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Developmental steps in learning to read: A longitudinal study in kindergarten and first grade

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By far the most carefully researched part of the beginning reading process has been *phoneme awareness.* In the late 1960s, researchers demonstrated that individual phonemes or speech sounds are difficult to perceive because they fuse or blend together within a spoken syllable (A. Liberman, Cooper, Shankweiler, & Studdert-Kennedy, 1967). Shortly thereafter, I. Liberman and her colleagues at the Haskins Laboratories (see Liberman, Shankweiler, Fischer, & Carter, 1974; Mattingly, 1972) put forth the idea that phoneme awareness, or conscious attention to individual sounds within a spoken word, might be a critical factor in learning to read. Until beginning readers can segment spoken words into phonemes (e.g., /băt/ = /b/ /ă/ /t/), I. Liberman argued, they will be unable to exploit the alphabetic code and to match letters in printed words to their corresponding sounds (*b a t* = /b/ /ă/ /t/).

Armed with this logic, researchers for the past 25 years have relentlessly studied the role of phoneme awareness in learning to read. Myriad correlational studies have established a strong positive relationship between phoneme awareness and success in early reading, and several training studies have suggested a possible causal connection (see reviews by Adams, 1990; Blachman, 2000; National Institute of Child Health and Human Development, 2000). Today the prevalent view is that there is a reciprocal or interactive relationship between phoneme awareness and early reading skill, with gains in one area leading to gains in the other (Ehri, 1992; Perfetti, Beck, Bell, & Hughes, 1987; Stahl & Murray, 1994). However, an explanation of how this reciprocal relationship actually works—specifically, how learning to read might enhance phoneme awareness—is lacking. The present study, longitudinal in nature, examines this issue.

Phoneme awareness and developmental formulations of printed word learning

As one might expect, phoneme awareness has figured prominently in developmental theories of how children learn to read words. For example, Frith (1985) proposed a three-phase theory of reading acquisition, with each phase characterized by a different type of reading strategy. In the *logographic* phase, children are able to recognize familiar words by attending to salient graphic features (e.g., the two "circles" in the middle of *look* or the "tail" at the end of *dog*); however, they do not use phonology or letter sounds as a way to identify printed words. In the *alphabetic* phase, children "sound out" new words they meet in print by attending to the sequential letter sounds in the words (e.g., m→a→p). In Frith's third or *orthographic* phase, children recognize new words instantly by attending to their distinctive orthographic or spelling patterns (e.g., *m-ake, sp-eak, fl-ight*). Phonological processing is not required at this point, although young readers cannot reach the orthographic phase without first going through the alphabetic phase where phonological processing is required. According to Frith's three-phase model, phoneme awareness is absent in the logographic phase; it is central in the alphabetic phase (to decode sequential letter sounds, one must be aware that words are composed of sounds); and it has outlived its developmental usefulness in the final orthographic stage.

In a longitudinal study of British infant school readers, Stuart and Coltheart (1988) challenged Frith's three-phase theory. These researchers argued that beginning readers, from the start, use whatever phoneme awareness they possess. Thus, a child who has only beginning consonant awareness (but possesses some letter-sound knowledge) might read *cat* for *cup* and *talk* for *tip*. Another child, who is aware of both beginning and ending sounds in words, might read *cap* for *cup* and *top* for *tip*. The point is that these two children are using neither a logographic nor an alphabetic (or sequential decoding) strategy, as defined in Frith's theory. Instead they are using whatever amount of phoneme awareness and letter-sound knowledge they possess to partially decode printed words. (Keep in mind that such partial decoding might suffice in the contextual reading of simple texts.) From Stuart and Coltheart's perspective, logographic reading may simply be a default strategy to be used when the beginner brings little or no phonological awareness to the task, and alphabetic or sequential decoding might better be conceptualized as the child, over time, is able to fill in missing pieces in a functional word recognition unit (C--, C-P, and finally CAP for the word *cap*).

Ehri (1998) has provided the most comprehensive description of how word knowledge develops in the beginning reader. Drawing on the work of Frith (1985) and Stuart and Coltheart (1988), developmental spelling theory (Henderson & Beers, 1980; Templeton & Bear, 1992), and evidence from her own research studies, Ehri proposed four phases of word recognition development. In the *pre-alphabetic* phase, similar to Frith's logographic phase, children remember how to read words by connecting salient visual cues in the word (e.g., the two posts at the end of *call*; the tail at the end of *big*) with the word's pronunciation and meaning. There is no systematic letter-sound processing in this pre-alphabetic phase; therefore, the child's ability to commit new words to memory, and to "hold on" to old words, is taxed when visually similar words are confronted in text (e.g., *call, will, sell,* or *big, leg, hug*).

In Ehri's (1998) next *partial alphabetic* phase, beginners commit printed words to memory by forming connections between one or more letters in a printed word and the corresponding sound(s) detected in the word's pronunciation (see Stuart and Coltheart's position). For example, a child might remember the word *back* by connecting the beginning and ending letters (*b* and *k*) with the corresponding sounds (/b/ and /k/) in the spoken word. To enter this partial alphabetic phase, children must know some letter-sound correspondences and be able to segment either the initial or the initial and final sounds in words. For beginning readers, the obvious advantage of moving from the pre-alphabetic to the partial alphabetic phase is that instead of trying to remember printed words via idiosyncratic visual cues, they can now use a restricted and reliable system of letter-sound relationships to help process new words and retain them in memory.

With gains in phoneme awareness, beginning readers eventually progress to a *full alphabetic* phase where they remember how to read specific words by forming complete connections between letters seen in the written word and phonemes detected in the word's pronunciation.

S P I N
/s/ /p/ /ĭ/ /n/

In reading the word *spin*, the child attends to both letters in the initial consonant blend, to the medial vowel, and to the ending consonant. By processing each letter sound, he or she can represent the word more completely in memory. According to Ehri (1998), this leads to more accurate reading:

> Whereas [partial alphabetic] readers' limited memory for letters may cause them to misread *soon* or *spin* as *spoon*, full alphabetic readers' representations eliminate confusion because their representations are sufficiently complete to distinguish easily among similarly spelled words. (p. 21)

In Ehri's (1998) final or *consolidated alphabetic* phase, the beginning reader starts to notice multiletter sequences that are common to many words he or she has stored in memory (e.g., the *-ock* sequence in *rock*, *lock*, *block*; the *-ight* sequence in *night*, *right*, *flight*; or the *-est* sequence in *best*, *rest*, *chest*). By consolidating these recurring letters into functional word recognition units or chunks, the child becomes more efficient in reading words and storing them in memory. Instead of processing each letter in a new word (e.g., *v-e-s-t*), the child can simply process the initial consonant (*v*) and the following vowel pattern (*-est*). As Ehri pointed out, such a chunking strategy is especially helpful when reading longer, multisyllable words such as *question*, *restaurant*, and *interesting*.

In summary, a common theme in the preceding developmental formulations is the progressive unfolding of phoneme awareness in reading acquisition. At first, beginning readers can attend to only the initial sound in a spoken word (*cup* = /k/ /-/ /-/); later, to the initial and ending sounds (*cup* = /k/ /-/ /p/); and, finally, to each sound in the word (*cup* = /k/ /ŭ/ /p/). Increases in phoneme awareness lead to more complete letter-sound processing, which in turn allows more and more words to adhere in sight word memory. This is the crux of Ehri's (1998) clearly articulated developmental model. But we are left with a question. If phoneme awareness and learning to read are in a reciprocal, two-way relationship, what is it, specifically, about learning to read that enhances phoneme awareness? As a group, reading researchers have tended to ignore this complicated—some would term it "messy"—question. The few researchers who have addressed it, however, suggest that phoneme awareness is enhanced by beginning readers developing a *concept of word in text*—an awareness that spoken words match to printed words in the reading of text.

Phoneme awareness and concept of word in text

Clay (1972, 1991) was among the first to discuss the importance of beginning readers developing an awareness of word units in text. From her careful, longitudinal observations of beginning readers, Clay (1991) noted that in order to read simple texts, the child must "break up his produced speech into word units; locate the visual patterns [in text]; move in the correct direction; and coordinate the timing of his pointing and looking with his uttering" (p. 162). This suggests that the seemingly simple act of finger-point reading—matching spoken words to written words—should not be taken for granted. Clay stated,

> At first, children respond to caption books with the speed and fluency that is typical of oral speech. As they develop skill in matching spoken words with print, fingers are used to point to those parts of the text that they suspect correspond to what they are saying. Fluency gives way to word by word reading. At that point the child overemphasizes the breaks between words and points with his finger. *He has taken a major step towards integration of these early learnings when his reading slows down and even becomes staccato.* He may be thought of as "reading the spaces." (1991, pp. 164–165)

Henderson (1980, 1981) also viewed accurate finger-point reading as an important benchmark in learning to read. But Henderson went beyond Clay when he hypothesized 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,

> 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 [phoneme segmentation] 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 end, they cannot know where to focus their attention. (1980, pp. 9–10)

Henderson's (1980) analysis directly addressed the issue of reciprocity. He essentially identified an aspect of early reading skill (concept of word in text) that might account for the progressive development of phoneme awareness in the beginning reader.

In two separate studies, Morris (1983, 1993) examined the relationship between beginning readers' concept of word in text and their phoneme awareness. In the 1983 study, he found a strong positive correlation between beginning first graders' ability to finger-point read a short, memorized verse and their ability to segment spoken words into phonemes. In the 1993 study, Morris assessed the reading knowledge of 53 kindergartners four times during the school year (September, December, February, and May). Results suggested a developmental sequence in beginning readers' acquisition of word knowledge; that is, an early form of phoneme awareness (beginning consonant awareness) preceded the ability to finger-point read, which in turn preceded a mature form of phoneme awareness (segmentation), which in turn preceded word recognition ability.

Morris (1993) interpreted this developmental sequence in the following manner. To the true beginning reader, a line of text may appear to be a random string of alphabet letters, some known, some not known. At this point, finger-point reading is impossible because the child does not perceive printed words as units in text bounded by spaces.

Child: I c a x p a x x x x a x o a x.
Text: I can paddle a boat.

As the child learns letter-sound relationships and begins to appreciate the significance of spacing between words, finger-point (or word-by-word) reading becomes possible. Spoken words (e.g., /pădl/) can be matched to printed words (e.g., *paddle*) because there is a space between words and a beginning letter-sound match.

Child:	I	cxx	pxxxxx	a	bxxx.
Text:	I	can	paddle	a	boat.

With practice, the beginning reader becomes more adept at using spacing and beginning consonant cues to track print. At this point, the printed word begins "to stand still" for the child and is amenable to further analysis. For example, on meeting the word *boat* in the text, the child is confronted *visually* not just with the beginning consonant (*b*) but with additional, as yet undecipherable letters (*-oat*) in the word unit. It is possible that these additional, unaccounted for letters (phonemically speaking) begin to send another message to the beginning reader. That is, "This word has an ending letter (*-t*) that matches the final sound of the spoken word (/bōt/); 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 phonemic properties of his or her speech,* then future readings of this text (and others like it) might be represented like this:

Child:	I	cxn	pxddlx	a	bxxt.
Text:	I	can	paddle	a	boat.

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. Again, the letters within words (see the *x*s) can potentially call the young reader's visual attention to unaccounted for sound-*letter* matches. It may be this "framed" visual attention to vowel letters within words (e.g., cxn, bxxt) that ultimately triggers a corresponding awareness of the vowel sound within spoken words (e.g., /kxn/, /bxt/).

The developmental model proposed by Morris (1993) depicted a progressive, ongoing interaction between beginning readers' phoneme awareness and concept of word in text. The importance of phoneme awareness was not questioned; the point was that such awareness matures within the context of the printed word—the word frame and the letters within.

Concept of word in text, initial sight words, and invented spelling: Related influences on the development of phoneme awareness

We have described how a child's ability to finger-point read—to match spoken words to printed words in reading text—might facilitate his or her awareness of phonemes within words. However, the story is undoubtedly more complicated. For example, it is likely that *initial sight vocabulary* and *invented spelling*, among other factors, also contribute to the development of phoneme awareness.

On entering school, many children know a few, cherished printed words (e.g., *mom, dad, love, kitty*, their own names, and possibly a sibling's or friend's name). Nonetheless, acquiring a core sight vocabulary of 15 to 25 words—a critical step forward in learning to read—usually depends on the child establishing a stable concept of word in text. For example, suppose a kindergartner learned to repeat the spoken phrase "The cat ran up the tree." Next, the child was shown a card on which the phrase was printed. If the spaces between the printed words had no functional meaning to the child, then the 18 letters would probably be seen as a random string of alphabet letters (Thecatranupthetree). Where in this sequence is the word to be remembered? (*ca tran* is just as likely as *cat ran.*) It seems doubtful that a child lacking such a concept of word could identify words or learn them on a sight word recognition basis.

As finger-point reading allows the beginning reader to accrue sight words in memory, these known words may exert an independent influence on the child's developing phoneme awareness. For example, although the first few sight words the child acquires (e.g., *go, cat, said, he*) might be unanalyzed logographs—at best, letter strings with only the beginning letter sound processed—the addition of more words to sight memory (e.g., *got, can, sun, hit*) could lead to some restructuring of letter-sound processing and an attendant increase in phoneme awareness. That is, in order to keep both *go* and *got* in sight word memory, the child may attend, for the *first* time, to the ending letter sound in a word. Similarly, attention to the ending consonant would also help the child distinguish between *cat* and *can*, and *said* and *sun.* In this way, initial sight word acquisition can lead the child to attend to other sounds in a word besides the beginning consonant.

Writing with invented spellings also enhances children's awareness of sounds within words (Chomsky, 1979; Clay, 1985; Ehri, 1989; Richgels, 2001). However, acknowledging that phoneme awareness is facilitated by sound-it-out spelling attempts (e.g., BC for *back*) does not diminish the importance of concept of word in text. To the contrary, concept of word in text and phonemic spelling are developmentally intertwined. Suppose that a kindergarten child, who possesses a rudimentary concept of word in text, does a good bit of writing. Over a month's time, the child's phoneme awareness progresses in the following manner:

	(I	can	ride	my	bike.)
Stage 1	I	C	R	M	B.
Stage 2	I	KN	RD	M	BK.

In Stage 2, the child shows awareness of word boundaries—of beginning and ending sounds in words. This Stage 2 spelling could have resulted from the child first beginning to recognize *through reading words in text* that word units have letter sounds at the beginning and end (see Morris, 1993). Or, it could work the other way. The child's nascent awareness of beginning and ending consonant sounds, as revealed in his or her writing (e.g., RD for *ride*), may actually precede his or her ability to process these letter sounds in reading. If so, the child is still faced with the task of applying his or her emerging phoneme awareness (beginning and ending consonants) when finger-point reading individual words in text. The child must continue to elaborate and refine his or her concept of word in text.

The influence of instruction

Teaching children to read can be approached in several ways. One can start by teaching them to blend individual letter sounds (*c-a-p = cap*); to memorize individual words (e.g., *cat, dog, run, play*); or to echo read (teacher reads, then child echoes) simple texts. Today, emergent literacy theorists (see International Reading Association and National Association for the Education of Young Children, 1998; also Snow, Burns, & Griffin, 1998) and many kindergarten teachers favor the latter approach; that is, supporting beginners in their efforts to read and reread familiar texts. It is in this instructional context that concept of word in text plays a central role. As kindergartners, following the teacher's model, attempt to finger-point read dictated stories, nursery rhymes, or favorite Big Books, they must learn to match the temporal flow of spoken words to their printed forms on the page. Until they can do this—until they can match spoken words to printed words—they will be unable to use letter-sound cues as a word recognition aide or acquire sight words from their reading.

This is not to argue that concept of word in text is equally important in all instructional schemes. For example, if reading instruction, from the start, emphasizes the blending of letter sounds or the rote memorization of sight words, and de-emphasizes supported contextual reading, then concept of word in text might play a secondary rather than a primary role. Several studies (Barr, 1974/1975; Cohen, 1974/1975; Elder, 1971) have shown that beginning readers' early word recognition strategies can be influenced significantly by different forms of instruction; for example, phonics-emphasis programs tend to produce readers who process words in a more analytic (letter-sound) manner than do readers exposed to whole-word instruction in basal preprimers. Keep in mind that the present study's hypothesis about the development of printed word knowledge applies to the balanced literacy instruction (supported contextual reading, phonics, and writing) found in the participating kindergarten classrooms.

Related studies

In addition to Morris (1993), only two studies over the past decade (Ehri & Sweet, 1991; Uhry, 1999) have investigated the relationship between beginning readers' phoneme awareness and concept of word in text. Ehri and Sweet (1991) taught an eight-line oral verse to a group of children (4.5 to 6 years old), and then measured the children's success in finger-point reading a printed form of the verse. The researchers also assessed the children's letter knowledge, word reading ability, and phoneme awareness. Regression analyses showed that letter knowledge was important for locating individual words in text and that phoneme segmentation was important for pointing to printed words at the same time they were spoken. At odds with Morris's (1993) results was Ehri and Sweet's finding that phoneme segmentation seemed to precede rather than follow finger-point reading ability.

Uhry (1999) also investigated the relationship between concept of word in text (or finger-point reading) and phoneme awareness. Working with kindergartners in a whole language classroom, Uhry assessed the children's letter knowledge, phoneme awareness, invented spelling ability, and finger-point reading ability. Findings showed that while letter knowledge and phoneme awareness were significantly correlated with finger-point reading, invented spelling ability was the best predictor ($r = .66$) of the skill. Uhry also concluded that beginning readers use either ending *or* initial consonant cues in their efforts to track words in print, countering Morris's (1993) contention that beginners rely mainly on the beginning consonant cue in their finger-point reading.

Task differences make it difficult to compare directly the results obtained by Ehri and Sweet (1991) and Uhry (1999) to the results obtained by Morris (1993). Moreover, while the first two studies analyzed data collected at one time point, the Morris study used a longitudinal design, tracking the reading development of 54 kindergartners at four points across the school year. Still, one finding common to all three studies was that letter knowledge and partial phoneme awareness seem to be precursors to finger-point reading.

The present study

Concept of word in text, as defined in this study, is the beginning reader's ability to match spoken words to printed words in reading a sentence. In a sense, concept of word in text is a *skill* (a sequence of behavior coordinated over time) that is based on evolving conceptual knowledge. Initially, this fledgling skill depends on the child's awareness of spacing between printed words and attention to beginning consonant letter sounds. With reading practice, the skill is elaborated and strengthened as the child begins to attend to additional letter sounds within the printed word—first the ending consonant and later the vowel. One can think of concept of word in text and phoneme awareness as developing in parallel, with gains in one area leading to gains in the other. Or one can think of concept of word in text as an evolving construct, a vehicle or frame into which emerging phoneme awareness fits. In either case, it should be possible to locate concept of word in text in the sequence of early reading acquisition—to identify the understandings that precede it and the ones that follow after.

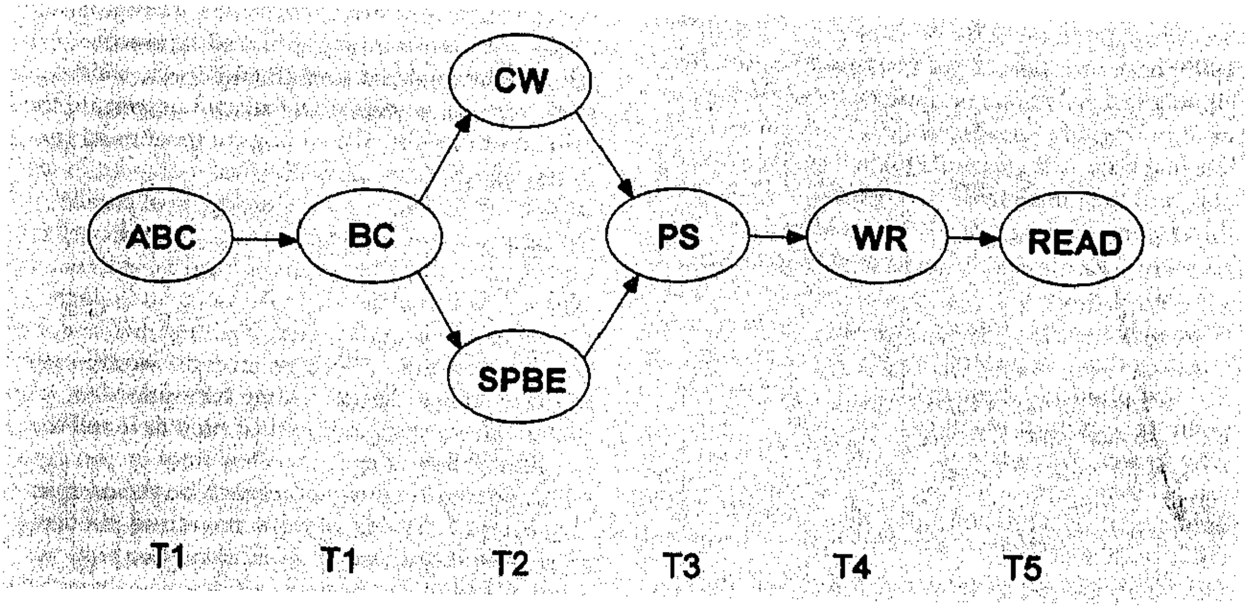
Given the paucity of research on the relationship between concept of word in text and phoneme awareness, the present study attempted to replicate Morris (1993) with a larger sample of neophyte readers over a longer time span (beginning of kindergarten through the end of first grade). With the larger sample and longitudinal design, we were able to test a model of early reading development using path analysis. Path analysis is the logical extension of multiple regression applied to complex models of observed variables that involve more than one equation. It is a method for testing theoretical relationships among observed variables, rather than a method for discovering causes. Thus, path analysis is ideally suited for testing the developmental model of emergent reading proposed here. We turn now to the components of the model.

Proposed model of early reading development

There are seven components or ability areas in the proposed model: alphabet knowledge (ABC), beginning consonant awareness (BC), concept of word in text (CW), spelling with beginning and ending consonants (SPBE), phoneme segmentation (PS), word recognition (WR), and contextual reading (READ). Over time, beginning of kindergarten to end of first grade, the components were expected to exert their developmental influence as seen in Figure 1.

At Time 1, beginning of kindergarten, the model features *alphabet knowledge* and *beginning consonant awareness.* Young children vary on how much alphabet knowledge they bring to school. Upon entering kindergarten, some children have little or no alphabet knowledge, others know a few letters in their name, and still others can recognize (and write) many alphabet letters. Recently, several studies (e.g.,

FIGURE 1
THEORETICAL MODEL OF READING DEVELOPMENT



Johnston, Anderson, & Holligan, 1996; Stahl & Murray, 1994) have shown that alphabet knowledge tends to precede and possibly facilitate children's attention to the beginning consonant sound in words. This may be because many alphabet letter names (e.g., *bee, tee, em*) carry the sound represented by the letter (e.g., /b/, /t/, /m/). Also, home and preschool literacy experiences often involve the child in linking an alphabet letter name with its corresponding sound; for example, in "reading" an alphabet picture book (*B, b* stands for *boy* [with a picture of a boy]) or writing personally meaningful words like one's name, *mommy, love,* and so on.

At Time 2, middle of kindergarten, *concept of word in text and spelling with beginning and ending consonants* come to the fore. Instruction over the first half of the kindergarten year will lead many children to master the alphabet and develop beginning consonant awareness. They can then use this knowledge to make further advances in reading and writing. For example, as the teacher models finger-point reading of favorite dictated stories and Big Books, children can use spacing between words plus beginning consonants to develop a concept of word in text—an understanding that words are units in a line of text, composed of letters that march left to right (Henderson, 1981). As the child's concept of word in text stabilizes (that is, begins to "stand still" for analysis), he or she can begin to process other letter sounds in the word, particularly the ending consonant (Morris, 1992, 1993).

Writing is another way for kindergartners to develop awareness of the ending consonant sound in words. As the teacher leads the children in a shared writing activity or dictated story, he or she might say:

> Our next word is *sled*. Who can tell me what letter I should put down first? [Children respond.] Good—an *s*. Then there is an *l* and an *e*. [Teacher writes these letters down.] Now, there is one more letter in *sled*. What sound do you hear at the end? [One little girl raises her hand, is acknowledged, and says *d*.] Good, Mary! The final sound in *sled* is /d/, so we write *d*.

As the kindergartners draw and write daily in their own journals, they have many opportunities to attend to sounds within words. Once they control beginning consonants, the knowledgeable teacher will encourage them to attend to the ending sound in the word ("Okay, you've written an *s* for *snake*; what sound do you hear at the end?") (see Clay, 1993; Morris, 2003).

For most children, a rudimentary concept of word in text probably precedes spelling with beginning and ending consonants (see Morris, 1993). However, in this study, with only one data collection point (February) in the middle of kindergarten, it is difficult to tease out this sequence. Therefore, the model predicts that CW and SPBE will emerge together at Time 2.

At Time 3, end of kindergarten, *phoneme segmentation* (or the ability to segment each sound in a consonant-vowel-consonant [CVC] word) is the targeted ability. During the second half of the kindergarten year, those children who can finger-point read and attend to beginning and ending consonants in words are in good position to refine their phoneme awareness; that is, to begin to attend to medial vowels (e.g., the /ĭ/ in /dĭg/ or the /ō/ in /bōt/). The medial vowel is the hardest phoneme for the young reader to process (Ehri, 1998; Lewkowicz, 1980), but a stable concept of word, with consonant boundaries processed, frames the vowel for conscious attention (e.g., *dig* = d x g; *boat* = b x t). Because of phoneme segmentation's inherent difficulty and dependence on reading and writing experience, we would not expect many children to demonstrate this ability before the end of kindergarten.

At Time 4, two months into first grade, *word recognition* is the ability of interest. Armed with phoneme awareness, the underlying "glue" that allows printed words to adhere in memory (Adams, 1990; Ehri & Wilce, 1985), and benefiting from direct reading and word study instruction, achieving first-grade readers will demonstrate word recognition ability after a few months in school. Moreover, first graders who are able to decode and remember printed words in October should be strong readers at the end of the school year. Therefore, at Time 5, end of first grade, *contextual reading* ability is measured.

Method

Participants

The 102 kindergarten students (58 boys, 44 girls) attended four schools in a rural, mountain county in western North Carolina. Two of the schools served a lower middle socioeconomic status (SES) population (40% free and reduced-cost lunch), while the other two schools served a slightly more heterogeneous population (28% free and reduced-cost lunch). The students, who were drawn from eight classrooms based on the return of parent permission forms, were 97% Caucasian. This figure represents the ethnic makeup of the Appalachian Mountain region in which the study was conducted.

In each of the eight classrooms there was a teacher and a teacher assistant. All eight teachers had 10 or more years of experience teaching kindergarten.

Assessment tasks

The 102 children were assessed individually at five different points during their first two years in school: September, February, and May of kindergarten; and October and May of first grade. The specific assessment tasks to be described were part of a slightly larger set that was used in the study. In all, there were six examiners or data collectors. The first and second authors (both university-based reading educators) collected approximately two thirds of the data. They were assisted by two graduate students in the first year of data collection and two different graduate students in the second year. To assure uniformity in the examiners' administration of the assessment tasks, extensive training was conducted prior to the first testing, and refresher training was carried out prior to each of the subsequent testings. The reliability of the measures used was assessed by Cronbach's alpha. The reliability values ranged from .70 to .91 for the sample.

Alphabet knowledge

Each child was asked to name the uppercase form of 15 alphabet letters (*C, A, S, R, N, F, W, E, D, K, L, T, M, G*, and *I*) as the examiner pointed to them in the order above. Later, the child was asked to name the lowercase form of the same 15 letters. *Scoring*: uppercase, 0–15; lowercase, 0–15. These scores were combined and converted into a percentage correct score for alphabet knowledge. (*Note*. The children were also asked to write the 15 letters, but their ability to do so was not factored into the alphabet knowledge score.)

Beginning consonant awareness

Beginning consonant awareness was assessed in two different ways. In the *oral segmentation task*, the child was asked to segment off and produce the different beginning consonant sounds in a set of spoken words. There were four training words (*ball, mouse, sack*, and *rat*), followed by eight test words (*cap, rice, milk, sun, team, face, doll*, and *joke*). The examiner began the task by saying to the child,

> The first sound in *ball* is /b/. Can you say the first sound in *ball*? [Examiner provided corrective feedback if needed.] The first sound in *mouse* is /m/. Can you say the first sound in *mouse*? [Again, feedback was provided.]

Following administration of the four 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 or her attempts. *Scoring*: 0–8. One point was awarded for each correct response on the test words. An initial consonant sound followed by schwa was scored correct (/rŭ/ for *rice*); however, a response that included the vowel sound in the target word was scored incorrect (/rī/ for *rice*).

In the second task, *consonant sorting*, the examiner placed on the table a picture and a small cup and then said,

> This is "Bill" [pointing to the picture]. Bill's name starts with /b/. We are going to find some other words that start like "Bill" (/b/) and put them in Bill's cup.

The examiner then brought out a picture card (*book*) and asked the child if *book* starts like *Bill*. The examiner waited for the child's response, provided corrective feedback if necessary, and then had the child place the *book* card in Bill's cup. The procedure was repeated with a second training item (*fish*), which of course was not placed in Bill's cup. Five test items followed (pictures of *bed*, *moon*, *boat*, *bird*, and *tire*); each time the child had to decide whether or not the word began with the /b/ sound.

Next, the examiner replaced the *Bill* picture with a picture of *Sarah*, informing the child that now the task was to find words that started like Sarah's name (/s/). Again, there were two training words (pictures of *soap* and *tent*), followed by five test words (pictures of *sock*, *dog*, *milk*, *sun*, and *fork*). *Scoring*: 0–10.

The *oral segmentation* (0–8) and *consonant sorting* (0–10) scores were converted to percentage correct scores and combined to yield a single score for beginning consonant awareness.

Concept of word in text

The child's concept of word in text was assessed in two different contexts. In the *sentence reading* task, the child finger-point read a three-page story (see Appendix A), with each page containing a single sentence and accompanying picture. After turning to page 1 (*Katie is walking in the rain.*), the examiner said: "I'm going to read this sentence, 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 reading attempt, the examiner immediately pointed to a target word in the sentence (*walking*) and said, "Can you read this word?" The child received 1 point for a perfect finger-point reading of the sentence (self-corrections in pointing were accepted) and 1 point for correctly naming the target word. Sentences 2 and 3 of the story were read in the same manner. *Scoring*: finger-pointing, 0–3; word identification, 0–3.

In the second task, *poem reading*, the examiner used picture cards (see Appendix A) to help the child memorize the first two lines of an old folk poem (*Sam, Sam, the baker man, / Washed his face in a frying pan*). The two lines were practiced orally until the child could recite them perfectly. Next, the examiner brought out a printed version of the two lines and said: "This is the verse we just learned. I'm going to read it, pointing to each word; then we'll read it together." After two readings in which the examiner finger-pointed, the child was asked to finger-point read the two lines of print. The child's finger-pointing accuracy was scored (correct or incorrect) for each line. Then the examiner pointed to a single word (*baker*) in the text ["What is this word?"], and then to a second word (*face*) ["What is this word?"]. *Scoring*: finger-pointing, 0–2; word identification, 0–2.

Collapsing performance on the *sentence reading* and *poem reading* tasks led to five finger-point reading attempts (0–5) and five *post-hoc* word identification attempts (0–5). The total number of correct responses (0–10) was converted to a percentage correct score for concept of word in text.

Note. The kindergarten children, particularly at Times 1 and 2, could recognize very few printed words in isolation. Therefore, their ability to identify specific words in sentence context (i.e., when the examiner pointed to the word) involved neither instant word recognition nor decoding skill, but instead a process of returning to the beginning of the line and finger-pointing (or eye-pointing) over to the target word; that is, using the structure of the printed sentence—words arrayed left to right and separated by spaces—to identify the word. Still, some critics may argue that the task is measuring word recognition, not concept of word in text. For this reason, we administered a pretest on the five target words (*big*, *on*, *face*, *baker*, and *walking*) *before* the text reading began. The child's score on the pretest was subtracted from his or her score on the word identification part of the concept of word task, thus controlling somewhat for the confounding influence of word recognition skill.

Spelling with beginning and ending consonants

Each child attempted to spell 10 words dictated by the examiner. The examiner, with pencil in hand, began by modeling a sound-it-out spelling of *map*:

If I were going to write the word *map*, what letter should I write down first? [If the child could not say *M*, the examiner said the letter name and wrote it down.] What letter comes next, what do you hear next in *map*? [The examiner wrote the correct letters, MAP, if the child could not provide them.]

After modeling a second sound-it-out spelling (BOT for *boat*), the examiner handed the pencil to the child and said,

Now you are going to write some words. Think about what sound you hear first and what next. Your first word is *back*. Write *back*.

The examiner proceeded to administer the 10 test words: *back, feet, step, junk, picking, mail, side, chin, dress*, and *road*. The examiner could probe for sounds on the first two test words (e.g., *Back*, what sound do you hear first? Or, you wrote an F for *feet*; what do you hear at the end of *feet*.), but could not probe on test words 3 through 10.

Scoring. As one might expect, there was wide variation in the children's ability to spell the words. For example, in the middle of kindergarten, *feet* was spelled R, T, F, FT, and FET by five different children. In this task, the measure of interest was the children's ability to represent the beginning and ending consonants in their spelling attempts. Therefore, a spelling received a score of 1 if it contained at least the beginning and ending consonant (e.g., *feet* spelled FT, FTE, FAT, or FET); otherwise, the spelling was scored 0 (e.g., *feet* spelled R, T, F, or FA). Total number of correct responses (0–10) was converted to a percentage correct score for spelling. (See Appendix B for scoring examples.)

Phoneme segmentation

This task was oral; there was no print involved. The child moved three small blocks as he or she separately pronounced each phoneme in a three-phoneme word. There were four training words (*map, seat, fun*, and *road*) followed by eight test words (*tap, neck, feet, dig, soap, mud, race*, and *job*). On the training trials, the examiner said the word (e.g., *map*) and then pronounced it again in a segmented manner, moving a block forward as he or she clearly said each phoneme in the word (/m/→/ă/→/p/). Next the child attempted to segment *map*. 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 eight test words that followed, the examiner pronounced each 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*: 0–8, which was converted to a percentage correct score. One point was awarded for each correct word segmentation. However, to receive credit, the child had to separate clearly each phoneme in his or her pronunciation of the word. Typical errors involved the child being unable to separate the vowel sound from the adjacent consonants (e.g., /măp/ = /m/ /mă/ /p/ or /m/ /ă/ /ăp/).

Word recognition

The child attempted to read 20 *basal words* (see Appendix C), 5 words from each of the first four levels (preprimer, primer, first grade, and second grade) of *Basic Reading Vocabularies* (Harris & Jacobson, 1982). The examiner pointed to the words one at a time, allowed the child up to three seconds to respond, and then moved to the next word in the list. Because the words were ordered by difficulty level, the examiner stopped the test when the child made seven consecutive errors. Next, the child attempted to read 20 *decodable words* (see Appendix C), also selected from the preprimer through second-grade levels of the Harris-Jacobson word corpus. Again the testing was discontinued when the child made seven consecutive errors. *Scoring*: 0–40, which was converted to a percentage correct score.

Contextual reading

Contextual reading was assessed in two different ways. In the *passage reading* task, the child read aloud up to seven passages that progressed in difficulty from early first grade to third grade (see Appendix D). The first two passages (emergent and preprimer) contained 29 and 69 words, respectively; the final five passages (primer, late first, early second, late second, and third grade) each contained 100 words. The child began reading at Level 1 and progressed through as many passages as he or she could. As the child read aloud, the examiner kept a running record of errors made (substitutions, omissions, insertions, examiner helps) and time needed to complete the passage. The examiner also asked three comprehension questions at the end of each passage. Passage reading was discontinued if the child's oral reading fell below 85% accuracy on the second passage (preprimer 2) or below 90% accuracy on one of the later passages (primer and above). To receive credit (1 point) for reading a given passage, the child had to meet preestablished levels of accuracy and rate (see Appendix D). *Scoring*: 0–7 (the highest passage reading level attained).

In the second contextual reading task, *comprehension,* the child attempted the first 36 items on the passage comprehension subtest of the Woodcock Reading Mastery Tests. In a cloze format, with an accompanying picture cue on many items, the child attempted to read a one- or two-sentence passage, identifying a key word that was missing (e.g., "Every day the old man ____ in his book."). Because only the first 36 or easiest items of the subtest were used, this was really more a measure of sentence comprehension than passage comprehension. The test was discontinued if the child made six errors in a row. *Scoring*: 0–36.

The *passage reading* (0–7) and *comprehension* (0–36) scores were converted to percentage correct scores and combined to yield a single score for contextual reading.

The preceding assessments, except contextual reading, were administered to all 102 children at Times 1, 2, 3, and 4 (September of kindergarten through November of first grade). The passage reading component of contextual reading was administered at Times 4 and 5, while the Woodcock comprehension component was administered for the first time at Time 5 (May of first grade).

Longitudinal studies of this kind are based on the assumption that valid measures are being obtained of the constructs ordered in the proposed developmental sequence. The alphabet knowledge, beginning consonant awareness, spelling with beginning and ending consonants, word recognition, and contextual reading tasks used in this study have considerable face validity. However, a critic might argue that it is possible to manipulate the sequential occurrence of concept of word in text and phoneme segmentation by varying task difficulty. For example, an "easy" CW task and a "difficult" PS task could conceivably produce the illusion of a CW→PS sequence where none existed; likewise, reversing the task difficulties could produce an illusory PS→CW sequence. We tried to guard against this task difficulty concern by choosing tasks that were straightforward measures of the target constructs 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 we used; that is, the child attempted to finger-point read a line of text immediately after hearing and seeing the examiner finger-point reading the same line. Regarding phoneme segmentation, we used a simple task requiring the child to segment a series of three-phoneme words by saying the phonemes in each word separately. The kindergarten children 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).

Kindergarten instruction

Although instruction was not manipulated in this study, the reading and writing instruction in the eight kindergarten classrooms undoubtedly influenced the course of the children's literacy development. For this reason, we interviewed the kindergarten teachers individually in the fall and again in the spring to document the kind and amount of literacy instruction they were offering in their respective classrooms. We summarize this interview data here.

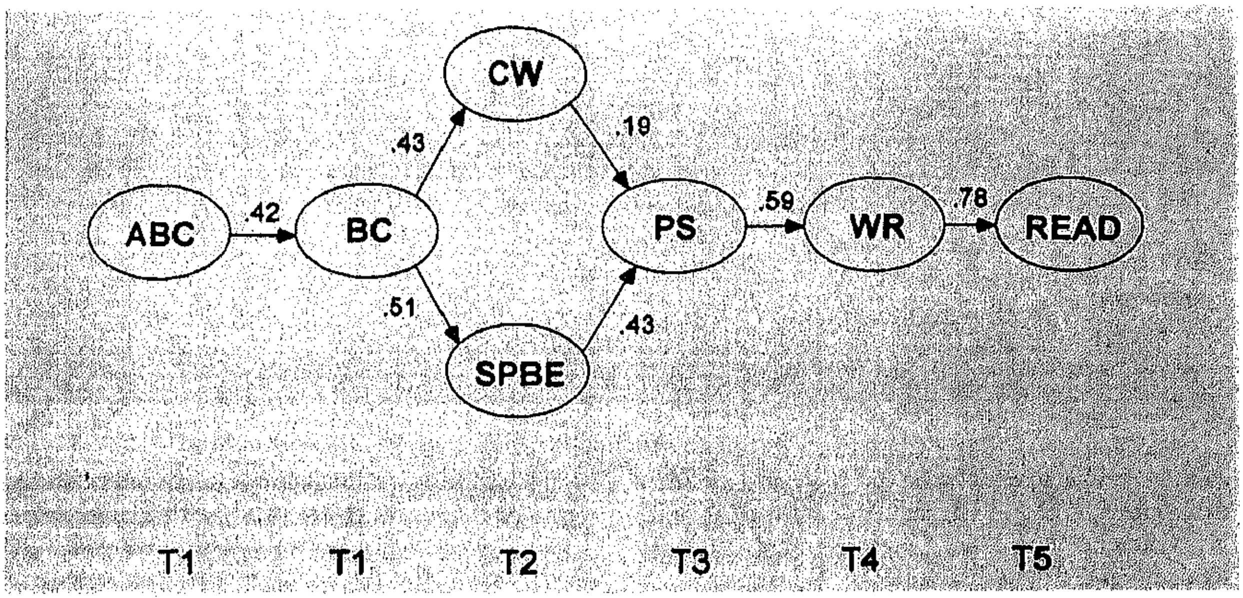
Alphabet instruction

During the fall semester, the eight kindergarten teachers concentrated on teaching the alphabet and the sounds represented by the letters (e.g., *b* = /b/; *r* = /r/). Five teachers began teaching the alphabet the first week of school. They taught one letter per week, reviewing letters in subsequent weeks as needed. The other three teachers waited two months before starting alphabet instruction. In the spring semester, the eight kindergarten teachers continued to teach and review the alphabet. They also made sure that children could attend to the beginning consonant sound in a word (e.g., the /f/ in /fēt/) and match the sound to the appropriate letter (*f*).

Guided reading

Overall, there was little guided reading instruction during the fall. The teachers read stories aloud to their children each day, but their intent was not to teach the children how to read stories. The only examples of guided reading were as follows. All eight teachers modeled the reading of a calendar message each day (e.g., "Today is Monday. The weather is cold and sunny."). The teacher pointed to each word in the calendar sentences and then had the children join in reading. Two of the eight teachers also modeled finger-point reading in a different context. On Mondays, one teacher had the children dictate one or two sentences that went along with a theme being studied in class; she then led the children in reading the "weekly story" each day of the week. Another teacher, on Mondays, introduced a short poem and led the children in reading the verse each day. (The poem emphasized the letter or sound being studied that week.)

FIGURE 2
STANDARDIZED ESTIMATES FOR MODEL OF READING DEVELOPMENT



In the spring semester all eight teachers increased the amount of time they spent reading to the children. Five teachers began reading Big Books (enlarged versions of favorite folk tales) to their students, often pointing to the words as they read the story aloud. However, this could hardly be called guided reading because of the following: (a) there was too much print on the page (five to seven lines) for most of the children to follow the teacher's modeling, and (b) the children were not given opportunities to come up and try finger-point reading the text themselves. The two teachers who, in the fall, had used a weekly rhyme and a weekly dictated story to model word-by-word reading continued these guided reading practices in the spring.

Writing instruction

As a group, the teachers did not emphasize writing during the fall. However, one teacher did begin to write with her children in mid-October. Each day after lunch, this teacher divided the class in half. While one group worked at centers (e.g., blocks, sand table, computer), each child in the other group drew a picture and wrote a sentence describing his or her drawing. The children were encouraged to spell words "the way they sound," and the teacher accepted, even praised, partial representations of words (e.g., B or BK for *back*). For those children who could not or would not write, the teacher had the child dictate a sentence describing his or her drawing. The teacher wrote the sentence down and then guided the child in finger-point reading it.

Beginning in January, all eight teachers began to emphasize writing in their curriculum. Children in each classroom began to draw and write three to four days per week. Activities ranged from writing a caption sentence under a picture to composing a book about one's family to making regular entries in a personal writing journal. Teachers took down dictation for children who could not write, but they expected most of their students to write independently with sound-it-out or invented spellings (e.g., I CN RD A 4 WLR: *I can ride a four-wheeler.*). In fact, several teachers raised the minimum amount of writing per day from one to two sentences.

Results

Structural equation modeling was used to assess the relations among the variables used in the theoretical model depicted in Figure 2.

Table 1 contains the correlations and standard deviations for the variables.

The first step in evaluating the model was to assess the fit between the hypothesized model and the sample data. The goodness-of-fit index (GFI) is used for this purpose because the chi-square statistic is easily influenced by large sample size (e.g., Fassinger, 1987). The normed chi-square (NC) (which is the chi-square to degree of freedom ratio)

TABLE 1
CORRELATION MATRIX AND STANDARD DEVIATIONS OF VARIABLES

	ABC	BC	CW	SPBE	PS	WR	READ
ABC	1.00						
BC	0.42	1.00					
CW	0.47	0.43	1.00				
SPBE	0.59	0.51	0.62	1.00			
PS	0.36	0.25	0.44	0.53	1.00		
WR	0.61	0.43	0.56	0.68	0.60	1.00	
READ	0.53	0.33	0.58	0.62	0.49	0.78	1.00
Standard deviations:							
	36.7	23.3	27.8	39.8	32.2	26.4	21.0

Note. ABC and BC were assessed at Time 1; CW and SPBE at Time 2; PS at Time 3; WR at Time 4; and READ at Time 5.

and the comparative fit index (CFI) are also useful in this context. GFI and CFI values of at least .90, and NC values between 1 and 5 often are cited as criteria for acceptable fit (e.g., Schumacher & Lomax, 1996). The GFI, NC, and CFI values can be seen in Table 2. Each of these indices indicated that the data had an acceptable fit.

In structural equation modeling (SEM), alternative models can be addressed in two different ways. First, in some cases, competing theoretical models exist and the researcher is interested in determining which model yields the best fit. This approach is theoretically based. Second, when only a single theoretical model is available, then that model is tested and the SEM results suggest ways in which the model could be altered in order to provide a better fit. This approach is statistically based.

TABLE 2
STRUCTURAL EQUATION MODELING RESULTS*

Paths	Values
ABC → BC	.42
BC → CW	.43
BC → SPBE	.51
CW → PS	.19
SPBE → PS	.43
PS → WR	.59
WR → READ	.78
Goodness-of-fit indices	
chi-square (12 *df*)	44.23
GFI	.90
NC	3.69
CFI	.90

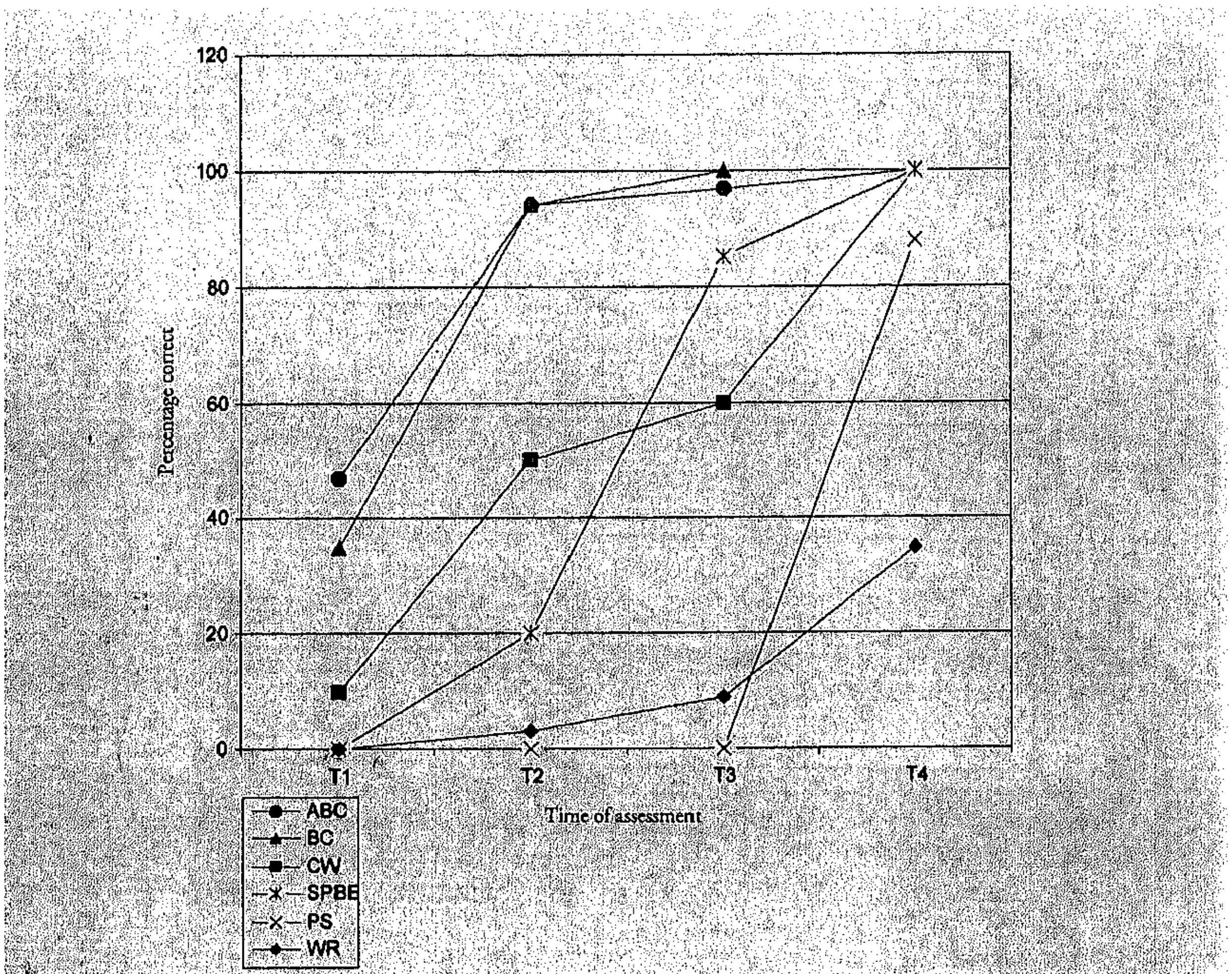
Note. *The values for the paths are the standardized path coefficients; all paths are significant ($p < .05$).

Regarding the first approach, our intent was to replicate the Morris (1993) study with a larger sample and a more sophisticated statistical analysis. Several alternative theoretical models were tested, but their fit was not nearly as strong as the original model. As for the second approach, the LISREL program made several suggested model modifications in the search for a better fitting model. The additional paths suggested for inclusion in a subsequent model were either in the wrong temporal sequence (e.g., a measure at Time 3 influencing a measure at Time 1) or were not theoretically plausible. Overall, then, the best fitting model was the only one that had a substantive basis. As this was the hypothesized model, none of the results from the inferior models are presented.

Two correlated measurement errors were included in the final model. The first was between SPBE and CW because both measures were obtained at the same time point, and examining a direct effect between them was not logical. However, both variables are strongly correlated ($r = .62$), and this was a way to model that correlation. The second was between PS and WR because the correlation ($r = .60$) was stronger than the direct effect of PS on WR and because both tasks involve aspects of decoding.

The model also was assessed by examining the standardized path coefficients for the relations among the variables. Those coefficients are analogous to standardized beta weights in multiple regression. All of the paths were statistically significant at $p < .05$, and the standardized path coefficients are shown in Figure 2 and Table 2. In addition, each standardized path coefficient was in the expected direction (i.e., positive relationship). (*Note.* For theoretical reasons, we allowed ABC to directly influence only BC and to have an indirect influence on the re-

FIGURE 3
MEDIAN PERFORMANCE OF ALL CHILDREN ($N = 102$) ON LITERACY VARIABLES FROM BEGINNING OF KINDERGARTEN THROUGH BEGINNING OF FIRST GRADE



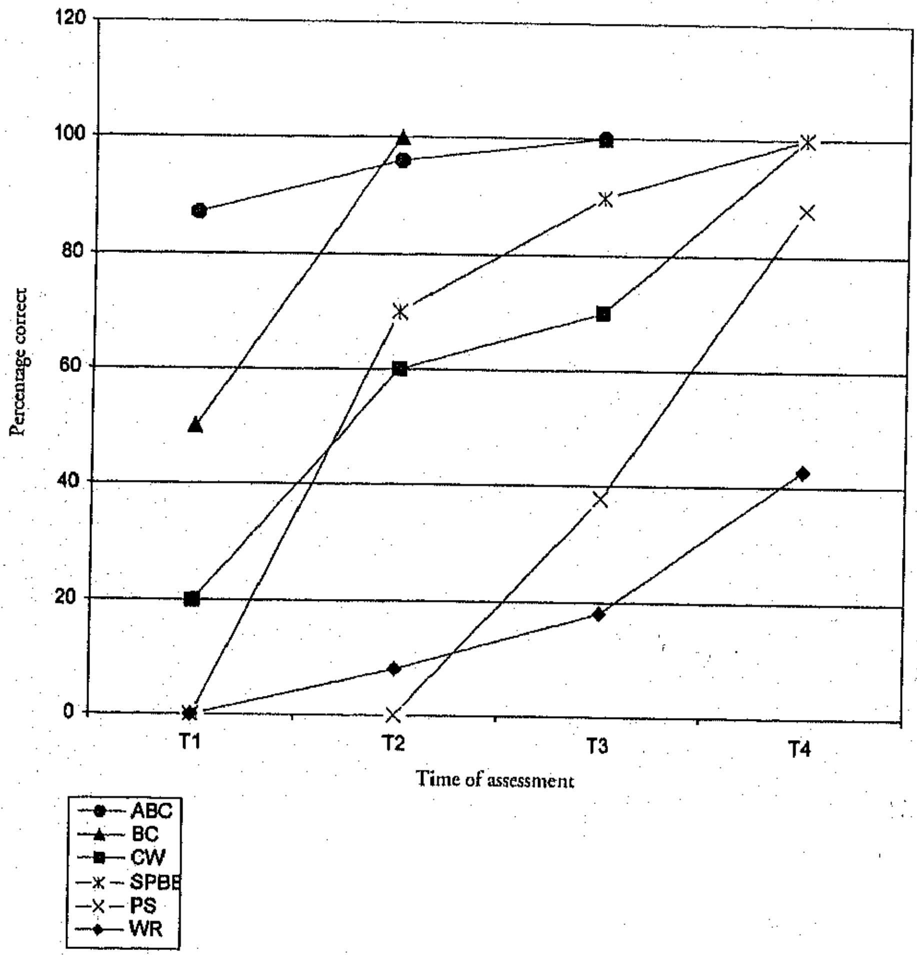
Note. At Time 4, only the *finger-point reading* part of the concept of word score was graphed. This was because two months into first grade, the children could read many of the words in the *word identification* part of the concept of word task. Because finger-point reading correlated highly with the total concept of word score at Times 1, 2, and 3 ($r = .89$ or higher), this small change in the CW measure at Time 4 did not affect the overall pattern of results.

maining variables through BC. Allowing ABC to directly influence all other variables did not seem to be theoretically plausible or defensible, although it would have resulted in a stronger statistical fit. Our bias was to prefer theoretical over statistical considerations in model testing.)

Data in the present study were collected over multiple time waves, with intervals of three to four months separating the first four data collection points. Figure 3 shows median performance for each variable at Times 1 through 4. The descriptive analysis used medians instead of means because for several variables the distribution of scores was skewed. Figure 3 shows that for the sample of 102 children, alphabet recognition (ABC) and beginning consonant awareness (BC) changed or rose in parallel across the course of the year, as did two other pairs of variables: concept of word in text (CW) and spelling with beginning and ending consonants (SPBE), and phoneme segmentation (PS) and word recognition (WR). Furthermore, changes in ABC/BC tended to precede changes in CW/SPBE, and changes in CW/SPBE clearly preceded changes in PS/WR. This supports the temporal pattern of changes that was predicted.

To determine if children possessing different amounts of knowledge at kindergarten entry followed a similar developmental course, we divided

FIGURE 4
MEDIAN PERFORMANCE OF HIGH-READINESS CHILDREN (n = 51) ON LITERACY VARIABLES FROM BEGINNING OF KINDERGARTEN THROUGH BEGINNING OF FIRST GRADE

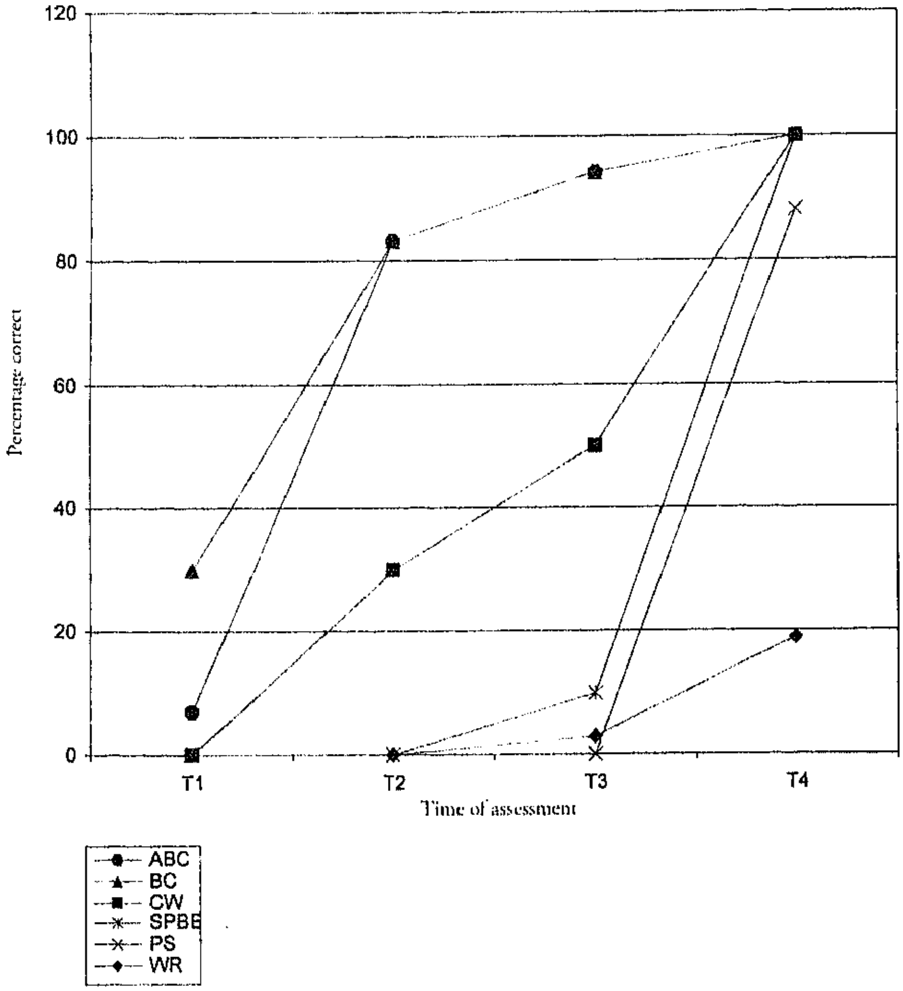


Note. At Time 4, only the *finger-point reading* part of the concept of word score was graphed (see Figure 3).

the 102 children into a high-readiness (N = 51) and low-readiness group (N = 51) based on their Time 1 alphabet knowledge score (high-readiness group mean = 81%; low-readiness group mean = 14%). Overall, the general pattern of results for the high- and low-readiness group children is similar, with the low group lagging behind on every variable (see Figures 4 and 5). One interesting difference, however, was the low-readiness group's slowness in learning to spell with beginning and ending consonants (SPBE). The low-readiness group did not demonstrate this ability until Time 4 (second month of first grade), whereas the high-readiness group could spell with beginning and ending consonants at Time 2 (middle of kindergarten).

Of particular interest in this study was the emergence of concept of word in text (CW) and its temporal relationship to phoneme segmentation (PS). Although Figure 3 shows that CW preceded PS in development, PS (an oral segmentation score) actually showed little growth during the kindergarten year, its median being 0% at Times 1 through 3. An alternative way to assess phoneme segmentation is through invented spelling attempts; that is, if a kindergartner spells *back* as BAK or *feet* as FET, he or she is demonstrating the ability to segment the word into phonemes (see Morris & Perney, 1984; Richgels, 2001; Stahl & Murray, 1994). We rescored the 10-word spelling test, this time counting an item correct if the child represented the beginning consonant,

FIGURE 5
MEDIAN PERFORMANCE OF LOW-READINESS CHILDREN (n = 51) ON LITERACY VARIABLES FROM BEGINNING OF KINDERGARTEN THROUGH BEGINNING OF FIRST GRADE



Note. At Time 4, only the *finger-point reading* part of the concept of word score was graphed (see Figure 3).

medial vowel, and ending consonant in his or her spelling (see scoring system in Appendix B). Medians for the new spelling measure of PS were 0% at Times 1 and 2 and 50% at Time 3.

Using the spelling measure of PS, we compared the children's concept of word in text at Time 2 with their phoneme segmentation (or spelling) at Time 3. Of the children (n = 40) who scored *at or above* 60% on CW at Time 2, 93% of them could spell phonetically one half or more of the words at Time 3. Of the children (n = 62) who scored *below* 60% on CW at Time 2, only 24% of them could spell phonetically half of the words at Time 3. The difference between 93% and 24% is statistically significant at the p < .001 level (chi-square = 45.39). This shows that for this sample of children, concept of word in text preceded phoneme segmentation during the second half of the kindergarten year.

Discussion

This study tested a theoretical model of early reading development with use of structural equation modeling. The longitudinal data fit the hypothesized model. The data also conformed to the predicted developmental sequence in a descriptive analysis of median performance change over time.

One could argue that the data pattern simply illustrates the progressive unfolding of phoneme awareness in reading acquisition. That is, first, the child becomes aware of the beginning consonant in a word; next, of the beginning and ending consonant; and finally, of the consonant boundaries and the medial vowel. However, the present study interjected another variable into this phoneme awareness-dominated story. As predicted by the theory, *concept of word in text* (facility in finger-point reading) followed beginning consonant awareness and preceded full phonemic segmentation of a syllable. This suggests that concept of word in text may play a linchpin role in reading development, helping to bridge an early form of phoneme awareness (beginning consonant) with a later form (segmentation). Henderson (1992) used different words to make the same point:

> To embrace this interactive model does not deny for an instant that phonological coding ability is causally related to reading success. This is simply to insist that phonological awareness can only ripen in the context of *word*. (p. 22)

It is important to distinguish between concept of word in text and the more widely used term concepts about print. *Concepts about print* refers to a variety of print-related understandings, including book orientation (e.g., front versus back, print versus picture), print direction concepts (e.g., left to right, top to bottom), letter and word concepts, and punctuation. On the other hand, concept of word in text refers more narrowly to a child's ability to finger-point read a sentence and then go back and identify a target word within the sentence (see Method section). Whereas in Clay's (1985) Concepts About Print test, only 1 of 24 items requires the child to isolate a word unit in text, in the present study's concept of word task, the child had five opportunities to finger-point read a sentence and five opportunities to identify a target word in a previously read sentence.

Results in the present study replicate Morris (1993), who found that in a sample of 53 kindergarten readers, beginning consonant knowledge preceded concept of word in text, which in turn preceded phoneme segmentation, which in turn preceded word recognition. Our results are also in agreement with two other point-in-time, correlational studies (Ehri & Sweet, 1991; Uhry, 1999) that looked at the relationship between finger-point reading and phoneme awareness. From their results, Ehri and Sweet concluded that finger-point reading (or concept of word in text) depended on both alphabet letter knowledge and phoneme segmentation skill. On first look, their finding that phoneme segmentation *precedes* concept of word seems to counter the present study's finding that concept of word *precedes* phoneme segmentation. However, Ehri and Sweet's phoneme segmentation task (segmenting two- and three-phoneme syllables, each containing the same vowel (e.g., /mā/, /bā/, /sla/) was easier than the present study's phoneme segmentation task (segmenting three-phoneme words, each containing a different vowel (e.g., /nĕk/, /dĭg/, /sōp/). In fact, the Ehri and Sweet phoneme segmentation task may be closer to the present study's beginning consonant knowledge task; if this is the case, then their results mirror the developmental findings in the present study.

Uhry (1999) used a more lenient measure of finger-point reading and a more stringent measure of invented spelling than did Morris (1993) and the present study. Therefore, caution is warranted in comparing results. Nonetheless, from her results, Uhry concluded that finger-point reading skill is related to children's awareness of beginning *and/or* ending consonants, not just beginning consonants, as Morris's (1993) formulation suggested (BC→CW→PS→WR). Results in the present study provide some support for both positions. That is, we found that for our sample of kindergartners, beginning consonant knowledge (Time 1) did precede concept of word in text (Time 2) (Morris's position). However, there was also a strong relationship (r = .62) at Time 2 between spelling with beginning and ending consonants (SPBE) and concept of word in text (Uhry's position). The issue seems to hinge on timing; that is, the onset of these skills over time. Early in learning to read, a child's concept of word in text depends on awareness of spacing between words and attention to the beginning consonant letter sound. Later in the process, a more mature concept of word involves awareness of spacing and attention to the beginning *and* ending consonant letter sounds. Data in the present study support this interpretation.

Regarding instructional effects, interviews with the eight kindergarten teachers revealed that they taught and reviewed the alphabet letters and accompanying beginning consonant sounds; they read to the children on a regular basis (but most teachers did not model word-by-word reading of Big Books or dictated stories); and they encouraged the children, during the second half of the school year, to write sentences using invented or sound-it-out spellings.

The kindergarten teachers' emphasis on alphabet and letter-sound instruction clearly showed up in the children's high scores on alphabet knowledge (ABC) and beginning consonant awareness (BC) at midyear (Time 2). The relatively small amount of guided reading instruction and writing practice during the first half of kindergarten did not deter the high-readiness students from developing a rudimentary concept of word in text (CW) and the ability to spell with beginning and ending consonants (SPBE) by Time 2 (see Figure 4). However, the lack of systematic teaching in these areas may have impeded the development of CW and SPBE in the low-readiness group from Time 1 to Time 2 (see Figure 5). Finally, the teachers' emphasis on writing with invented spellings during the second half of kindergarten increased phoneme awareness (SPBE and PS) in the high-readiness group at Time 3, but seemed to a have a marginal effect on the low-readiness group.

Instructional implications

Findings in the present study pertain to the traditional literacy instruction offered in the eight kindergarten classrooms. We acknowledge that the proposed developmental model could be affected by a different form of instruction (e.g., daily explicit instruction in phoneme segmentation and decoding would undoubtedly accelerate the development of these skills). Still, the specific reading instruction described in this study (guided contextual reading, alphabet and beginning consonant work, writing with invented spellings) is representative of what goes on in many kindergarten classrooms throughout the United States. Thus, we believe that the model described in this article offers kindergarten teachers a useful way to think about early reading development.

Figure 6 shows the reading-related concepts or abilities that were tracked over a two-year period in the present study. The abilities tended to emerge in the order (top to bottom) shown in the figure; that is, alphabet knowledge came in first and contextual reading ability last. Several aspects of this developmental model warrant comment. First, notice that *word recognition* (beyond an initial sight vocabulary) comes sixth in the seven-item sequence. This highlights the notion that crucial language- and print-related understandings (e.g., alphabet, concept of word in text, phoneme awareness) underlie and actually make possible word recognition skill. Next, note that *concept of word in text*, third in the sequence, is an understanding or skill that bridges early and later forms of phoneme awareness. In truth, concept of word or finger-point reading is an evolving skill that begins to emerge at stage 3 and continues to mature through stage 5. Finally, keep in mind that individual children will progress through the developmental sequence at different rates. As shown in Figure 6,

FIGURE 6
DEVELOPMENTAL SEQUENCE OF EARLY READING ACQUISITION

Kindergarten	1. Alphabet knowledge
	2. Beginning consonant awareness
	3. Concept of word in text
	4. Spelling with beginning and ending consonants
	5. Phoneme segmentation
First grade	6. Word recognition
	7. Contextual reading ability

many children will reach stage 5 by the end of kindergarten. However, a few children may progress all the way to stage 6 during the kindergarten year, while others may advance only to stage 3 or 4.

From longitudinal data of this kind, only tentative implications can be drawn for instruction. Nonetheless, for kindergarten teachers who favor a holistic or meaning-emphasis approach to teaching reading, the developmental model does suggest how instruction might guide student learning. Systematic teaching of the alphabet and beginning consonant letter sounds is obviously called for, because such knowledge underpins early reading and writing attempts. Early on, however, the kindergarten teacher can guide children in finger-point reading simple and engaging texts (e.g., two-sentence dictated stories or Big Books containing only one or two lines of text per page) (see Morris, 2003). By observing the teacher's model and then consistently practicing finger-point reading on their own, the children will eventually develop a concept of word in text. At this point, they can apply their beginning consonant knowledge in tracking printed words, and, as the word begins "to stand still" for analysis, they can attend to other letter-sound properties within the word unit (e.g., the ending consonant).

Writing of all kinds (e.g., lists, picture captions, journal entries, stories) is also to be encouraged. Writing with invented spelling complements young children's reading development by enhancing perception of phonemes within words, reinforcing knowledge of letter-sound relationships, and helping to automatize the spellings of high-frequency words (e.g., *the, and, is, to*).

Given a judicious mix of skill instruction and guided practice in reading and writing text, most kindergarten children will develop prerequisite reading skills, "a set for literacy" (Holdaway, 1979, p. 49). For those children who do not respond to such a "balanced" instructional diet, there are at least two options open to teachers. First, the teacher can *intensify* the developmental instruction. That is, provide small-group instruction, three or more times per week, that affords low readers focused opportunities to learn letter sounds, to finger-point read, and to write with invented spellings (see Morris, 2003). Or the teacher can take a more direct, explicit approach to teaching alphabet knowledge and phoneme awareness by using one of the many instructional programs that are now on the market (e.g., Adams, Foorman, Lundberg, & Beeler, 1998; Bishop & Bishop, 1996; Blevins, 1997). With either option, what is needed is careful, systematic teaching, along with adequate review of the concepts taught. (*Note.* A training study is needed to compare the relative effectiveness of intensive concept of word/ invented spelling instruction to that of explicit phoneme segmentation instruction. Such a study could be carried out with low-performing kindergartners during the second half of the school year.)

Conclusion

While literally hundreds of studies have examined the role phoneme awareness plays in reading acquisition, researchers have paid little attention to beginning readers' concept of word in text. This may be because researchers who study the beginning reading process have not had the opportunity to observe young children in real reading situations. Until one actually sees a child struggling to finger-point read a simple text—struggling to match spoken words to printed words—it is very easy to take this developmental skill for granted. The present study suggests an interactive relationship between beginning readers' concept of word in text and phoneme awareness. If this is the case, there are implications for pedagogy. Direct training in phoneme segmentation would remain an important teaching option. However, teachers might also choose to use older, meaning-based approaches (e.g., language experience, see Stauffer, 1970; and shared-book experience, see Holdaway, 1979) to help children develop awareness of word units in text and sound units in words. The relationship between concept of word in text and phoneme awareness, for its teaching implications alone, warrants more study that it has received.

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