Reading Research in Metalinguistic Awareness: Findings, Problems, and Classroom Applications

David B. Yaden, Jr.

Metalinguistic awareness — defined as the ability to reflect upon and analyze the structure of both spoken and written language — is discussed in view of its relationship to the acquisition of reading in young children. The corpus of existing research literature is grouped and examined under three broad categories which are indicative of major lines of research: (a) Concepts about the nature, purposes, and processes of reading, (b) concepts about spoken language units and instructional terminology, and (c) knowledge of print conventions and mapping principles. Examined in other major sections are issues related to the direction of cause between metalinguistic abilities and reading, disparities in research methodology between studies, and commercial instruments purporting to measure metalinguistic knowledge. A major conclusion reached by the review is that although young children are largely unaware of the overriding structure of both speech and print, experience with written language is the most efficient way to enhance metalinguistic growth. Implications for reading instruction and directions for future research are suggested as well.

During the past decade and a half there has been increasing interest among language and reading researchers in the ability of young children to consciously and deliberately reflect upon and analyze the structure of both oral and written language as opposed to merely reacting to its content. This capacity for what is most commonly known as "metalinguistic awareness" (Gleitman & Gleitman, 1979; Gleitman, Gleitman, & Shipley, 1972; Holden, 1972) or sometimes just "linguistic awareness" (Mattingly, 1972, 1979; Ryan, 1980) is believed to encompass a variety of language behaviors including the ability to comment upon the grammaticality of certain types of utterances (de Villiers & de Villiers, 1974; Gleitman, Gleitman, & Shipley, 1972), to segment the stream of speech into words (Tunmer, Bowey, & Grieve, 1983), syllables and phonemes (Liberman, Shankweiler, Fischer, & Carter, 1974), and to understand the conventions of the written language system as well — the latter capability being more specifically described as "orthographic linguistic awareness" (Day, Day, Spicola, & Griffen, 1981). Surprizingly, however, research examining the above behaviors

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Author's address: College of Education, University of Houston, Houston, TX 77004.

has disclosed that many young children first learning to read exhibit a widespread inability to think of *language qua language* and oftentimes seem to misunderstand the very nature and purposes of the reading act itself.

While there exist reviews of the literature and critiques of the research regarding the relationshp of metalinguistic awareness to language acquisition and growth (Sinclair, Jarvella, & Levelt, 1978; Tunmer, Pratt, & Herriman, 1984) and to aspects of developing cognition (Hakes, Evans & Tunmer, 1980), there are fewer such comprehensive treatments touching upon the broad range of metalinguistic abilities and their direct application to the acquisition of literacy behaviors (cf. Downing & Valtin, 1984; Henderson, 1981; Henderson & Beers, 1980; Yaden & Templeton, in press). Of the more widely quoted extant summaries, Ryan (1980) has only hypothesized the relationship between certain metalinguistic skills and reading. An earlier review by Ehri (1979), the most detailed critique to have appeared, defined metalinguistic abilities narrowly and omitted most of the research which explores children's perceptions of what reading actually is. Even Downing's (1979) presentation, perhaps the most cogent argument for a conceptual foundation to beginning reading ability, focused his discussion around the data supporting oral language segmentation as prerequisite to reading, a view not shared by others (e.g., Donaldson, 1978; Ehri, 1979). It is most significant to note overall that given the range of variations of problem focus, method of data collection and unit of analysis between examinations of metalinguistic abilities and reading, there is virtually no consensus as to exactly what emerging conceptual abilities, if any, might be crucial in enhancing those first steps in learning how to read.

The primary purpose of the following review, therefore, is to bring together and discuss a broad range of date-gathering studies exploring children's concepts about the reading act, linguistic units, and properties of the written language system under the general rubric of "metalinguistic." The main body of the review of organized into three major sections, each representative of a distinguishable strand of research within the general corpus of the literature: (a) concepts about the nature, purpose and processes of reading, (b) concepts about spoken language units and terms in the "reading instruction register" (Downing, 1976), and (c) knowledge of print conventions and mapping principles. Further divisions within the major sections have been made according to the varying data collection procedures employed. To give the reader some sense of the history and cumulative progress of the research to be discussed, studies within each subsection of the review

are presented in chronological order, based upon their appearance primarily in English-language journals (see Downing, in press, and Valtin, 1984, for a review of studies in non-English-speaking countries). Similarly, the ordering of the three major research strands follows the approximate development of interest in the field, although by the late 60's research was being carried out simultaneously in all three areas delineated. Following the main presentation of research, other major sections will summarize questions and research involving the direction of cause between metalinguistic abilities and reading achievement, the disparities between research methodologies, commercial instruments purporting to measure metalinguistic knowledge, and instructional considerations to be made in the teaching of reading based upon current findings.

It is necessary to distinguish at this point between the focus of the following research and related investigations into "metacognition" and reading (e.g., Brown, 1980, Brown & Palincsar, 1982) and "comprehension monitoring" (e.g., Wagoner, 1983). While it may be accurate that metalinguistic abilities are merely one facet of a general growth in cognition (e.g., Hakes et al., 1980; Ryan, 1980; Tunmer & Bowey, 1984) that allows a person to "think about his/her own thinking" and to engage in other metacognitive acts where conscious examination of the actual processes of *mind* takes place (cf. Flavell, 1976), reading research being tagged as "metalinguistic" generally focuses upon preschoolers', kindergartners', or first graders' developing notions of the purposes and processes of literacy acts and structural properties of either their own speech or the written language system. On the other hand "metacognitive" studies as a rule examine the development of comprehension strategies in both children and adults, being interested in such questions as "What do readers know about what they comprehend and how they comprehend?" (Wagoner, 1983, p. 329). Thus, it can be observed that metalinguistic investigations study behaviors that are developmentally prior to the growth of comprehension processes needed to understand fully the messages in written texts. It is of interest to note as well that there is little overlap, if any, between the reference lists of individual studies in the following body of research and those investigations studying behaviors described as "metacognitive" which have been excluded.

One concluding caveat is perhaps warranted before the review begins. Readers familiar with the more traditional use of the term "metalinguistic" as an adjectival form of "metalanguage" (Burchfield, 1976, p. 909) in the literature of philosophy and logic or as a description of a branch of linguistics which examines "the relation of language to

the rest of the culture" (Pei & Gaynor, 1954, p. 135) will note little similarity to the usages of the term in this paper. In the literature to be cited at least, the term has taken on as its referent varying states of psychological awareness as opposed to merely being a description of types of statements made in a metalanguage about another object-language (Cherry, 1980, p. 82; Edwards, 1972, p. 68).

Interestingly, a close analog still exists, however, between the traditional meaning of metalanguage and Downing's (1976) "reading instruction register" in that the latter refers to terms used to talk "about" properties of language systems. Hence, linguistic descriptors and terms in the reading instruction register such as word, syllable, phoneme, sentence, etc., are in the technical sense truly "meta-linguistic." Perhaps the primary insight that educational research in the 70's and 80's has added to the traditional nuances of the term has been that in order to speak in metalanguage and use metalinguistic vocabulary appropriately, one has to also be able to "think" meta-linguistically. And this latter capability as will be shown in the following research develops slowly and exists in varying degrees among the population of young children learning to read.

Concepts about the nature, purposes, and processes of reading

Incongruous as it may sound given the long history of teaching reading, researchers have reported that prior to 1960 relevant literature on children's perceptions of reading act was "virtually nonexistent" (Denny & Weintraub, 1963, p. 363). It is not fair to say, however, that early professionals in reading were unaware of the disparities between children's notions of what the act of reading ought to entail since Betts (1946) devoted an entire chapter to "Basic notions about reading" (although from an adult's point of view) and at least mentions in passing that some children indeed were observed to "entertain some rather weird notions about reading" (p. 281). It can be said, however, that the pervasiveness of these "weird notions" in most children learning to read is a discovery only of systematic research in the last quarter century or so when the children themselves have been asked directly about these matters.

One of the first extensive discussions of children's disparate concepts concerning the functions and processes involved in reading is reported in a dissertation by McConkie (1959). Interviewing 81 five-year-olds from middle and lower class families, McConkie noted six categories of response to the question, "What do you think reading is?" Responses ranged from definitions as "Reading is telling stories" or "Reading is writing" to "Reading is looking at pages and studying them" and

"Reading is when you look into books, then you go home" (pp. 104-105). A "frustrating" aspect of the interviews, according to McConkie, was that only a very few children (11%) could express "that they perceived reading as a means of securing information" (p. 107). In addition, across all categories only about a fourth of the children indicated that reading had anything to do with looking at letters or words. However, among these children, McConkie also included those who thought that they looked at "numbers," "things," and "names" as well.

McConkie also asked children how they would teach someone else to read. Interestingly, only one child out of the entire sample said that he would teach someone by helping them to sound out words and letters. Other categories included responses such as "I'd teach him by making him listen" or "He'd talk about the pictures in the book, that's reading." Perhaps the most interesting response was, "I would have him learn the 'elephant'; I know all of mine" (pp. 128-129). In short, most of the children interviewed thought that others learned to read by retelling stories that they'd heard, talking about pictures, or "guessing" at words. One summary observation by McConkie was that "children have quite different perceptions of what constitutes an ability to read" (p. 115). An interesting finding as well was that children in the upper socio-economic class provided usually more "adult-like" comments in defining reading, even though the lower class children were similar in intelligence. Thus, McConkie's findings imply, as do others (e.g., Ferreiro & Teberosky, 1982), that early experiences with books provide children with insights into more conventional notions of reading such as they can expect to be expressed by teachers.

The most widely quoted early investigation of children's slowly developing notions of what reading is for and how it is to be accomplished is Reid's (1966) study of a dozen five-year-olds beginning school in Scotland. Interviewing the children at the beginning, middle, and end of their first year in school, Reid asked a "kernal" set of questions designed to probe their understanding of "technical vocabulary — the language available to them for talking and thinking about the activity of reading itself" (p. 56). In quizzing the children with such questions as "What is in books?", "How does your mummy [sic] know what bus to take?", and "What are these spaces for?", Reid observed that initially only one child out of twelve said that books contained words; several thought that the pictures, not print, carried the meaning; most of the children in the sample used the term "numbers" to refer both to letters and numerals. Further Reid noted that the children seemed unaware that letters stood for sounds in words and more often used single

letters to refer to whole words such as "h" for "horse" when asked to describe what they had written. Reid concluded that her subjects were "exhibiting certain linguistic and conceptual misunderstandings about the nature of the material they had to organize" (p. 61). Taking a Piagetian view of cognition, she suggested that the "resolution of these uncertainties" lay in an understanding of the relationship between classes and subclasses. "In short, the children had to come to see that language and pictures are two kinds of symbols, that 'names' form a subclass in the class of written words, and that capitals form a subclass in the class of 'letters'" (p. 61).

While from the first to the third interview, the children showed progress in more fully understanding these relationships, progress was slow and success not uniform. Thus Reid suggested that perhaps a "fostering of the understanding of classification, order and regularity" (p. 62) might be simultaneously emphasized with reading instruction in order to help children make the connection between written and spoken language and better understand the relationship between letters and words.

Reporting in the same year, Denny and Weintraub (1966) interviewed over 100 entering first graders of varying ethnicity and socioeconomic class with the following three questions: (a) "Do you want to learn how to read?", (b) "Why?", and (c) "What must you do to learn how to read in the first grade?" (p. 444). Placing the responses into categories ranging from "vague, irrelevant, and circular" to ones indicating an expressed purpose for reading, the authors noted that 25% of all the responses fell into the categories indicating "vague and meaningless reasons for wanting to learn to read" (p. 444). For the third question as well, over a third (38%) of the children "offered no meaningful explanation of what one must do to learn to read" (p. 446). The authors pointed out, however, that several confounding variables were present. For example, children with no prior kindergarten experience gave more responses categorized as "vague and irrelevent" while the middle class children in the sample gave the fewest responses in these categories. Despite these limitations, Denny and Weintraub suggested that the need existed "for helping pupils see a reason for learning to read and for gaining some insight into how it is going to be accomplished" (p. 446).

Using the interviewing techniques of previous studies, Mason (1967) asked a sample of preschoolers four basic questions: (a) "Do you like to read?", (b) "Would you like to be able to read?", (c) "Does anyone in your family read?", and (d) "Do you like him/her/them to read?" (p. 130). Surprisingly, Mason discovered that most (90%) of the pre-

schoolers already thought they could read and enjoyed doing it! From this finding, Mason posited that "one of the first steps in actually learning to read is learning that one doesn't already know how" (p. 132). He further suggested that coming to this realization of not knowing how to read was a part of reading readiness which needed to be explored by future research.

Downing (1969, 1970) replicated Reid's (1966) first interview study but included as well some concrete aids to ensure that the misunderstandings that Reid found were not merely an artifact of the verbal interview. He also included an experimental portion probing knowledge of specific language units which will be discussed in the next major section. Downing (1970) generally confirmed Reid's earlier conclusions. In his sample of 15 English five-year-olds, no child mentioned that books contained words and several thought that their parents only looked at the pictures when they read. In addition, some of the children used the term "numbers" to describe both letters and numbers which they had produced and none of the children seemed to be sure of exactly what the numbers on the buses might indicate. From the replicated interview, at least, Downing (1970) corroborated Reid's findings that "young children . . . have only a vague notion of the purpose of the written form of language and in what activities the reading task consists" (p. 109).

Use of the concrete aids, however, produced somewhat different results. Whereas only one of the children in Downing's (1970) sample mentioned in the interview that their parents looked at the symbols when they read, half of them when given a book pointed to the print and described it as being either "the writing," "words," or "letters." In addition, while none of the children in either Downing's (1970) or Reid's (1966) sample mentioned the destinations of the buses when asked how their mothers knew what bus to take, 11 out of 12 of Downing's children pointed to both the number and the destination board when given the toy buses to handle. Even though from further testing, Downing concluded that children have a very poor grasp of spoken and written language units in the abstract, he admitted that they were able to demonstrate more competency in identifying these units when in the presence of functional objects displaying printed forms.

In a sequence of studies Johns (1972, 1974) explored the relationship between concepts of reading and actual reading achievement as measured by a standardized reading test. In the first study, Johns (1972) asked the question "What is reading?" to a sample of 53 fourth graders and recorded their responses into "meaningful" and "non-

meaningful" categories. While the correlations were relatively low, Johns found a slight positive relationhip between concepts of reading and the vocabulary (r = .31) and comprehension (r = .27) subtests of the *Gates-MacGinitie Reading Test* (Gates & MacGinitie, 1965). In the second investigation, Johns (1974) asked the same question to an additional sample of 50 fifth grade children but divided the total sample of fourth and fifth graders into above and below average readers based upon their grade equivalent scores from the comprehension subtest. He then compared the type of reader against meaningful and non-meaningful responses. Not surprisingly, Johns found that good readers gave significantly more meaningful responses, although less than half of the "good" reader group gave them. The author concluded by saying that the question "What is reading?" may be interpreted differently even by good readers and that additional research needed to take into consideration of not only how to more adequately assess concepts of reading but also how to more accurately identify good and poor readers.

Also asking children the question "What is reading?" and others such as "Can you read?" and "What do people do when they read?", Oliver (1975) found that for a sample of preschool, native American children, most four-year-olds associated reading with behaviors such as "blowing the nose," "putting on glasses," and "just looking" (p. 868). In contrast to the three-year-olds in the sample, half of whom said they could read already, the majority of five-year-olds said they couldn't but would like to learn. Oliver also reported that some of these older children described the activity of reading more precisely by indicating that people looked at words and letters when they read. However, while the five-year-olds demonstrated more knowledge of what reading entailed, Oliver stated that, for the most part, "these preprimary children generally seemed to lack a clear concept of written language as coded speech and generally seem to think of reading and writing as something they will learn to do 'when they get bigger'" (p. 869).

In testing certain psycholinguistic hypotheses that children should view reading as a silent process aimed at gaining meaning, Tovey (1976) discovered that in response to the question "What do you think you do when you read?", 29% of a sample of 30 first through sixth graders viewed reading as "spelling," "talking," "memorizing," and "breathing" (p. 537). In addition Tovey noted "confusion, ambivalence, and uncertainty" in responses to the question, "Do you look at every word when you read?". While most of the children said that they did look at every word, a third of these felt that it wasn't really necessary.

And of those who said they didn't look at every word, most thought they should be. For his sample, at least, Tovey stated that reading seemed to primarily a "word calling" process rather than one of getting meaning from the printed page.

In by far the largest and most comprehensive of examination of children's perceptions of the reading act, Johns and Ellis (1976) asked 1655 predominantly white students in grades one to eight the following three questions: (a) "What is reading?", (b) "What do you do when you read?", and (c) If someone didn't know how to read, what would you tell him/her that he/she would need to learn?" (p. 119). In response to the first question, the authors reported that a staggering 69% of the sample gave answers that were classified as either "vague, circular, or irrelevant." In addition, only 5% of the students indicated a concept of reading that included both word recognition and meaning (p. 120). For the second question as well, over half the sample gave "meaningless" responses and only a fifth of the sample indicated that reading involved the getting of meaning. In response to being asked how they would teach someone else to read, Johns and Ellis reported like McConkie (1959) did earlier that a large portion (36%) of students could not relate an intelligible procedure that a nonreader might follow in learning to read. In fact, only 8% of the sample indicated that in learning to read one must focus on both decoding and meaning. Over half of the sample (56%) in response to the third question felt that reading was primarily a process of either decoding or the learning of rules and grammer (p. 124).

In concluding their investigation, Johns and Ellis noted that while older children in grades six through eight seemed to have more conventional notions of what learning to read entails, "the vast majority of children have little or no understanding of the reading process" (p. 127). An important finding as well was that slight sex differences were found in the data favoring girls' greater understanding of the functions and processes of reading. Johns and Ellis suggested then that a potential field for future research in this area involved examining concepts of reading as they are influenced by norms of socialization for boys and girls.

The final study reviewed in this section by Mayfield (1983) replicated very closely the findings of earlier investigations, particularly that of Johns and Ellis. Interviewing 82 kindergarten children equivalent in age, socio-economic status and prior learning with the questions (a) "What do you think reading is?", (b) "Can you read?", (c) "Who do you know who can read?", and (d) "What does reading help you to do?", Mayfield reported that prior to specific instruction on the types of

graphic codes which exist in the environment, 73% of the sample gave only "vague" and "circular" responses to the first question. Even after specific and direct instruction in types of code systems, over half of one experimental group still could not provide a meaningful definition of reading. Mayfield did discover, however, that both direct and incidental instruction as to the existence of various types of written codes in the environment helped children more correctly identify literacy behavior as measured by the *Linguistic Awareness in Reading Readiness (LARR) Test* (Downing, Ayers, & Shaefer, 1982).

In summary, all of the studies reviewed reported that young children, even those with several years of reading instruction, did not view the process of reading as being a meaning-getting activity. Indeed, most studies indicated that the majority of students could not provide an intelligible description at all. Most often it was observed that children viewed reading within the confines of a specific school-related task like learning the alphabet, doing workbook pages or retelling stories to the teacher. It was also common for beginning readers to believe that pictures, not print, are what is to be "read" and to use the terms *letter* and *number* interchangeably.

Interestingly, a trend noted in several studies was that a more conventional, adult-like perception of the process of reading as being a combination of decoding print and getting meaning (not necessarily in that order) was very slow in developing and surprisingly impervious even to direct instruction. In fact, those children who gave more accurate depictions of reading were usually those who had had prior and plentiful independent experiences with books in the home. Finally, it is fair to say that in all of the studies reviewed, there are strong suggestions made to classroom teachers that the provision of a book-rich environment with a variety of activities wherein the children can experiment with and use print is perhaps more important early on than specific rule learning and an exclusive focus upon learning letter/sound correspondences.

Concepts about spoken language units

Within the general body of metalinguistic research as it relates to beginning reading ability, the studies exploring children's awareness of the components of their speech and their "verbalizable" knowledge (cf. Templeton & Spivey, 1980) of the metalinguistic terms word, letter, sound, etc., are by far the most extensive. Underlying the concern with speech segmentation in particular is the belief that unless a child is aware of his speech as being comprised of a temporal succesion of sounds (cf. Bradley & Bryant, 1983; Elkonin, 1973), he/she will have

less success in understanding the form of written words as made up of sequences of letters. There is, however, a great debate carried on in this section and in the field in general since some reseachers (e.g., Ehri, 1975, 1976) feel that it is rather exposure to the written form of language that provides insight into the fact that one's spoken language includes several kinds of identifiable units. This discussion will be taken up again later in the paper.

Studies of children's knowledge of oral language units (i.e., words, syllables) generally fall into three categories distinguished by the methodology used in assessing beginning readers' ability to isolate or identify these units in the speech stream. The most common strategy used is a "word tapping" task in which the child repeats a sentence and counts each word by tapping on the table with a pencil or similar object. A variation of this task has been to have the child point to wooden blocks or poker chips as each word is spoken. A second task used is to ask the general question "What is a word (letter, sentence)?". These investigations tend to seek out developmental trends in that they not only point out disparities between children's and adults' notions of language units, but also gather information on what exact concepts children possess at different ages. A third strategy adopted by fewer researchers involved selecting a priori categories of verbal and nonverbal "sounds" and training the subjects to respond "yes/no" when they thought they heard a single sound (phoneme) or word. A more detailed discussion of investigations in each category directly follows.

Word, syllable, and phoneme segmentation

One of the earliest attempts to observe children's ability to segment speech into words was Karpova's study (1966) in Russia in 1955 with a sample of children ages 5-7. Karpova asked children to repeat sentences and respond to the questions, "How many words are here?" and "Which is the first . . . second . . . third word?" Karpova reported that the youngest children (ages 4-5) did not isolate words but rather semantic units. For example, a child aged 4-6 years indicated that the sentence "Galya and Vova went walking" had two words: "Galya went walking, and Vova went walking" (cited in Smith & Miller, 1966, p. 370). Under repeated questioning, children approaching 7 were beginning to isolate nouns and began to break sentences into subject and predicate. It is reported also that some of the oldest children in the sample isolated all of the words correctly excepting functors as prepositions and conjunctions. Karpova also instituted a training procedure in which children moved plastic counters as they repeated

each word. The procedure apparently was quite successful for the children who initially could not segment any words.

Another early study by Huttenlocher (1964) designed to assess word awareness investigated the ability of 66 children ages 4 1/2 and 5 years to either reverse word pairs of different grammatical and nongrammatical relationships or to say the first word of the pair, await a "tap" from the researcher, then say the second. The sample was randomly divided into two groups with each group performing only one of the tasks. Huttenlocher discovered that a third of the children in each group were unable to reverse or segment any pairs. For the remaining subjects, the most troublesome categories involved reversing or segmenting common grammatical sequences such as "man-runs," "I-do," or "is-it" (p. 264). Huttenlocher then hypothesized that children's confusions as to the identification of a single word might particularly come with words not ordinarily used in isolation such as copulatives and pronouns.

In another frequently quoted article, Holden and MacGinitie (1972) generally confirmed Huttenlocher's suspicions that prepositions and auxillaries were not seen as distinct units by young children. In a tapping task where the child repeated an utterance and simultaneously pointed to individual poker chips to indicate a word, the majority of subjects when presented with the sentence "You have to go home" either combined "to" with "have" or "to" with "go." Similarly, when the verb "to be" was used as an auxillary in the progressive form "Bill is drinking sodas," kindergarteners generally made the combination "isdrinking" and a few chose "Billis." "In general," concluded Holden and MacGinitie, "the greater the proportion of content words in an utterance, the greater the percentage of correct segmentations" (p. 554).

In one of the first attempts to correlate awareness of word boundaries with actual reading achievement, McNinch (1974) found that with pre-established readiness groups (good, average, poor) ability to segment a spoken sentence into words did not significantly differ. However, in a multiple regression with visual word boundary scores, oral segmenting ability was the significant predictor of end of the year reading scores on the *Metropolitan Achievement Test* (Prescott, Balow, Hogan, & Farr, 1971). Similarly, Evans (1975) reported that for a sample of 45 kindergarteners and 45 first graders divided into above and below average groups based upon a segmenting task identical to Karpova's (1955/1966), better readers in December as measured by the *Gates-MacGinitie Primary Reading Tests* (Gates & MacGinitie, 1965) were also the better segmenters a few months earlier.

Like Elkonin (1973), Liberman (1973) and Liberman, Shankweiler, Fischer, and Carter (1974) also have offered evidence of the existence of a relationship between syllable and phoneme segmentation and instruction in reading. Employing a tapping task where 135 preschool, kindergarten and first grade children were to identify phonemes and syllables in spoken words, Liberman et al. found main effects for both task and grade, observing that phoneme segmentation was uniformly more difficult for all groups than syllable segmentation and that first graders performed better than kindergartners who, in turn, performed better than preschoolers. While Liberman et al. did not discount the effects of maturation, they posited that in all probability "analysis of language, even of the most elementary sort, requires instruction" (p. 210).

In contrast to the findings of previous analyses of children's inability to segment spoken sentences, Fox and Routh (1975) claimed that even three-year-olds were able to segment sentences into words, words into syllables, and in a few cases even syllables into individual phonemes. Fox's and Routh's task was to have the children listen to a sentence, word, or syllable spoken by the researcher and then respond to the statement "Say just a little bit of it" (p. 335). This statement was repeated until all the words or sounds were completely analyzed. The results showed that ability to analyze the items steadily increased with age. However, even three-year-olds segmented over half of the sentences into words, approximately a third of the words into syllables, and a fourth of the syllables into individual phonemes. These findings contradict earlier statements by Bruce (1964) that until a mental age of 7, children are unable to competently perform word analysis tasks. Fox and Routh also found significant positive correlations between reading comprehension as measured by the *Peabody Individual Achievement Test* (Dunn & Markwardt, 1970) and ability to segment words into syllables and syllables into phonemes.

Ehri (1975), in addition to a word and syllable segmentation measure, also tested children's ability to analyze a sentence for target words and analyze spoken words for specified syllables. Using a sample of preschool, kindergarten, and first grade children, Ehri found that for most tasks, readers' (first graders) mean performance was higher than prereaders (preschool and kindergarten) while the means for the latter two groups did not differ. As a result of their more frequent exposure to printed language, Ehri stated that "readers, in contrast to prereaders, possess substantial conscious awareness of lexical as well as syllabic constituents of speech" (p. 211). As did other researchers (e.g., Holden & MacGinitie, 1972; Huttenlocher, 1964), Ehri noted that

all of her subjects, particularly the prereading groups, failed to distinguish functors such as "the," "a," "to," and "is" as distinct units of language.

In a similar kind of sentence analysis task designed to tap children's lexical awareness, Holden (1977) tested 26 kindergarten and 24 first grade children on their ability to identify the added word in one sentence of a pair of sentences with homophonous words (e.g., "John leaves after dinner; John rakes leaves after dinner," p. 214). Based upon a previous study (Holden & MacGinitie, 1973) which demonstrated that differences between kindergartners and first graders on this same task was not a result of intelligence, Holden surmised that regular patterns of response should occur if indeed there were developmental stages in young children's evolving awareness of word units. Holden's findings supported this notion since the first graders made almost twice as many correct responses as did the kindergartners. Further, Holden demonstrated that short-term memory recall limitations could hardly have been a factor since for many of the incorrect responses, the children often repeated the entire verbal stimulus without error except in a fraction of the cases. Holden observed, however, that even the better performing first graders still exhibited an "unstabilized ability to perceive language at both phonetic and semantic levels simultaneously" (p. 206) as their most common error was to isolate the homophonous word which had changed meaning in the second sentence. Holden concluded, therefore, that the capacity to analyze language "abstractly" apart from its semantic context shows definite developmental patterns (p. 206). She did not discuss, however, how these patterns might be affected by prior experience with books or direct reading instruction.

Another study employing a tapping task examined under this subcategory of speech segmentation was conducted by Leong and Haines (1978). Testing a total sample of 72 children in grades 1-3, the researchers had children segment words into syllables and syllables into phonemes by tapping a wooden dowel on the table as they distinguished each unit spoken. In addition, there were also tasks of identifying the number and order of sound patterns in words (cf. Lindamood & Lindamood, 1971) and recall of sentences varying in grammatical complexity (i.e., "high" or "low"). Results showed that while there was a significant difference across grade in ability to segment words into syllables, there was no difference between groups in segmenting syllables into sounds. However, in the "auditory conceptualization" task of recognizing the number and order of sounds of words, there was a significant difference between grades 2 and 3 combined and grade 1.

To further investigate the relationship of auditory conceptualization, word and syllable segmentation with reading achievement, a canonical correlation was computed with the experimental tasks as independent variables and two measures of reading achievement as the dependent variables. The analysis showed that auditory conceptualization or the recognizing and ordering of sound sequences in words contributed most to the correlation with reading scores (R = .777). This was followed in the weightings by recall of high complexity sentences, syllable segmentation, phoneme segmentation, and recall of low complexity sentences (p. 402). Despite the finding unlike previous studies that phoneme segmentation did not discriminate between grades (cf. Liberman et al., 1974), the authors suggested that for some children "acquisition of verbal skills is facilitated if their understanding is brought to the focal level . . . This contemplation of words and sentences, which can be taught . . . , will go some way towards helping the child in the learning to read process" (p. 405).

The final two studies reviewed in this subsection have provided some necessary controls over the mechanics of the data-collection task and the nature of the stimuli themselves not included in previous investigations. In the first, Treiman and Baron (1981) included a nonsense sound counting task along with syllable and phoneme counting to ensure that children could indeed perform the mechanical task itself. In addition, they had the first and second grade children move checkers rather than tap to identify phoneme and syllable units since the former task seemed less affected by rhythmic responses as noted in other studies (e.g., Holden & MacGinitie, 1972). In addition, nonsense words were used as stimuli in order to aid the child in "thinking about sounds" apart from their meaning. Interestingly, Treiman's and Baron's results closely corroborated the traditional finding that phoneme segmentation is uniformly harder than syllable segmentation for all children. However, with the inclusion of the neutral sound test, the researchers observed that second graders performed better than first graders on simply the ability to count. Therefore, the authors suggested that the older children's apparent increasing awareness of sounds in words may simply be a result of their superior ability to enumerate. Other results reported by Treiman and Baron included the finding that for some words fricatives were more easily isolated than stops and that speech segmentation for nonsense words at least proceeded in order of difficulty from vowels being the hardest to discriminate followed by final consonants then initial consonants (p. 172). The authors pointed out, however, that previous research indicated a similar pattern for real words.

The last study reviewed in this section by Tunmer, Bowey, and Grieve (1983) provided additional control in the nature of the stimuli to be isolated. In five separate experiments where groups of children 4 to 7 years of age were given word strings to first repeat orally then tap out the number of word units, the investigators varied such factors as grammaticality, plurality, form class, and stress pattern. Their results showed that while there is an increasing ability to segment speech proportional to chronological age, the effects of varying syllabic congruence (i.e., more syllables than words in stimulus), plurality (presense of plural nouns), word class (i.e., adjectives, verbs, nouns, etc.), and grammaticality (grammatical vs. ungrammatical strings) within the stimulus items had little differential effect between age groups. However, in the experiments designed to explore the influence of stress pattern, Tunmer et al. observed that young children segmented primarily according to phrase and syllable stress; whereas the older children in the sample (6-7 years) began to focus upon morphemic units (p. 592). Even so, the authors noted that "most five-year-olds and a few six- to seven-year-olds do not segment meaningful syntactic phrases into their constituent words in the present studies" (p. 590). Interestingly, Tunmer et al. observed also that "explicit demonstrations and corrective feedback" did little to enhance the four- to five-year-olds' notion of an "abstract concept of word as a unit of language" (p. 591). However, the authors concluded by saying that future research must take into account the effects of memory, stress, word awareness, and other factors before it can be decided whether or not children's awareness of units of language can be enhanced by specific training and subsequently if "lexical awareness" has any direct bearing upon learning to read.

In short, studies in speech segmentation demonstrated that preschoolers as well as first and second grade children have great difficulty isolating linguistic units in their speech, particularly phonemes or "sounds." In addition, contentives are much more easily picked out of the speech stream than functors. It was suggested also that specific training in segmentation may be less productive since approaching the age of 7 children seem to use a variety of stress cues to anticipate divisions in oral language rather than knowledge of discrete language elements. Finally, researchers in general admit a correlation between reading ability and phonological awareness, but the direction of cause is still much under dispute.

Indentifying what is a word?

In the next group of studies the qualitative content of children's notion about words as units of language is explored. The methodology of the following investigations normally involves a researcher posing to a child an inquiry such as, "What is a word?" Hence, the child's verbalizable or "reflective" (cf. Templeton & Spivey, 1980) knowledge is used as the unit of data. The importance of these types of studies, as noted earlier, lies in their ability to discover the evolving stages of a child's concept of word, this time from the learner's point of view.

Testing a group of 50 five-year-olds four times over a two year period, Francis (1973) asked, "Can you tell me any letter (word, sentence) you know?" Following this task, she also showed them an example of each element on a card and asked the children to identify the particular units. On the first testing occasion, half of the children either chose examples of words or sentences when asked to identify individual letters. Words continued to be confused with letters until the last testing at age 7. The results of asking for each concept were very similar to the recognition test. Words were frequently confused with numbers or names, and words were given as examples of sentences. Overall, Francis noted a pattern from the first to the last testing that letters were mastered before words and words before sentences. She also noted that children generally learned the last two concepts after gaining some facility in reading. In addition, she found that reading ability was positively correlated with knowledge of technical language terms (i.e., word, letter) even with I.Q. controlled (Kendall r = .34). Francis concluded, therefore, "that factors independent of a general ability to deal with abstract concepts were involved in learning technical vocabulary and that these were closely related to the reading process" (p. 22).

In probably the most well known study of reflective word knowledge, Papandropoulou and Sinclair (1974), using a list of commonly known words, identified four levels in development of word consciousness as a result of asking children 4 1/2 to approximately 11 years of age the questions "Is that a word?" and "What is a word, really?" An analysis of the results showed that most of the children under age 5 answered in level one which was characterized by the inability to differentiate between a word and its referent (cf. Markman, 1976) as exemplified by responses such as "Children are words" or "It can be a cupboard or a chair or a book" (p. 244). Level two (5-7 years) was characterized by two functions of words: (a) as labels for things, and (b) to express a "topic-comment" relationship such as "I put the dog in the kennel" in response to the request, "Say a short word." At level three (6-6.8

years), words began to take on the feature of elements which made up wholes but which did not yet have individual meanings, for instance, "a word is a bit of a story" and "a word is something simple, very simple, it's all by itself; it does not tell anything" (p. 246). Papandropoulou and Sinclair noted that during the fourth and final stage words finally become "autonomous" elements, having meaning of their own and play a definite role in grammatical relationships. Responses to inquiries at this stage take the form, for instance, of "letters form words . . . a word is something that means something" (p. 247). Based on their findings, the researchers concluded that the concept of a word "undergoes a long and slow elaboration during the ages studied. Gradually, words become detached from the objects and events they refer to, and it is only late in cognitive development that they are regarded as meaningful elements inside a systematic frame of linguistic representation" (p. 249).

In a series of related studies, Sulzby (1978, 1979) used a different approach to eliciting students' "metalanguage" in a task designed to explore elementary students' thinking about known and unknown words in both oral and written form. In the first of these studies, Sulzby (1978) examined the responses of 30 rural, predominantly black students in grades 2, 4, and 6 to the question "How does your (student's) word go with my (researcher's) word for you?" (p. 52). On the whole, Sulzby found that students in all grades tended to give answers indicating a semantic focus rather than structural (e.g., "They both got letters"), although this tendency increased across grades. In addition, students in all grades gave mostly semantic responses even to words presented in written form. A very interesting finding by Sulzby was that even sixth graders were observed to be using instructional terminology (i.e., "metalanguage") incorrectly when giving the less frequent structural responses. Sulzby noted as well that by fourth grade, students would create "hypothetical contexts" for unknown words more frequently than give structural responses.

Using the same task, but a different population of 28 predominantly white children in grades 1, 3, and 5, Sulzby (1979) found again that all students gave significantly more semantic responses although more so in the oral presentation mode this time. As in her first study Sulzby noted the tendency for children to create meanings for unknown words rather than give a simpler structural response (p. 52). Both of these studies offer from a slightly different angle evidence that the structural aspects of words, even in written form, if not immediately available for reflection, are subordinated to the child's need to create some kind of intelligible meaning.

In an extension and replication of the Papandropoulou and Sinclair study (1974), Templeton and Spivey (1980) asked a sample of 24 children ages 4.0 to 7.8 years of age such questions as, "Is _____ a word?" (from a predetermined list), "Why is/is not _____ a word?", and "What is a word, anyway?" (p. 268). In addition the children were queried in a similar manner about long, short, easy and hard words as well. Templeton and Spivey also grouped the sample according to performance on the Piagetian concept attainment tasks of classification and seriation and, thus, were able to describe responses as being characteristic of children at the preoperational, transitional, and concrete levels of operation. The results indicated that the preoperational children in particular were unable "to talk about language abstractly" (p. 274), most often refusing to respond. Transitional children, on the other hand, began to give answers which reflected a notion of "wordness" as having something to do with spoken language (i.e., "It comes out of your mouth," p. 274) apart from a specific context.

Interestingly, Templeton and Spivey pointed out that even the more sophisticated responses to questions like "What is a word?", characteristic of concrete operational children, most often reflected the influence of exposure to print (i.e., "We have to read them" or "It's something that you write," p. 275). Therefore the authors suggested that while a more frequent referral to the internal structure of words was in general more indicative of a higher level of cognitive functioning, the ability to think "metalinguistically" seemed to be enhanced by mere exposure to the written language itself.

In another study, Sanders (1981) analyzed first grade classroom interactions by video and audio recordings and then interviewed three first grade males as to their understanding of the teacher's use of instructional terms such as "beginning sound" and "word." Sanders discovered that while students seemed to observably understand classroom directives, individual interviews revealed confusion on the child's part. One child indicated in the personal interview that "Dog and God and big and dig begin alike" (p. 269). The researcher also noted that the subject confused the referents of letters and words as well as "a long word" or a "string of words" (cf. Templeton & Spivey, (1980). Interestingly, Sanders also observed that the interviewees thought that while learning letter/sound correspondences and letter names was useful for first grade, the skills had little to do with reading itself (p. 269). Further, all of the subjects, as noted by the researcher, adhered to the formula of "three letters, plus or minus a letter" (cf. Ferreiro & Teberosky, 1982) in deciding whether a written array was a word or not. In general, Sanders observed that while classroom

activities provided isolated focus upon many metalinguistic aspects of learning about print, accurate notions of what it means to be literate are derived primarily from functional and meaningful interaction with written language.

The last study examined in this subsection exploring children's reflective knowledge of word and other language units was conducted with Spanish-English bilingual children grouped into reader groups of fair-to-good and non-to-poor. Matluck and Mace-Matluck (1983) elicited responses from 94 children in grades 1 to 4 over a 3 year period regarding their knowledge of decoding processes and understanding of the metalinguistic terms "word," "sentence," and "story." Concerning decoding, very few first grade children in either language could explain why they knew how to pronounce a word. By second grade, however, a large majority of the better readers were giving responses which demonstrated some facility using metalinguistic terminology (i.e., "by syllables, by letters — I sound each letter," p. 28). By the third and fourth grades, over 80% of the good readers were giving accurate, adult-like explanations of print deciphering processes while only half of the poor readers could do so.

In response to the statement, "Tell me what a word (sentence, story) is," Matluck and Mace-Matluck again observed that only a very few first graders, mostly good readers, could give formal definitions of these terms. By second grade, although more of the entire sample attempted answers, only good readers again gave more accurate definitions. Even by fourth grade, a majority of the formal definitions of these terms were still being given by the good reader group. Interesting, like other studies (cf. Templeton & Spivey, 1980), definitions of the term "word" reflected the influence of increased exposure to print (i.e., "A word is a group of letters joined together to pronounce a word," p. 33). The authors concluded by reiterating the hypothesis of previous studies that "the development of metalinguistic skills appears to coincide with experience with literacy and to be related to exposure to literacy training" (p. 33).

Briefly summarizing this group of studies, it can be noted that young children in kindergarten and first grade have an extremely difficult time verbalizing their notions of the metalinguistic terms used in classroom instruction. And when these notions were tapped, the concepts seemed to be extricably woven to semantic content rather than including structural dimensions. When children did begin to verbalize more adult-like perceptions of such terms as "word," the influence of print was evident. This finding lends support to the notion expressed earlier by Ehri (1975, 1976, 1979) that until children are

exposed to the written language, they have little reason to view their speech as being made up of discrete, isolatable units. Finally, while it has been observed that an expression of more sophisticated concepts about language often accompanied increasing development in cognition, the relationship is still confounded by prior exposure to print and the influence of classroom instruction.

Identifying verbal vs. non-verbal units

The next small group of studies discussed have generally used the same general paradigm to assess children's knowledge of word, syllable, and phoneme units. Initially, Downing (1970) devised a task in which children were presented 25 tape recorded auditory stimuli of five types: nonhuman noises (bell-ringing) and human utterances of a single phoneme, word, phrase, and sentence. Each child was tested twice with the "sounds" of each category and asked first if he/she heard a single word and then if he/she heard a phoneme. Results of the presentation of the stimuli to 13 English five-year-olds showed that 5 children responded "yes" or "no" to all stimuli in all categories, thus evidencing no discrimination even between verbal and non-verbal sounds. In addition, five children responded positively in the word phrase of the experiment to phrases and sentences as well. No child, Downing reported, correctly identified either a single word or phoneme.

Later, Downing and Oliver (1973-74) extended the categories to include nonverbal "abstract" sounds (i.e., dice rattling), isolated syllables and both long (e.g., hippopotamus) and short words. He also specified in the pretraining task that the children respond "yes" to only single words. Results, however, followed the pattern of the first experiments. All children, across ages gave significantly fewer correct responses for both syllables and phonemes than for any other auditory class while none of the children in the youngest age group (4.5-5.5) recognized that phonemes or syllables were not words. In addition, Downing and Oliver noted that children even up to 6.5 years confused non-verbal sounds, phrases and sentences and phonemes as words. Downing and Oliver stated, therefore, "A more generalized implication of these findings would seem to be that it is not safe for reading teachers to assume that their beginning students understand linguistic concepts such as word" (p. 581).

Johns (1977) replicated Downing's and Oliver's study with a larger sample (120) of American children ranging in age from 5.6 years to 9.5 years and generally confirmed the latter's results. In Johns' study almost 40% of the subjects at beginning reading age were unable to

consistently identify a single spoken word. In addition, nearly 90% of the subjects in this age group confused single phonemes with words. Johns surmised that such confusions "may be due, at least in part to the fragmentation that occurs in reading instruction. Concentrating on sounds (phonemes) and word parts may only serve to confuse children who are trying to learn what reading is all about" (p. 256).

In a more restricted version of the task, Ryan, McNamara, and Kenney (1977) presented above and below average readers in first and second grades with a word discrimination task in which they were to identify single phonemes, two-syllable words, and two phrases as either a "word," "not a word," or "two words" (p. 399). Their results showed that above average readers scored significantly higher than below average readers in correctly identifying the stimuli. Ryan et al. then administered the same tasks to third and fourth grade remedial readers divided into above and below average reading groups by placement in basal readers. They again discovered that better readers out performed their poorer reading counterparts in identifying linguistic units.

Finally, in the most recent replication of the study by Downing and Oliver (1973-74), Horne, Powers, and Mahabub (1983) tested 40 male students ages 6 1/2 to 10 1/2 on their ability to distinguish from a range of non-verbal stimuli to types of linguistic utterances. Reader and non-reader groups were equated by intelligence and also given pretraining tasks to ensure their understanding of the response required. An ANOVA comparing reader levels, age, and stimulus class showed that the sample of Horne et al. performed similarly to students in the previous two investigations (Downing & Oliver, 1973-74; Johns, 1977), in that readers outperformed non-readers in all classes and that there was uniform difficulty among all pupils in identifying phonemes and syllables as opposed to the rest of the stimuli. An important extension of the Horne et al. study, however, was the inclusion of the oldest group (9.5 - 10.5) and the finding that non-readers in this group mastered *none* of the stimulus groups excepting short words (p. 11), thus indicating extensive confusion about linguistic terminology and concepts about language units.

In summary of the major section, regardless of the method of data collection used, most studies indicated that a great number of primary aged children as well as some of those with several years of schooling were not able to analyze their speech into units such as phonemes or words, with some even unable to distinguish between linguistic utterances and infrahuman sounds. Further, a tendency noted by several researchers was for children to overlook functors as distinct

language entities and primarily focus upon the semantic aspects of words. With the glaring exception of Fox and Routh (1975), whose method of data collection has been questioned (see Ehri, 1979), the majority of studies reviewed consistently reported that children's concepts of their oral language as being comprised of distinct linguistic units were not stabilized, and some implied that these nascent concepts may be resistant even to direct instruction. Finally, it has been commonly observed that children who are better readers also demonstrated greater facility at analyzing their speech into distinct components and verbalizing more precise notions about the nature of words, sentences and other language units.

Concepts about printed conventions

Clay's (1967, 1969) weekly observation of 100 children's beginning reading behavior over a year's period in New Zealand has provided the impetus for numerous investigations into children's specific concepts about printed conventions such as left-to-right/top-to-bottom directionality, marks of punctuation, and especially "space" as a boundary for written words. This latter area has absorbed much of the attention of American researchers, although some have examined the child's gradual development of an accurate speech-print match as well. Studies in the following section, then, will be further subdivided into separate discussions of children's knowledge of visual word boundaries, the correspondence between the spoken and written word, and concepts about directionality, punctuation and other printed conventions.

Knowledge of written word boundaries

The first American investigations of children's knowledge of printed conventions almost exclusively focused upon recognizing written word boundaries. Meltzer and Herse (1969) provided the basic algorithm by having children first read the sentence, "Seven cowboys in a wagon saw numerous birds downtown today" (p. 4). The instructions then were to count each word while pointing to it and finally to circle each word. With a sample of 39 beginning first graders, Meltzer and Herse noted a recognizable developmental pattern: (a) letters are words, (b) a word is a unit made up of more than one letter, (c) space is used as a boundary *unless* the words are short, in which case, they are combined; or long, in which case they are divided, (d) only long words continue to be divided, and (e) spaces indicate word boundaries except where there is a "tall" letter in the middle of a word (p. 13). As a result of these findings, the authors stated that "a very cursory sampling of the

kindergarten seemed to indicate almost complete ignorance after three months of school of graphic characteristics which define . . . a letter or word" (p. 11). Meltzer and Herse also made the intriguing suggestion that this knowledge of printed conventions was not directly taught; "Rather the assumption is made either that the child already has this information or that he will discover it independently from the material presented to him" (p. 13).

Subsequent replications of the above study — while suppporting the finding that children do not use space consistently as a boundary for written words — have not confirmed the existence of a developmental pattern however. Kingston, Weaver, and Figa (1972) noted that the most common error in their sample of 45 first graders was that of combining two short words, usually when one contained only one letter (e.g., "andI" or "Isaid"). Kingston et al. observed that other combination errors involving longer, multisyllabic words seemed "to be a result of a failure to perceive any word meaning in addition to the fact that the printers' space was not recognized as a word boundary cue" (p. 95). Such errors were recorded as dividing at ascenders, descenders, and of putting together the end of one word with the beginning of the next. Kingston et al. concluded that "recognizing the printer's space as the separator of words is secondary to perceiving that a particular linguistic unit represents a meaningful entity" (p. 95).

McNinch (1974) also used Meltzer's and Herse's (1969) task in conjunction with an aural word boundary task (word segmentation) with a sample of 60 first graders. The primary finding was that while performance on the visual word boundary task discriminated between readiness groups (high, average, low), it did not appear as a significant predictor of spring reading scores in a multiple regression. McNinch did not report any patterns of word division.

Mickish (1974) tested 117 first grade students at the end of the year on their ability to segment the spaceless sentence "Thecatandthedogplayball" (p. 20) by drawing vertical lines in between the words. Even though it could be "safely assumed," according to Mickish, that the term *word* had been referred to "hundreds of times," 50% of the subjects did not correctly segment the sentence. Mickish observed also that children in higher levels of basal readers performed better than children at lower levels.

Blum, Taylor, and Blum (1979) also attempted to replicate the task and findings of Meltzer and Herse (1969) with a sample of 54 first graders and 47 kindergartners. Using the same test sentence "Seven cowboys in a wagon saw numerous birds downtown today" and having the children count and circle the words, the authors reported as did

Kingston et al. (1972) that the most common error of both grades was combining two words and that the putative developmental pattern identified by Meltzer and Herse (1969) was not evident. Blum et al. echoed Clay's (1967) earlier admonition, however, that "exposure to 'meaningful' print results in clarity about word space. The nature and pace of this clarity depends on the nature of the child and the quality and quantity of print exposure" (p. 38).

In one of the more descriptive investigations of the nature and development of printed word boundaries, Sulzby (1981) gathered writing samples from nine kindergarten children and recorded their rereadings and explanations of their composing processes. Dividing the sample into high, moderate, and low "emergent" reading groups, Sulzby was able to observe alternative ways of segmenting printed strings such as dots between words, separate lines for each word (i.e., a columnar display), and even circles drawn around letters in order to, as one child put it, "keep the parts from getting mixed up" (p. 14). Interestingly, Sulzby noted that children in the lower two groups asked many more questions about the processes of writing and when reading their productions than did the children in the high emergent group who perhaps, as Sulzby surmised, asked these questions at an earlier age. An important point noted by Sulzby was that although many young children do not use space conventionally, it does not mean that they are unaware of the principle of segmentation itself.

Thus, the few studies reviewed indicated that the convention of "space" as separating word units in print, if not easily grasped by young children, is not used to begin with. While there is less evidence for a distinct developmental pattern, all of the studies indicated that better readers or those having more exposure to print more closely approximated the adult notion of segmentation. Since Meltzer and Herse pointed out that there is little specific instruction in this area, it can be surmised that children were quite successful in gleaning from their printed environment alone some of the characteristics of written language, albeit slowly.

The speech-print match

Studies in the following section generally assess the oral/visual correspondence in one of two ways. Some investigations have explored the spoken/written word match from the standpoint of either too many or too few words spoken for the number of written words represented (Clay, 1967; Holden & MacGinitie, 1972). On the other hand, several have focused attention on whether or not children understand that long spoken utterances generally are represented in print by words

with many letters as well. Reviewed are examinations of both types.

Clay (1967) observed that subjects in her sample went through several stages before correctly matching spoken and written utterances. During the initial stage, children only matched their memorized rendition of a written text by locating the appropriate page with no reference, however, to the actual written text. In stage two the child was able to find the appropriate line of print and during the third stage located some memorized words within the line itself. Stage four was characterized by a process which Clay called "reading the spaces" or "voice-pointing" where the child exaggerated the spaces between words by prolonged pauses between utterances in oral reading. Finally, some chidren moved into a more fluent stage where oral reading errors were characterized by a "movement speech" mismatch where there are either too many or too few spoken words for written ones or a "speech-vision" mismatch in which substitutions for written words were governed by prior language habits.

In a study mentioned earlier, Holden and MacGinitie (1972) tested a sub-group of 57 kindergartners in their original sample on their ability to match written sentences with previously spoken and segmented ones. In the matching task, responses were scored as "congruent" if the child matched the correct number of written clusters with the oral segments he/she had counted and "conventional" if the number of spoken words matched the number of written ones as normally printed. The written sentences contained both mono- and polysyllabic words and many were segmented unconventionally (i.e., "Red and green balloons popped.", p. 555). Even with prior instruction in the principles of printing convention, Holden and MacGinitie found that only 5 children in the sample were able to correctly count the words in the spoken utterances and match them to their written equivalents. While several children were able to choose a "congruent" written match with the segments they had counted, the authors stated that none of the children consistently picked out the standard written form of the spoken sentences (p. 556). Summarily, therefore, the authors warned that "a first grade teacher cannot take for granted that children will understand her when she talks about 'words' and their printed representation" (p. 556).

Rozin, Bressman, and Taft (1974) tested a total of 218 children in kindergarten, first, and second grades on their ability to recognize and explain why pairs of words such as "mow-motorcycle" and "ash-asparagus" represented different lengths of spoken utterances. The authors reported significant differences in percentage between suburban kindergarteners who were able to match the spoken and written

forms correctly (43%) and urban kindergarteners who performed less well (11%). While the urban group improved performance in first and second grades, Rozin et al. noted that a fair number of urban second-graders could still not perform the matching task adequately (76% and 40% in two classes, respectively). Rozin et al. did not offer any explanations as to the differences between socioeconomic groups; however, they suggested that "it might be useful for a child to grasp the nature of the writing system before delving into its detailed specifics (letter/phoneme mappings). It appears that partial mastery of the details does not guarantee appreciation of the basic system" (p. 334).

Using the same task with some variations in the nature of the stimulus pairs, Lundberg and Torneus (1978) asked 100, nonreading children, ages 4-7, to match long or short written words with their appropriate oral representation and to explain the reason why. The researchers varied such factors as vowel duration and semantic referent (i.e., long/short written words referring to either large or small objects). While the results showed a steady increase in correct matching due to age, Lundberg and Torneus reported that less than 20% of the entire sample met the criterion of 90% correct responses (p. 410). In addition, only the 7-year-olds were able to give explanations of their choices which indicated an accurate understanding of the relationship between the duration of spoken utterances and number of written letters. Other trends noted were that children in all age groups seemed to adhere to a semantic strategy when deciding on the word length while no groups demonstrated reliance upon vowel duration as a cue. In summary, Lundberg and Torneus stated that even the oldest preschoolers "seemed to have poor concepts of the basic principle of our writing system" [Swedish] (p. 412). Further the authors warned that "conventional beginning reading instruction with phonic emphasis starts well before the children have developed necessary meta-linguistic skills, with serious educational consequences" (p. 412).

Finally, Evans, Taylor, and Blum (1979) used the same task of Rozin et al. as a component in the development of their own instrument to measure metalinguistic abilities. Using a sample of 53 first graders, they found that in a multiple regression with reading achievement as the criterion, the "mow-motorcyle" test was a significant predictor of achievement while knowledge of visual word boundaries was not. They suggested that tasks such as "mow-motorcycle" which require the child to focus on aspects of both oral and written language are more useful in helping the child understand print since they enhance "decision-making by the child and an active interaction with his language" (p. 17).

It can be observed, then, that children do not immediately understand the convention of spacing between written words as separating lexical units in print. Nor do they, as reported, realize that longer utterances are usually represented by more letters. Interestingly, as demonstrated in other studies, direct instruction regarding these concepts seemed to have little effect; whereas increasing experience with books and interaction with the printed page led to more adult-like notions of how spoken words are represented in print.

Directionality, punctuation, and other printed conventions

Most of the studies reviewed in this final subsection of concepts about printed conventions have used the few commercially available tests in the area to measure a variety of reading-specific behaviors. Clay's (1972, 1979) *Concepts About Print Test* (CAPT), the *Linguistic Awareness in Reading Readiness* (LARR) *Test* by Downing, Ayers, and Schaefer (1982) and Blum's, Evan's, and Taylor's (1982) *BET: Written Language Awareness Test* (WLA) were all developed to give more accurate insight into the child's direct facility with reading behaviors than was possible with traditional reading readiness tests. Among the tests a range of concepts about written language are measured including knowledge of printed letter and word units, understanding of metalinguistic vocabulary, correct directional movements, the function of punctuation marks, and in some cases, discrimination between different types of script and cognizance of various kinds of environmental message-carriers.

Clay (1969) noted that habits of directionality varied according to the attained reading level of the child. Better readers usually established accurate line movement and return sweep after seven weeks of instruction while children in average and low reading groups took 15-20 weeks to develop accurate movements. Clay observed, however, that some children took as long as six months to establish correct directional habits. In Clay's (1967) view, though, exposure to written forms should not be withheld because a child is judged "immature" (p. 24). She stated that a correct orientation to print is "fostered by contacts with written language. The visual perception of print, the directional constraints on movement, the special types of sentences used in books, and the synchronized matching of spoken word units with written word units will only be learned in contact with written language" (p. 24).

In one of the more recent and extensive analyses of American children's knowledge of printed conventions, Day, Day, and colleagues (1979, 1980, 1981,) tested children three times during their kinder-

garten year and twice during their first grade year with the *Sand—Concepts About Print Test* (CAPT) which attempts to measure not only knowledge of word boundaries, but also directional habits and knowledge of punctuation. From a previous factor analysis, Day and Day (1979) identified four dimensions of printed concepts which seemed to develop sequentially. By the end of the first grade, Day, Day, and Hollingsworth (1981) recorded that 80% or more of their sample of 51 first graders at the year's end had mastered basic book orientation habits of directionality and were able to identify upper and lower case letters as well as single words in print. However, roughly only a third to a half of the sample were able to recognize incorrect letter and word sequences or noticed when whole lines of print were placed out of order (top and bottom reversed). In addition, while three-quarters of the sample could identify a comma, only 16% could explain the function of quotation marks. However, Day and Day (1979) cautioned in a previous discussion that strong evidence did not emerge supporting the notion that concepts of print are prerequisite to actual ability since some children whose scores were relatively low on the test (16 out of 24) were observed to be reading by teachers during the first grade year.

Johns (1980) administered the CAPT to 60 first graders ending their first year of instruction and found that above average readers performed significantly better than below average ones on items assessing knowledge of letter and word units and on tasks where the child was to recognize incorrect letter and word sequences and explain the function of various punctuation marks. However, Johns pointed out that several items on the test may have not adequately directed the child's attention to the print; therefore, the differences found between types of reader in recognizing inverted letter and word sequences may be less qualitative than an artifact of the examination procedure. Despite these limitations, Johns surmised that "data from this study indicate that above average readers have a greater understanding of print-related concepts than below average readers" (p. 547).

In a further attempt to replicate and extend findings of previous administrations of the CAPT, Yaden (1982) tested 118 first graders in the spring with the most recent edition of the CAPT, *Stones* (Clay, 1979), and obtained a measure of intelligence as well. Using the reading subtests of the *Standard Achievement Test* (SAT) (Madden, Gardner, Rudman, Karlsen, & Merwin, 1972) as measures of reading ability, Yaden found that in a multiple regression with print awareness scores as the criterion, the subtest of word reading was a better predictor of knowledge of printed conventions than that of intelligence as measured by the *Otis-Lennon School Ability Test* (Otis

& Lennon, 1979). Further, all of the reading subtests (word reading, reading comprehension, word study skills, and vocabulary) retained significant partial correlations with print awareness even with intelligence controlled (cf. Francis, 1973).

In general, Yaden's study supported the findings of previous research that some beginning readers' concepts of letters, words and marks of punctuation are not stabilized even after one year of reading instruction. Yaden also discovered that above average readers had better performance on items purporting to measure directional habits with normal and irregular print, and items pertaining to the identification of incorrect letter and word sequences and marks of punctuation. The study did not confirm, however, hypothesized "large" effects of reading achievement and intelligence upon knowledge of printed conventions based upon computation of prior power analyses (cf. Cohen, 1977). Neither reading achievement nor intelligence can be said to contribute substantially to the relationship with print awareness independent of the other. In combination, however, measures of reading achievement and intelligence proved to be useful predictors of knowledge of printed conventions contributing together approximately 40% of the total variance of scores on the CAPT.

In summary, despite discrepancies in the observation of a distinct developmental pattern in the growth of knowledge of printed word boundaries, there is a remarkable unanimity in the findings that beginning readers do not possess firm concepts of printed language units as letters, words, or punctuation marks. Nor do they immediately understand current directional movements. As noted in studies dealing with oral language units, superior readers recognize these linguistic elements in their written form better than poorer readers. This observation plus the finding that reading ability was a better predictor of print awareness than intelligence (cf. Yaden, 1982; Francis, 1973) lends support to an earlier contention by Ehri (1979) that practice with written language is the best way to enhance metalinguistic growth.

Summary/discussion

A review of the extant research on children's concepts of the functions and processes involved in reading and their awareness of the units of spoken and written language revealed that beginning readers are largely unaware of the overriding structure of the writing system as well as their own speech. They have disparate notions as to what behavior comprises the act of reading and the necessary steps that they must take in getting ready to become a reader. Perhaps the most

disturbing thing as pointed out by some is that there is little or no instructional time spent orienting the children to what reading is or what useful functions it may serve. As Meltzer and Herse (1969) noted, the children are expected to intuitively grasp these conceptual or "metalinguistic" aspects of reading as if the actual learning of the visual symbols itself was entirely self-explanatory of the higher processes. What research has divulged, however, is that merely learning the code does not automatically give children insight into how print may be used nor how these "bunches of letters," as one child put it, work together to represent the variety of intelligible messages ubiquitous in everyday surroundings.

However, there are several issues within the research literature itself which must be addressed and resolved before any definitive conclusions can be drawn as to what applied measures might be taken by educators to improve reading instruction in the area of developing accurate concepts about print. While these have been discussed elsewhere in more depth (Yaden, 1982), space necessitates only a brief mention of three primary concerns here.

Causation Between Metalinguistic Awareness and Reading Ability and the Effects of Instruction

As Day et al. (1981) have pointed out, the absence of a definite causal direction from metalinguistic ability to reading achievement should admit caution when deciding what practical steps ought to be taken in enhancing metalinguistic awareness. From their own study Day et al. found, in a path analysis model, that performance on a measure of print awareness at the beginning of first grade was more highly correlated with reading achievement at the end of the year than was performance on a standardized readiness test. However, this finding has not been universal. Both McNinch (1974) and Evans, Taylor, and Blum (1979) have reported in their investigations that knowledge of printed conventions is a poor predictor of future reading achievement whereas knowledge of spoken word boundaries and ability to "track sound" in words has a greater relationship with end of the year scores in reading.

On the other hand, Ehri (1976) has provided evidence that readers learned context-dependent words such as prepositions and auxillaries better than pre-readers of the same age, thus lending credence to the view that experience with print heightens awareness to words which otherwise go undetected in normal speech due to their elision with other words. For Ehri, "word segmentation is an inevitable product of the learner's attempts to achieve competence with printed language

and that no special instruction delivered prior to encountering print is required to accomplish this" (p. 841). Since, however, the majority of studies have been correlational, (e.g., Allen, 1983; Taylor & Blum, 1983; Tunmer & Fletcher, 1981) which have indicated a relationship between reading ability and metalinguistic awareness and have involved only statistical manipulations, it has been improper to tease out any definite temporal sequence, verified by experimental procedures, between reading achievement and the development of metalinguistic awareness.

Two studies reviewed, however, have experimentally applied a treatment for enhancing metalinguistic awareness. In the first, Ollila, Johnson, and Downing (1974) found that a Russian training procedure (cf. Elkonin, 1973) for increasing awareness of the phoneme as a "concrete entity" led to better performance on the *Wepman Auditory Discrimination Test* (Wepman, 1958) than did instruction in two basal programs even when the groups were equated on readiness measures. In the second and most recent study, Bradley and Bryant (1983) trained four- and five-year-old non-readers in sound categorization (i.e., distinguishing the "odd" word not sharing a common phoneme in a group of words) and compared them to a control group of children equated in age and intelligence on abilities to read and spell over a 4 year period. Bradley and Bryant found that the treatment group trained previously in sound categorization performed significantly better in standardized tests of reading and spelling than did the controls. In addition, one experimental group given additional exposure to plastic letters along with the training procedure surpassed all groups in the ability to spell. Thus the authors concluded that while former studies implied a relationship between phonological awareness and reading, "our study is the first adequate empirical evidence that the link is causal" (p. 421).

While the Bradley and Bryant study is by far the strongest argument for the view that training in spoken language awareness enhances reading ability, some qualifications must be added. For instance, Bradley and Bryant reported that initial sound categorization scores for the children at 4 and 5 years of age accounted for less than 10% and 5%, respectively, of the variance in reading scores later on. In addition, two years of intensive training in sound categorization produced only a 3-5 month gain for the treatment group in standardized tests of reading and spelling. Thus the small correlation between phonological awareness and reading ability plus the minimal payback of 2 years of instruction mitigates in a pragmatic sense even the discovery of an apparent, proveable, temporal sequence.

Finally, Ehri's (1979) contention that exposure to print itself brings

about awareness of language structure cannot be fully disproven until groups of non-readers are given the kind of intensive immersion in print that has been shown to enhance early reading ability (Clark, 1976; Durkin, 1966; Teale, 1978). Since it has been demonstrated (e.g., Yaden, 1983, 1984; Yaden & McGee, in press) that children as young as two years of age spontaneously asked questions about printed language, including about mapping principles, an experiment could be designed to tests the effects of early reading program such as Durkin has suggested (1974-75), against the effects of training in phonological awareness (cf. Bradley & Bryant, 1983). It may be that immersion in a print-rich environment with adults available to answer questions has a greater effect even than training at this age. Final conclusions as to causation must await this type of experimental study.

Differences in research methodologies

Purposes and processes of reading. One reason for discrepancies in the findings of research on measures of metalinguistic awareness and knowledge of print conventions is that as a conceptual framework, metalinguistic knowledge has yet to be fully and adequately described, and therefore methodologies for tapping the related constructs differ widely. For instance, investigators interested in assessing children's knowledge about purposes for and strategies during reading have typically used the structured interview as a data-gathering method (e.g., Denny & Weintraub, 1966; Johns, 1972, 1974; Mason, 1967; Myers & Paris, 1978; Oliver, 1975; Reid, 1966, Tovey, 1976). Since Downing (1970), however, discovered children's ability to point out acts of reading correctly and describe reading processes in more adult-like terms when actually presented with a book or other models of real-life message carriers, doubt is cast on the structured interview as a reliable indicator of children's functional knowledge of the processes involved in reading.

Spoken language units. Similarly, researchers studying children's understanding of spoken language units such as phonemes, words, or sentences have used a variety of tasks as well including the structured interview (Matluck & Mace-Matluck, 1983; Papandropoulou & Sinclair, 1974; Templeton & Spivey, 1980), a range of segmentation tasks (Holden & MacGinitie, 1972; Huttenlocher, 1964; Liberman et al., 1974; Treiman & Baron, 1981) and other performance measures in which children chose linguistic elements from a range of stimuli (e.g., Downing & Oliver, 1974; Horne et al., 1983; Ryan et al., 1977).

Unfortunately, as there was no uniformity in methodology, no uniformity was present in the findings of the aforementioned studies.

While Fox and Routh (1975) stated that 3-year-olds successfully segmented most of the sentences presented into individual words, Downing and Oliver (1973-74) reported for their sample confusions between phonemes, syllables and words even with eight-year-olds. This gross disparity in methodology and findings is disturbing and warrants further investigation toward the development of a well-defined, theoretical framework for metalinguistic abilities as well as some systematic research methodologies for tapping these constructs (cf. Nesdale & Tunmer, 1984)

Written language units. While inquires into children's knowledge of written word boundaries show less variation in experimental tasks, nevertheless, results vary from study to study and certain practical difficulties have arisen. Both Yaden (1982) and Johns (1980) have commented upon the inadequacy of certain items on the CAPT to direct the children's attention to the print, thus confounding findings especially between above and below average readers. Further Ehri (1979) pointed out that the children in Mickish's (1974) study may have not known the words in the test sentence and, therefore, with no spaces between the words, it would be impossible for the children to respond competently. Additionally, Meltzer's and Herse's (1969) original finding of a developmental pattern in the development of space as a boundary for written words has not been corroborated by subsequent replications using their original task or any other. Thus, with print conventions as well, no uniform data collection methods have been found which yield consistently repeatable results.

Tests of Metalinguistic Awareness

Finally, in an effort to substantiate the relationship of metalinguistic awareness to actual reading achievement and to establish some stable, systematic measures of the conceptual nature of reading and awareness of print conventions, a few researchers have developed various formalized tests of linguistic awareness covering a wide array of abilities. While all of the tests measures written conventions including concepts of letter, word and sentence units, marks of punctuation and directional movements, some also include measures of oral language segmentation (e.g., Blum, Evans, & Taylor, 1982) and items to assess knowledge of the functions and types of printed messages found in everyday life (e.g., Downing, Ayers, & Schaefer, 1982). The tests in general explore reading-specific and book-handling behaviors not included in traditional readiness tests and have been often found to correlate more highly with reading achievement measures than either

readiness tests themselves (e.g., Day et al., 1981) or intelligence (e.g., Yaden, 1982). In addition, versions of the LARR (Downing, et al., 1982) have been found valid for usage with non-white populations (e.g., Downing, Ollila, & Oliver, 1975) and to successfully assess the effects of early school instruction and home environment on the acquisition of literacy behaviors (e.g., Downing, Ollila, & Oliver, 1977).

Despite, however, the additional insights into the relationship of metalinguistic awareness and reading achievement gained by the use of these tests, several uncertainties remain to be resolved. Day et al. (1981) have suggested that the high positive correlations between knowledge of print conventions and reading achievement may simply be due to a redundancy across test items. Further, they noted that statistical control of other aspects of linguistic awareness may reveal that knowledge of printed conventions contributes little to actual reading ability. Another difficulty pointed out by Evans et al. (1979) and Johns (1980) is that studies using relatively small sample sizes (e.g., $N \leq 60$), but considering several variables in the analysis generally suffer from a loss of power and generalizability. American investigations using the CAPT (e.g., Day & Day, 1980; Johns, 1980) have generally been of this size, although Yaden (1982) has recently confirmed many of the previous findings with a sample nearly twice as large.

In sum, although the CAPT (Clay, 1972, 1979) has been reviewed favorably (e.g., Goodman, 1981) neither it nor the other instruments have been used widely, particularly in America. While McDonell and Osburn (1978) have reported that the CAPT can be a useful measure of readiness skills in a classroom, few other discussions exist other than by the authors themselves (e.g., Ayers & Downing, 1982; Clay, 1979a; Downing, Ayers, & Schaefer, 1978; Taylor & Blum, 1983) as to the efficacy of these tests in measuring early reading behaviors. More extensive standardization procedures and investigations of applied usages are definitely needed.

Conclusion

In closing, Donaldson (1984) has recently cautioned literacy researchers against the "fashionable" trend of emphasizing "what children *can* [Donaldson's emphasis] do rather than what they cannot do" (p. 174), and ignoring the real differences in the ease of learning to speak as opposed to learning to read and write. She goes on to say that "some things take longer than others to learn and are achieved later or with less universal success. We do no good to children, or to science, by trying to deny it" (p. 174). Thus, that over two decades of research into

metalinguistic abilities, even despite varying methods of data collection and analysis, has turned up overwhelmingly negative results in documenting children's awareness of spoken and written language units and the language of reading instruction speaks strongly toward further investigations into refining existing instruments and the development of experimental research procedures which can yield consistent, replicatable results. It has been repeatedly shown that beginning readers are often unaware of the practical applications of written language in everyday events and have tenuous notions as to the nature, functions, and constraints of the elements constituting written language. That traditional tests of readiness have overlooked these more global aspects of literacy is a fault. To continue to overlook them in the face of mounting evidence for their existance will be inexcusable.

Vygotsky (1978), in discussing the history of written language, has said that "children should be taught written language, not just the writing of letters" (p. 119). The implication here is that to view written language as merely the reproduction of certain isolated, graphic shapes is to miss the importance of the printed code altogether. More recently, Ferreiro and Teberosky (1982) have powerfully reiterated this view.

> It has traditionally been thought that to learn to read children must possess good language (or a sufficient level or oral language development) evaluated in terms of vocabulary, diction, and grammatical complexity. If we believe that we must consider language awareness, the perspective changes. Rather than being concerned with whether children know how to speak, we should help them become conscious of what they already know how to do, help them move from "knowing how" to "knowing about," a conceptual knowing. (p. 298)

Thus, while the author of the present paper does not claim to have presented an exhaustive discussion of the literature, it is hoped that enough has been examined that a reevaluation of current reading approaches in terms of ensuring children's "conceptual knowing" might be soon in coming.

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