The Relationship Between Children's Concept of Word in Text and Phoneme Awareness in Learning to Read: A Longitudinal Study

Darrell Morris
Appalachian State University

Using a longitudinal design, this study tested a developmental hypothesis about the growth of word knowledge in kindergarten readers. Based on previous work (Henderson, 1980; Morris, 1980, 1983), it was predicted that beginning consonant knowledge (BC) facilitates a child's concept of word in text (CW), which in turn facilitates phoneme segmentation (PS), which in turn facilitates word recognition (WR). Fifty-three kindergartners were tested at two-month intervals during the school year on BC, CW, PS, and WR tasks. The results of two different analyses provided convergent support for the developmental hypothesis (BC→CW→PS→WR). Generalizability of the results is limited by the specific kindergarten instructional contexts in this study. Nonetheless, the findings do highlight some interesting relationships between beginning readers' emerging phonological awareness and their understanding of how spoken words map to printed words in text.

There exists a strong relationship between children's early phonological awareness (awareness of phonemes within spoken words) and their achievement in reading upon entering school. Over the last decade and a half this has been an important and frequently replicated finding in research on beginning reading (Bradley & Bryant, 1983; Juel, Griffith, & Gough, 1986; Liberman, Shankweiler, Fischer, & Carter, 1974). The present study, a year-long investigation in kindergarten, contributes to the rapidly growing body of research on the relationship between phoneme awareness and learning to read. The data clearly highlight the unfolding of phoneme awareness as the kindergarten children start to become readers. In addition, the study traces longitudinally another concept not so frequently mentioned in theories of beginning reading, namely, children's *concept of word in text*—their awareness of the match between the spoken word and the written word in the reading of text. It will be argued that the establishment of a concept of word in text is a pivotal event in learning to read, pivotal in the sense that this orienting concept facilitates

not only an initial sight vocabulary but also a developing awareness of phonemic units within words.

Theoretical Framework

Phoneme Awareness, Concept of Word in Text, and Reading Acquisition

In learning to read an alphabetic language, phoneme awareness is the underlying mental "glue" that allows written words to enter and remain in memory. Individual differences in phoneme awareness predict differences in early reading achievement. That is, if Child A possesses awareness of only beginning consonant sounds ("cap" = /k/ /?/ /?/) while Child B is aware of beginning, medial, and ending sounds in words ("cap" = /k/ /a/ /p/), then Child B, other things being equal, will enjoy an advantage in learning to read. This is because the more phoneme awareness a beginning reader possesses, the more fully he/she will be able to process (get into memory) the letter/sound properties of individual printed words (Ehri & Wilce, 1985; Gough & Hillinger, 1980; Liberman & Shankweiler, 1991).

In addition to phoneme awareness, some researchers have been interested in *when* and *how* beginning readers become aware of *word units* in language (Ehri, 1975; Holden & MacGinitie, 1972; Meltzer & Herse, 1969; Morris, 1980). In learning to speak and listen, young children attend more to the meaning of language than to its formal properties (words, syllables, and phonemes). Learning to read, however, introduces new demands, one of which is that the child is required to attend to and process individual words arrayed in lines of print. Clay (1972) made this point in her careful longitudinal study of New Zealand beginning readers when she stressed the importance of children learning "to read the spaces"—of their being able to match spoken words to written words as they read aloud familiar stories or rhymes. How else, Clay maintained, could the child learn to read new words or recognize familiar ones in text?

The theoretical work of Henderson (1980, 1981) brought the ideas of word awareness and phoneme awareness together. Henderson argued that, for the beginning reader, it is the very act of trying to read printed language—the attempt to match words in a spoken sentence to the printed forms on the page—that actually drives the development of word consciousness in both spoken and written language (see Ehri, 1975). Next, Henderson put forth the rather novel idea that the stabilization or maturing of the beginning reader's concept of word in text facilitates the child's awareness of phonemes within words. He stated (1980, pp. 9–10):

> The ability to identify words in a text as individual nameable objects appears to be a "watershed" event in learning to read. Children who cannot point to individual words as they "read" a memorized text learn few words

> and cannot reliably segment spoken words. Children who *can* identify individual words in text learn words and are able to segment by phoneme with astonishing accuracy. It seems to me that the notorious difficulty prereaders have with tasks of auditory discrimination hinges on this phenomenon. It is not that prereaders cannot discriminate phonemes or learn so called letter sounds; in fact, they must in order to speak. It is simply that, lacking a stable concept of word as a bound figure with a beginning and an end, they cannot know where to focus their attention.

Directly implied in Henderson's work—and in the early work of Ehri, (1978)—is the idea that word consciousness in text precedes or facilitates phoneme consciousness. Or, to put it another way, once the beginning reader learns to focus on word units within a line of print, he or she will be in a better position to analyze the letters and sounds within words.

In two separate studies, Morris (1980, 1983) examined the hypothesized relationship between beginning readers' concept of word in text and their ability to segment spoken words into phonemes. Working with first graders at the beginning of the school year, he found a strong positive relationship ($r = .72$ and $r = .83$) between the children's ability to finger-point read a short memorized verse (concept of word measure) and their ability to segment spoken words into phonemes (phoneme awareness measure). Although the correlations between concept of word and phoneme awareness were suggestive, there were clear limitations in interpreting Morris's results. First, a high correlation between two entities at a given point in time does not allow the inference that one entity precedes or facilitates the occurrence of the other. Second, observations of the first graders performing the concept of word task showed clearly that several of the children were using beginning consonant letter/sound cues (along with spacing) to help identify words in the poem. Thus, the children's concept of word, at least in this task, was not purely the result of their honoring the space between words but also seemed to involve their attention to beginning letter/sound cues. This was a confounding factor in a study attempting to measure the strength of the relationship between concept of word in text and phoneme awareness (beginning consonant knowledge being an early form of phoneme awareness).

What was needed was a clearer developmental formulation of the relationship between concept of word and phoneme awareness and an empirical design that would test the validity of such a formulation.

How Early Word Knowledge Might Evolve: A Developmental Hypothesis

Beginning Consonant Knowledge and the Emergence of a Concept of Word in Text

For the neophyte reader the initial letter or sound in a word is the most salient. Marchbanks and Levin (1965) found that kindergarteners and

first graders showed a consistent visual preference for the first letter in nonsense trigrams. Developmental spelling researchers (Beers & Henderson, 1977; Paul, 1976; Read, 1971) have repeatedly shown that young children progress from representing only the beginning consonant in a word to representing the beginning and ending consonants and finally to including the vowel element in their spelling attempts. And Lewkowicz (1980), in her review of phoneme segmentation training studies, noted that the one constant finding was that children found it easier to deal with the first sound in a word than with the medial or final sounds.

No matter when or in what situation young children begin to attend to word units in text, their beginning consonant letter/sound awareness can aid the "word-locating" process. For example, a five year-old boy may know that a certain sign in his neighborhood says, "John Crown University Park." However, in attempting to finger-point read the sign one day, the child finds his voice to be at "-ver-" (third syllable in *University*) while his finger has moved over to the printed word, *Park.* Realizing that there is a mismatch between the sound he is saying and the word he is pointing to ("-ver-" does not begin with a *P*), the child starts over, trying now to align spoken word to written word by attending closely to both spacing and beginning consonant letter/sound cues. If successful this second time through (i.e., if the four spoken words now line up with the four written words), the child may well decide to use this strategy in future reading situations. Thus, simultaneous attention to spacing between words *and* beginning consonant cues can aid the learner in dividing up written language into word units—aid him in developing a rudimentary concept of word in text.

The Child's Concept of Word in Text, Early Sight Vocabulary, and the Development of Phoneme Segmentation Ability

Initially, the child's grasp of the concept of word in text is tenuous and unsure. However, given supported opportunities to read simple texts (picture captions, dictated accounts, nursery rhymes, natural language preprimers, etc.), the child's concept of word eventually stabilizes. He or she accurately matches spoken words to written words while reading, and if errors (mismatches) do occur, they are quickly self-corrected. This is a pivotal period in learning to read. The fact that the child is now controlling the act of contextual reading at the word level makes possible further growth in several areas, namely sight vocabulary and phoneme segmentation (awareness of the beginning consonant segment *and* additional phoneme segments within the word).

To illustrate how sight vocabulary and phoneme segmentation ability might result from finger-point reading of familiar texts, let us follow a beginning reader through the dictated story:

My Bike
I can ride my bike.
I ride it fast.
Sometimes I fall off, but I
don't get hurt.

Supported initially by only two sight words (*I* and *my*) and a memory for what was dictated, the young reader steps into what might be called unfamiliar printed terrain. However, a stable concept of word in text allows the child to train finger, eye, and voice on each successive word as it is read aloud. Over several finger-point readings of the same dictation, a few new words will enter the child's sight vocabulary (e.g., *bike, Sometimes, hurt*). This is not surprising. Given that the child is saying each word while pointing to it in the text *and* reading the same text several times, the powerful learning laws of association and repetition are brought to bear on sight word acquisition.

What is more interesting (but also more difficult to explain) is how such finger-point reading of familiar texts might enhance the beginning reader's ability to segment words into phonemic units. At this point in reading development, the child is already conscious of one phonemic element within words, i.e., the beginning consonant. (Remember that beginning consonant letter/sound knowledge, along with spacing between printed words, helped the child to acquire a sense of wordness in text in the first place.) Now, however, the table is turned, and *the child, for a period, uses his/her concept of word (letter group surrounded by spaces—beginning letter/sound known) to facilitate further phonemic analysis of individual words in text.* Let us suppose that in terms of sound/letter awareness the first two lines in our sample dictation look like this to the beginning reader:

I cxx rxxx my bxxx.	(I can ride my bike.)
I rxxx xx fxxx.	(I ride it fast.)

Note several factors about the child's word perception: 1) He/she knows a few words by sight recognition (*I* and *my*); 2) Memory of the text and syntactic knowledge allowed the child to anticipate upcoming words as he/she reads; and 3) The anticipated identity of a given word can be confirmed, on meeting it, by its beginning consonant letter (*b* in bxxx, *f* in fxxx). Thus, a child possessing minimal phoneme awareness can read simple, familiar texts by relying on memory, syntactic knowledge, a few sight words, and confirmatory beginning consonant cues.

Now keep in mind that the child, on meeting the word *bike* in the text, is confronted *visually* not just with the beginning consonant (*b*) but with additional, as-yet undecipherable letters (*-ike*) in the word unit. Certainly, his/her attention to these letters, when it occurs, will aid the child in

remembering the word and in discriminating it visually from other *b* words (e.g., *boy, bird, ball,* etc.). However, it is possible that these additional, unaccounted for (phonemically speaking) letters in *bike* (i.e., *-ike*) could begin to send another message to the beginning reader. That is: "This written word has an ending letter (-k) which matches the final sound of the spoken word; therefore, other sound/letter matches in a word can be made." If the child heeds this perceptual message in which the printed form of language is informing the reader about phonological properties of his/her speech, then future readings of this text (and others like it) might be represented like this:

I cxn rxdx my bxkx.
I rxdx xt fxxt.

The child is now attending to both the beginning and ending consonant elements in words, evidence of a new advance in underlying phoneme awareness.

The scenario proposed above is supported both by logic and by some developmental data. Once the child has mastered the strategy of using the beginning letter/sound to identify a word in text, it should not be difficult to begin to transfer the same strategy to another part of the word—the final consonant. Also, several investigators (Ehri, 1986; Morris & Perney, 1984; and Paul, 1976) have pointed out that beginning readers reveal just such a transfer in their *spelling* attempts. That is, the children's first spellings often represent only the beginning consonant letter/sound in words (B for *back,* F for *feet*), whereas a few months later they begin to put in both the beginning and ending consonant letters in their spellings (BK or BC for *back;* FT for *feet*).

Awareness of beginning and ending consonants in words is an important start, but of course the beginning reader must go on to develop vowel awareness if he/she is to advance in word recognition ability. To take our present example one step further, it is quite possible that once a concept of word in text is established, with concomitant attention to both beginning and ending consonants, this freezes or highlights the interior of the word (where the vowel resides) for further analysis.

I cxn rxdx my bxkx.
I rxdx xt fxxt.

Again we see that letters within words (see the x's) can potentially call the younger reader's visual attention to unaccounted for sound/letter matches. It may be this "framed" visual attention to the vowel letter(s) within a word (e.g., rxdx) that ultimately triggers a corresponding awareness of the vowel sound within the spoken word (/r/ /x/ /d/).

Phoneme Segmentation and Word Recognition Skill

There is some consensus today that phoneme segmentation (the child's awareness of the sequential sound segments within words) underlies word recognition ability in the beginning reading process (see Stanovich, 1987). Word recognition ability here does not refer to the beginning reader's ability to recall a few idiosyncratic sight words, but rather to a) the child's ownership of a fairly large sight vocabulary (50+ words) or b) his/her ability to decipher unknown pattern words (CVC, CVCe, CVVC) through either a sound-it-out or an analogy strategy.

The Present Study

In the present study, kindergarten children's reading or prereading abilities (concept of word, phoneme awareness, and word recognition) were assessed at four points during the school year (September, December, February, and May). Based on clinical observation in previous studies, a decision was made to divide the phoneme awareness construct into two parts: 1) beginning consonant knowledge and 2) the more advanced ability to segment one-syllable words into their constituent phonemes (/tap/ = /t/ /a/ /p/). By considering phoneme awareness in this manner (that is, as having an early and a later stage) and by assessing it at different points during the year, the present study was able to test an hypothesis:

beg. cons. knowledge	……> precedes	concept of word in text	……> precedes	phoneme segment ability	……> precedes	word recognition

Method

Subjects

Fifty-three suburban-Chicago kindergarteners from three different classrooms participated in the study. The 31 children in Classes A and B received approximately 30 minutes per day of what might be termed "systematic language-experience" instruction. Working with their respective teachers in both whole class and small group situations, the AB children, on a daily basis, read aloud poems and class-dictated stories. Under the teacher's guidance they also completed workbook pages on consonant letter-sound relationships.

The 22 children in Class C received little formal instruction in reading; on average, less than one minute per day was spent on print-related

instruction. In this class, the emphasis was on developing oral language, imparting science and social studies knowledge, and encouraging experiential play. Regarding reading readiness skill instruction, Teacher C worked on beginning consonant discrimination and rhyme awareness intermittently during the school year, but then only in oral, game-like situations (e.g., no workbooks or structured letter-sound seatwork).

Assessment Tasks

At eight week intervals during the school year (September, December, February, and May), the kindergarteners were assessed individually in each of five knowledge or skill areas (see below). The specific tasks to be described were part of a larger set that was used in the study. There were four examiners or data collectors: the author (a college reading clinic director) and three advanced graduate students in reading. To assure uniformity in the examiner's administration of the assessment tasks, extensive training was conducted prior to the September testing. Refresher training was also carried out prior to each of the subsequent assessments.

Alphabet Recognition

In September and December, each child was asked to name the 26 upper case alphabet letters as the examiner pointed to them in random order. In February and May, the children were asked to identify both the 26 upper case and the 26 lower case letters. *Scoring:* upper case, 0 to 26; lower case, 0 to 26.

> (Note: The mean correct score in September on the upper-case alphabet recognition measure was 21.8 out of 26. Moreover, 31 of the 51 children who were present for all tests recognized 24+ of the upper case letters. This surprising alphabet recognition performance by entering kindergarteners produced a ceiling effect, limiting the alphabet variable's usefulness in this longitudinal study.)

Beginning Consonant Awareness

Each child was asked to segment off and produce the different beginning consonant sounds in a set of spoken words. There were seven training words (*ball, juice, family, hop, run, money,* and *bear*) followed by ten test words (*cat, sun, rabbit, lip, dog, father, window, pan, house,* and *milk*). The examiner began the task by saying:

> The first sound in 'ball' is /b/. Can you say the first sound in 'ball'? [Examiner gave corrective feedback if needed.] The first sound in 'juice' is /j/. Can you say the first sound in 'juice'? [Again, feedback was provided.]

Following administration of the seven training words, the examiner moved immediately to the test words. The same procedure was followed

except that no feedback was provided to the child as to the correctness of his/her attempts. *Scoring:* 0 to 10. One point was earned for each correct response on the test words. An initial consonant sound followed by a schwa was scored correct (/du/ for dog, /fu/ for father); however, a response that included the vowel sound in the target word was scored incorrect (/ra/ for rabbit or /li/ for lip).

Concept of Word in Text

Each child's concept of word was assessed in two different contexts. In the *sentence-reading context,* the child first explained what was happening in a line drawing (see Figure 1), and then the examiner read aloud the sentence beneath the drawing.

Next, the examiner said, "I'm going to read this sentence one more time, pointing to each word as I read. Watch closely, because then you (the child) are going to finger-point read the sentence." After the child's finger-point attempt, the examiner brought out the second drawing and the procedure was repeated. *Scoring:* 0 to 2. One point was earned for each sentence correctly finger-point read. (Each finger-point reading attempt was scored "all-or-none" in that every printed word in the sentence had to be correctly pointed to as it was read; spontaneous self-corrections in pointing *were* accepted.)

In the *book reading context,* a very similar procedure was followed. The examiner began by "sharing" with the child *My Home,* a simple little 5-page text from the The Wright Group's *Storybox* reading program (see Figure 2). The pictures on each page were discussed and, at one point in the "story," the child was asked to predict the final outcome. Next, the examiner and child returned to page 1 and began to echo-read the book. The examiner modeled a finger-point reading of the sentence on page 1,

The apple fell on the boy. The girl is walking in the rain.

Figure 1. Concept of word task: Sentence Reading Context

Remaining sentences:
2) My home is here, said the frog.
3) My home is here, said the pig.
4) My home is here, said the dog.
5) My home is here, said the rabbit, and in I go.

Figure 2. Concept of word task: Book Reading Context

and then the child tried to emulate the model. Page 2 was read in the same manner. To add challenge, the sentences on pages 3 and 4 were read at one time. The examiner cued the child by saying, "This time I'm going to read both pages and then you will go back and finger-point read both pages." The final sentence on page 5 presented a different type of challenge in that it contained an extra clause or four additional words. *Scoring:* 0 to 5. One point was earned for each sentence correctly finger-point read. Collapsing the *sentence reading* (0–2) and *book reading* (0–5) scores produced a total concept of word score (0–7) for each child.

Phoneme Segmentation Ability

In this task the child had to move a small wooden block as he separately pronounced each phoneme in a 3-phoneme word (see Ferroli & Shanahan, 1987). There were five training words (*sun, pot, hug, red,* and *map*) followed by ten test words (*tap, neck, soap, job, feet, lip, race, mud, side,* and *move*). On the training trials the examiner said the word (e.g., 'sun'), and then pronounced it again in a segmented manner, moving a block forward as he/she clearly said each phoneme in the word (/s/ → /u/ → /n/). Next the child attempted to segment 'sun'. A successful attempt was praised. If the child erred, the examiner modeled the process again and let the child try a second time. On the ten test words that followed, the examiner pronounced each test word, the child repeated it, and then the child attempted to segment the word, moving the blocks. No corrective feedback was provided to the child on the test words. *Scoring:* 0 to 10. One point was awarded for each correct word segmentation. However, to receive credit, the child had to separate clearly each phoneme in his pronunciation of the word. Typical errors involved a child's inability to

separate the vowel sound from the adjacent consonants (e.g., "map" = /m/ /ma/ /p/ or /m/ /a/ /ap/). A few children produced a slowed-down, continuous pronunciation of the word, moving the blocks at approximately the right time. This type of response was corrected during training and did not receive credit on the test trials.

Word Recognition

The child was asked to read ten *decodable* (CVC) words as the examiner pointed to the words one at a time (*cap, net, win, bug, fat, mop, led, dig, job, mud*). The child was also asked to read ten *basal* words taken from the Preprimer 1 level of the Houghton-Mifflin (1982) basal reader program (*for, in, mother, the, fine, how, need, take, where, but*). Collapsing the decodable (0–10) and basal (0–10) scores yielded a total word recognition score (0–20) for each child.

Results

This study tested an hypothesized sequence of development in kindergartners' emerging knowledge of written words: a) Beginning consonant knowledge facilitates a concept of word in text; b) concept of word in text facilitates phoneme segmentation ability; and c) phoneme segmentation ability facilitates word recognition.

A conception that undergirds all forms of experimentation is that a *change* in X produces a *change* in Y. Applied to data collected over multiple time waves, this notion implies that a change in X (e.g., concept of word) between two time points should be associated with a change in Y (e.g., phoneme segmentation) at two later points. In this study, intervals of only two months separated the four data collection points.

Figure 3 presents median performance on beginning consonant awareness (BC), concept of word in text (CW), phoneme segmentation (PS), and word recognition (WR) for the 51 children who were tested at all four time points. The descriptive analysis used medians instead of means because for several variables (BC, CW, and PS) the distribution of scores was skewed. As the theory predicts, the children tended to either have the concept (high scores) or not have it (low scores), with fewer scores in the middle of the range. (See Table 1 in the Appendix for a comparison of medians and means at each testing point, and Table 2 in the Appendix for Pearson correlations for all variables.) Recall that the four target variables contained different numbers of items (BC and PS = 10 items; CW = 7 items; and WR = 20 items). For purposes of analysis, the median raw score for each variable was converted to a "percentage correct" and then graphed on the 10 point scale.

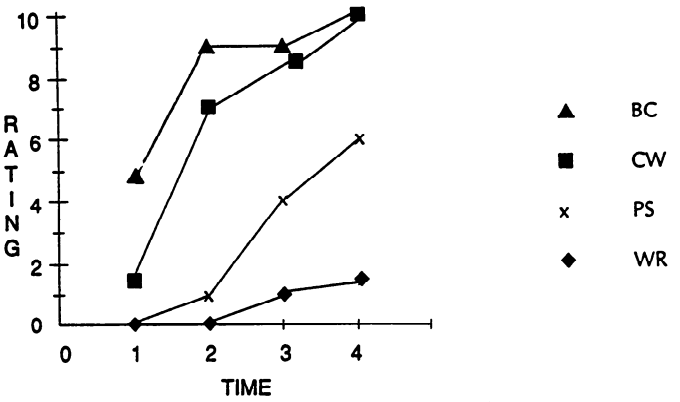

Figure 3. Median performance at each testing point (N=51)

Figure 3 shows that for the sample of 51 children, BC and CW changed or rose in parallel across the course of the year. Changes in CW clearly preceded changes in PS, and changes in PS preceded changes in WR. This partially supports the temporal pattern of changes that was predicted.

It is possible to use the data from the initially more proficient students (the 14 who scored above 5 on CW in September) in a way that describes how the relationships between variables might have looked over a longer developmental span. Assume that the performance of the more proficient children (n = 14) describes what the less advanced students (n = 37) would have achieved after the fourth data collection point. Then the data from the more proficient students can be used to describe what the next 8 months of development might have been for the initially less proficient. Figure 4 is drawn with this assumption in mind; that is, the less advanced

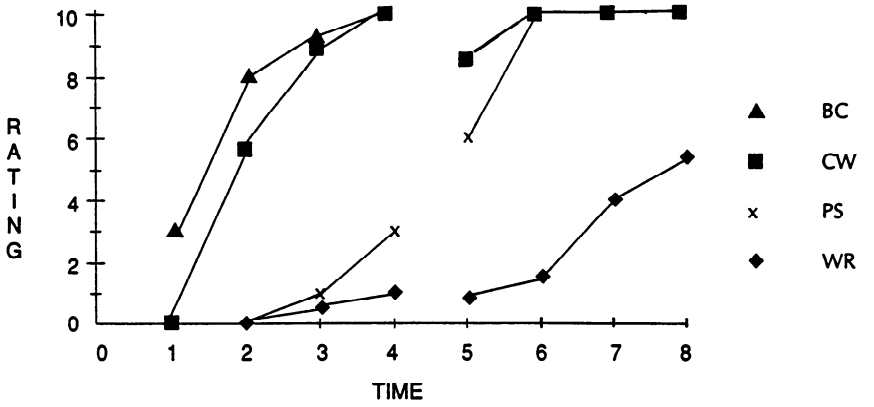

Figure 4. Medians for CW < 5.0 (N = 37) and CW > 5.0 (N = 14)

children (CW < 5) providing data at the first four time points, and the more advanced (CW > 5) at the "later" time points.

The theoretically expected data pattern now emerges more clearly, particularly with respect to changes in CW preceding changes in PS, and changes in PS preceding changes in WR.

The analyses above describe how the group performance of the kindergarten children conformed to the predicted developmental sequence. Yet in a study of this kind it is also important to examine the performance patterns of individual children. One technique that can provide evidence for the developmental nature of a series of tasks is the Guttman scale analysis. This analysis is based on the probability of a person being successful on one or more higher-order tasks. In this study, the Guttman analysis was applied to the kindergarteners' performance on the BC, CW, PS, and WR tasks.

First, an accuracy criterion or cut-off point was established for each of the assessment tasks at 70% for beginning consonant, concept of word, and phoneme segmentation and at 30% for word recognition. The 70% cutoff point was chosen for BC, CW, and PS to assure a reasonable level of mastery on these tasks. A lower criterion was chosen for WR to provide a more sensitive and valid measure in this area. That is, it is unreasonable to expect kindergarteners to be able to read 70% of the words on an arbitrarily chosen word list.

With the cutoff points established, it was possible to analyze how an individual child's performance at each testing date conformed to one of the following patterns:

	Beginning consonant (7 of 10: 70%)	Concept of Word (5 of 7: 70%)	Phoneme Segmentation (7 of 10: 70%)	Word Recognition (6 of 20: 30%)
Pattern 1	0	0	0	0
Pattern 2	+	0	0	0
Pattern 3	+	+	0	0
Pattern 4	+	+	+	0
Pattern 5	+	+	+	+

Each child was given a (+) if he/she had reached criterion on a task and a (0) if he/she had not. The prediction was that a child, at any point during the year, would not be successful on a given task (e.g., PS) unless he or she had met criterion on all tasks lower in the developmental scheme (e.g., BC and CW). Thus, the pattern BC(+), CW(+), PS(+), WR(0) would represent a "hit" (supportive of the hypothesis), but the pattern BC(+), CW(0), PS(+), WR(0) would represent a "miss." Providing further support for the developmental hypothesis, when the Guttman analysis (addressing the question of whether hits were more frequent than misses) was applied to individual children's performances at each testing date,

the coefficients of reproducibility were high (September—.92; December—.92; February—.89; and May—.89).

Overall, there were 210 pattern instances that could be examined (51 children tested 4 times, and 2 children tested 3 times). Of these 210 instances, only 20 (less than 10%) failed to fit the predicted developmental sequence. Interestingly, the dominant "miss" pattern (12 of the 20 "misses") was BC(0), CW(+), PS(0), WR(0) indicating that on occasion some children could finger-point read accurately without meeting criterion on the beginning consonant task.

Because there were clear classroom instructional differences in this study (the AB children receiving much more direct print-related instruction than the C children), Guttman coefficients were computed for each instructional group. In the AB group (N=31), there were 11 "misses" out of 123 pattern instances, yielding a Guttman coefficient of .91. In the C group (N=22), there were 9 "misses" out of 87 pattern instances, yielding a Guttman coefficient of .90. This strongly suggests that the developmental course of knowledge growth was similar in both instructional contexts.

Discussion

Bertelson (1987) recently pointed out that the attempt to determine which was the "true" prerequisite for the other, phoneme awareness or reading acquisition, would probably fail to yield a clear and useful answer. He noted that the entities are too global in nature to expect to find a unidirectional causal relation between them: "Only by analyzing both processes [beginning reading skill and phoneme awareness] into simpler episodes can one hope to reach a level of description at which unidirectional influences would be found" (p. 11).

The present study, heeding Bertelson's advice to analyze the processes into "simpler episodes," provided convergent evidence of a developmental sequence in kindergarteners' emerging knowledge of word. For the sample of kindergarteners studied, beginning consonant knowledge was achieved before concept of word in text; concept of word was achieved before the ability to segment words into phonemes; and segmentation preceded word recognition ability. This sequence was extremely common in the data reported here, with very few cases deviating from it.

A necessary caveat to the present finding of a sequence in young children's developing word knowledge is the fact that the 53 kindergarteners were studied under only two instructional conditions: 1) two classrooms in which reading was taught daily and that systematically used language-experience procedures and 2) a classroom in which there was very little reading or print-related instruction. Barr (1975),

DeLawter (1975), Elder (1971), and others have reported that beginning readers' early word recognition strategies can be influenced significantly by different instructional schemes; for example, phonics-emphasis programs that produce readers who process words in a more analytic (letter-sound) manner than do readers exposed to traditional whole-word basal programs. Therefore, it is possible that the proposed developmental sequence of word knowledge (BC → CW → PS → WR) can be modified by instruction different from that found in the present study. One can envision a beginning reading scheme emphasizing the rote memorization of sight word cards as possibly accelerating WR in the developmental sequence or a scheme emphasizing synthetic phonics as possibly accelerating PS. These are questions worthy of further study and empirical test.

Before we leave the issue of instructional effects, it should be re-emphasized that there *were* two instructional conditions in the present study. And there were clear instructional effects. In the two kindergarten classrooms where language-experience reading activities were a part of the daily routine, by May 84% of the children demonstrated a concept of word in text and 71% could segment words into phonemes. In the oral language/experiential play kindergarten, however, where there was little direct teaching of print-related concepts during the year, by May only 50% of the children demonstrated a concept of word, and only 18% showed phoneme-segmentation skill at year's end (cf. Ivy, 1989). Although instruction accelerated learning in the language-experience group, it is significant that both groups (language-experience and oral language) followed a similar developmental pattern in word knowledge growth. The Guttman analyses showed 90% adherence to the BC → CW → PS → WR pattern in one group and 91% adherence in the other.

A different concern in developmental studies of this kind involves the necessary assumption that valid (or ideal) measures are being obtained of the constructs ordered in the proposed developmental sequence. A critic might argue that it is possible to manipulate the sequential occurrence of concept of word and phoneme segmentation by varying task difficulty. For example, a psychologically "easy" CW task and a "difficult" PS task could produce the illusion of a CW → PS sequence where none existed. Likewise, reversing the task difficulties above could well produce an illusory PS → CW sequence.

The present study tried to safeguard against the *task difficulty* concern by choosing tasks that were thought to be straightforward measures of the target constructs (BC, CW, and PS) and by providing adequate training on each task before moving into the test phase. It is difficult to envision a more basic measure of concept of word in text than the one used; that is, the child attempted to finger-point read a short, six-word sentence immediately after hearing and seeing the examiner finger-point

read the same sentence. In addition, on the first two of seven sentence trials, the child heard the target sentence read twice by the examiner before being asked to finger-point read.

Previous researchers have used various tasks to assess children's phoneme segmentation ability (Stanovich, Cunningham, & Cramer, 1984). The phoneme segmentation task used in the present study was a simple one requiring the children to segment a series of three-phoneme words by saying the phonemes in each word separately. Blocks were used to concretize the task, but the children were judged only on their ability to produce an accurate spoken segmentation of the word. The five and six year olds did not have to substitute, delete, or count individual phonemes making this a relatively easy and therefore appropriate task to use with beginning readers (Lewkowicz, 1980).

Concept of word in text played a "linchpin" role in the present developmental formulation. Defined as the ability to match spoken words to written words in reading a memorized sentence, concept of word in this study awaited the formation of beginning consonant awareness and preceded further phoneme segmentation ability. One can, however, question the "purity" of the concept of word measure; that is, could not the children's concept of word performance have been influenced by their beginning consonant knowledge, sight word store, syntactic knowledge, and short-term sentence memory? The theory actually acknowledges the role of beginning consonant awareness in successful finger-point reading. Regarding the influence of sight words, syntactic ability, and sentence memory, these variables were controlled for in previous concept of word studies (Morris, 1980, 1983) that yielded results similar to those reported here. In a sense, the present concept of word assessment concerns a *skill*, a sequence of behavior coordinated over time (Bussis, Chittenden, Amarel, & Klausner, 1985), as opposed to a *defining characteristic* of printed words (e.g., length, configuration, or directionality). Although the discreteness of the measure can be questioned, there are several advantages to this particular task (see Morris, 1980), not the least of which is that it taps what the beginning reader must learn to do early in many classroom instructional approaches (finger-point read dictated stories, predictable books, nursery rhymes, even whole word basal preprimers).

Instructional Implications

There is consensus among reading researchers in the early-1990's concerning the importance of phonological awareness in the learning-to-read process (Gough & Hillinger, 1980; Mason, 1984; Perfetti, 1986; and Stanovich, 1987). Such a convergence of scholarly opinion is rare in the

field of beginning reading and, for this reason alone, is likely to influence in coming years the design of kindergarten and first grade reading programs.

One implication that might be drawn from the phoneme awareness research is that we should teach children to perceive individual phonemes within spoken words *before* introducing reading instruction. Kindergarteners and beginning first graders could routinely be taught to segment spoken words into phonemes (later making sound/letter associations where appropriate) as a prerequisite to learning printed words in a formal reading scheme (e.g., whole word basal, phonics emphasis, or language-experience). Elkonin (1973) pioneered such a sound segmentation approach in the Soviet Union, and American, British, and Swedish researchers have commented favorably on explicit phoneme segmentation training as a prerequisite to reading instruction (Bryant & Bradley, 1985; Juel et al., 1986; Liberman, 1983; Lundberg, Frost, & Peterson, 1988). Interestingly, such training has been specifically recommended for low-socioeconomic or minority groups who show low reading readiness upon school entry (Juel et al., 1986; Tumner & Nesdale, 1985).

The theoretical position put forth and tested in the present study offers a different perspective on beginning reading instruction. Although the crucial role of phoneme segmentation in printed word learning is not challenged in this study, the results suggest that a stable concept of word in text can actually facilitate a child's awareness of the sequential sounds within words. If one acknowledges this "facilitator" role of concept of word, then it follows that reading instruction of a certain kind (that which leads beginners to map spoken words to written words in text) need not await the presence of phoneme segmentation skill, but rather can precede it (or at least be taught in conjunction with it).

The present study did not address the question as to which teaching approach (direct phoneme segmentation training, sentence-based beginning reading instruction, or, for that matter, sight word "flash card" instruction) is most effective in helping beginning readers develop phoneme awareness. Training studies are called for. However, future investigators might keep in mind that, from a pedagogical perspective, other issues bear on this question. For example, as Meek (1985) has asked: How can instructional time best be used to foster children's reading-related knowledge and simultaneously their interest in becoming literate?

Acknowledging that the "best" way to develop phoneme awareness remains an open question, let us nevertheless offer some existing classroom instructional approaches that could be used to help children discover word units in text and later the phonemic and letter/sound

properties of words. Three such approaches immediately come to mind: 1) traditional language-experience instruction emphasizing dictated stories, word banks, and early writing (Stauffer, 1970); 2) the shared book-experience approach used extensively in New Zealand (Holdaway, 1979); and 3) the British *Breakthrough to Literacy* program (Mackay, Thompson, & Schaub, 1970). These are often referred to as "top-down," meaning-based approaches to teaching reading, which in a very real sense they are. However, a central point here is that teachers who use such beginning reading approaches bear responsibility for eventually guiding their children to the "-down" part of "top-down"—that is, to an awareness of word-units in text and of letter/sounds in printed words. Teachers can accomplish this by modeling finger-point reading of familiar texts, by providing many memory-supported opportunities for children to read, and by consistently pointing out, via incidental discussion or game-like activities (see Holdaway, 1979), the existence of individual word and letter/sound units in text. In particular, beginning consonant letter/sound cues warrant teacher attention as these appear to be integrally involved in the child's establishment of a stable concept of word in text.

Another way of fostering children's word and phoneme awareness is to encourage them to write their own texts. Certainly any attempt by a young child to sound-out the written spelling of a word (MK or MAK for *make*) is an exercise in conscious phoneme segmentation. Note, however, that the sound-it-out or "invented spelling" that is being advocated today in kindergarten and first grade classrooms (see *Literacy Development and Pre-first Grade*, 1986) may well depend on the young child's concept of word in text. That is, the phoneme awareness that must underlie phonetic "letter-name" spelling (e.g., I LIK MI SESDR MARE) does not appear out of nowhere on the day that a kindergarten teacher decides to introduce writing activities in the classroom. Such phoneme awareness (and phonetic spelling) may well emanate from a child's early reading experience, from his/her developing concept that a word is a bound figure in text composed of letters that march left to right and correspond to sounds (Henderson, 1981). The relationship existing between word awareness in text and early phonetic spelling has been overlooked and under-researched (but see Ferroli & Shanahan, 1987; Morris, 1983; and Temple, Nathan, & Burris, 1982).

As the implications of phoneme awareness research filter down to the classroom over the next few years, it is likely that new assessment instruments will be devised and that special phoneme segmentation training programs will be tried, if not widely, then at least with populations of low-readiness youngsters. The present study has provided a different way of thinking about the development of phoneme awareness in the

beginning reading process. As we continue to reconceptualize and test alternative paths for the development of phoneme awareness, perhaps one day we will be able to explain how different teaching approaches—some old, some new—succeed in fostering linguistic insight in beginning readers and writers.

Author's Note: This research was partially supported by a grant from the Jessie Smith Noyes Foundation (New York, NY). I wish to thank Rebecca Barr, Thomas Cook, Edmund Henderson, and Frank Vellutino for their comments on an earlier version of this manuscript.

References

Barr, R. (1975). The effect of instruction on pupil reading strategies. *Reading Research Quarterly, 10,* 556–582.

Beers, J. W. & Henderson, E. H. (1977). A study of developing orthographic concepts among first graders. *Research in the Teaching of English, 2,* 133–148.

Bertelson, P. (1987). The onset of literacy: Liminal remarks. In P. Bertelson (Ed.), *The onset of literacy: Cognitive processes in reading acquisition* (pp. 1–30). Cambridge, MA: MIT Press.

Bradley, L., & Bryant, P. (1983). Categorizing sounds and learning to read: A causal connection. *Nature, 301,* 419–421.

Bryant, P., & Bradley, L. (1985). *Children's reading problems.* Oxford: Basil Blackwell.

Bussis, A., Chittenden, E., Amarel, M., & Klausner, E. (1985). *Inquiry into meaning: An investigation of learning to read.* Hillsdale, NJ: Erlbaum.

Clay, M. (1972). *Reading: The patterning of complex behavior.* Auckland, NZ: Heinemann.

DeLawter, J. (1975). The relationship of beginning reading instruction and miscue patterns. In W. D. Page (Ed.), Help for the reading teacher: *New directions in research* (pp. 42–51). Urbana, IL: National Conference on Research in English.

Ehri, L. (1975). Word consciousness in readers and prereaders. *Journal of Educational Psychology, 67,* 204–212.

Ehri, L. (1978). Beginning reading from a psycholinguistic perspective: Amalgamation of word identities. In F. Murray (Ed.). *The development of the reading process* (pp. 1–33). Newark, DE: International Reading Association.

Ehri, L. (1986). Sources of difficulty in learning to spell and read. In M. L. Wolraich & D. K. Routh (Eds.), *Advances in developmental and behavioral pediatrics* (pp. 121–195). Greenwich, CT: JAI Press.

Ehri, L., & Wilce, L. (1985). Movement into reading: Is the first stage of printed word learning visual or phonetic? *Reading Research Quarterly, 20,* 163–179.

Elder, R. D. (1971). Oral reading achievement of Scottish and American children. *Elementary School Journal, 71,* 216–229.

Elkonin, D. (1973). U.S.S.R. In J. Downing (Ed.), *Comparative reading: Cross-national studies of behavior and processes in reading and writing* (pp. 551–578). New York: MacMillan.

Ferroli, L., & Shanahan, T. (1987). Kindergarten spelling: Explaining its relationship to first-grade reading. In J. Readence & S. Baldwin (Eds.), *Research in*

literacy: Merging perspectives (pp. 93–100). Rochester, NY: National Reading Conference.

Gough, P., & Hillinger, M. (1980). Learning to read: An unnatural act. *Bulletin of the Orton Society, 30,* 180–196.

Henderson, E. (1980). Developmental concepts of word. In E. Henderson & J. Beers (Eds.), *Developmental and cognitive aspects of learning to spell: A reflection of word knowledge* (pp. 1–14). Newark, DE: International Reading Association.

Henderson, E. (1981). *Learning to read and spell: A child's knowledge of words.* Dekalb, IL: Northern Illinois University Press.

Holdaway, D. (1979). *The foundations of literacy.* Auckland, NZ: Heinemann.

Holden, M., & MacGinitie, W. (1972). Children's conceptions of word boundaries in speech and print. *Journal of Educational Psychology, 63,* 551–557.

Ivy, C. (1989). *Kindergarten instruction: The merging of cognitive understandings about print.* Unpublished doctoral dissertation, National College of Education, Evanston, IL.

Juel, C., Griffith, P., & Gough, P. (1986). The acquisition of literacy: A longitudinal study of children in first and second grade. *Journal of Educational Psychology, 78,* 243–255.

Lewkowicz, N. (1980). Phonemic awareness training: What to teach and how to teach it. *Journal of Educational Psychology, 72,* 686–700.

Liberman, I. (1983). A language-oriented view of reading and its disabilities. In H. Myklebust (Ed.), *Progress in learning disabilities (Vol.5)* (pp. 81–100). New York: Grune and Stratton.

Liberman, I., & Shankweiler, D. (1991). Phonology and beginning reading: A tutorial. In L. Rieben and C. Perfetti (Eds.) *Learning to read: Basic research and its implications* (pp. 3–17). Hillsdale, NJ: Erlbaum.

Liberman, I., Shankweiler, D., Fischer, F., & Carter, B. (1974). Explicit phoneme and syllable segmentation in the young child. *Journal of Experimental Child Psychology, 18,* 201–212.

Literacy development in a pre-first grade. (1986). *Young Children, 41,* 10–13.

Lundberg, I., Frost, J., & Peterson, O. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly, 23,* 263–284.

Mackay, D., Thompson, B., & Schaub, P. (1970). *Breakthrough to literacy.* London: Longman.

Marchbanks, G., & Levin, H. (1965). Cues by which children recognize words. *Journal of Educational Psychology, 56,* 57–61.

Mason, J. (1984). Early reading from a developmental perspective. In P. D. Pearson (Ed.), *Handbook of reading research* (pp. 505–543). New York: Longman.

Meek, M. (1985). *Learning to read.* Portsmouth, N. H.: Heinemann.

Meltzer, N., & Herse, R. (1969). The boundaries of written words as seen by first graders. *Journal of Reading Behavior, 1,* 3–14.

Morris, D. (1980). Beginning readers' concept of word. In E. Henderson and J. Beers (Eds.), *Developmental and cognitive aspects of learning to spell: A reflection of word knowledge* (pp. 97–111). Newark, DE: International Reading Association.

Morris, D. (1983). Concept of word and phoneme awareness in the beginning reader. *Research in the Teaching of English, 17,* 359–373.

Morris, D., & Perney, J. (1984). Developmental spelling as a predictor of first-grade reading achievement. *Elementary School Journal, 84,* 441–457.
Paul, R. (1976). Invented spelling in kindergarten. *Young Children, 31,* 195–200.
Perfetti, C. (1986). Continuities in reading acquisition, reading skill, and reading disability. *Remedial and Special Education, 7,* 11–21.
Read, C. (1971). Pre-school children's knowledge of English phonology. *Harvard Educational Review, 41,* 1–34.
Stanovich, K. (1987). Introduction. *Merrill-Palmer Quarterly, 33,* 251–254.
Stanovich, K., Cunningham, A., & Cramer, B. (1984). Assessing phonological awareness in kindergarten children: Issues of task comparability. *Journal of Experimental Child Psychology, 38,* 175–190.
Stauffer, R. (1970). *The language-experience approach to the teaching of reading.* New York: Harper & Row.
Temple, C., Nathan, R., & Burris, N. (1982). *The beginnings of writing.* Boston: Allyn & Bacon.
Tumner, W., Nesdale, A. (1985). Phonemic segmentation skill and beginning reading. *Journal of Educational Psychology, 77,* 417–427.

Appendix

Table 1

Medians, Means, Standard Deviations, and ranges for BC, CW, PS, and WR at Each Testing Point (T1 through T4)

		Median	Mean	SD	Range
Sep	(T1)				
	BC	5.0	4.8	3.6	10.0
	CW	1.0	2.5	2.6	7.0
	PS	0.0	2.1	3.3	10.0
	WR	0.0	0.7	1.7	8.0
Dec	(T2)				
	BC	9.0	7.2	3.5	10.0
	CW	5.0	4.3	2.6	7.0
	PS	1.0	3.5	4.2	10.0
	WR	0.0	1.5	3.0	14.0
Feb	(T3)				
	BC	9.0	7.7	3.1	10.0
	CW	6.0	5.3	2.5	7.0
	PS	4.0	4.7	4.2	10.0
	WR	2.0	3.2	4.4	15.0
May	(T4)				
	BC	10.0	8.9	2.4	10.0
	CW	7.0	6.0	1.8	7.0
	PS	6.0	5.6	4.1	10.0
	WR	3.0	4.9	5.4	19.0

BC = beginning consonant awareness (items = 10); CW = concept of word in text (items = 7); PS = phoneme segmentation (items = 10); WR = word recognition (items = 20)

Table 2

Pearson Correlation Matrix of Key Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. BC1	—															
2. BC2	.56															
3. BC3	.55	.86														
4. BC4	.32	.68	.61	—												
5. CW1	.68	.45	.44	.19	—											
6. CW2	.56	.60	.60	.33	.73	—										
7. CW3	.40	.58	.60	.26	.49	.80	—									
8. CW4	.41	.65	.68	.45	.41	.65	.80	—								
9. PS1	.64	.36	.38	.29	.59	.45	.30	.32	—							
10. PS2	.69	.52	.49	.37	.68	.57	.44	.40	.80	—						
11. PS3	.69	.57	.48	.35	.61	.50	.45	.43	.68	.87	—					
12. PS4	.62	.68	.61	.48	.59	.54	.59	.58	.60	.78	.85	—				
13. WR1	.53	.28	.26	.16	.57	.42	.27	.25	.67	.53	.50	.42	—			
14. WR2	.52	.32	.31	.20	.63	.45	.31	.26	.62	.51	.48	.43	.77	—		
15. WR3	.64	.46	.43	.30	.65	.57	.43	.36	.68	.64	.60	.57	.72	.75	—	
16. WR4	.57	.57	.55	.39	.55	.52	.51	.47	.63	.61	.59	.67	.62	.68	.91	

$r = .32$ ($p < .01$)