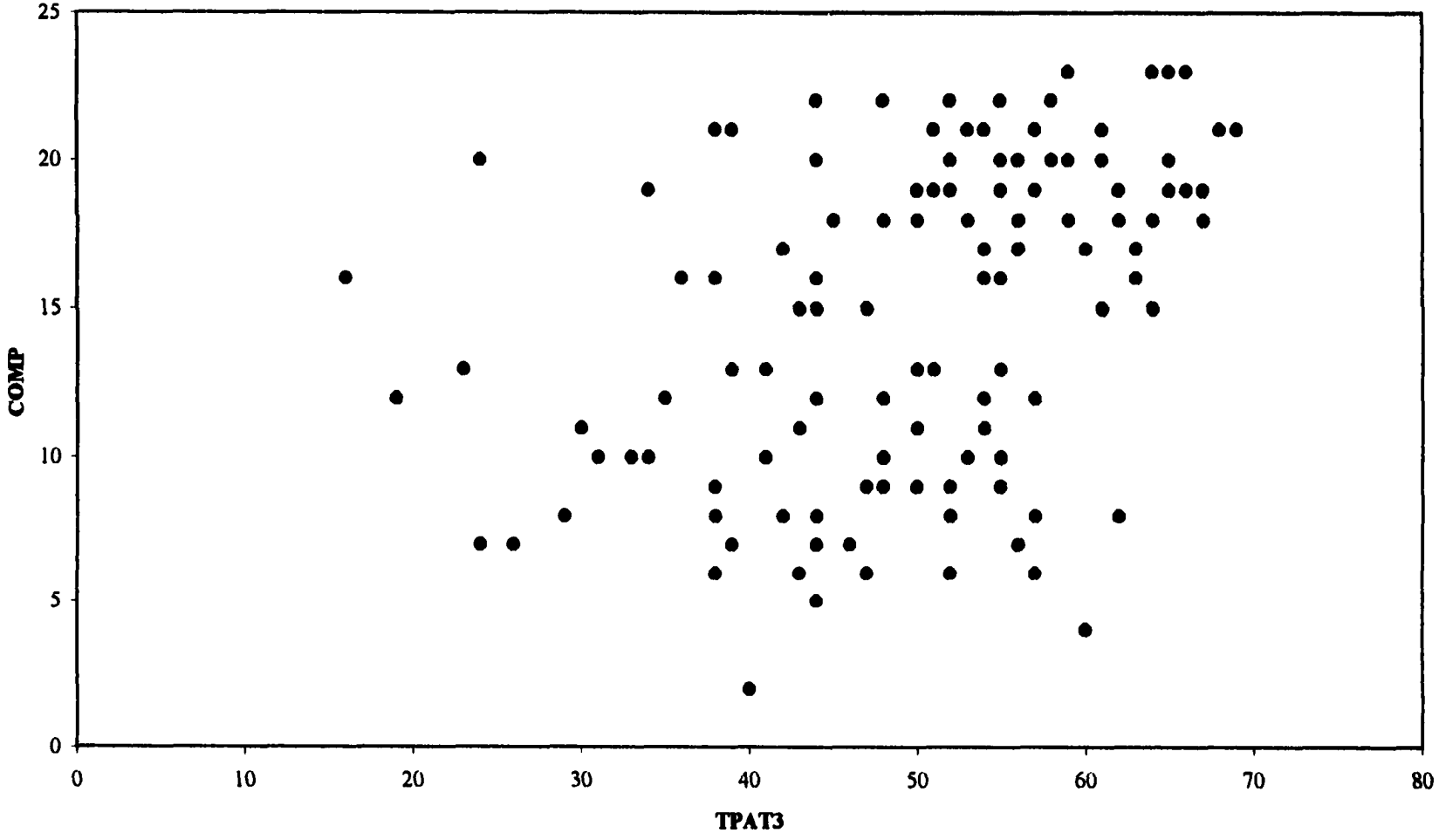
Tests	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT3	COMP
Mean	9.02	4.22	9.25	6.04	8.27	5.93	7.14	49.93	14.80
SD	1.73	2.55	1.50	2.52	2.16	2.41	2.61	11.15	5.44
Range	3-10	0-10	1-10	0-10	0-10	0-10	0-10	16-69	2-23
Possible Score	10	10	10	10	10	10	10	70	25

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT3 = Total PAT #3 (composite score); COMP = Scott Foresman Grade 2 Reading Comprehension Subtest

Question 4: The Relationship Between the Auditory Subtests and Composites of the PAT #1, #2, #3

To explore the relationship between the auditory subtests and auditory composites of the PAT #1 and PAT #2, given prior to instruction, and the corresponding auditory subtests and auditory composites of the PAT #3, given after one year of reading instruction, the Pearson product-moment coefficient was employed.

Figure 6
Reading Comprehension Subtest of Scott Foresman Class Placement Test (COMP) with Auditory Composite of Phonological Awareness Test #3 (TPAT3)



A perusal of Table 9 shows that all of the auditory subtests of the PAT #1 were strongly correlated with the PAT #2. These findings suggest that the PAT is a relatively reliable test instrument.

Table 9

Pearson product moment correlations for PAT #1 with PAT #2 Subtests (n=121)

PAT #1	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
PAT #2	.89*	.82*	.81*	.87*	.86*	.85*	.83*	.93*

Pearson product moment correlations for PAT #1 with PAT #3 Subtests (n=121)

PAT #1	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
PAT #3	.86*	.47*	.28**	.47*	.30**	.40*	.45*	.72*

Pearson product moment correlations for PAT #2 with PAT #3 Subtests (n=121)

PAT #2	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blend	TPAT
PAT #3	.93*	.52*	.37*	.52*	.31**	.41*	.50*	.76*

*$p = .0001$ **$p < .002$

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (overall score)

Table 9 also shows that the correlations for the PAT #1 auditory subtests and the PAT #3 auditory subtests ranged from r = .28 (Isolation-Initial Position) to r = .86 (Rhyming) while the correlations for the PAT #2 subtests and the PAT #3 subtests ranged from r = .31 (Isolation-Medial Position) to r = .93 (Rhyming), Thus, the relationship between the auditory composites of the PAT #1 and the PAT #3, as well as the PAT #2 and the PAT #3, was moderately strong. The correlations between the auditory subtests for the PAT #1 and #3, as well as for PAT #2 and PAT #3, however, ranged from strong (Rhyming) to poor (Isolation-Initial).

An analysis of the mean scores and standard deviations of the PAT #1, #2, and #3 auditory subtests and composites shows an improvement in all scores with each test administration (see Table 10). The largest improvements are noted on the Isolation-Medial Position Subtests #2 and #3, where scores improved from a mean of $\overline{X} = 2.56$

(#2) to $\bar{X}$ = 8.27 (#3), and the Blending Subtests #2 and #3, where the means improved from $\bar{X}$ = 3.89 (#2) to $\bar{X}$ = 7.14 (#3). This indicates that during the first grade year, the students learned how to identify and isolate medial phonemes of words, as well as how to blend the isolated phonemes together to become words.

This table also shows the improvement in a composite of phonological awareness skills (TPAT). The composite mean score shows a large increase from the PAT #2 administration ($\bar{X}$ = 33.18) to the PAT #3 administration ($\bar{X}$ = 49.90). Thus, the students improved in their overall phonological awareness ability; i.e. to rhyme and to segment, isolate, delete, and blend phonemes during first grade.

Table 10

Means and Standard Deviations of Isolated Subtest and Composite Scores on the PAT #1, #2,and #3

PAT Tests	Rhy	Seg	Iso-I	Iso-F	Iso-M	Del	Blen	TPAT
#1 Mean	7.81	1.52	7.35	4.78	2.16	3.22	3.13	30.24
SD	3.20	2.37	3.43	3.66	2.63	2.91	3.11	15.96
#2 Mean	8.25	1.62	7.75	5.49	2.56	3.66	3.89	33.18
SD	2.93	2.07	3.61	3.70	2.94	2.99	3.32	15.98
#3 Mean	9.02	4.22	9.25	6.04	8.27	5.93	7.14	49.91
SD	1.73	2.55	1.50	2.52	2.16	2.41	2.61	11.16

Tests: Rhy = Rhyming; Seg = Segmentation; Iso-I = Isolation-Initial Position; Iso-F = Isolation-Final Position; Iso-M = Isolation-Medial Position; Del = Deletion; Blend = Blending; TPAT = Total PAT (composite score)

Question 5: Effective Predictors of the SORT-R and the Scott Foresman Reading Comprehension Subtest

This question investigated how well isolated phonological awareness skills predicted word reading and reading comprehension. To determine which PAT subtests were effective predictors of the scores on the SORT-R #1, #2, and #3 test administrations and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest, a

forward-selecting stepwise multiple regression procedure was performed. This procedure entered the most significant predictor at the first step, continuing to add and remove variables until none could improve the fit. The level of significance used was .15.

SORT-R #1 Predictors. The Blending and Isolation-Medial Position Subtests of the PAT #1 were significant predictors of the SORT-R #1 score (see Table 11). As can be seen in Table 11, the students' ability to blend phonemes together to make words was very significant (F = 47.85). The Blending Subtest, which accounted for 29% of the variance, combined with the Isolation-Medial Position Subtest, to predict 34% of the variance for SORT-R #1. These results indicate that the students' ability to isolate medial phonemes and to blend phonemes were the strongest predictors of their being able to read words prior to instruction.

Table 11

Stepwise Regression: SORT-R #1as predicted by PAT #1

Measure	F	*P*	Partial R**2	Adj R-sq
Blending	47.8449	.0001	.2868	.3417
Isolation-Medial	12.0191	.0007	.0659	

SORT-R #2 Predictors. The auditory composite, the Isolation-Medial Position Subtest, and the Deletion Subtest scores of the PAT #2 were significant in predicting the SORT-R #2, together predicting 56% of the variance (Table 12). These results indicate that the students' composite of phonological awareness skills (which was the most significant and accounted for 54% of the variance), combined with their skills in deleting phonemes in words and isolating medial position phonemes to predict their ability to read words after 4 months of instruction.

Table 12

Stepwise Regression: SORT-R #2 as predicted by PAT #1

Measure	F	*P*	Partial R**2	Adj R-sq
TPAT	135.02	.0001	.5379	.56
Isolation-Medial	6.38	.0129	.0243	
Deletion	4.12	.0448	.0153	

SORT-R #3 Predictors. Table 13 shows that the Isolation-Medial and Final Positions Subtests and the Deletion Subtests scores of the PAT #1 were the most effective predictors of the SORT-R #3 score, predicting 45% of the variance. The ability to isolate medial phonemes was the most significant and predicted 39% of the variance. These results indicate that the ability to isolate medial and final phonemes and to delete phonemes prior to reading instruction predicts word reading after a year of reading instruction.

Table 13

Stepwise Regression: SORT-R #3 as predicted by PAT #1

Measure	F	*P*	Partial R**2	Adj R-sq
Isolation-Medial	72.87	.0001	.3858	.45
Deletion	8.94	.0034	.0443	
Isolation-Final	6.54	.0119	.0309	

The Deletion, Segmentation and Isolation-Final Position Subtest scores of the PAT #3 were effective predictors of the SORT-R #3 score, together predicting 34% of the variance, as shown in Table 14. These results indicate that the students' development of the ability to segment and delete phonemes, as well as to isolate final phonemes of words, predicted their ability to read words after one year of instruction.

Table 14

Stepwise Regression: SORT-R #3 as predicted by PAT #3

Measure	F	*P*	Partial R**2	Adj R-sq
Deletion	4.09	.0454	.0233	.34
Isolation-Final	2.58	.1108	.0145	
Segmentation	3.501	.0638	.0194	

Scott Foresman Reading Comprehension Predictors. The auditory composite and the Isolation-Medial Position Subtest scores of the PAT #1 were significant predictors of the Scott Foresman Reading Comprehension Subtest score as shown in Table 15. The adjusted R-square indicated that these two variables together predicted 31% of the variance of the comprehension subtest, with the auditory composite (TPAT) predicting 29% of the variance. These results indicate that the students' composite of phonological awareness skills, along with their ability to isolate medial phonemes of words, prior to instruction were the most predictive of reading comprehension after one year of reading instruction.

Table 15

Stepwise Regression: Scott Foresman Reading Comprehension as predicted by PAT #1

Measure	F	*P*	Partial R**2	Adj R-sq
TPAT	47.8398	.0001	.2867	.3084
Isolation-Medial	5.7566	.0180	.0332	

The PAT #3 Deletion, Isolation-Final Position, Segmentation, and Blending subtests were the most significant predictors of the Scott Foresman Reading Comprehension Subtest (Table 16). Together, these variables predicted 25% of the variance. These results indicate that the students' acquisition of the ability to delete, segment, and blend phonemes in words, as well as to isolate the final phonemes in words, helped to predict their ability to comprehend what they were reading. The ability to delete phonemes of words appears to be the strongest predictor of reading comprehension after instruction in phonological awareness and reading.

Table 16

Stepwise Regression: Scott Foresman Reading Comprehension Subtest as predicted by PAT #3

Measure	F	*P*	Partial R**2	Adj R-sq
Deletion	30.17	.0001	.2022	.2514
Isolation-Final	5.23	.0240	.0339	
Segmentation	2.21	.1397	.0142	
Blending	4.17	.0433	.0260	

Summary. The effective predictors of word reading and reading comprehension varied according to the three time periods targeted in this study. These time periods were at the beginning of first grade (prior to instruction), four months later (during instruction), and at the beginning of second grade (after instruction).

The phonological awareness tasks that best predicted word reading varied depending upon the time of administration. The students' skills in auditory isolation of medial phonemes and blending of phonemes on the PAT #1 were the best predictors of their word reading on the SORT-R #1 prior to instruction. The students' composite of phonological awareness skills, combined with their skills in deleting phonemes and isolating medial phonemes of words, were the best predictors of their word reading scores on the SORT-R #2 during instruction. Their skills in isolation of medial and final phonemes and deletion of phonemes on the PAT #1 prior to instruction predicted their word reading on the SORT #3 after instruction. Their skills in deletion, segmentation, blending, and isolation of final phonemes, which developed during instruction with the Cunningham Model as measured by the PAT #3, were predictive of word reading after one year of instruction as measured by the SORT-R #3.

The phonological awareness tasks that predicted reading comprehension also varied depending upon the time of administration. The auditory composite and isolation-medial position subtest scores of the PAT #1 given prior to instruction were also

significantly predictive of reading comprehension after 1 year of instruction as measured by the Scott Foresman Reading Comprehension Subtest. Moreover, the skills of segmentation, deletion, blending, and isolating final phonemes, which developed during instruction in the Cunningham Model as measured by the PAT #3, were predictive of reading comprehension after 1 year of instruction on the Scott Foresman.

In conclusion, the auditory composite of phonological awareness skills, and specifically the ability to auditorily manipulate phonemes of words, apparently developed during instruction with the Cunningham Model; these skills as measured by the PAT #3 became significant predictors of the students' word reading after instruction as measured by the SORT-R #3. Thus, this regression analysis indicates that a composite of phonological awareness skills, which facilitates the ability to manipulate phonemes, predicts word reading and reading comprehension.

Discussion

The purpose of this study was to determine whether phonological awareness skills predict reading acquisition and reading comprehension through the use of standardized, norm-referenced measures that employed the auditory modality exclusively. With this in mind, five questions were raised. The results of this study are discussed as those questions are answered.

Question #1

Did the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the PAT (Test 1) correlate positively with the scores on the word reading task of the SORT-R prior to (#1), during (#2), and after (#3) reading instruction?

The results of the Pearson product-moment correlation procedure indicated that prior to reading instruction, phonological awareness is not a strong predictor of word reading skill. The auditory skills of rhyming, segmenting phonemes, isolating initial and final phonemes, and deleting phonemes in words were only weakly related to the students' abilities to read words, while the skills of isolating medial phonemes and blending phonemes were moderately correlated. Thus, the skills of isolating medial phonemes in words and blending phonemes together to make words appear to be moderate predictors of students' ability to read words on the SORT-R prior to reading instruction. These results support the Gilbertson and Bramlett (1998) study which showed that phonemic isolation/categorization and blending were moderate predictors (r = .55, .58 respectively). Even though the composite auditory score of the PAT #1 was a moderate predictor of word reading on the SORT-R #1 (r =.53), approximately 75 % of the students who had a good composite of phonological awareness skills prior to reading instruction had difficulty reading without formal instruction, which would be expected. There were no studies in the literature that reported the results of a composite of phonological awareness skills at the beginning of first grade.

The relationship between phonological awareness and word reading strengthened after four months of instruction. The strongest correlation between reading and an isolated phonological awareness skill during instruction was the students' ability to isolate medial phonemes in words (r = .67). However, the students' composite of phonological awareness skills prior to reading instruction was a better predictor of their word reading after four months of instruction than any isolated phonological awareness skill (r = .73). This finding is supported in the literature by Hoien et al. (1995) who

found that having the ability to perform a variety of phonological awareness skills (phoneme segmentation, isolation, and blending) was a better indicator of word reading in first grade than any isolated phonological awareness skill.

The relationship between phonological awareness and word reading appears to become stable after one year of instruction. Although the students' ability to isolate medial and final phonemes, delete phonemes, and blend phonemes before instruction was weakly related to their ability to read words at the beginning of first grade, these skills were moderately correlated with the students' ability to read words at the beginning of second grade (r = .61, .58,.54, .53 respectively). Thus, the students' ability to manipulate the phonemic components of words facilitated their ability to read words after instruction. Rohl and Pratt (1995) also found that the skills of isolating and deleting phonemes were moderately correlated with word reading in second grade students. In contrast, Torgesen et al. (1994) found that there was a strong correlation between phoneme blending and word reading in second grade students. In the present study, however, the students' ability to perform a composite of phonological awareness skills prior to instruction was the strongest predictor of their ability to read words after one year of instruction (r = .63). There is no study in the literature that has a similar comparison.

Question 2

Did the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the PAT #3 (given at the beginning of second grade) correlate positively with the word reading task of the SORT-R #3 (given at the beginning of second grade) after one year of reading instruction?

Question 2 addressed the relationship between the development of phonological awareness skills and reading skills after instruction. The results of the PAT #3 and SORT-R #3 after one year of instruction (at the beginning of second grade) indicate significant decreases in the correlations between the isolation of initial ($r = .19$) and medial ($r = .36$) phonemes in words and blending phonemes ($r = .34$) with word reading. The ceiling effect may explain the poor correlations between the Rhyming and Isolation-Initial Position Subtests with reading; the mean raw scores on these subtests were > 9, with the maximum possible score being 10. Thus, the students "maxed out" on these skills, but did not improve proportionately in their reading.

In addition, the correlation, although still moderate, between the auditory composite score and word reading decreased ($r = .55$). This decrease indicates that phonological awareness skills were not strong predictors of reading skills by second grade; i.e. after instruction in reading with the Cunningham Model that was integrated with training in phonological awareness skills, the students had learned to read and were not as dependent upon the phonological awareness skills as they were during instruction. There were no studies in the literature that compared the composite of phonological awareness skills with reading at the beginning of second grade. The only comparable study was conducted by Leather and Henry who found that their students' composite of phonological awareness skills (i.e. phonemic deletion, segmentation, blending) measured during second grade had a significant relationship (predicting 57% of the variance) with their ability to read words during second grade.

In summary, the results indicate a moderate relationship between a composite of phonological awareness skills and word reading by grade 2. The relationship begins

tenuously as a weak to moderate correlation prior to instruction, then grows to a stronger relationship during instruction, and finally levels off to a moderate correlation after 1 year of instruction.

Question #3

Did the scores on the rhyming, segmentation, isolation, deletion, and blending subtests of the PAT #1 versus the PAT #3 correlate positively with the reading comprehension subtest of the grade 2 Scott Foresman Class Placement Test after reading instruction?

The PAT #1 auditory composite (given at the beginning of first grade) correlated moderately (r = .54) with the reading comprehension subtest of the grade 2 Scott Foresman Class Placement Test (given at the beginning of second grade). This correlation indicates that having a composite of phonological awareness skills prior to reading instruction moderately predicts reading comprehension skill after a year of reading instruction.

The PAT #3 auditory composite (given at the beginning of second grade) and the reading comprehension subtest of the grade 2 Scott Foresman Class Placement Test (given at the beginning of second grade) correlated weakly (r = .41). This correlation indicates that having a composite of phonological awareness skills after a year of phonological awareness training is not a strong predictor of reading comprehension after a year of reading instruction.

It is noteworthy that the most difficult subtests of the PAT (as determined by the number correct) were the most highly correlated with the comprehension subtest: these were the Isolation-Medial Position Subtest of the PAT #1 (r = .53) and the Deletion

Subtest of the PAT #3 (r = .45). According to the literature, these skills require a high degree of phonemic awareness, which is necessary to achieve automaticity in decoding words so that reading comprehension can occur. In support of these results, the studies by Leather and Henry (1994) and Gilbertson and Bramlett (1998) indicated poor to moderate correlations between phoneme isolation and deletion with reading comprehension.

In summary, the positive correlations between the auditory composite scores on the PAT #1 and #2 and the scores on the Scott Foresman Reading Comprehension Subtest indicate a positive relationship between phonological awareness and reading comprehension following reading instruction which incorporates phonological awareness training. This finding is supported by the Lie, 1991 study which reported that phonemic awareness training had a facilitating effect on reading, enabling the students to attain automaticity by the end of Grade 2. The current findings suggest that phonological awareness skills possibly develop concurrently with reading skill as both skills are being taught in an integrated instructional format. However, after the students develop automaticity in reading (automatic decoding of words), they are able to focus on the content of the reading passage and to comprehend what they are reading, instead of trying to decode each word that they are reading. Thus, after developing automaticity in reading, phonological awareness does not appear to play an essential role, but is still employed when the reader must decode unfamiliar words.

Question #4

What was the relationship between the scores on the PAT subtests (Test 1 and Test 2) administered prior to reading instruction with the scores on the PAT subtests (Test 3) administered after reading instruction?

The composite scores on the PAT #1 and PAT #2 (which had good test-retest reliability) given at the beginning of first grade, correlate moderately strong with the composite scores on the PAT #3 ($r > .72$), given at the beginning of second grade. This strong relationship indicates that the use of a composite of standardized, norm-referenced auditory measures to determine phonological awareness skill is consistent. Thus, the administration of a composite of standardized phonological measures has validity and reliability.

Individual subtest correlations varied according to how difficult the phonological awareness task was and how well the students learned each phonological awareness skill. For example, the students' mean raw score for rhyming was high for all three administrations of the PAT, which resulted in strong correlations between the PAT #1, #2, and #3 Rhyming Subtests. Rhyming, as noted by Stanovich et al. (1984), Hoien et al. (1995), Naslund and Schneider (1996), and Johnson et al. (1996), is an early developing phonological awareness skill that develops prior to school; thus, most of the students in this study knew how to rhyme at the beginning of first grade as indicated by their high scores, so their scores on this subtest did not improve significantly from PAT #1 to PAT #3. However, all of the other subtest scores showed improvement from PAT #1 to PAT #3. These increases resulted in poor correlations between the PAT #1 and PAT #3 subtests. These subtests, which assessed the phonemic level of phonological awareness,

were the most difficult for the students prior to instruction as indicated by their scores on the PAT #1. However, after training in these phonemic awareness skills using the Cunningham Model of Reading Instruction, the students performed much better on the tasks, as indicated by their improved scores on the PAT #3. Since the phonological awareness training that is integrated into reading instruction using the Cunningham Model teaches the students to segment, isolate, delete, and blend phonemes in words, as well as to reinforce their rhyming skills, it appears logical that the students would improve their scores on the PAT #3. (PAT #1 and #2 were more strongly correlated because they were given one week apart prior to instruction in the Cunningham Model. Thus, the scores achieved on PAT #1 were similar to those scores achieved on PAT #2.)

In summary, it is important to note that, although there was a wide range of correlations among the isolated subtest scores, the correlations between the composite scores were high for PAT #1, #2, and #3 ($r > .72$). This finding suggests that the strong correlation of the rhyming subtests influenced the composite correlation. Perhaps, if the rhyming subtest were deleted from the composite, the correlation would be poorer. However, the strong correlation between the auditory composite scores for PAT #1, #2, and #3 might indicate the importance of testing a composite of phonological awareness skills to get a true picture of a student's phonological awareness ability. Moreover, the need for a composite of standardized auditory tasks to measure phonological awareness skills, rather than any isolated subtest which consists of a specific phonological awareness task, is supported by recommendations from other researchers (Hoien, et al.1995; Leather and Henry, 1994).

Question #5

Which PAT subtests are effective predictors of the scores on the SORT-R #1, #2, and #3 test administrations and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest?

The best predictor of word reading on the SORT-R #1 (prior to instruction) was the Blending Subtest, which alone predicted 29% of the variance. When combined with the Isolation-Medial Position Subtest, these two tasks were the best predictors of reading prior to instruction. Therefore, those students who could auditorily blend phonemes together to make words and isolate medial phonemes of words were predicted to be better able to read before they had instruction.

The composite of phonological awareness skills was the strongest predictor of word reading for the SORT-R #2 (during instruction). This composite of skills, combined with the students' ability to delete phonemes and isolate medial phonemes of words, best predicted their ability to read words after 4 months of instruction. This supports the integration of phonemic awareness training that encompasses the Cunningham Model.

The best predictors of the SORT-R #3 (after instruction) were the Isolation-Medial and Final Positions Subtests and the Deletion Subtest scores of the PAT #1 (prior to instruction). This indicates that the students' ability to isolate medial and final phonemes and to delete phonemes in words prior to instruction predicted their ability to read words after instruction. Rohl and Pratt (1995) also found that phoneme deletion and isolation skills in first graders were moderate predictors of reading at the end of second grade (although the current study measures skills at the beginning of second grade).

The Deletion, Isolation-Final Position, and Segmentation Subtests of the PAT #3 were the best predictors of the SORT-R #3. The Deletion Subtest was the strongest predictor. These findings indicate that the students' learning how to delete phonemes in words, as well as how to segment phonemes and isolate final phonemes of words, during the Making Words portion of the Cunningham Model of Reading Instruction, predicted their ability to read words at the beginning of second grade.

The composite of phonological awareness skills that the students had at the beginning of first grade most strongly predicted the reading comprehension of the students at the beginning of second grade. This composite, combined with the ability to isolate medial phonemes of words at the beginning of first grade, best predicted the students' reading comprehension at the beginning of second grade. These findings are supported in the literature because the ability to isolate medial phonemes is tied to automaticity – the ability to decode automatically and to comprehend what one is reading without having to "sound out" each letter in the words (Rohl & Pratt, 1995). The only study in the literature using a stepwise procedure was by Gilbertson and Bramlett (1998) who studied students from kindergarten to grade 1; they found that phoneme isolation and blending skills of students in kindergarten were the strongest predictors of reading comprehension of students in first grade.

After a year of phonological awareness training with the Cunningham Model, the best predictors of reading comprehension on the second grade Scott Foresman Reading Comprehension Subtest were the deletion, isolation-final position, segmentation, and blending tasks of the PAT. The deletion task, the strongest predictor of the four tasks, is noted in the literature as one of the most sensitive to reading comprehension in grade 2

(Leather & Henry, 1994). Therefore, the students' training in learning how to delete, segment, and blend phonemes, as well as to isolate final phonemes, through the Cunningham Model of Reading Instruction, helped to predict their reading comprehension by the beginning of second grade.

The wide range of correlations between phonological awareness skills and reading cited in the literature differs from the consistently poor to moderate correlations found in this study. However, there is a wide range of correlations between the scores on the three administrations of all of the PAT subtests except the Rhyming Subtest, which has a consistently high correlation. Although phoneme segmentation was identified in the literature as the best predictor of word reading, two tasks identified in this study - Phoneme Deletion and Phoneme Isolation - were also described as significant predictors of word reading and/or reading comprehension in seven of fifteen studies reviewed in the literature. These two tasks require a high degree of phonological awareness to be able to manipulate the phonemic segments of words. This ability to manipulate phonemes of words (which is trained in the Cunningham Model of Reading Instruction) may enable a student to achieve automaticity in decoding words, which is necessary for reading comprehension.

In summary, this study suggests that training in the Cunningham Model may facilitate the development of phonological awareness. In addition, it suggests that phonological awareness skills may develop along with reading skill in a complementary relationship and are best assessed as a composite of phonological awareness tasks, rather than as one or two isolated tasks. This idea is supported in the literature review, which described a wide range of correlations of isolated phonemic predictors from study to

study. Thus, even though phoneme deletion and phoneme isolation were identified as the best predictors of word reading and comprehension in this study, their attainment may be dependent upon the acquisition of a composite of phonological awareness skills. Rather than attempting to determine which isolated phonemic skills are statistically effective predictors of reading, perhaps it is more important to determine if these skills have a meaningful relationship to the development of reading. In so doing, the efficacy of the integration of these skills into reading instruction could be investigated.

CHAPTER V

Summary and Conclusions

Summary

Research has shown the importance of having phonological awareness skills in learning to read. Studies have found that phonological awareness skills predict reading acquisition in first and second grade students (Leather & Henry, 1994; Rohl & Pratt, 1995; Swank & Catts, 1994; Troia et al., 1996; Zifcak, 1981). Other studies have found that training in phonological awareness facilitates reading acquisition in first and second grade students (Lie, 1991; Uhry & Shepherd, 1993). However, there is inconsistency in how the phonological awareness skills were assessed and trained in these studies.

The studies that investigated phonological awareness skill as a predictor of reading acquisition have used a variety of modalities, formats, and tasks to assess this skill. In addition to the auditory modality, researchers often used visual and kinesthetic stimuli. Since phonological awareness is defined as an awareness of the auditory components of oral language, it appears that only the auditory modality should be used to assess it. The format of assessment has also varied from study to study. A standardized, norm-referenced measure was used exclusively in one study to assess phonological awareness skill. However, in that study, the researcher (Scarborough, 1998) only investigated one isolated phonological awareness skill. Although researchers have found that some isolated phonological awareness skills are good predictors of reading words

(decoding skill), most have indicated that a composite of phonological awareness tasks is a better predictor of reading comprehension. However, only two studies reported how a composite score for phonological awareness skill correlated with reading. Thus, there were no phonological awareness predictor studies that employed all three of these factors in assessment: (1) auditory only modality, (2) norm-referenced, standardized tasks, and (3) a composite score.

Although researchers have suggested the value of training in phonological awareness that is integrated into the format of reading instruction, they have not investigated the integration of phonological awareness training into reading instruction. The studies that have been conducted examined phonological awareness training that was done either prior to reading instruction or in a separate format isolated from concurrent reading instruction. Moreover, the auditory modality was not used exclusively to assess the results of phonological awareness training. In addition only two of these studies employed standardized measures for assessment of two isolated phonological awareness skills. Thus, there were no studies that investigated the use of the following three factors simultaneously: (1) phonological awareness training that was integrated into reading instruction, (2) phonological awareness assessment that was auditory only, and (3) phonological awareness assessment that was standardized and norm-referenced.

The purpose of this study, therefore, was to investigate phonological awareness skill as a predictor of reading acquisition, using the criteria explained above, to verify the findings of the previous studies. Thus, auditory-only, norm-referenced, standardized phonological awareness tasks were used to predict word reading on a norm-referenced, standardized reading test prior to, during, and after phonological awareness training

which was integrated into reading instruction. The same phonological awareness tasks were also used to predict reading comprehension on a norm-referenced, standardized reading test after a year of reading instruction.

The results of this study showed that the use of auditory-only, norm-referenced, standardized measures to predict word reading and reading comprehension supported the results found in other research studies. Phonological awareness skills prior to instruction were weakly to moderately correlated with word reading prior to instruction. This finding agrees with the findings of the Gilbertson and Bramlett (1998) study in which auditory-only tasks were used that were neither standardized nor norm-referenced. The auditory phonological awareness composite score and, specifically, the subtest scores which measured isolation of medial phonemes and blending phonemes on the PAT #1 were moderate predictors of a student's ability to read words on the SORT-R #1 before reading instruction. The use of a composite of auditory phonological awareness tasks is unsupported in the literature because there were no studies that reported a composite score for phonological awareness skills at the beginning of first grade.

The strongest correlations between phonological awareness skills prior to instruction occurred with word reading skills during and after instruction. The auditory composite score on the PAT #1 was a better predictor of word reading on the SORT-R #2 and the SORT-R #3 than any of the isolated phonological awareness subtests of the PAT #1. Hoien et al.(1995) also found that a composite score predicted word reading during first grade, but there was no study in the literature having a similar comparison to word reading after first grade.

After instruction, the auditory phonological awareness composite on the PAT #3 was a better predictor of word reading on the SORT-R #3 than any isolated phonological awareness skill. The ceiling effect was noted on two of the PAT #3 subtests; both of these had poor correlations with word reading. Although the correlation between the auditory composite and word reading decreased, it was still moderate. This finding supports the results of the study by Leather and Henry (1994) who found that a composite of auditory phonological awareness skills was a better predictor of word reading during second grade than isolated phonological awareness skills.

The students' phonological awareness skills prior to reading instruction, rather than their phonological awareness skills after instruction, correlated more strongly with their reading comprehension after instruction. The auditory composite score and the Isolation-Medial Position Subtest score of the PAT #1 given prior to instruction were both moderate predictors of the reading comprehension subtest of the second grade Scott Foresman Placement Test given after instruction. However, both the auditory composite score and the isolated subtest scores of the PAT #3 given after instruction correlated weakly with the reading comprehension subtest of the second grade Scott Foresman Placement Test given after instruction. These results are supported by Leather and Henry (1994) and Gilbertson and Bramlett (1998).

This study also investigated the development of phonological awareness skills from the beginning of first grade to the beginning of second grade. Although there was a wide range of correlations among the isolated subtest scores, the strong correlations between the composite scores of the PAT #1, #2, and #3 show the consistency in testing a composite of phonological awareness skills to determine the student's development of

phonological awareness skills. This finding is supported by Hoien, et al. (1995) and Leather and Henry (1994).

PAT subtests that were effective predictors of word reading on the SORT-R and reading comprehension on the grade 2 Scott Foresman Class Placement Test were identified. Although these subtests were identified as being statistically effective predictors, their meaningfulness to instruction is an important consideration. Prior to instruction, the best predictor of word reading on the SORT-R #1 was the Blending Subtest of the PAT #1, while the best predictor of word reading on the SORT-R #2 during instruction was the auditory composite of the PAT #1. The most effective predictors of word reading on the SORT-R #3 given after instruction were the Isolation-Medial and Final Positions Subtests and the Deletion Subtest of the PAT #1. The Deletion Subtest of the PAT #3 was also the strongest predictor of word reading on the SORT-R #3. The composite of phonological awareness skills on the PAT #1 and the Deletion Subtest of the PAT #3 most effectively predicted reading comprehension on the second grade Scott Foresman Class Placement Test after a year of instruction. These findings are supported by Rohl and Pratt (1995) and Leather and Henry (1994).

Conclusions

This study found a positive correlation between the scores on the auditory subtests of the PAT, the SORT-R, and the grade 2 Scott Foresman Class Placement Test: Comprehension Subtest. The correlation is strongest during and after instruction, not prior to instruction, which suggests that phonological awareness skills and reading skills were developed during reading instruction using the Cunningham Model which integrated phonological awareness training into the reading instruction.

The use of a composite of standardized auditory measures, as opposed to isolated subtests, to determine phonological awareness skill is suggested by this study. The correlations between the composite scores of the three administrations of the PAT were consistently strong, but there was a wide range of correlations between the isolated subtest scores of the three administrations of the PAT.

The phoneme deletion and isolation tasks were identified as being statistically effective predictors of word reading and reading comprehension after instruction. As supported by the literature review, these tasks required a high degree of phonological awareness skill to be able to manipulate the phonemic segments of words. The ability to manipulate the phonemic segments of words, which is trained through phonological awareness activities that are integrated into the Cunningham Model of Reading Instruction, enables a student to attain automaticity in decoding words. The ability to decode words automatically without having to sound out each phoneme allows the student to comprehend what he is reading.

Limitations

This study has some possible limitations. There was no measure of the development of phonological awareness skills after four months of instruction to compare with the word reading measure. If the PAT had also been administered after four months of reading instruction at the same time as the SORT-R #2, a measure of concurrent development of phonological awareness and word reading could have been ascertained. Secondly, the lapse in instruction during the summer vacation may have influenced the scores. A stronger correlation may have resulted if the students had been tested at the end of first grade, rather than waiting until the beginning of second grade. Thirdly, the

influence of socioeconomic status is apparent when the students' scores on the PAT and SORT-R are compared to nationally norm-referenced scores. Seventy-five percent of the students tested were at or below the poverty level; thus, this may have influenced the range of the students' scores. Fourthly, the ceiling effect on two of the PAT subtests may have influenced their correlations with reading. Finally, the consistency in administration of the Cunningham Model of Reading Instruction could be questioned. Although, the teachers were trained to use the model, there was no control of their actual use of the model.

In conclusion, this study suggests that the use of a norm-referenced, standardized test, which employs auditory stimuli only, to assess a composite of phonological awareness skills is useful in determining its relationship with reading acquisition. The auditory phonological awareness composite score seems to be a better predictor of reading skill, than scores on isolated phonological awareness tasks. Moreover, there appears to be a positive relationship between the development of phonological awareness skills and the acquisition of reading skills when phonological awareness skills training is integrated into reading instruction.

Implications

This study has implications for further research into the concurrent development of phonological awareness and reading acquisition. Although the supposition is made throughout the literature, no one has actually investigated the concurrent development hypothesis. This investigation could possibly be accomplished by doing periodic assessments of phonological awareness and reading acquisition during and immediately following reading instruction in first grade.

This study also suggests that the integration of phonological awareness training into reading instruction, as opposed to isolated training, should be investigated. This investigation would require the comparison of two groups of students, matched according to age and intelligence, who would receive phonological awareness training that is integrated into reading instruction versus phonological awareness training that is isolated from reading instruction. This investigation of phonological awareness training could include the normal population, as well as the at-risk population, of students who are being taught to read. Thus, classroom teachers may need to consider integrating phonological awareness training into reading instruction. Speech-language pathologists and reading specialists may also need to determine if the remediation of oral language and reading skills is facilitated by an integration of phonological awareness skills into instruction. Perhaps deficits in oral language which inhibit reading acquisition in young students can be overcome by phonological awareness training in an integrated format using the visual, auditory, and kinesthetic modalities. In so doing, students in the normal, as well as at-risk, populations will benefit from seeing, hearing, and feeling the components of oral language, which will enable them to get the "whole picture" so that they can successfully learn to read.

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APPENDIX A

CHART OF STUDIES OF PREDICTORS OF PHONOLOGICAL AWARENESS

CHART OF TRAINING IN PHONOLOGICAL AWARENESS

Studies of Predictors of Phonological Awareness (Preschool, Kindergarten, Grades 1 & 2)

* * *

Author/s of Study	Students' Grade Level	Tasks	Auditory	Stan/Nor	Compos	Relationship to reading
Zifcak, 1981	G.1	Pho Seg Pho Del	Y Y	N Y	N	Wd: r = .78 Wd: r = .54
Mann & Liberman, 1984	K – G.1	Syl Seg	Y	N	N	Wd: r = .40
Stanovich et al., 1984	K – G.1	2 Rhy, 5 Dis, 1 Pho Del 2 Pho Sub	Y Y Y Y	N N N N	N	Wd: r = .11, .30 Wd: r = .39 -.60 Wd: r = .42 Wd: r = .09, .52
Badian, 1994	PK – G.1	Syl Seg	Y	N	N	Wd: r = .36; Com: r = .33
Leather & Henry, 1994	G. 2	Pho Del (I) Pho Del (F) Pho Blen Pho Seg	Y Y Y Y	N N N N	Y	Wd: r = .73; Comp: r =.55 Wd: r = .68; Comp: r =.56 Wd: r = .51; Comp: r =.51 Wd: r = .01; Comp: r =.13 Compos: Wd =57% var, Comp = 48% var
Torgesen et al., 1994	K – G.1 – G.2	Pho Seg Pho Blen	Y Y	N N	N	Wd: r = .82 (G.1 & 2) Wd: r = .78 (G.2)
Rohl & Pratt, 1995	G.1 (end) – G.2 (end)	Pho Seg Pho Del Pho Cat	Y Y Y	N N N	N	Wd: r = .60 Wd: r = .70 Wd: r = .55
Johnston et al., 1996	PK	Rhy Pho Seg Pho Del	Y Y Y	N Y Y	N	Let Nam: r = .39 Let Nam: r = .48 Let Nam: r = .43
Naslund & Schneider, 1996	PK– G.2(begin)	Rhy Syl Seg Syl Blend Pho Seg Pho Iso Pho Blen	Y Y Y Y Y Y	N N N N N N	N	Wd: r = -.21; Comp: r = .34 Wd: r = -.01; Comp: r = -.07 Wd: r = -.08; Comp: r = .05 Wd: r = -.11; Comp: r = .32 Wd: r = -.35; Comp: r = .50 Wd: r = -.22; Comp: r = .26
Gilbertson & Bramlett, 1998	K – G.1	Pho Del Pho Cat Pho Blen Pho Seg	Y Y Y Y	N N N N	N	Wd: r = .45; Comp: r =.48 Wd: r = .51; Comp: r =.50 Wd: r = .53; Comp: r =.56 Wd: r = .31; Comp: r =.37
Mann, 1993	K – G.1	Pho Seg/Iso	N	N	N	Wd: r = .58
Swank & Catts, 1994	G.1 (begin) – G.1 (end)	Pho Del Pho Cat Pho Blen Pho Seg	N Y Y Y	N N N N	N	Wd: r = .58 Wd: r = .48 Wd: r = .48 Wd: r = .37
Hoien et al., 1995	PK (lst study) G.1 (2nd study)	Rhy, Syl Seg, Pho Seg, Pho Iso, Pho Blen (group admin)	N	N	Y	Wd w/ Rhy: r = .14 Wd w/ Syl Seg: r = .14 Wd w/ Pho Seg, Iso, Blen (Compos): r =.55 in Grade 1
Troia et al. 1996	G.2 (during)	Pho Seg Pho Blen	N N	N N	N	Wd: r = .79; Comp: r = .75 Wd: r = .64; Comp: r = .57
Scarborough, 1989	K – G.2 (end)	Pho Seg/Iso	Y	Y	N	Wd: r = .36; Comp: r = .36

*Auditory Modality only; Standardized, Norm-referenced Measure; Composite Score; Y=Yes, N=No

Studies of Training in Phonological Awareness

Author/s of Study	Age of Children	Treatment Type	Aud *	Stan/Nor *	Integ *	Results
Lundberg, et al., 1988	PK – G.2	Rhy, Pho Seg in PK	N	N	N	Wd Rd (G.2): $F(1,318) = 5.0$, $p<.05$
Brady et al., 1994	K	Rhy, Pho Seg, Pho Del	Y	N	N	Wd Rd: $F(1,40) = 4.6$, $p< .04$
Torgesen & Davis, 1996	K	Pho Seg, Pho Blen	N	Y	N	Let Sds: $r = .44$, $p < .05$
Ball & Blachman, 1991	K	Pho Seg	N	N	N	Let Sds: $F(2,85) = 6.90$, $p <.001$ Wd Rd: $F(2,86) = 11.97$, $p < .0001$
Torgesen et al., 1992	K	Combo of Pho Seg & Blen Blen only	Y	N	N	Wd Rd: $t(9) = 2.61$, $p < .05$
Lie, 1991	G. 1-2	Pho Isol & Pho Seg	Y	N	N	Wd Rd: $F(2,135) = 3.34$, $p< .05$
Uhry & Shepherd	G. 1	Pho Seg	Y	Y	N	Wd Rd: $F(1,20) = 1.08$, $p = .312$

*Auditory Modality Tested only, Standardized, Norm-referenced PA Measure, PA training integrated into instruction; Y = Yes; N = No

APPENDIX B

INFORMED CONSENT

Informed Consent

The University of South Carolina

Child: _____ Teacher: _____

Sex: _____ Race: _____ Birthdate: _____ Age: _____

INFORMATION STATEMENT

This research study is concerned with the relationship between the child's ability to process speech auditorily and his ability to read. A review of the research literature indicates that this relationship is important. In this study, your child will be given auditory subtests from *The Phonological Awareness Test* and the *Slosson Oral Reading Test-R.* These tests will be administered individually and should take approximately 10-15 minutes each. These scores will be correlated with scores on the grade 2 *Scott Foresman Class Placement Test: Comprehension Subtest* that will be given by the classroom teacher to the entire class. Testing times for the individual tests will be coordinated with your child's classroom schedule so that loss of instructional time is minimized.

CONFIDENTIALITY

The children will be administered the individual tests within their familiar school environment in quiet offices by Speech-Language Pathologists. Scores on each of the individual tests will be given to the child's classroom teacher for use as a diagnostic tool. All scores will be kept confidential between the teacher and the investigator of this study.

BENEFITS

Valuable diagnostic and planning information on auditory awareness of spoken sounds and reading skills will be generated. The impact of this information should provide guidance to parents, teachers, and speech-language pathologists as to the importance of phonological awareness training within the reading curriculum.

INQUIRIES

If you have questions about this study, please contact Susan W. Floyd, Speech Services Coordinator, Florence School District 3 at 394-3353 or 394-2353. Thank you for the opportunity to work with your child and to provide valuable information to others through this study!

CONSENT

I have read the above information. I consent for my child to participate in this research study.

_____ _____

Signature Date

APPENDIX C

RAW SCORE DATA

Phonological Awareness Study: Test Results 8/97

Phonological Awareness Test Subtests:

Students	Rhy		Seg:P		Iso:I		Iso:F		Iso:M		Del:P		Blen:P		Total		SORT	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
BF:6-6.5																		
D. A.	10	10	0	0	7	9	0	0	0	0	7	5	2	1	24	25	0	20
As. B.	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	5	16
Am. B.	10	10	0	2	8	8	7	6	4	4	0	4	1	3	30	37	5	30
A. C.	10	10	0	0	9	10	5	3	5	6	2	1	0	0	31	30	0	21
N. C.	9	10	2	2	3	7	0	0	0	0	1	1	1	6	16	26	2	14
C. D.	9	9	0	0	7	0	2	0	0	0	0	0	0	0	18	9	0	21
L. D.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
D. E.	9	9	0	0	4	1	2	0	1	0	0	0	0	0	16	10	3	23
S. G.	10	10	5	6	10	10	10	9	4	5	5	8	2	3	46	51	5	30
J. H.	1	1	0	0	10	10	1	7	3	7	4	9	1	2	20	36	8	33
N. M.	7	8	0	1	10	10	6	9	1	4	5	7	2	2	31	41	5	47
L. P.	5	7	7	4	10	10	8	9	5	9	7	7	6	8	43	54	20	46
D. P.	10	10	0	5	10	10	7	8	2	4	1	0	4	8	34	45	5	46
S. P.	10	10	0	1	9	10	0	8	2	1	5	6	1	1	27	37	6	30
L. P.	6	9	0	0	9	0	0	1	0	0	0	0	1	3	16	13	5	26
K. P.	9	10	0	0	0	0	8	8	0	0	0	0	0	2	17	20	2	13
S. S.	10	9	5	0	7	8	9	8	5	2	3	2	2	1	41	30	7	35
B. S.	1	0	0	0	10	10	7	3	0	0	0	0	0	1	18	14	3	22
I. S.	7	6	0	1	9	10	3	4	0	0	4	6	3	3	18	30	8	30
Jan. S.	10	10	4	4	9	10	7	9	4	6	5	5	10	8	49	52	34	55
Jar. S.	10	10	0	0	8	10	0	0	0	0	2	1	1	4	21	25	1	25
T. S.	10	10	0	0	3	7	3	7	0	0	0	0	0	0	16	24	2	10
J. S.	9	10	1	0	7	7	10	8	3	3	0	2	0	0	30	30	22	49
WF:6-6.5																		
K. G.	10	10	2	3	10	10	9	9	5	6	4	4	3	4	43	46	3	23
K. L.	9	9	2	3	10	10	3	4	4	5	7	8	6	7	41	46	3	22
S. M.	9	9	4	5	10	10	10	10	7	8	7	7	6	7	52	55	7	32
T. M.	8	10	5	4	9	10	8	10	7	5	3	4	9	10	49	53	16	43
A. P.	4	6	0	0	9	9	9	9	0	0	2	4	5	9	23	31	0	22
A. P.	10	10	1	2	8	9	8	9	0	1	0	1	3	4	31	37	1	20
C. R.	10	10	0	6	10	10	10	10	6	7	8	8	6	9	50	58	12	70
A. W.	10	10	1	2	8	9	6	7	1	2	0	1	3	4	34	35	1	22
BM:6-6.5																		
J. A.	6	9	0	0	9	10	0	0	0	0	4	6	2	3	21	25	4	18
K. D.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	14
L. F.	10	4	0	0	10	10	5	4	0	0	0	0	3	1	28	19	1	18
F. G.	7	10	0	0	5	0	0	0	0	0	0	2	0	1	12	13	0	12
E. G.	10	10	2	3	10	10	10	10	7	8	7	6	7	10	53	57	16	56
L. G.	6	6	0	0	0	0	0	0	0	0	0	0	0	1	6	7	0	7
A. H.	9	9	0	0	10	10	8	9	0	0	6	3	7	1	40	32	3	25
D. H.	4	8	0	1	10	10	2	6	0	0	0	3	0	1	16	28	0	14
H. K.	9	10	1	1	9	9	5	3	1	1	9	9	4	2	38	35	74	120
J. P.	10	10	1	2	10	10	10	10	5	10	6	7	7	1	51	48	17	22
B. W.	9	10	1	1	8	9	5	5	1	2	1	0	3	4	28	31	12	28
M. W.	9	10	1	1	8	10	8	8	0	0	3	3	1	0	40	32	2	19
WM:6-6.5																		
J. C.	10	10	0	1	10	10	10	10	6	6	6	6	2	3	44	47	3	37

C. D.	10 10	0 1	6 7	7 7	3 4	4 5	0 1	31 35	0 37
P. F.	7 7	0 1	9 10	4 5	0 1	3 4	0 1	33 29	0 12
C. G.	9 9	1 2	9 10	8 9	2 3	8 8	5 6	42 47	7 46
K. J.	10 10	4 5	8 8	6 7	9 9	5 6	7 8	49 53	5 41
T. L.	10 9	3 4	10 10	8 9	5 6	6 7	3 4	49 49	3 41
C. M.	10 10	4 5	10 10	9 9	2 3	3 4	5 6	43 47	3 43
C. O.	8 8	0 0	0 0	0 0	0 0	0 0	1 0	9 8	1 10
L. S.	10 10	4 5	10 10	2 3	0 1	3 4	7 8	36 41	0 25
M. W.	10 10	0 0	8 10	3 5	0 2	2 2	1 1	24 30	2 11
WF:6.6-6.11									
A. H.	7 9	0 0	10 10	10 10	4 4	10 10	2 6	43 49	6 31
H. F.	10 10	9 7	10 10	10 10	8 8	4 3	3 5	54 53	15 55
A. K.	8 10	1 2	0 10	0 3	0 2	1 2	5 8	15 37	8 10
H. M.	10 10	6 5	10 10	9 9	6 4	6 8	10 10	57 56	38 85
K. R.	10 10	0 0	10 10	5 9	1 2	5 7	9 9	40 47	14 32
A. S.	10 10	2 2	10 10	9 10	1 0	3 5	6 2	40 49	6 30
M. W.	10 10	4 5	10 10	7 9	4 4	9 6	9 9	53 53	7 32
H. W.	10 10	1 2	10 10	7 8	4 4	2 1	7 7	41 42	3 31
BF:6.6-6.11									
K. B.	9 9	2 2	10 10	7 5	1 0	4 0	4 3	37 29	5 21
T. B.	8 9	0 0	10 10	6 8	1 0	2 2	4 3	41 32	6 22
L. B.	10 8	0 1	10 10	5 8	5 2	6 9	2 3	38 42	9 24
W. C.	2 3	0 0	9 9	4 5	0 0	3 4	4 3	22 24	3 25
A. F.	8 7	2 1	9 9	6 9	3 3	4 2	2 3	34 32	14 43
K. G.	10 10	0 0	0 8	0 0	0 0	0 0	0 1	10 11	2 14
L. G.	10 10	3 2	10 10	8 8	6 7	0 0	1 1	38 38	8 26
G. H.	8 9	2 2	9 8	2 7	2 1	2 3	1 3	26 33	17 41
S. H.	2 3	0 0	10 10	4 4	0 0	0 0	0 1	16 18	9 28
D. K.	0 0	0 0	10 10	2 3	0 0	3 3	2 3	17 19	2 18
J. M.	10 10	0 0	0 0	0 0	0 0	0 0	0 0	10 10	3 26
B. M.	7 9	0 1	0 1	2 0	2 1	4 4	0 0	23 16	5 20
M. M.	10 10	5 3	5 3	6 7	7 5	1 2	9 8	48 45	14 45
K. P.	10 8	2 2	2 2	9 8	5 4	1 4	10 10	46 46	15 50
J. S.	0 5	0 0	0 3	0 3	0 0	0 1	1 1	1 13	0 5
Jes. S.	10 10	2 1	9 8	6 6	1 4	8 8	5 6	41 43	5 62
Jua. S.	10 10	0 0	9 9	6 4	0 0	0 0	1 0	26 23	0 17
L. S.	9 10	0 2	10 10	8 10	0 4	0 5	0 0	27 41	5 21
N. S.	10 9	5 2	10 10	9 10	6 3	8 4	9 7	57 55	10 45
P. S.	0 1	0 0	3 3	4 1	0 0	7 8	0 0	14 13	4 20
P. Sm.	8 10	0 0	5 5	1 1	0 0	0 0	1 1	15 17	4 10
P. T.	8 10	0 0	0 1	0 0	0 0	0 0	0 2	8 13	1 15
D. W.	3 6	0 0	0 0	0 0	0 0	3 4	0 0	6 10	0 10
P. W.	9 10	0 0	7 4	4 7	0 0	0 0	0 0	20 21	2 15
WM:6.6-6.11									
C. B.	9 10	0 0	9 10	0 0	0 0	0 4	0 3	18 24	2 11
S. C.	9 10	0 0	4 10	0 1	0 2	0 1	0 3	13 27	3 6
W. G.	9 10	0 2	8 9	9 8	9 7	7 7	5 7	48 50	18 53
B. G.	10 10	4 4	9 10	6 10	6 7	7 8	5 9	48 58	49 77
D. H.	10 10	10 7	10 10	10 9	8 8	9 7	9 8	66 59	27 68
T. M.	10 10	0 1	6 6	5 7	0 1	3 5	2 4	26 34	3 45
S. O.	10 10	4 2	5 5	0 2	0 2	7 6	5 10	31 37	4 39
T. P.	10 10	4 4	10 10	10 10	6 5	8 6	10 10	58 55	29 50
R. S.	9 8	0 0	9 10	10 10	6 6	7 6	6 7	47 47	10 30

M. T.	10 10	7 5	10 10	10 10	6 9	5 2	8 10	53 56	17 35
K. W.	10 10	10 10	9 10	9 8	7 9	10 10	9 10	64 67	4 36
BM:6.6-6.11									
D. B.	0 0	0 0	7 10	1 0	0 0	1 2	2 3	11 15	6 31
N. B.	8 9	0 0	7 10	1 3	1 5	4 4	0 10	21 41	5 28
R. B.	9 9	0 3	10 10	2 9	0 0	5 6	0 3	26 40	10 38
C. C.	10 6	7 5	9 9	7 8	3 4	8 8	10 9	54 51	53 116
D. D.	10 10	0 1	0 3	0 4	0 0	0 1	2 3	12 22	0 19
K. F.	0 2	0 0	0 0	0 0	0 0	0 0	0 0	0 2	0 6
M. G.	10 10	4 2	10 10	8 7	0 0	4 4	5 5	41 48	0 47
S. G.	5 8	2 4	10 10	10 10	4 8	2 7	1 2	34 47	17 43
T. G.	0 0	0 0	8 9	0 3	0 0	1 0	0 0	9 12	1 6
S. H.	10 10	0 0	8 10	6 7	7 7	3 7	5 6	39 47	5 44
J. H.	10 10	1 0	9 10	5 7	3 4	7 7	6 9	41 47	18 43
N. J.	0 0	0 2	10 10	6 7	4 6	3 6	5 7	30 38	3 41
T. J.	8 8	0 0	9 10	5 5	5 0	4 4	1 1	32 28	14 40
R.L.	10 10	8 8	10 10	10 10	3 7	8 8	9 10	57 63	4 40
M. M.	7 9	0 2	6 10	2 3	1 4	5 6	3 4	24 38	10 33
D. M.	4 6	0 0	6 10	0 0	0 0	2 2	1 1	13 19	5 20
R. M.	4 8	0 0	0 0	0 0	0 0	0 0	0 0	4 8	2 8
C. M.	8 9	5 4	10 10	10 8	4 6	1 5	5 7	43 49	5 26
G. N.	10 10	0 1	9 10	8 10	0 0	1 0	3 5	31 40	4 14
S. R.	9 10	0 0	6 4	0 0	0 0	0 0	2 2	17 16	0 5
F. S.	10 10	3 0	7 9	6 7	6 7	7 6	2 2	39 36	5 41
L. S.	10 10	0 0	0 0	0 0	0 0	0 1	0 2	10 13	0 10
J. W.	3 4	0 0	0 1	2 6	2 6	5 3	0 0	10 14	2 16
D. W.	9 7	6 3	7 8	5 9	5 9	5 7	7 7	38 39	4 19
S. W.	2 8	2 0	3 0	0 0	0 0	1 0	0 3	8 11	7 17
C. W.	10 10	1 2	8 8	1 1	0 0	4 5	3 3	27 29	2 15

Phonological Awareness Study: Test Results 9/98

Phonological Awareness Test Subtests:

Students	Rhy	Seg	Iso	Iso	Iso	Del	Blen	Total	SORT	Comp
BF: 7.0–7.5	**Pro**	**Pho**	**Ini**	**Fin**	**Med**	**Pho**	**Pho**			
D. A.	10	5	8	7	9	8	8	55	50	22
As. B.	7	0	8	7	6	0	7	35	79	12
Am. B.	10	1	9	4	6	5	7	42	44	8
A. C.	10	3	10	3	6	6	5	43	38	6
N. C.	10	3	10	7	9	5	4	48	35	9
C. D.	10	4	6	5	7	6	9	47	12	9
L. D.	5	0	10	2	4	3	0	24	11	20
D. E.	10	5	10	4	8	2	5	44	24	7
S. G.	10	5	9	6	8	6	9	53	57	21
J. H.	5	6	10	9	10	10	6	56	52	18
N. M.	9	4	10	8	8	6	6	51	74	19
L. P.	8	4	10	7	9	6	8	52	54	6
D. P.	10	5	10	5	10	7	6	53	100	18
S. P.	10	5	10	8	10	7	7	57	27	12
L. P.	10	0	4	4	9	7	4	41	55	13
K. P.	10	4	10	6	10	7	10	57	25	8
S. S.	10	4	2	6	6	5	6	39	59	21
B. S.	5	3	9	5	8	6	8	44	44	8
I. S.	7	0	9	4	6	5	3	34	78	19
Jan. S.	10	10	10	9	10	8	10	67	90	18
Jar. S.	10	5	10	8	10	6	6	55	43	9
T. S.	10	6	8	6	8	4	8	50	90	19
J. S.	10	5	10	8	10	9	5	57	97	21
WF: 7.0 – 7.5										
K. G.	10	10	10	7	9	7	10	63	75	16
K. L.	10	5	9	7	9	7	8	55	51	20
S. M.	10	5	9	10	10	7	10	61	86	21
T. M.	10	5	10	7	10	4	6	52	56	19
A. P.	7	4	10	7	6	6	10	50	45	9
A. Po.	10	5	10	9	8	9	8	59	48	18
C. R.	10	7	10	9	10	10	9	65	129	23
A. W.	10	5	8	6	10	6	8	53	40	18
BM: 7.0 – 7.5										
J. A.	10	3	10	9	10	4	9	55	52	13
K. D.	5	1	8	1	8	3	4	30	19	11
L. F.	5	0	10	4	8	6	5	38	21	9
F. G.	8	1	10	4	9	0	9	41	32	10
E. G.	10	8	10	8	10	10	10	66	88	23
Lab. G.	7	1	6	0	1	3	1	19	24	12
A. H.	9	6	10	7	10	7	8	57	38	6
D. H.	9	3	9	7	8	6	2	44	58	12
H. K.	10	2	9	4	6	10	7	48	138	22
J. P.	10	2	9	7	9	6	4	47	64	15
M. W.	10	2	10	7	9	4	6	48	35	12
B. W.	10	3	10	3	8	6	5	45	63	18

WM: 7.0 – 7.5										
J. C.	10	6	10	7	9	9	9	60	89	17
C. D.	10	8	10	9	10	8	9	64	91	15
P. F.	8	2	10	4	9	5	6	44	19	15
C. G.	9	4	8	7	9	7	6	50	84	18
K. J.	10	4	10	9	9	9	10	61	102	21
T. L.	10	4	9	7	9	4	7	50	74	11
C. M.	10	6	9	5	8	6	8	52	64	20
C. O.	8	2	4	2	10	4	9	39	13	7
L. S.	10	6	10	7	10	3	8	54	27	21
M. W.	10	8	10	6	10	7	9	60	20	4
WF: 7.6 – 7.11										
A. H.	10	4	10	9	10	5	4	52	90	22
H. F.	10	6	10	9	9	8	10	62	74	19
A. K.	10	4	10	6	10	4	10	54	47	16
H. M.	10	9	10	8	10	10	10	67	89	19
K. R.	10	10	10	2	9	7	8	56	72	17
A. S.	10	5	10	4	9	4	9	51	52	13
M. W.	10	5	10	8	10	10	9	62	69	18
H. W.	10	4	9	6	10	8	9	56	82	20
BF: 7.6 – 7.11										
K. B.	10	5	10	6	8	4	8	51	67	21
T. B.	9	3	9	8	9	6	10	54	47	17
L. B.	9	4	10	9	10	8	2	52	53	20
W. C.	5	0	1	5	6	5	1	23	42	13
A. F.	8	3	10	5	8	4	6	44	74	20
K. G.	10	5	9	7	0	8	8	47	30	6
L. G.	10	3	10	8	9	6	9	55	90	19
G. H.	10	5	8	3	5	6	7	44	58	22
S. H.	5	3	10	4	10	4	3	39	38	13
D. K.	5	2	9	5	8	2	9	40	24	2
J. M.	10	3	9	4	7	2	9	44	60	5
B. M.	10	6	10	7	10	5	7	55	41	13
M. M.	10	6	10	10	10	10	10	66	86	19
K. P.	9	5	10	10	10	10	10	64	92	18
J. S.	6	4	9	5	6	6	2	38	77	21
Jes. S.	10	5	8	6	9	5	7	50	84	18
Jua. S.	10	4	10	0	6	3	5	38	11	8
L. S.	10	4	10	8	10	6	7	55	25	10
N. S.	9	4	10	9	10	8	8	68	90	21
P. S.	5	4	10	4	6	1	8	38	46	16
P. Sm.	10	4	10	9	9	6	6	54	22	12
P. T.	10	4	9	8	10	3	9	53	42	10
D. W.	7	2	8	3	8	0	1	29	35	8
P. W.	10	0	10	2	9	3	0	34	30	10
WM: 7.6 – 7.11										
C. B.	10	2	10	7	7	8	10	54	10	11
S. C.	10	2	8	4	9	1	4	38	7	6
W. G.	10	5	10	7	9	9	9	59	104	20
B. G.	10	9	10	8	9	8	10	64	82	23

D. H.	10	10	10	8	10	8	9	65	115	20
T. M.	10	6	9	6	10	7	10	58	89	20
S. O.	10	5	10	6	6	9	10	56	23	7
T. P.	10	6	10	10	10	9	10	65	100	19
R. S.	9	4	10	7	10	6	9	55	46	16
M. T.	10	4	10	9	9	7	10	59	89	23
K. W.	10	9	9	9	7	7	10	61	47	20
BM: 7.6 – 7.11										
D. B.	5	2	10	2	5	2	5	31	34	10
N. B.	9	5	10	9	10	8	10	61	58	15
R. B.	9	4	10	7	10	6	9	55	81	19
C. C.	10	10	10	10	10	9	10	69	139	21
D. D.	10	3	9	6	8	6	8	50	43	13
K. F.	3	1	8	0	1	2	1	16	12	16
M. G.	10	4	10	8	9	7	9	57	30	19
S. G.	10	6	10	7	8	10	7	58	78	22
T. G.	3	0	9	2	5	5	9	33	29	10
S. H.	10	10	10	8	10	5	10	63	63	17
J. H.	10	4	10	2	5	6	7	44	68	16
N. J.	6	1	10	7	10	8	6	48	80	18
T. J.	9	3	9	6	7	4	4	42	69	17
R. L.	10	10	10	10	8	6	10	64	126	18
M. M.	9	4	10	2	7	4	7	43	56	15
D. M.	7	1	9	4	8	8	6	43	90	11
R. M.	9	2	6	2	2	9	6	36	26	16
C. M.	10	8	10	8	8	8	10	62	41	8
G. N.	10	1	10	5	10	4	7	47	55	6
S. R.	10	10	10	4	8	3	3	48	10	10
F. S.	10	3	10	7	10	8	8	56	79	20
L. S.	10	0	8	0	0	3	3	24	16	7
J. W.	8	4	10	8	10	5	7	52	22	8
D. W.	8	4	10	6	10	6	8	52	55	9
S. W.	8	1	8	2	8	3	4	26	46	7
C. W.	10	2	10	3	8	5	8	46	35	7

APPENDIX D

VITA

VITA

Susan Weathers Floyd was born April 25, 1949 to Mr. and Mrs. George Weathers Jr. of Bowman, South Carolina. Upon graduation from high school, she attended Coker College where she received a Bachelor of Arts degree in Elementary Education in 1971. During college, she served as Vice President of the Student Government and as student representative to the Board of Trustees. She was awarded the Algernon Sidney Sullivan Award upon graduation.

Immediately after graduation, Susan began graduate school at the University of South Carolina in Speech Pathology and Audiology. During graduate school, she organized the speech program in the Hartsville, S. C. school system. Susan graduated in 1974, and subsequently received the Certificate of Clinical Competence by the American Speech and Hearing Association and Licensure for Private Practice by the South Carolina Board of Examiners. She continued post-graduate studies and received the Masters + 30 Hours Certificate from the South Carolina State Department of Education in 1988.

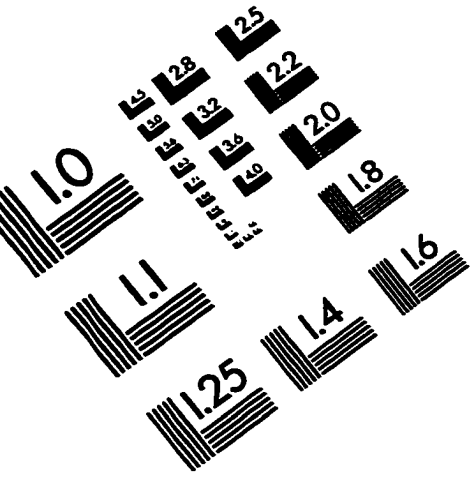
Since 1974, Susan has worked as a speech-language pathologist in the Florence County District #3 School System and in private practice. She has received four incentive rewards and six grants from the South Carolina State Department of Education. In 1991, she was named Speech Services Coordinator in addition to her job as speech-language pathologist.

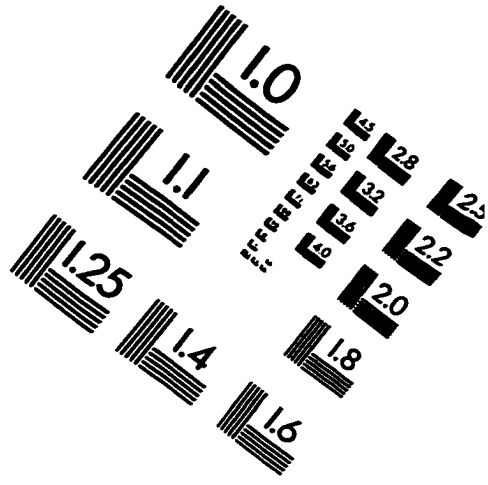
Susan has received recognition from the South Carolina Speech-Language and Hearing Association (SCSHA), as well as the American Speech-Language and Hearing Association (ASHA). In 1991, one of her students was named the SCSHA Poster Child of the Year. In 1992, Susan received the SCSHA Dicarlo Award for Clinical Achievement and the ASHA Clinical Achievement Award for South Carolina. In 1995 Susan led the Florence District #3 Speech Services Program to win the SCSHA Public School Speech Program Award.

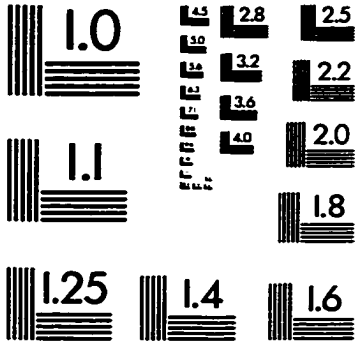
Susan has presented her "Communication Collaboration" program at SCSHA conferences and to school districts throughout the state. She has served as Chair of the SCSHA Continuing Education Committee and on the SCSHA Legislative Committee. In 1997 Susan received a contract from *Super Duper Publications* to publish her "Communication Collaboration" materials. In 1998 the *OPEC Review* published her article about the "Summer Speech Stars" program.

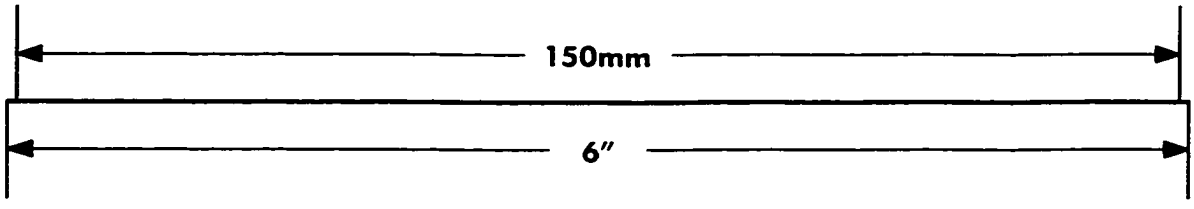
Presently, Susan is enrolled in the Ph.D. program in Speech-Language Pathology and Audiology at the University of South Carolina and continues as Speech Services Coordinator/Speech-Language Pathologist in Florence School District #3. She also supervises the USC Distance Education Summer Speech Program in Lake City, S. C. She is married to Dr. Lane N. Floyd and has 2 sons, Jim and Scott, and a puppydog named Pokey.

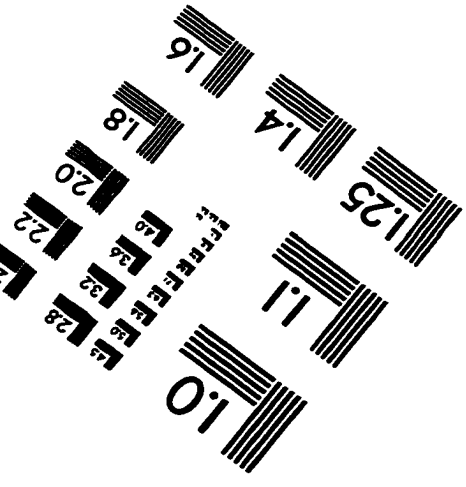
IMAGE EVALUATION TEST TARGET (QA-3)

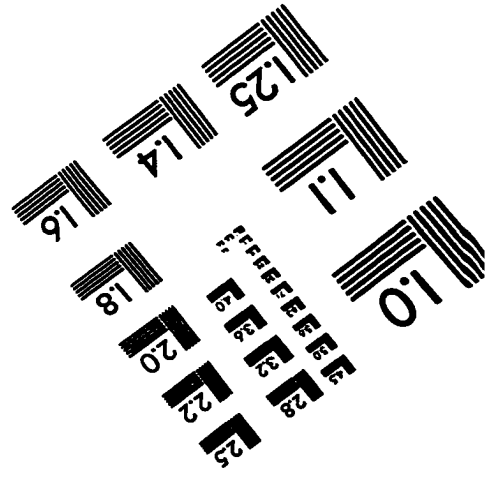












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