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A MULTIVARIATE ANALYSIS OF FIRST GRADERS' PRINT AWARENESS AS RELATED TO READING ACHIEVEMENT, INTELLIGENCE AND GENDER

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A MULTIVARIATE ANALYSIS OF FIRST GRADERS' PRINT AWARENESS AS RELATED TO READING ACHIEVEMENT, INTELLIGENCE AND GENDER

BY

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A MULTIVARIATE ANALYSIS OF FIRST GRADERS' PRINT AWARENESS AS RELATED TO READING ACHIEVEMENT, INTELLIGENCE AND GENDER

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To my wife, Jon-Lynn

"An excellent wife is the crown of her husband."

Proverbs 12.4

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Anxiety in the heart of man weighs it down,
But a good word makes it glad.
Proverbs 12:25

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Dave Yaden
July 23, 1982

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CHAPTER I

Background of the Study

Since Reid's (1966) discovery of children's confusion between such terms as "letter" and "numeral," "words" and "names," some researchers in reading (e.g., Clay, 1979b; Downing, 1976, 1979b; Mattingly, 1972, 1979) have stressed that concepts about reading, or "metalinguistic awareness" (Blachowitz, 1978; Evans, 1975), is just as crucial in beginning to read as learning sound/letter correspondences. Further, Downing (1979b) has stated that most children approach learning to read in a "state of cognitive confusion about the purposes and technical features of language" (p. 37). The intent, therefore, of the present study was to explore one aspect of metalinguistic awareness, knowledge of printed conventions, and to examine this aspect taking into account the effect of reading ability, intelligence and gender.

Metalinguistic Awareness: An Extended Definition

One key to understanding the characteristics of a writing system, according to Downing (1976), is familiarity with the concepts underlying the "reading instruction register" which is "the special language used to talk about reading and its relation to speech" (p. 763). Such concepts include notions of

units in both oral and written language such as "phonemes," "sounds," "letters," "words," "sentences" and of differences between the processes of "reading," "writing," and "drawing." While investigators have established that most children develop some idea about language units and scripting early in the preschool years (Goodman & Altwerger, Note 1; Hiebert, 1981; Harste, Burke & Woodward, Note 2; Hill, 1980; Yaden, Note 3), the consensus of studies internationally, particularly with kindergartners and first graders, has been that these nascent concepts are not overwhelmingly congruent with teachers' usage of the terms (Downing, 1976).

Another area of conceptual development pointed out by Clay (1979b) is becoming familiar with the spatial orientation of letters and directionality in print. Clay has suggested that the encounter with written language is actually a unique situation in the child's overall experience.

> The child's experience has trained him in different habits from those he needs in reading. An orange, a dog, or mother must be recognized from any viewing angle. Meaning is constant when the object is small or large, is upside-down, back-to-front, or sideways to the viewer. The child has learned to recognize the constancy of objects despite their changing visual image. On entry to school he has to learn that in one particular situation, when he is faced with printed English, this flexibility is inappropriate. Now he must recognize some directional constraints. (p. 99)

In developing this "orthographic linguistic awareness" (Day, Day, Spicola & Griffen, 1981), the child must learn that print, not pictures, carries the meaning, that left pages are read before right pages, that top lines are read before bottom lines, that printed words are read from left to right, etc. Clay (1979b) has noted that these concepts are not easily grasped as it took the average child in her two year longitudinal study of 100 children six months to

gain consistency in directional behavior, and even after a year of instruction, "4 percent to 16 percent of children still show directional errors" (p. 131-132).

Finally, along with an understanding of the technical instructional terms and their referents and a realization of which direction printed language must be processed, Mattingly (1979) has stated that an "essential prerequiste" to learning to read is " 'linguistic awareness': the ability of a speaker-hearer to bring to bear rather deliberately the grammatical, and in particular, the phonological knowledge he does have in the course of reading" (p. 277). As opposed to the largely unconscious mechanisms involved in the processing of speech input, reading must be, according to Mattingly (1972), a "deliberately acquired, language-based skill dependent upon the speaker-hearer's awareness of certain aspects of primary linguistic activity" (p. 145). In other words, to process written language, the child must be "thoroughly familiar with the rules of the writing system, the shapes of the characters and the relationship of characters and combinations of characters to the phonology of his language" (p. 142). However, as Mattingly (1972) has noted, the relationship between the orthography and the spoken language is not merely phonemic as suggested by some linguists (e.g., Bloomfield, 1942), but rather "morphophonemic." The child learning to read must be cognizant that words in the spoken language are only imperfectly represented in print and that the visual symbols often correspond more appropriate[ly] to underlying semantic structures than phonemic ones as in pairs "anxious-anxiety" or "courage-courageous" where the orthography remains constant despite [pro]nunciation (Chomsky, 1970). Thus, Mattingly (1979) has suggested,

> To the linguistically-aware child, the phonological segmentation and the morphophonemical structure of words is intuitively obvious, and

> the orthography seems reasonable even though there may be substantial discrepancies between the orthographic transcriptions of words and his immature morphophonemic forms; to the child not thus aware, the principles by which the orthography transcribes words seem quite mystifying. (p. 277)

What research has discovered, however, is that the majority of children beginning to read across cultures are indeed "mystified" at the task which lies before them. While Reid (1966) studied only a dozen Scottish children using a Piagetian interview technique, the persistence of beginning readers to show an overall lack of awareness for the purposes and processes involved in reading has since been shown by a variety of both descriptive and experimental studies with American kindergartners and first graders (Day & Day, 1979; Evans, Taylor & Blum, 1979; Holden & MacGinitie, 1972; Johns, 1980; Kingston, Weaver & Figa, 1972; McNinch, 1974; Meltzer & Herse, 1969; Mickish, 1974), with Canadian and English children (Downing, 1969, 1970, 1971-72; Downing & Oliver, 1973-74; Francis, 1973; Leong & Haines, 1978), in New Zealand (Clay, 1967, 1969, 1979b; Turnbull, 1970, 1971), Switzerland (Papandropoulou & Sinclair, 1974) and across ethnic boundaries (Denny & Weintraub, 1966; Downing, Ollila & Oliver, 1975; Oliver, 1975). While a certain amount of initial uncertainty is to be expected, a disturbing finding is that children only "groped" (Reid, 1966) towards understanding these concepts very slowly and that a large number were still confused with certain aspects of printed conventions such as written word boundaries even after a year of reading instruction (Mickish, 1974).

Metalinguistic Awareness and Reading Ability

Although in earlier studies children had been observed to lack adult notions of written word boundaries (e.g., Kingston, Weaver & Figa, 1972; Meltzer & Herse, 1969) and to confuse isolated phonemes and syllables for spoken words (Downing & Oliver, 1973-74), McNinch (1974) has correctly

pointed out that these studies failed to compare awareness of printed conventions or understanding of oral language units with actual reading achievement. McNinch (1974) found that while perception of visual word boundaries differentiated between groups of first graders categorized as good, average and poor on readiness measures, it was not a significant predictor of end of year reading scores on the Metropolitan Achievement Test, whereas perception of aural word boundaries had precisely the opposite relationship. Similarly, Blum, Taylor & Blum (1979) observed that some children scoring perfectly on their visual word boundary instrument still read below grade level as measured by standardized tests. Thus, the authors concluded that "while awareness of visual word boundaries seems to be related to readiness skills, this readiness skill is not closely associated with success in learning to read" (p. 37).

Other researchers as well have found that a limited conceptual understanding of technical language terms in addition to concepts of directionality does not necessarily inhibit the initial acquisition of reading. For example, Francis (1973) noted that concepts of "letter," "word," and "sentence" seem to develop sequentially with "the two latter concepts being mastered while the children were already reading" (p. 20). In addition, Day and Day (1979) discovered that the average child in their sample of beginning first graders knew only half of the items on a measure designed to tap concepts of directionality, knowledge of punctuation, differences between letters and words, and matching speech to print. Even children who were classified as readers by their teachers at the end of the first grade only correctly identified approximately two-thirds of the items on the instrument. Day and Day (1979) stated, therefore, that "some of the concepts assessed by this test may not be crucial for basic reading acquisition" (p. 22).

Thus, while metalinguistic abilities such as differentiating between units in oral and written language and understanding the purposes for and processes involved in deciphering visual language in its various scripted forms have been postulated as crucial in learning to read, the relationship to actual reading achievement is by no means well-defined as yet. Ehri (1979), for example, insisted that "it is a waste of time to study these capabilities in prereaders" (p. 89). In her view, the process of learning to read itself "is the significant factor accounting for the emergence of word-consciousness" (p. 69). On the other hand, Evanechko, Ollila, Downing and Braun (1973) have stated that

> to identify certain concepts pertaining to the nature of reading, the elements of the reading process (words, letters) and related environmental phenomena. . . suggests the significance of the learner's ability to classify experiences and identify their relationships and meaning. . . Furthermore, this factor measures a unique aspect of reading readiness, that of the child's concept of the nature and purpose of reading, an aspect hitherto ignored in test [sic] of reading readiness. (p. 74)

Purpose of the Study

The purpose of the investigation was in part to replicate with a larger sample size previous findings using the Concepts About Print Test that children demonstrate certain confusions about printed conventions and that above average readers specifically because of their reading ability perform better on measures attempting to assess knowledge of print conventions. The study in addition set out to measure the contribution of intelligence to both print awareness and reading achievement and to test for the presence of certain hypothesized effect sizes to more precisely define the relationships between the three variables. In addition, several precautions were taken as suggested by previous researchers to overcome the difficulties presented by certain items on the test.

Statement of the Problem

The specific questions investigated by the study were:

1. What is the total as well as singular contribution of reading achievement, intelligence and gender to an awareness of print conventions?
2. Can above and below average readers be differentiated on a dimension of variables comprised of aspects of print awareness and intelligence and gender?
3. What is the proportion of common variance shared by aspects of print awareness and measures of reading achievement?

Hypotheses

Specific null hypotheses tested were:

H_O1 Measures of reading achievement do not comprise a statistically significant proportion of the total variance of print awareness with intelligence and gender statistically controlled.

H_O2 Intelligence as measured does not comprise a statistically significant proportion of the total variance of print awareness scores with measures of reading achievement and gender controlled.

H_O3 Above and below average readers do not differ significantly along a dimension of variables comprised of aspects of print awareness, intelligence and gender.

H_O4 Print awareness scores and measures of reading achievement do not share a statistically significant proportion of common variance.

Significance of the Study

As yet there is little firm evidence to indicate that print awareness is influenced primarily by reading achievement and not intelligence or other

extraneous variables not yet detected. With the actual relationship between print awareness and reading ability still largely undetermined, attempts to design instruction to enhance metalinguistic abilities are proceeding without a well-defined theoretical framework within which these abilities can meaningfully be described. This study, therefore, will contribute a more precise estimate of the relationship between knowledge of print conventions and facets of reading ability; although due to the correlational design of the study, the direction of cause, if any, cannot be stated definitively. However, as the general relationship between print awareness and actual reading ability is further substantiated, researchers will be in a better position to decide whether or not further consideration should be given to the design of special instructional techniques for training specific metalinguistic abilities.

Limitations of the Study

While the sample size of the present study was twice as large as previous investigations using the Concepts About Print Test, the nonrandomly selected sample of white, middle class students precludes any generalization to other socioeconomic levels although differences in metalinguistic abilities have been noted elsewhere between groups varying in socioeconomic status (e.g., Downing, Ollila & Oliver, 1977). Also the deletion of students of other ethnic origins further limits the generalizability of the results (c.f., Downing, Ollila & Oliver, 1975).

Another limitation stems from the low reliabilities obtained for the present group of subjects. While higher reliabilities have been obtained in samples half the size of the present one, the fact that those reliabilities were not supported in a large sample does not confirm the reliability of the Concepts

About Print Test with American first graders. Therefore, further investigations need to be conducted to establish a consistent pattern of reliability before definitive statements can be made about the discriminating power of the test with lower elementary students. In addition, the present study is the only one of which the writer knows that used the most recent edition of the tests Stones (Clay, 1979c). Previous investigations (Day et al., 1981; Hollingsworth, 1978; Johns, 1980) used the Sand (Clay, 1972). While there is no reason to believe that the parallel forms differ greatly, only further research using both editions can shed light upon any differences between the two which could affect reliability adversely.

A further limitation noted also by other researchers (e.g., Johns, 1980) is that some of the items which require the children to identify incorrect letter and word sequences do not appear to engage the subjects' visual attention in order that the task might be done adequately. Although the present examiner used a specific prompt for each item (12, 13, 14) which directed the children's attention to the "writing," the majority of the students gave responses which indicated that they were looking at the pictures. It is only barely conceivable, but not impossible, that the children interpreted "writing" as drawing" (c.f., Reid, 1966) and, thus, believed that they were performing the correct task by interpreting the pictures. However, unless a test prompt is used which directs the children's attention to specific words or lines such as "What's wrong with the words (letters, lines) on this page?", it is impossible to know whether or not the large majority of children in this study as well as previous ones were truly unable to recognize incorrect sequences of words and letters. Future researchers using the Sand (Clay, 1972) and Stones (Clay, 1979c) need to explore

different ways to make sure that the students are focusing upon the print and not the pictures. To date, this has not been done reliably.

A final limitation is that the Concepts About Print Test is wholly a measure of "orthographic linguistic awareness" (Day et al., 1981). Metalinguistic ability as suggested by the literature includes knowledge of spoken language units as well as insights into the varied functions of and purposes for literacy behaviors. Knowledge of print conventions or "orthographic factors" (Holdaway, 1979) comprises only a small part of the whole and, according to some researchers (Evans et al., 1979; McNinch, 1974), is a relatively poor predictor of actual reading ability.

Definition of Terms

Intelligence - defined according to the Otis-Lennon School Ability Test as abstract reasoning ability and the mental manipulation of ideas represented by verbal, numerical, figural and symbolic forms.

Metalinguistic - a broad, global term including knowledge about the purposes and processes of literacy behaviors and knowledge about the elements (i.e., words, letters, sentences, syllables, etc.) of both spoken and written language. Incorporates knowledge about printed conventions such as directionality, punctuation, etc.

Morphophonemic - the property of syntax or semantics to effect changes in the surface pronunciation of a word (e.g., "sign-signal).

Print awareness - a term referring primarily to knowledge of printed conventions such as directionality, punctuation, book orientation, letter-sound relationships and the relationship between written letters, words and sentences.

Word-consciousness - in regards to spoken language it refers to the ability of children to differentiate between individual words in the stream of speech. As applied to written language, it refers to the cognizance of space as separating letter clusters.

Reading Achievement - defined according to the Stanford Achievement Test subtests as explained below:

Word Reading - matching one of four words with a picture. Words are of increasing difficulty.

Paragraph Meaning - selecting one of four words in a cloze procedure in paragraphs of increasing difficulty.

Vocabulary - selecting one of three words as an answer to a question or statement by the teacher.

Word Study Skills - matching appropriate beginning or ending sounds from a stimulus word read by the teacher from a list of three words. Matching appropriate words from a selection of three to correspond with a stimulus word read by the teacher.

Overview of Remaining Chapters

The ensuing discussion will be subsequently divided into a review of the literature regarding metalinguistic awareness followed by a description of the procedures undertaken to conduct the study, a presentation of the findings, and finally, a discussion of the results. Immediately following in Chapter II will be a review of the literature in each of the major strands of metalinguistic research as identified by the writer: these being primarily studies exploring children's knowledge of (a) concepts about the functions and processes of literacy behaviors, (b) concepts about spoken language units, and (c) concepts

about printed conventions. Other, less explored aspects of metalinguistic ability will be discussed as well. In Chapter II, the present sample of first graders will be described as well as method of data collection, materials used and design and statistical procedures implemented. The findings of the study will then be discussed in Chapter IV both descriptively and in light of the statistical analyses bearing upon the specific hyotheses. Finally in Chapter V, the results of the study will be summarized, conclusions drawn and recommendations offered.

CHAPTER II

REVIEW OF THE LITERATURE

Studies of metalinguistic awareness have not followed a uniform course of development nor reached a consensus as to what abilities are crucial for the successful acquisition of reading. As mentioned in the introduction a great number of researchers have focused their attention on children's notions and understanding of the technical language of reading instruction better known as the "reading instruction register" (Downing, 1976). On the other hand, several have concentrated primarily upon exploring beginning readers' familiarity with printed conventions or "orthographic linguistic awareness" as described by Day et al. (1981). Still others have been interested in observing whether or not children understand the purposes or pragmatic functions of print and what processes they must utilize in learning how to read. Fewer but no less interesting investigations have probed the relationship between metalinguistic abilities and developing cognition, the development of an accurate "speech-print" match, the direction of cause between reading ability and metalinguistic awareness and whether or not the latter can be enhanced by instruction.

The following review will discuss the literature related to metalinguistic awareness chronologically under each of the broad rubrics as mentioned. Reviewed initially will be studies categorized by the writer as following the three major strands of metalinguistic research: (a) concepts about the nature, purpose and processes of reading and writing, (b) concepts about spoken

language units and terms in the "reading instruction register," and (c) knowledge of print conventions. Following will be brief summaries of studies dealing with the "speech-print" match, the relationship between metalinguistic awareness and developing cognition, the direction of cause between metalinguistic ability and reading achievement and disparities between research methodologies. Finally, various tests of metalinguistic awareness and classroom applications of metalinguistic instruction will be discussed. In addition, summary comments will be made in hopes of giving metalinguistic awareness and its related facets some identifiable shape as a viable psychological construct.

Concepts About Purposes and Processes Involved in Reading and Writing

While it had been earlier hypothesized that concepts of reading were related to reading achievement independent of other attributes as intelligence (c.f., Edwards, 1962), these early studies did not question the children directly. Hence for all practical purposes, the discovery of children's slowly developing notions of what reading is for and how it is to be accomplished began with 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 know what bus to take?", and "What are these spaces for?", Reid (1966) observed that initially only one child out of twelve said that books contained words, several thought that the pictures, not print, carried the meaning and 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 (1966) concluded that her subjects were "exhibiting certain linguistic and conceptual misunderstandings about the nature of the material they had to organize" (p. 61). Taking essentially 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 letters and numerals are subclasses of the class of written 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 (1966) 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 relationships between letters and words.

Denny and Weintraub (1966) interviewed over one hundred entering first graders of varying racial and socioeconomic makeup 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. 44). 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 irrelevant" while the middle class children in the sample gave the fewest responses in these categories. Despite these limitations, Denny and Weintraub (1966) 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 technique 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). Amusingly, Mason discovered that most (90%) of the preschoolers already thought they could read and enjoyed doing it. From this surprising 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.

As previously mentioned, Downing (1960, 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 (1966) earlier conclusions. In his sample of 13 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 (1966) 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 does your mummy know 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 (1970) concluded that children have a very poor grasp of spoken and written language units in the abstract, he admitted that they are 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 (1972) found a slight positive relationship between concepts of reading and the Vocabulary (r = .31) and Comprehension (r = .27) subtests of the Gates-MacGinitie Reading Test. 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 types of reader against meaningful and non-meaningful responses. Not surprisingly, Johns (1974) found that good readers gave significantly more meaningful responses, although less than half of the "good" readers gave meaningful responses. 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 peope do when they read?", Oliver (1975) found that for a sample of preschool Indian children, most 4 year olds associated reading with behaviors such as "blowing the nose," "putting on glasses," and "just looking" (p. 868). In contrast to the 3 year olds, in the sample, half of whom said they could read already, the majority of 5 year olds said they couldn't but would like to learn. Oliver (1975) 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 5 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 (1976) noted "confusion, ambivalence, and uncertainty" in responses to the questions "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 (1976) stated that reading seemed to primarily a "word calling" process rather than one of getting meaning from the printed page.

Finally, Myers and Myers (1978) in assessing "metacognitive knowledge" about reading in a sample of second and eighth graders ask a set of questions designed to tap knowledge of the characteristics of a "good" reader, the structure of text, and strategies for comprehension. They found that 25% of the young children could not describe the qualities of a good reader and 80% did not know the function of the first sentence in a paragraph or story. In addition, while second graders indicated that rereading might be necessary to "figure out" a story, 88% could not explain what additional information might be gained by way of context or other structural and semantic clues by rereading. Therefore in general, Myers and Myers (1978) concluded,

> Young children in this study were unaware of many important parameters of reading. They were not sensitive to task dimensions or the need to invoke special strategies for different materials and goals. They reported few strategies or reasons for checking their own understanding or progress and were not aware of specific characteristics of proficient readers. (p. 688)

In summary, none of the studies reviewed indicated that beginning readers, even those with a year or two of instruction had notions of reading which are congruent with adult expectations or the level of most introductory materials. While they seem to respond with more adult-like terminology when presented with functional objects displaying printed messages, there seems to be confusion when asked to explain their understanding of literacy behaviors directly. In short, teachers cannot assume apparently that the only thing children need to learn during first grade reading instruction are the sound-letter correspondences.

Concepts About Spoken Language Units

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 tact 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 in children's and adult's 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 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 will be taken up next.

Sentence, Word and Syllable Segmentation

One of the earliest attempts to observe children's ability to segment speech into words was Karpova's (1955) study in Russia with a sample of 3-7 year olds. Karpova asked children to repeat sentences and respond to the questions "How many words are here?" and "Which is the first. . . second. . . third word?". The researcher reported that the youngest children (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 Slobin, 1968, p. 320). Under repeated questioning, children approaching age 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 (1955) also instituted a training procedure in which children moved "plastic counters" as they repeated each word. This 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 aged 4½ 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 (1964) 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.

Holden and MacGinitie (1972) in the first of two experiments generally confirmed Huttenlocher's (1964) 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 as representing one 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 (1972), "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 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. 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), better readers in December as measured by the Gates-MacGinitie Primary Reading Tests were also the better segmenters a few months earlier.

In contrast to the findings of previous analyses of children's inability to segment spoken sentences, Fox and Routh (1975) claimed that even 3 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 (1975) 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 3 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 (1975) also found significant positive correlations between reading comprehension as measured by the Peabody Individual Achievement Test 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 did not differ. As a result of their more frequent exposure to printed language, Ehri (1975) 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 (1975) noted that all her

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

The final study examined under this subcategory of speech segmentation was conducted by Leong and Haines (1978). Testing a total sample of 72 children, 24 each 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 phonemes in words and recall of "high" and "low" complexity sentences. 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 in 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 run 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 (.609), syllable segmentation (.404), phoneme segmentation (.112) and recall of low complexity sentences (.132). From these findings, Leong and Haines (1978) suggested that the most beneficial reading programs are those which help the child "monitor their own language behavior, to objectify it in words, to operate on it in various ways, and to know what they know" (p. 405).

Identifying "What is a Word?"

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 (1973) 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 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 (1973) 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).

Papandropoulou and Sinclair (1974), using a list of commonly known words, identified four primary levels in development of word consciousness as a result of asking children 4 years 5 months to 10 years 10 months the questions "Is that a word?" and "What is a word, really?". An analysis of the results showed that most of the children under 5 answered in level one which was characterized by the inability to differentiate between a word and its referent (c.f., 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" (subject/predicate) 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) words began to take on the feature of elements which make up wholes but which do 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 (1974) 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 of, for instance, "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)

Sulzby (1979) and Pudis and Sulzby (1980) investigated elementary students' notions of words as either possessing semantic or structural characteristics. In Sulzby's (1979) study, first, third and fifth grade children were asked to combine a word they knew with one provided by the researcher when prompted by the question "How does your word go with my word for you?" (p. 51). Structural responses, for instance, involved identification of graphic units such as "they both got letters." Results indicated that all children tended to give semantic responses when both their word and the experimenter's target word were known. Thus, Sulzby (1979) reasoned that "to invent a potential or hypothetical meaning would have utility for a maturing reader who wishes to

read rapidly without stopping to check for precise meaning of unknown words" (p. 53). Testing for the same semantic/structural difference, Pudis and Sulzby (1981) asked first, third and fifth graders again "What is a word?" immediately after three different instructional activities designed to focus attention on either structural or semantic aspects of words. Results showed that there was a steady increase in semantic responses by grades despite prior activities which could, in the researchers' view, have influenced responses otherwise. The conclusion reached by Pudis and Sulzby (1981) was that short term instruction, then, does not appreciably influence children's notions of words in the direction of noting more about their structural features.

In one of the most recent investigations examined, 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 understand classroom directives 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 subjects confused letters and words as well as "a long word" and a "string of words." Interestingly, Sanders (1981) observed that the child with the lowest literary profile as measured by Clay's (1979a) Concepts About Print Test seemed to understand the instructional terminology the best. Unfortunately, as Sanders (1981) observed,

> Instructional procedures may have stimulated the subject to generate isolated bits of metalinguistic awareness related to literary instruction. These unrelated bits may have been related to this subjects confusion about the reading process. He knew many of the "how-to's" of reading, but he barely knew how to read. (p. 220)

Identifying Verbal vs. Non-Verbal Units

The next studies discussed (Downing, 1970; Downing & Oliver, 1973-74; Johns, 1977; Ryan et al., 1977) 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 twenty-five 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 heard a single word and then if he/she heard a phoneme. Results of the presentation of the stimuli to 13 English 5 year olds showed that five 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 (1970) 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 (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 (1973-74) 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 (1973-74) 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' (1977) 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 (1977) 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)

Finally, Ryan et al. (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-word 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. (1977) 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.

Concepts About Printed Conventions

Clay's (1967, 1969) weekly observation of 100 children's beginning reading behavior over a years' period in New Zealand has provided the impetus for numerous investigations into children's knowledge of printed conventions such

as reading from left to right, marks of punctuation, etc. 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 match 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 is able to find the appropriate line of print and during the third stage can locate some memorized words within the line itself. Stage four is characterized by a process which Clay (1967) called "reading the spaces" or "voice-pointing" where the child exaggerates the spaces between words by prolonged pauses between utterances in oral reading. Finally, the child moves into a more fluent stage where oral reading errors are 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 are governed by prior language habits.

Clay (1969) also 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 (1969) noted, however, that several children took as long as six months to establish correct directional habits. In Clay's (1967) view, 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. (Clay, 1967, p. 24)

Knowledge of Written Word Boundaries

American investigations of children's knowledge of printed conventions have 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 to finally circle each word. With a sample of 39 beginning first graders, Meltzer and Herse (1969) noted a 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 the graphic characteristics which define. . . a letter or word" (p. 11). Meltzer and Herse (1969) 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 supporting the finding that children do not use space consistently as a boundary for written words have not confirmed the existence of a developmental pattern. 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. (1972) 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. (1972) 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 (1974) 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 Mikish (1974), 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 kindergarteners. 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 was not evident. Blum et al. (1979) echoed Clay's (1967) earlier admonition 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 the most recent and extensive analysis of American children's knowledge of printed conventions, Day, Day and colleagues (1979, 1980a, 1980b, 1981, Note 4) tested children three times during their kindergarten year and twice during their first grade year with the Concepts About Print Test (Sand) 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 (Note 5) identified four dimensions of printed concepts which seemed to develop sequentially. By the end of the first grade, Day and Day (Note 4) 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 and only 16% could explain the function of quotation marks. Similar results on these items were also obtained by Johns (1980) with a slightly larger sample of 60 first grade students. However, Day and Day (1979) cautioned 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.

The Speech-Print Match

While other investigations had 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), others 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. 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. (1974) 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. (1974) 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)

Evans, Taylor and Blum (1979) used the same task of Rozin et al. (1974) as a component in the development of their own instrument to measure meta-linguistic abilities. Using a sample of 53 first graders, they found that in a

multiple regression with reading achievement as the criterion, the "mow-motorcycle" test was a significant predictor of achievement while knowledge of visual word boundaries was not. They suggested that tasks such as "mow-motorcyle" 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).

Metalinguistic Awareness and General Cognitive Ability

Early on, Reid (1966) had suggested that children might benefit from instruction in the relationship of "classes and subclasses" in order to better understand the relationship between letters and words. Along with testing children on their ability to segment written sentences, Meltzer and Herse (1969) also had their sample of first graders complete several tasks involving the manipulation of parts and wholes. The tasks included viewing pictures of pennies cut in half and responding to the question "How many whole pennies are on this card?" (p. 5). In addition, the child was shown two paper cups cut in half lengthwise and asked the similar question "How many whole paper cups are there?" (p. 5). When compared to the performance on the sentence segmenting tasks, Meltzer and Herse reported that 71% of the children who were able to correctly count the wholes in the penny and cup tasks did not violate the space boundary in words (p. 16). In contrast, 80% of the children violating space boundaries in segmenting written words also counted halved objects as wholes. The authors concluded then that either conceptualizing wholes in this manner related to understanding the relationship of letters to words or that an unmeasured difference in intellectual functioning was operating.

Two other references to metalinguistic ability cognitive functioning were found in dissertations by Holden (1972) and Hollingsworth (1977). The former reported that for her sample of 50 kindergarteners and as many first graders the "relationship between word awareness tests and seriation measures was low," the highest correlation being .48 (p. 2792-B). However, Holden (1972) also reported that some of the children who were "lingusitically advanced" still had not yet attained the level of concrete operations as measured by the seriation tasks.

Hollingsworth (1977) correlated performance on the Concepts About Print Test (Sand) with several intellectual measures including the Concept Assessment Kit—Conservation and the Peabody Intelligence Achievement Test. Hollingsworth's figures showed that while the correlation between print awareness and conservation was the highest for girls (.74), it was among the lowest for boys (.27). Thus the original suppositions of Reid (1966) and Meltzer and Herse (1969) that general cognitive functioning as demonstrated by Piagetian tasks was positively related to metalinguistic ability remains moderately supported at this point.

Causal Considerations Between Metalinguistic and Reading Ability

As Day et al. (1981) have pointed out, the absence of a definite casual 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, mentioned earlier, they 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.

Ehri (1976) has provided evidence that readers learned context-dependent words such as prepositions and auxillaries better than prereaders 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 (1976), "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, most studies to this point have been correlational as pointed out by some investigators (Day et al., 1981; Ehri, 1979), it has been impossible to tease out any definite temporal sequence, verified by experimental procedures, between reading achievement and the development of metalinguistic awareness.

One study reviewed, however, did manage to experimentally apply a treatment for enhancing metalinguistic awareness in comparison to traditional reading programs. Ollila, Johnson and Downing (1974) found that a Russian training procedure (Karpova, 1955) for increasing awareness of the phoneme as a "concrete entity" led to better performance on the Wepman Auditory Discrimination Test than did instruction in two basal programs even when the groups were equated on readiness measures. This result is in direct contrast to Ehri (1979) who has stated that instruction to increase metalinguistic ability is futile. While there are, therefore, arguments on both sides of the issue,

experimental research results such as Ollila et al. (1974) give weight to the view that metalinguistic ability is prerequisite to reading and can indeed be enhanced by instruction.

Differences in Research Methodologies

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. 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). A few examples of questions that have been asked are "What must you do to learn how to read in first grade?", "What is reading?", "What makes someone a really good reader?", "What do people do when they read?", "How does mummy [sic] know what bus to take?", and "Do you look at every word when you read?". Interestingly, Downing (1970) in a replication of Reid's (1966) interview study extended the investigation to include several concrete aids in the way of colored photographs of people in reading and non-reading activities as well as a book with text for the children to handle. He found that

> the concrete aids facilitated motor and verbal responses which indicated how these young children were groping towards an understanding of the technical concepts of language, although they had been very much less able to use them accurately in the verbal interviews. (p. 111)

While Downing (1970) generally confirmed Reid's (1966) findings of children's vague notions of language units by other measures, the children's ability to

point out reading acts and describe them in adult-like terms when actually presented with a book casts doubt on the structured interview as a reliable indicator of children's functional knowledge of the processes involved in reading (c.f., Evans, Taylor & Blum, 1979).

Researchers studying children's understanding of letter, word and sentence concepts have also used the structured interview as well as manipulative aids and word-association tasks. Francis (1973) asked children, "Can you show me a letter (word, sentence)—any letter you know?" and "What do we use letters (words, sentences) for?" as well as showing them an example of each printed on a card. Papandropoulou and Sinclair (1974) pronounced a list of words and asked children 4 to 10 years old after each utterance, "Is that a word?" and "What is a word, really?". In a similar vein, after three different instructional activities hypothesized to influence perceptions of words, Pudis and Sulzby (1980) asked first, third and fifth graders, "What is a word?". Finally, in a "word-choice paradigm" designed to elicit either semantic or structural responses to words, Sulzby (1979) presented children with a word to be compared with another word known by the child and inquired, "How does your word go with my word?". With the exception of Francis' (1973) study, the above mentioned investigations used only the child's verbal explanation as the unit of data.

Investigators studying the salience of the spoken word as a distinct unit of language for children have used varying methods as well. Downing (1970; Downing & Oliver, 1973-74) in two different experiments trained children to respond "yes/no" as to whether they heard a single word or not when listening to a series of auditory stimuli. These stimuli included nonverbal abstract and real

life sounds such as "dice rattling" and a "cat meowing" in addition to isolated phonemes and syllables, long words, phrases and sentences. Ehri (1975) and Holden and MacGinitie (1972) used a "tapping" task where the child was to repeat a spoken utterance and either tap on the table with a stick or tap a poker chip with his/her finger each time a word was said. In other studies, Huttenlocher (1964) had 4 and 5 year old children verbally reverse different kinds of grammatical and non-grammatical pairs as "man-runs" and "black-white." Evans (1975), on the other hand, had kindergarten children and first graders repeat sentences and respond to the questions, "What is the first word?", "What is the second word?" and so forth. One more task devised by Fox and Routh (1975) and used with 3 through 7 year olds was having the children repeat a sentence then respond to the researcher's inquiry, "Say just a little bit of it." This inquiry was used repeatedly by the experimenter until the child had isolated each word unit in the sentence.

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 8 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.

While inquiries 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. A commonly used strategy developed by Meltzer and Herse (1969) to investigate the salience of space as a word boundary is to have children segment a written sentence by first counting, then circling the words (Blum et al., 1979; Evans, Taylor & Blum, 1979; McNinch, 1974). Another task involves cutting off individual words with a pair of scissors (Kingston, Weaver & Figa, 1972; Oliver, 1975). In a variation of the previously mentioned tasks, Mickish (1974) had first grade students draw a vertical line between the run-together words of a sentence while simultaneously listening to a tape-recorded voice repeat the sentence over and over. In other studies, Francis (1973) asked children to identify written words by pointing to printed examples, and a task designed by Clay (1979a) required 5 and 6 year old children to isolate individual words by covering the rest of the sentence with blank cards.

A difficulty noted by Johns (1980), however, with the latter task was that some kindergartners did not appear to understand the task of sliding the cards together to block out individual word and letter units. 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. Instead of the sequence of (a) letters are words, (b) a word is a unit made up of more than one letter, (c) short words are combined, long words divided, (d) only long words are divided, and (e) spaces are boundaries except where there are "tall" letters in the middle of words, Blum,

Taylor and Blum (1979) found that for their sample of kindergartners and first graders, 30% of the children who made errors only combined two words, identifying correctly all other long words and long words with tall letters. Similarly, Kingston, Weaver, and Figa (1972) noted that the most common error in a group of first graders was combining two words, and only when the children were asked to respond to "adult novel material" did some of the original categories of Meltzer and Herse (1969) begin to appear.

Tests of Metalinguistic Awareness

In an effort to further 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 still available in only an experimental edition, the three subtests of the Test of Linguistic Awareness (Ayers, Downing & Schaefer, 1977), in a factor analysis with ten other variables of reading readiness had high variable loadings on two factors identifed by Evanechko et al. (1973) as "Conceptualizing" and "Literacy Behavior." The factor of "Conceptualizing," comprising 10.5% of the total variance of reading readiness, included the subtests of "Understanding Literacy Functions" and "Technical Language of Literacy." These subtests required the child to recognize acts in which reading was an integral part, to differentiate between letters, words, forms of script, concepts of first and last, and marks of punctuation. The highest loading on the factor of "Literacy Behavior" was on the subtest of "Recognizing Literacy Behavior" which required children to distinguish between reading and non-reading acts, writing and drawing, and to recognize various displays of print in the environment. Interestingly, however,

in a multiple regression on selected subtests of the Bond-Balow-Hoyt New Developmental Reading Tests (1965), only the subtest of "Understanding Literacy Functions" appeared as a significant predictor of reading ability. In other applications of the Test of Linguistic Awareness, Downing, Ollila and Oliver (1975) found that the subtests successfully discriminated between ethnic groups of Indian and non-Indian kindergartners and between children classified as "high", "middle," and "low" on a socioeconomic scale (Downing, Ollila & Oliver, 1977).

In another effort to standardize metalinguistic measures, Evans, Taylor and Blum (1979) combined several earlier measures of concepts about print and reading as some of their own and developed the BET—Written Language Awareness Test (1980). The BET, also in experimental form, is individually administered and by four subtests attempts to measure the child's ability to segment speech into words ("Aural Word Boundaries"), to match short and long utterances with short and long printed arrays ("Rye-Rhinocerous"), and to supply a final word in an "Aural Consonant Cloze" procedure which is contextually appropriate and which matches the written target word. In addition, the child is to identify via a "Metalinguistic Interview" the alphabet, letter, word and sentence units and to demonstrate knowledge of selected printed conventions as the beginning and ending of a printed story and that pages are read from front to back. In an initial study with 53 first graders, Evans et al. (1979) found that the four previously described subtests of the Written Language Awareness (WLA) battery correlated .82 with Metropolitan Achievement Test reading scores, accounting for 66% of the total variance in a stepwise multiple regression. In addition, it was found that the Written

Language Awareness instrument was as good a predictor of Spring reading scores on the Metropolitan Achievement Test as was the Metropolitan Readiness Test. Thus Evans et al. (1979) concluded,

> While the MRT may be the most efficient way for predicting reading achievement, it only provides a global notion of readiness for reading instruction. The WLA, on the other hand, provides information that is more specifically related to the tasks of reading instruction; information that can be used diagnostically to adjust instruction. (p. 17)

Perhaps the most frequently used measure of print conventions is the Concepts About Print Test developed by Clay (1972, 1979c). Unlike the previously mentioned tests, Clay's instrument is comercially available in two booklets entitled Sand (1972) and Stones (1979) and has been standardized. Like the WLA (1980), it is individually administered and requires the child to respond to periodic questions during a short narrative read by the examiner. In addition to attempting to measure concepts of letters and words as distinct units, Clay's tests also assesses a child's understanding of which direction printed language is to be read, concepts of first and last, and the ability to recognize inverted lines of print and reversed words and letters. The test also is designed to tap the child's ability to match spoken words with printed units and to identify most of the common marks of punctuation. For American kindergartners and first graders, The Concepts About Print Test (Sand) has been shown to correlate highly with the subtests of the Iowa Test of Basic Skills and the Metropolitan Readiness Test (Day, Day, Spicola & Griffen, 1981). Johns (1980) found several items of the Concepts About Print (Sand) to successfully discriminate between above and below average readers as identified by the Metropolitan Achievement Test. And in one of the few attempts to establish a direction of cause between reading ability and linguistic awareness, Day et al. (1981), using a recursive

path analysis model, reported that the path coefficient between the fall administration of the Concepts About Print Test (Sand) and spring reading scores on the Iowa Test of Basic Skills was higher than the coefficient between the Metropolitan Readiness Test scores and the end of the year reading scores.

Despite, however, the additional insights into the relationship of metalinguistic awareness and reading achievement gained by the use of standardized measures, 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 print 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=60), but considering several variables in the analysis generally suffer from a loss of power and generalizability. American investigations using the Concepts About Print Test in particular (Day & Day, 1980; Johns, 1980) have generally been of this size.

Classroom Applications

To date there has been little practical emphasis on increasing metalinguistic awareness in the classroom. Largely, this has been due to the fact that abilities identified by researchers as being "metalinguistic" have not been represented in standardized readiness tests (Evanechko et al., 1973). Additionally, as observed by Day et al. (1981), Clay's print awareness tests, Sand (1972) and Stones (1979) are the only standardized and widely available test of print conventions. While Clay's tests have received a favorable review in a major

reading journal (Goodman, 1981), little interest on the classroom level seems to have been generated.

The few attempts, though, to stimulate knowledge of print conventions and other metalinguistic abilities with beginning readers have largely been successful. As mentioned Ollila et al. (1974) found that a kindergarten program designed to enhance discrimination of the phoneme as a conceptually real entity produced better performance in auditory discrimination than did two other tradition reading programs. More recently, McDonell and Osburn (1978) have reported that Title I teachers have been able to more successfully diagnose problem readers by using a checklist gleaned from Clay's tests and research into print awareness. In a year long study where an experimental kindergarten program stressing a "print-rich" environment was implemented alongside traditional kindergarten programs, Taylor, Blum, Logsdon and Moeller, (Note 6) found significant differences favoring the experimental group both on their own metalinguistic measure as well as standardized readiness tests. This latter finding suggests that knowledge about language and printed messages, their function, form, etc. can indeed be enhanced by instruction and is neither impervious to training (c.f., Rozin et al., 1974) nor dependent upon prior reading ability (c.f., Ehri, 1976, 1979).

Summary

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. They have disparate notions as to what behavior comprises the act of reading or what are the necessary steps that

they must take in getting ready to become a reader. Perhaps the most disturbing thing as pointed out by Meltzer and Herse (1969) 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 "metalinguistic" or "metacognitive" 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 attempting to learn the code (i.e., letters, sound/symbol correspondences, etc.) does not automatically give insight into how print may be used.

Further, the overwhelming consensus of studies of children's awareness of spoken and written language units indicate that from the time children enter school until about the third grade, their concepts of language as comprised of elemental units such as "syllable," "letter," "word" and "sentence" are in a state of flux. A few studies (e.g., Rozin et al., 1974; Pudis & Sulzby, 1980) have even indicated that these nascent concepts seemed impervious to instruction (c.f., Ollila et al., 1974; Taylor et al., Note 6). This tendency would then produce a mismatch with most reading programs since the emphasis is primarily placed on learning isolated structural units, the very elements of which most children have been shown to be least aware.

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. Further, Vygotsky (1978) has written that in order for children to successfully master the written language it must be presented as

being "relevant to life" (p. 118). In short, these admonitions that writing is "more than the sum of its parts" and that acquiring control over the printed word is facilitated by it being "relevant to life" have been the tenets of research into metalinguistic abilities since Reid's (1966) foundational study. It has been replicated over and over 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 and early reading ability have overlooked these more global aspects of literacy is a fault.

At this point, however, it has not been clearly shown that metalinguistic awareness is "prerequisite" to reading acquisition as some have proposed (Mattingly, 1972). However, the fact that better readers tend to out perform poorer readers of the same age (Ehri, 1976) lends credence to the view that the reading process itself and increased exposure to print does exert an influence upon children's awareness of the language units themselves rather than vice versa. Ehri (1979) has suggested that there is a reciprocal relationship between awareness of language units and reading ability. As a result of exposure to print initially, according to Ehri (1976),

> the beginner may suddenly awaken to the fact that meaningful sentences are comprised of word units. Achieving word consciousness may be like turning on the lights in his lexicon, rendering his implict knowledge of words suddenly explicit and available for use. (p. 839-840)

Subsequently, this increased awareness of the units of language gives actual reading ability an added boost which in turn enhances further metalinguistic sophistication.

The above hypothesis that reading ability determines the level of metalinguistic awareness apart from the influence of intelligence (c.f., Francis,

1973) is the central one explored in this study. An ex post facto correlational design has been used to more definitively describe the magnitude of the relationship while still hinting at the causal direction of it.

Chapter III

Method

Introduction

In the following chapter is given a description of the selected sample, the design of the study and statistical procedures used, the particular evaluative instruments and the specific procedures followed in the collection of the data. Also described are procedural changes in administration of the print awareness test that the present writer made based on recommendations from the literature. Given as well are the hypothesized effect sizes that reading ability and intelligence should have upon print awareness in order to constitute practical significance.

Subjects

Subjects for the study were drawn from the total population of 186 first graders at two elementary schools in Moore, Oklahoma. Parent permission forms (see Appendix A) to participate in the study were sent early in April and 146 (78.4%) were returned within two weeks, 75 from one school and 71 from the other. While all 146 of the students were tested with the Concepts About Print Test (Stones) not all of the students' scores were used in the final analysis. Since the study did not intend to assess differences between ethnic groups, minority students' scores, comprising approximately 8% of the useable sample (12/146) were excluded. In addition, 16 white students had no recorded score for the Otis-Lennon School Ability Test and were subsequently deleted as well.

The final sample was comprised of 118 all white students, 62 female and 56 male, from a predominantly middle class, metropolitan school district.

Means and standard deviations for males and females on all variables measured in the study are displayed in Table 1. Since separate univariate analysis such as multiple t-tests or ANOVA's (analysis of variance) are inappropriate primarily due to correlations between the variables (Huck, Cormier & Bounds, 1974), a one-way multivariate analysis of variance (MANOVA) was applied to the data, comparing males and females on all variables. Results of this analysis showed the effect of gender to be nonsignificant for all measurements according to Wilk's lambda Criterion F (12, 105) = 0.86, p = 0.587 (Helwig & Council, 1979).

Design

The design of the study was correlational in nature with several multivariate relationships measured and statistically manipulated. The first of these statistical procedures involved a multiple regression analysis of the criterion variable, print awareness, as measured by the Concepts About Print Test (Stones) on the predictor variables of Word Reading, Reading Comprehension, Word Study Skills and Vocabulary as measured by subtests of the Stanford Achievement Test, Primary I. Included in the multiple regression also as independent predictor variables were the "School Ability Index" from the Otis-Lennon School Ability Test and gender (coded "1" for males, "0" for females). The second multivariate procedure conducted was a two-group discriminant function analysis designed to assess whether or not above and below average readers could be distinguished by their scores (item total) on four previously identified factors (Note 5) within the Concepts About Print Test (CAPT): (a)

Table 1

Means and Standard Deviations for Males and Females on All Measured Variables

Variable	Males (N = 56) M	Males (N = 56) SD	Females (N = 62) M	Females (N = 62) SD	Total (N = 118) M	Total (N = 118) SD
1. Age	84.42	4.26	83.91	4.47	84.18	4.36
2. Otis-Lennon	105.28	14.49	109.75	13.76	107.63	14.23
3. Total Reading[a]	107.14	26.12	112.32	23.99	109.86	25.05
4. CAPT Total	18.48	2.09	18.98	2.35	18.74	2.24
5. Word Reading	31.46	9.30	32.25	9.10	31.88	9.16
6. Reading Comprehension	26.44	10.61	29.93	9.50	78.27	10.10
7. Word Study Skills	49.19	7.71	50.12	7.50	49.68	7.59
8. Vocabulary	25.40	4.91	26.35	4.30	25.90	4.60
9. Book Orientation[b]	2.91	.28	2.96	.17	2.94	.23
10. Print-direction	6.75	.54	6.80	.47	6.77	.50
11. Letter/Word	5.64	.72	5.69	.73	5.66	.72
12. Advanced Print	3.16	1.61	3.51	1.80	3.34	1.72

[a]Total Reading equals the sum of Word Reading, Reading Comprehension and Word Study Skills.

[b]Concept scores are comprised of the summed Concepts About Print items as follows:
Book Orientation - items 1, 2 and 11.
Print Direction - items 3, 4, 5, 6, 7, 8, 9 and 16.
Letter/Word - items 8, 19, 21, 22, 23, 24.
Advanced Print - items 10, 12, 13, 14, 15, 17, 18 and 20.

Book Orientation, (b) Print-direction, (c) Letter/Word and (d) Advanced Print Concepts. The "School Ability Index" and the coded variable "Gender" were included as discriminating variables also. For the present study, above and below average readers were defined a priori as falling above the 55th percentile on total reading or below the 45th. By removing the middle decile, it was intended to preserve a sample of at least 100 (N = 103) for the sake of power, while still creating distinct, separate groups. The last analysis performed was a canonical correlation, a multivariate procedure in which more than one dependent variable, conceptually related as a set, is correlated with multiple independent variables also conceptually meaningful. In the present study, the dependent variables analyzed were the four concept scores of the print awareness test and the independent included the four reading subtests of the Stanford Achievement Test (SAT). The statistical procedure is designed to maximize the correlation between the two sets of variables (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975). All statistical analyses were carried out via the Statistical Analysis System (Helwig & Council, 1979).

For the multiple regression, statistical power was calculated from tables by Cohen (1977) to be between .985 - .995 for finding a proportion of variance of .26 accounted for in print awareness by measures of reading achievement and an explained variance of .13 accounted for by the measure of intelligence with α = .05, N = 120. Proportions of .26 and .13 of explained variance in print awareness are considered by Cohen (1977) to represent "large" and "medium" effects respectively. These amounts of variance were chosen by the writer to represent the minimum contribution that variables of reading and intelligence

should make apart from the influence of the other before their influence could be considered pragmatically significant.

Materials

The Concepts About Print Test (CAPT) is a 24-item instrument developed by Clay (1979c) to assess a child's knowledge of print conventions such as correct book orientation, directionality of print, visual word boundaries, concepts about letters (upper and lower case), words, and marks of punctuation. It is administered individually by reading a short narrative approximately 7-10 minutes in length to the child from either of two booklets entitled Sand (1972) and Stones (1979). On each page of the booklet, the examiner asks a question pertinent to an area of print awareness and records a dichotomous score (right or wrong) based on criterion responses for each item provided by Clay (1979a). While originally developed in New Zealand, it has been used in American homes with preschoolers (Goodman & Altwerger, 1981) and in American schools with kindergartners and first graders (Day & Day, 1980; Johns, 1980). Day and Day (1980) reported for their sample test-retest reliability coefficients of .73 - .89 and split-half coefficients of .84 - .88. Similarly, Johns (1980), for a sample of first graders reported a Kuder-Richardson Formula No. 20 (KR 20) of .86 for males, .76 for females, and .82 for the total sample. However, the KR 20 coefficients for the present sample were considerably lower being .57 for males, .68 for females, and .63 for the overall sample. One suspected reason for these low coefficients is the lack of variability on approximately 70% of the items on the test. Results to be discussed show that 80% and better of both males and females scored successfully on 17 out of the 24 items on the test, the large proportion of variability originating from only half a dozen or so items.

Clay (1979a) herself alluded to a ceiling effect on the test which may happen with children progressing at a normal rate in reading.

> The test reflects changes in reading skill during the first year of instruction but is of less significance in the subsequent years for children who make average progress. For problem readers confusions about these arbitrary conventions of our written language code tend to persist. (p. 17)

While these first graders were in their first year of basal reading instruction, it was noted that the school district has a very strong kindergarten program which stresses focus on letter and word forms and beginning reading behaviors. Thus, it is conceivable that most of the children in the sample at the time of testing were actually in their "second" year of reading instruction and, therefore, had acquired most of the concepts to which Clay's (1979c) test addresses itself. The actual number of subjects who had attended kindergarten in the district was not verified.

As a supplement to the above argument for low reliability, Day and Day (Note 4) reported their higher test-retest reliability coefficients for the three administrations during the kindergarten year and one testing at the beginning of the first grade when the children were less sophisticated in their knowledge of print conventions and showed greater variability. They have reported, however, lower test-retest coefficients between administrations of the CAPT at the beginning of kindergarten and end of first grade (.67 for males and females) and between a second administration (Nov./Dec.) during the kindergarten year and end of first grade of .63 for males and .61 for females. As Van Dalen (1979) has pointed out, test-retest reliability is severely affected by either experiences or maturation which influences performance on the particular test (p. 139). As Day's and Day's (Note 5) data showed, for instance on item 3 for beginning at

the top left of the page, at the beginning of kindergarten only 51% of their sample had acquired this knowledge; whereas at the end of first grade, 98% were familiar with this convention. Thus, for the present study, the relatively low reliability is imputed to the prior familiarity of a majority of the sample with print conventions as measured by the test, rather than to the instability of the test itself.

Scores were also obtained from a school administered Otis-Lennon School Ability Test (OLSAT). The test is a group-administered test of "general reasoning ability" involving the capacity "to deal with abstract relationships involving the manipulation of ideas expressed in verbal, numerical, figural and symbolic form" (Otis & Lennon, 1979, p. 14). It provides a single, standardized measure (School Ability Index) of performance with a mean of 100 and standard deviation of 16. A test-retest coefficient of .84 for a fall-spring administrations was reported in the norming manual for first grade. Reliability coefficients were not computed for the present sample.

Measures of reading achievement were also obtained from a school administered Stanford Achievement Test, Primary I (Kelley, Madden, Gardner, Rudman & Merwin, 1973). According to the authors, the test is designed to be "in harmony with present instructional objectives and measure what is actually being taught in today's schools" (p. 7). In addition to Mathematics and Listening subtests which were not used, it is comprised of subtests on Vocabulary, Word Reading, Paragraph Reading and Word Study Skills. The total reading score is the sum of scores from the Word and Paragraph Reading plus Word Study Skills. The norms booklet reports KR 20 coefficients for the subtests of Vocabulary, Word Reading, Paragraph Reading and Word Study Skills of .86, .94, .95, and .93

respectively. Present sample reliabilities were not obtained. In order to ensure the maximum variability of reading measures, raw scores were used in all analyses.

Procedures

Using the booklet Stones (Clay, 1979c), the test was administered individually following the protocols specified by Clay (1979a) in the test manual The Early Detection of Reading Difficulties: A Diagnostic Survey with Recovery Procedures. In one school, the children were tested outside their classroom in the hall while in the other, the examiner used a nearby empty classroom. The interview took approximately 7-10 minutes and all children seemed to enjoy having the story read to them. Data were collected during the week of April 5th for the first school and during the weeks of April 12th and 19th for the second. The data sheets were then turned in to a school district secretary who recorded the OLSAT and SAT scores in appropriate places on the data sheets and then gave them back to the writer with the names of the children deleted.

Johns (1980) noted several variations in responses for particularly the items probing knowledge of punctuation marks. One seemingly anomalous response recorded in the present study was that a period denoted, as one child said, "Not getting excited" or as another confidently stated, "Talking plain." More commonly the response was that a period specified a "telling" sentence. After discussing with the teachers the actual instruction given the children on punctuation marks, they confirmed that the children had indeed been repeatedly told that a period meant an absence of excitement in addition to the more common instruction that it denoted the end of the sentence. Responses

therefore to item 16 such as recorded above were counted as correct answers for the function of a period.

Johns (1980) noted as well that some of the children in his sample did not seem to understand the task required to answer items 21-24 which entailed blocking out single letters and words with a pair of index cards. Johns (1980) suggested that perhaps having the children point to examples of letters and word units might provide more accurate responses. In the present investigation, therefore, children were told that they could either point to the particular units or use the cards to isolate them on the page. Interestingly, most of the children used the cards and did not demonstrate the particular difficulty that Johns (1980) observed in his sample.

A final observation made by Johns (1980) involved items 12-14 which require the child to identify letters and words which are reversed on the page. The question posed by the examiner ("What's wrong on this page?") does not direct the child's attention to the print specifically, hence many of his subjects' responses reflect some activity as inferred from the picture. To avoid this, the present examiner used the question protocol for item 14 which is "What's wrong with the writing on this page?" for items 12 and 13 to coerce the child to focus on the printed lines rather than the picture. Interestingly, however, this procedure apparently did not enhance responses appreciably because most children continued to offer explanations based on the picture as will be seen in the findings, next to be discussed.

Chapter IV

Findings

Introduction

The results of the study will be presented in two parts. First, a descriptive summary of the percentages of correctly identified Concepts About Print Test (CAPT) items by factor pattern for the whole sample will be given as well as a brief discussion and presentation of the item percentage breakdown for males and females. Secondly, the statistical analyses directly bearing on the hypotheses of the study will be discussed. The analyses presented in order are the intercorrelations between all variables measured, the contributions of reading and intelligence to print awareness as disclosed by the regression analysis, partial correlations between reading, intelligence and print awareness, a comparison of above and below average readers according to print awareness, intelligence and gender and, lastly, the multiple correlations between print awareness and reading ability.

Book Orientation Concepts.

Table 2 presents the percentage of Concepts About Print Test (CAPT) items correctly answered by the present sample as a whole. Since items were scored dichotomously, the percentages also represent mean scores as well. While six children (5%) in the present sample responded incorrectly to item 1 where the examiner asked, "Show me the front of this book," the confusion seemed more to be with the test prompt than with knowing the actual answer.

Table 2

Percentage of Total Subjects Answering Each Concepts About Print (Stones) Item Correctly Grouped by Factor Pattern

Item		Percentage of Subjects
BOOK ORIENTATION CONCEPTS		
1	Identifies front of book	95
2	Print (not picture) carries meaning	100
11	left page before right	100
PRINT-DIRECTION CONCEPTS		
3	starts top left	100
4	moves left to right	100
5	return sweep to next line	100
6	matches spoken to written word	98
7	first and last (lines, words or letters)	98
9	Movement along inverted print	96
16	Identifies period	86
LETTER-WORD CONCEPTS		
8	recognizes inverted picture	99
19	identifes upper/lower case letters	97
21	identifies one and two letters	91
22	identifies one and two words	94
23	identifies first and last letter in a word	93
24	identifies capital letter	93
ADVANCED-PRINT CONCEPTS		
10	recognizes inverted lines	57
12	recognizes incorrect word sequence	14
13	recognizes incorrect letter sequence	19
14	recognizes incorrect letter sequence	18
15	identifies question mark	75
17	identifies comma	33
18	identifies quotation marks	34
20	distinguishes between was/saw and no/on	86
N =		118

Of the six indicating something other than the front cover, three pointed to the first page of print, two at the adjacent picture and one merely looked at the examiner and gave no response. It appeared that at least five of the six children knew where the story began and were perplexed at the ambiguity of the term "front," meaning perhaps "first" or "beginning" of the story. Hesitation to respond immediately to this initial question was noticed with a number of other children who looked quizzically at the researcher and often times flipped the book over and back again as if looking for something to divert them from the too obvious answer. Clearly, for the majority of these children, the question appeared as a "trick" rather than a probe of actual knowledge.

Print-direction Concepts.

All children in the study demonstrated correct directional habits and only two (a boy and a girl) showed difficulty in pointing to each word of text (item 6) as it was being read by the examiner. The same boy and another girl missed item 7 which required the identification of the "first" and "last" part of the story on one page. Interestingly, two out of three of these children missing item 6 and 7 had total CAPT scores which were at least one standard deviation (2.24) below the mean for the total sample (18.7). Thus, unlike the students missing item 1, the ones missing these latter items (6 & 7) seemed to be showing real difficulties in processing print.

While five children responded incorrectly to item 9, recognizing inverted print, four of the five stated that the print was indeed "upside-down." However, when prompted to indicate which direction it should be read, all underscored the print with their fingers, moving left to right. Whether or not the children were exhibiting a fundamental confusion seems in doubt since all of

them scored perfectly on items 3-6, thus indicating correct movement on normally oriented print. However, while the majority of the sample (96%) readily turned the book upside-down or moved from right to left, these few children seemed "normal print bound," in the sense that normal left-to-right directional habits were applied "generically," mutatis mutandi, regardless of the spatial orientation of the letters and words. This confusion, however, should not be considered noteworthy in light of the prior performance with regular print. The misunderstanding, it seems, is rather generated by the test presentation of the special case of print and not because of uncertainty in reading common sequences of graphic arrays in the environment or books.

Identification of the name and/or function of the period (item 16) seems incongruous with the rest of the items included in Print-direction Concepts. However, the writer discussed this with the first author (Note 7) of Day and Day (Note 5), and though the latter agreed that it made intuitive sense to include it with other punctuation items, the factor analysis did not support its removal from the other related items in the Print-direction cluster. Therefore for this reason, the present study maintained the integrity of the original factor analysis patterns.

On item 16, most of the children responded to the question "What is this for?" by saying, "For ending" or "For stopping." However as mentioned earlier, a large proportion stated that the period was for "telling." A brief sampling of the first grade teachers revealed that this response was in line with the current mode of instruction which stressed voice inflections as accompanying each question, period and exclamation point. The most common response of the 17 students (14%) who answered incorrectly was "Can't remember."

Letter/Word Concepts

Item 8 which required the child to recognize an upside-down picture was one of the least stable variables in the original factor analysis (Note 5) and according to Day (Note 6) probably could have been included under Book Orientation Concepts without disturbing the factor structure. However for the sake of replication, it too was left with its original group of correlated items. Only one child out of the total 118 failed to point out the "bottom" of the picture (indicated by pointing to the top of the page). However, a number of children hesitated slightly and began to point to the bottom of the page (top of the picture initially). This item as well as item 9 (inverted print) elicited an initial puzzlement as to how to respond and may, for older children in particular, generate incorrect responses that are test specific and not reflective of real misunderstanding.

Over 90% of the sample was able to correctly distinguish between one and two letters and one and two words. Yet, eleven children on item 21 and seven on item 22 did equate letters with words and frequently divided words at places other than space boundaries. For example, when asked to block out one and two letters, several showed one and two words. When asked follow-up questions as to what he was indicating, one child responded, "down and rolled down" (the test sentence read: The stone rolled down the hill.). Another child, identifying one and two words, blocked out "led dow" and "lled down." Of the children who incorrectly identified the first and last letter of a word (item 22), most showed whole words, usually the first and last words of the sentence "The stone rolled down the hill." Yet, the confusion was not so much with the concepts of "first" and "last" as much as with equating words with letters. Thus, a fundamental

confusion of equating letter with words and dividing words at places other than space boundaries was documented in the present sample with children ending at least nine months of concentrated reading instruction.

Advanced Print Concepts

For this conceptual dimension comprised of items 10, 12, 13, 14, 15, 17, 18, and 20, the sample exhibited considerably better performance in recognizing top and bottom lines which had been reversed (item 10)

and kicked it very hard.

I swung back my foot

than in recognizing inverted word sequences (e.g., "Then I stood my on toes and I and watched.") or letter sequences (e.g., "The stone rolled down eth hill, bumping thsi way and that."). An insightful response of the several of the children who didn't indicate that the lines were reversed was either that "and" wasn't capitalized or that there was not a period after "foot." In other words, for these children, one line of print, beginning with a captial and ending with a period, constituted one written sentence. And any lines not conforming to this pattern were "wrong" in the child's eyes. One of the teachers confided to the examiner later that even though the basal test in use contained primarily one-line sentences, all of the teachers stressed to the children that written sentences could be more than one line of print. Interestingly, however, for this item the childrens' incorrect responses seemed more conditioned by the sentence style of the basal test rather teacher admonition.

Items 12, 13, 14 for the present sample proved to be the most difficult as over 80% of the children did not recognize inverted word or letter sequences. Knowing that responses to these items were often semantic, referring to the

story line and/or pictures, the writer purposely prompted the children on these items with the question "What's wrong with the writing on this page?" to focus attention on the print. Despite this precaution, however, many of the children gave the semantic responses of "down to the flowers that are yellow" or "go on to the bend," referring to the where the rolling stone in the picture was eventually headed. The poor performance on these items (12, 13 & 14) was somewhat surprising for the present subjects since a heavily synthetic phonic approach is taken by the current basal series in use. It should be also noted that neither words with letter switches at the beginning or end (e.g., "eth," "thsi," "tsop") produced any better performance than switches in the middle (e.g., "huose" and "yelolw"), even though it is commonly observed that initial and final letters of words are more salient to children than medial ones. Even though the present examiner attempted to constrain the subjects' attention more than in previous studies, it was obvious that most children were looking at the picture rather than print in forming their answers. Therefore, the low performance of all children in the present study may not be entirely indicative of their ability to sight read or track sound in words.

For the items asking for identification of various punctuation marks (i.e., 15, 17, 18), approximately one third of the children identified commas and quotation marks equally as well while three quarters of the students knew the function of the question mark. And reversible words (e.g., "was/saw," "no/on") were distinguished by 86% of the sample.

Table 3 shows the percentage of correctly identified items broken out by gender. Differences in the sample at hand between boys and girls, excepting item 10, were very small with 12 out of the 15 items favoring girls reflecting a difference of less than or equal to only 5%. Only item 10 produced any

Table 3

Percentage of Males and Females Answering Each Concepts About Print Item Correctly Grouped by Factor Pattern

Item		M	F
BOOK ORIENTATION CONCEPTS			
1	Identifies front of book	93	97
2	Print (not picture) carries meaning	100	100
11	left page before right	98	100
PRINT-DIRECTION CONCEPTS			
3	starts top left	100	100
4	moves left to right	100	100
5	return sweep to next line	100	100
6	matches spoken to written word	98	98
7	first and last (lines, words or letters)	98	98
9	Movement along inverted print	95	97
16	Identifies period	84	87
LETTER-WORD CONCEPTS			
8	recognizes inverted picture	100	98
19	identifes upper/lower case letters	96	97
21	identifies one and two letters	86	94
22	identifies one and two words	93	95
23	identifies first and last letter in a word	95	92
24	identifies capital letter	93	94
ADVANCED-PRINT CONCEPTS			
10	recognizes inverted lines	48	65
12	recognizes incorrect word sequence	13	15
13	recognizes incorrect letter sequence	16	21
14	recognizes incorrect letter sequence	16	19
15	identifies question mark	73	77
17	identifies comma	32	34
18	identifies quotation marks	30	37
20	distinguishes between was/saw and no/on	88	84
N=		56	62

noticeable difference in performance (17%). The current investigation found no significant differences between the means for males (18.48) and females (18.98) on performance for the entire test, t (116) = 1.22, $p > .05$.

Correlations Between Variables

In Table 4 are displayed the zero-order correlations for all variables measured in the study. Of the 78 possible correlations, 47 (60%) are significant at $\alpha = .05$ and 39 (50%) at $\alpha = .01$. However, with a sample this large, significance is reached with correlations above $\pm .181$ ($\alpha = .05$) and $\pm .236$ ($\alpha = .01$). It can be seen that many of the lower correlations occur between the four concept scores of the CAPT, none being above .244. This would seem to indicate that the four groups of items identified by the original factor analysis (Day & Day, Note 5) are relatively distinct from one another, measuring different print awareness abilities. Both Print-direction and Letter/Word concept scores, however, have moderate correlations with the total CAPT score (.489 and .549 respectively) and the Advanced Print coefficient (.906) is very high. Thus, for the present sample, performance on the Advanced Print items accounts for over 80% of the variance in total print awareness ability as measured by the CAPT.

As expected, the subtests of the Stanford Achievement Test (SAT) correlate, for the most part, very highly among one another and with the Total Reading score, Word Reading, Reading Comprehension and Word Study Skills sharing 89%, 87% and 83% of the common variance with the overall reading measure. Of particular interest to this study is that the above mentioned reading subtests all correlate more highly with the total print awareness score than does the intelligence measure (Otis-Lennon). Of further interest is the fact that the correlations between Advanced Print Concepts and the reading

Table 4

Zero Order Intercorrelation[a] Matrix for all Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	-	.058	-.330	-.017	.017	.108	-.075	.033	-.097	.016	-.219	-.081	-.127
2. Gender		-	-.157	-.043	-.172	-.061	-.102	-.103	-.120	-.055	-.034	-.103	-.112
3. Otis-Lennon			-	.492	.498	.466	.563	.523	.013	.196	.334	.425	.480
4. Word Reading				-	.811	.818	.537	.943	.000	.283	.261	.549	.568
5. Reading Comprehension					-	.762	.477	.933	.014	.285	.202	.533	.537
6. Word Study Skills						-	.507	.912	.018	.342	.184	.525	.539
7. Vocabulary							-	.543	.041	.206	.214	.454	.465
8. Total Reading								-	.011	.322	.233	.576	.589
9. Book Orientation									-	-.038	-0.64	.134	.148
10. Print-direction										-	.240	.244	.489
11. Letter/Word											-	.228	.549
12. Advanced Print												-	.906
13. CAPT Total													-

[a] $\underline{r}$ = .181 required for $\underline{p} = .05$ and r = .236 for $\underline{p} = .01$ with df = 116 for a two-tailed test.

subtests are nearly the same as the coefficients between the latter and the total print awareness score. This seems to indicate that of the variety of print awareness abilities tapped by the CAPT, only the items representing Advanced Print Concepts (noting incorrect letter and word sequences and distinguishing punctuation marks) share substantially the same abilities and knowledge as measured by this particular standardized reading test (SAT).

Contributions of Reading Achievement and Intelligence to Print Awareness

The first problem investigated was the individual and joint contributions of measures of reading achievement, intelligence and gender to print awareness ability. This was accomplished by means of a stepwise multiple regression which selected the independent variables one by one for inclusion into the regression equation (i.e., dependent = independent$_1$ + independent$_2$ + . . . independent$_i$) according to the largest amount of variance accounted for in print awareness ability. In the particular statistical procedure used, all possible combinations of independent variables were compared with one another in order to produce the "best" one, two, three, etc. variable model explaining the variance in print awareness scores.

Table 5 displays the "best" two, three and four variables models accounting for the largest possible $\underline{R}^2$ for each combination of independent measures. The associated $\underline{F}$-values for each variable indicate whether or not that variable's removal from the model would constitute a significant loss in explained variance. The first $\underline{F}$-value in each subtable represents the ability of the overall combination of variables to account for the variance in print awareness as opposed to chance.

As can be seen from the Table 5, Word Reading and intelligence (Otis-Lennon) both account for a significant amount of explained variance in print

Table 5

Stepwise Regression of Concepts About Print Test (Stones) on Reading Subtests of Stanford Achievement Test and Intelligence: "Best" Two, Three and Four Variable Models

Best 2-Variable Source	df	SS Added to Residual if Removed	B	F	p	R^2
Regression	2			34.70	.0001	.376
Word Reading		85.488	.107	26.79	.0001	
Otis-Lennon		31.263	.041	9.80	.002	
Residual	115					

Best 3-Variable Source	df	SS Added to Residual if Removed	B	F	p	R^2
Regression	3			24.04	.0001	.387
Word Reading		59.212	.095	18.73	.0001	
Otis-Lennon		16.548	.033	5.24	.024	
Vocabulary		6.557	.066	2.07	.152	
Residual	114					

Best 4-Variable Source	df	SS Added to Residual if Removed	B	F	p	R^2
Regression	4			18.51	.0001	.395
Otis-Lennon		15.077	.031	4.79	.030	
Word Reading		13.067	.066	4.15	.043	
Vocabulary		5.461	.061	1.74	.190	
Word Study Skills		4.876	.047	1.55	.215	
Residual	113					

Note: The first F value in each column is the significance for the overall two, three or four variable model.

awareness and represent the "best" two variable combination. Even with the addition of Vocabulary (three variable model) and Word Study Skills (four variable model) the contributions of both Word Reading and intelligence remain statistically significant beyond $\alpha = .05$. Due to the high correlations between all the reading subtests (see Table 4), the addition of Reading Comprehension to the regression equation did not effect a significant increase in R^2 (.399) from the four variable model (.395). The amount of additional variance explained by inclusion of the last variable, gender, was also trivial. The total amount of explained variance accounted for in print awareness by the total combination of the reading subtests, intelligence and gender was slightly over 40% ($R^2 = .401$).

Partial Correlations: Hypotheses 1 and 2

In Table 6 are displayed the zero and first order partial correlations of the print awareness measure (CAPT) with each of the reading subtests. In the column under "first order" are listed the partial correlations when intelligence (Otis-Lennon) is held constant. (Since the correlation of gender with all other variables was nonsignificant, only intelligence was controlled.) After each column of correlation coefficients is listed the explained variance in print awareness. According to the original significance criterion of 26% of the variance in print awareness being accounted for by measures of reading achievement, all measures of reading ability, if taken singly in a bivariate correlation with print awareness will exceed this level. However, when the effect of intelligence is partialed out, the variance percentages drop considerably below the acceptable significance level for a "large" effect.

Table 6

Zero and First Order Partial Correlations Between the Concepts About Print Test (Stones) and the Reading Subtests of the Stanford Achievement Test with Intelligence Controlled

Subtest	With Stones — zero order	% of explained variance	With Otis-Lennon controlled — first order	% of explained variance
1. Word Reading	.568	32.2	.434	18.8
2. Reading Comprehension	.537	28.8	.391	15.2
3. Word Study Skills	.539	29.0	.406	16.4
4. Vocabulary	.465	21.6	.267	7.1

Note: All correlations significant, $p < .01$.

Similarly, as displayed in Table 7, intelligence if taken in a bivariate correlation with print awareness scores will account for 23% of the variance which exceeds the criterion level of significance (13%) for a "medium" effect size. Yet when the overlapping correlations of each of the reading subtests are considered, the explained variance percentages drop even more drastically than when intelligence is held constant. This differential drop in explained variance between when intelligence is held constant and when reading achievement is controlled is taken to mean that factors involved in reading ability share more in common with concepts of print awareness than do aspects of abstract reasoning ability.

For the present study, therefore, the first two null hypotheses that measures of reading achievement would not comprise a statistically significant

Table 7

Zero and First Order Partial Correlations Between the Otis-Lennon School Ability Test and Concepts About Print Test (Stones) with Subtests of the Stanford Achievement Test Controlled

Zero Order	% of Explained Variance	Otis-Lennon with Stones Subtest Controlled	First Order	% of Explained Variance
.480	23	1. Word Reading	.279	7.7
		2. Reading Comprehension	.290	8.4
		3. Word Study Skills	.307	9.4
		4. Vocabulary	.296	8.7

Note: All correlations significant, $p < .01$

proportion of the variance of print awareness with intelligence controlled and that intelligence would not comprise a statistically significant proportion of the variance in print awareness with measures of reading achievement held constant were not rejected based on specific hypothesized effect sizes.

Comparisons Between Above and Below Average Readers: Hypothesis 3

Groups of above and below average readers were created by a modified median split in which the middle decile (45th to 55th) of total reading scores (the sum of Word Reading, Reading Comprehension and Word Study Skills) was deleted from the subsequent analysis. This resulted in a loss of 15 students and resulted in a final N of 103, with 52 in the above average reader group and 51 in the below average group.

Initially the data were subjected to a two-group discriminant analysis comparing types of reader along a dimension of print awareness abilities (Book Orientation, Print-direction, Letter/Word and Advanced Print Concepts), intelligence and gender. However, the particular statistical package available to the writer for discriminant analysis did not render significance tests for the discriminant function obtained nor tests for the standardized regression coefficients. Therefore, the data were reanalyzed by a one-way MANOVA, comparing the means of the above listed variables excluding gender for the two groups of readers. In essence, the two statistical procedures do not differ conceptually in that both evaluate the "distance" between the mean vectors (comprised of the dependent variables) of each treatment group in the analysis. The effect of gender upon type of reader was analyzed separately in a 2 x 2 contingency table by an independent samples chi-square test.

Results of the one-way MANOVA revealed a significant difference between the two groups of readers for the variables as measured according to Wilk's Lambda, $\underline{F}$ (6, 96) = 8.74, $\underline{p} < .001$. As can be seen from Table 8, subsequent t-tests show the means for Print-direction, Advanced Print and intelligence to be all significantly different from one another. The obtained χ^2 = 1.17, $\underline{df}$ = 1, however, was not significant at α = .05 for the effect of gender upon type of reader.

While the present study did not compare types of reader on specific items, from Table 2 (p. 59) it should be noted that performance on items 3, 4, and 5 under Print-direction concepts was 100%. Variation on this concept measure for the current subjects comes from items 6, 9, 7 and 16, the latter accounting for most of it. Means for both Advanced Print Concepts and the Otis-Lennon

Table 8

Comparison of Above and Below Average Readers on Means of Concept Measures and Otis-Lennon Following a Significant MANOVA

Variable	Above Average (N = 52) M	SD	Below Average (N = 51) M	SD	t
1. Book Orientation	2.94	.26	2.92	.27	.41
2. Print-direction	6.88	.32	6.67	.65	2.14*
3. Letter/Word	5.81	.63	5.59	.73	1.64
4. Advanced Print	4.23	1.53	2.37	1.41	6.40**
5. Otis-Lennon	113.88	13.12	101.12	12.56	5.04**

* $p < .05$
** $p < .01$

measure, however, show more distinct performance differences. Above average readers seem better able to recognize incorrect letter sequences in words as well as identify the marks of punctuation. Interestingly, the large disparity in the intelligence measure between the groups approaches the standard deviation for the Otis-Lennon School Ability Test (16). For the present study, null hypothesis no. 3 that stated above and below average readers do not significantly differ on a dimension of variables comprised of print awareness abilities, intelligence and gender was rejected.

Correlation Between Print Awareness Abilities and Reading Achievement: Hypothesis 4

The final analysis carried out was a canonical correlation relating the four concept scores of the CAPT as a conceptually meaningful set with the reading

subtests of the SAT. Canonical correlation provides not only an overall correlation between the two sets of variables but also ascribes weights (standardized regression coefficients) to all criterion and predictor variables, thus giving the researcher insight into which variables contribute most to the relationshp.

The results of the analysis are shown in Table 9. The first and only significant canonical correlation computed between the two sets of variables is .634, representing a shared variance of 40% between the measures of print awareness and reading ability. According to the standardized weights of the reading subtests, Vocabulary (.308) contributes most highly to the relationship with print awareness followed by Word Reading (.293), Reading Comprehension (.287) and Word Study Skills (.278).

On the other side of the equation, while the contribution of Book Orientation is very trivial (-.061), Print-direction and Letter/Word Concepts each contribute a small amount to the relationship with reading abilities (.266 and .133, respectively). However, the standardized regression weight on Advanced Print (.859) indicates that performance on this subtest determines the relationship almost entirely. This result was anticipated before in the correlation matrix as each of the subtests of reading correlated substantially only with Advanced Print scores out of all the concept measures (excluding the total CAPT score). Therefore, null hypothesis no. 4 which stated that print awareness abilities and measures of reading achievement do not share a statistically significant proportion of common variance was rejected also.

Table 9

Canonical Correlation and Standardized Regression Coefficients of CAPT Concept Scores and Reading Subtests of the SAT

Variable	B	R	R^2	F	p
CONCEPT SCORES					
Book Orientation	-.061	.634	.402	4.232	.0001
Print direction	.266				
Letter Word	.133				
Advanced Print	.859				
READING SUBTESTS					
Word Reading	.293				
Reading Comprehension	.287				
Word Study Skills	.278				
Vocabulary	.308				

Note: All subsequent canonical R's are nonsignificant.

Chapter V

Discussion

Given the limitations as mentioned earlier, definite trends in the data can be observed. While the overall differences in performance between males and females is nonsignificant for the print awareness measure as a whole, girls performed slightly better on 15 out of 24 items. This result is comparable to those of Day et al. (1980b) who found differences between boys and girls on 20 out of 24 items (see Table A, Appendix B). Even though for the present sample the difference in correctly answered items between sexes was very small, less than 5% in most cases, a pattern of difference favoring girls noted in previous investigations using the CAPT was confirmed in the present study.

Performance on the CAPT for the entire sample also indicated misunderstanding and confusions identified previously in the literature. First of all, a small percentage of children still equated letters with words or failed to recognize spaces as a visual word boundary. When asked to identify individual letters, 9% of the sample pointed out whole words and combined the last part of a word with the first of another to indicate one word. In addition, 8% of the first graders when asked to identify the first and last letter of a word, for the most part, chose the first and last word in the sentence.

Thus, within the present sample, there seems to be a group of children still confused as to the visual representation of a word and letter which may indicate a prior conceptual difficulty with these items. It is probably safe to say that the terms "word" and "letter" are certainly two of the most ubiquitously used technical descriptors in first grade reading instruction. However, sheer frequency of utterance in the classroom may not be effective in helping children understand how these labels represent elements in the spoken and written language.

The results on the items comprising Advanced Print Concepts are more difficult to interpret. While some authors have stressed that phonemic analysis alone can be used to distinguish good and poor readers, it is not certain that the lack of proficiency in detecting incorrect letter and word sequences on the part of the present subjects is indicative of inadequate word analysis skills. Although a significant difference was found between above and below average readers on these items (12, 13, 14), the mean of the former group was 4.23, only half of the possible score. The fact that over 80% of the present sample of first graders, good readers included, did not notice incorrect letter and word sequences raises the strong possibility that poor performance on these items, observed by other researchers as well (see Table B, Appendix C), is an artifact of the test design. Until, however, a way is discovered which assures that the children are indeed scanning the lines of print, it is not possible to reliably tell how well these items discriminate between types of reader.

Another area of possible concern about the test validity resides with the four items (15, 16, 17, 18) requiring identification of punctuation. In the present sample, the period and questions mark were familiar to the majority of

children (86% and 75%, respectively), while the comma and quotation marks were identifiable only to about a third (33% and 34%, respectively). However, a correct answer to the test question "What's this for?", as the examiner points to or traces the appropriate mark, can either be the name of the mark or some statement of its function (Clay, 1979a, p. 18). Some children readily giving the name of the mark (and thus given credit for a right answer) could not precisely identify its function. For example, one student when shown a comma quickly replied, "comma." Yet, when asked follow-up questions to further specify what the mark meant in reading, she replied, "I forgot." However, since the scoring standards allow for a name to qualify for a right answer, a number of children have the "appearance" of knowledge of punctuation who in actuality have no functional grasp of what constraints the marks impose on the written language.

In addition, it was somewhat amazing to note the variation in answers to items requesting identification of punctuation. For instance, a period meant for different children, "just say it," "make your voice go down," "telling," "don't get excited" and "talking plain." The comma was variously specified as meaning "like you stop, but not really," "take a breath," "stop and go," "pause a second," "pause a minute" and "slow down." All of the aforementioned responses, it should be mentioned, were counted as correct after checking with the teachers as to the kinds of instruction delivered and responses that were acceptable in the classroom. Some of the incorrect responses, however, were just short of mystifying as one child thought the comma meant to "wink" while another stated that it meant the words were "locked in." Similarly, quotation marks to one boy were "like bunny ears" and the question mark to one child signified "entertainment." Most of the incorrect responses fortunately had to do with

the child either not remembering the name or function of the mark or confusing the names and functions between the four marks.

Aside from problems with the items themselves, the individual marks carried no unitary interpretation. Just as children have varying ideas of what constitute words and letters, so apparently do they vary in their perceptions of the functions of punctuation. While ultimately it is doubtful that a misunderstanding of punctuation will retard reading, the confusion and varying perceptions are merely symptomatic of the larger phenomenon in the classroom that intensive reading instruction, per se, does not assure that a single set of rules, guidelines or processes supported by a particular teacher or text have the same interpretation for all children. As evidenced by the present sample, there is literally a metalinguistic "milieu" in the classroom comprised of varying views of letters, words, punctuation marks, etc. through which the children must pass before finally attaining adult notions of these elements. While most do this successfully, there is a small percentage in whom incorrect ways of processing print become entrenched. Therefore, while it is at first glance amusing that a child may "wink" when seeing a comma or think of "bunny ears" when seeing quotation marks, after a year of reading instruction, it should alert the teacher to possible difficulties that the child is experiencing in negotiating print conventions.

Of primary interest to the study was the comparison between above and below average readers and the contribution of reading achievement and intelligence to the measure of print awareness. It was determined beforehand that if reading ability was indeed the "spur" to increasing print awareness as theorized by some, then measures of reading ability should show a "large"

effect upon print awareness scores, comprising at least 26% of the variance with intelligence held constant. If, on the other, hand, intelligence was a primary contributor, it was predetermined to have at least a "medium" effect, accounting for 13% of the variance in print awareness independent of reading ability.

Analysis of the results showed that neither variable, reading ability nor intelligence, had the hypothesized effect with the other's influence partialed out. With intelligence controlled, measures of reading ability individually accounted for less than 20 percent of the variance of print awareness (see Table 6). And the influence of intelligence on print awareness with reading controlled was less than 10% of the variance (see Table 7). Interestingly, with a sample size as large as in the present study, despite not meeting the hypothesized criteria of pragmatic significance, all of the partial correlations were statistically significant. It can be said, then, that while actual reading ability and intelligence contribute less than substantially to the variance of print awareness scores, they are "better-than-chance" predictors of knowledge of print conventions, although less so than what was originally expected. This relationship was borne out by the regression analysis which showed that in combination, reading ability and intelligence accounted for nearly 40% of the variance in print awareness (see Table 5), contributing together a substantial amount of explained variance.

In support of the finding by some investigators that better readers demonstrate more competence in metalinguistic ability than poor readers, the present study does offer positive evidence. Above average readers were shown to be superior in knowledge of Print-direction Concepts, Advanced Print

Concepts, but also intelligence as well. This study did not support, however, the difference between types of readers for Letter/Word Concepts nor for the effect of gender. Both types of readers were able to distinguish, for the most part, between one and two letters and one and two words. As previously mentioned, though, knowledge of visual word boundaries has been found to predict readiness scores more successfully than end of the year reading achievement.

Due to differences in intelligence found in the sample between above and below average readers, differences in metalinguistic ability between groups of readers in studies which did not measure intelligence should be viewed with caution. Given the sharp decrease in the correlation between print awareness and reading with intelligence held constant, to say that reading achievement is the sole determiner of differences in print awareness or other metalinguistic abilities is inaccurate.

It is further suspected that differences in Print-direction ability is primarily due to variation in item 16, knowledge of the period. The mean for item 16 (.80) for below average readers was the only one in the concept group less than .94. Similarly, for above average readers, it was the lowest as well (.90). Further comparisons with different item groupings are planned.

Differences between readers were also noted for Advanced Print concepts which included items requiring the recognition of incorrect letter and word sequences and identification of the comma, question and quotation marks. While the mean for above average readers was only half of the possible score for this group of items, still they demonstrated a familiarity with punctuation and an ability to scan lines and words that below average readers did not. Interestingly, the weighting of Advanced Print (.859) in the canonical corre-

lation indicated that performance on these items is responsible for most of the relationship with measures of reading ability. This is logical, however, as two of the four weighted subtests of the reading measures, Word Reading (.292) and Word Study Skills (.278) require the child to make discriminations between words with similar letter groupings (e.g., "jet," "jump", "just"). It follows, then, that students with high scores on these reading subtests would do well on similar items of the print awareness test. There is still some question, nevertheless, that the test itself does not construct the task for items 12, 13, and 14 such that all readers are given a fair opportunity to perform up to their ability. Thus, above average readers' superiority at this point must still be taken with qualification.

That Vocabulary, a measure of "verbal competency independent of reading ability" (Madden et al., 1973), had the highest weighting (.308) in the canonical correlation for the total sample, however, was not anticipated. This occurrance, coupled with the fact that Vocabulary had the highest bivariate correlation (.563) with intelligence among the subtests of reading, seems to indicate that a general intellectual or language ability perhaps still comprises a portion of print awareness, even though intelligence as measured in this study did not substantially contribute to the measure of written language awareness. This relationship of vocabulary to a knowledge of printed conventions is perplexing and further investigations to explore the relationship are being planned.

Conclusion

The purpose of the investigation was, in part, to replicate with a larger sample size previous findings using the CAPT that children demonstrate certain

confusions about printed conventions and that above average readers, specifically because of their reading ability, perform better on measures attempting to assess knowledge of print conventions. The study also assessed the contribution of intelligence to both print awareness and reading achievement and hypothesized certain effect sizes to more precisely define the relationships among the three variables. In addition, certain precautions were taken as suggested by previous researchers to overcome the difficulties presented by certain items on the test.

In general, the study supported the findings of previous research that some beginning readers' concepts of letters, words and marks of punctuation are not stablilized even after one year of reading instruction. It was also found 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, the hypothesized individual effects of reading achievement and intelligence. Neither one 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 are useful predictors of knowledge of print conventions.

Further, it would be a mistake to heed Ehri's (1979) contention that concern about metalinguistic abilities is a "waste of time" (p. 89). In the present study, the "best" predictor among reading achievement measures, Word Reading, accounted for less than a third of the variance in print awareness not considering the overlapping correlation of intelligence. Thus, high reading achievement alone does not ensure that a child will fully understand the terms

in the "reading instruction register" nor understand the more esoteric refinements that punctuation adds to written language. Similarly, there is no guarantee either that a child with superior intelligence will discover on his own the technical features of print. Clearly, neither reading achievement nor intelligence as measured by the present study is sufficient in and of itself to explain knowledge of print conventions as assessed by the CAPT.

Recommendations

A limitation imposed upon the present study was the low reliabilities obtained by use of the most recent edition of the print awareness instrument. Rather than inconsistencies in the test itself, it was suggested that the sample as selected was familiar with most of the printed conventions as presented, thus reducing the variability throughout the test and concentrating it only within a few items. Since this is the first usage of the Stones (Clay, 1979c), other investigations need to be carried out to confirm, or disconfirm, the reliabilities and results obtained in this study. A preliminary recommendation, however, is that the test is more appropriately used at the beginning or end of kindergarten than at the end of first grade.

A further recommendation involves either a change in the examiner's questions for items 12, 13 and 14 (identification of incorrect word and letter sequences) or appropriate follow-up activities which confirm the responses elicited on these items. There is good reason to believe as suggested by this study and others that the student's attention is not focused on the lines of print containing the reversed word and letter sequences. This was evidenced by the high percentage of semantic responses (i.e., referring to the picture) obtained in this study even among above average readers. One suggestion might be to

either have the child point to each word as the examiner reads it or to run a finger under the lines of print while scanning silently. In this manner, one can be surer that all of the children at least have the opportunity of focusing on the print initially before giving an answer.

Another suggestion regarding actual test administration is that responses for the items dealing with punctuation should be verified for a knowledge of function, rather than just the name of the mark. It was found in the present study that several children who knew the names of the various forms of punctuation could not readily explain their effects on the written text. Thus, if the child first responds to the examiner's question "What is this for?" by giving the name of the mark, follow-up questions such as "What does that mark tell you to do?" or something similar needs to be asked before the response to the item is considered correct.

A recommendation for future research is the further exploration of the notion that print awareness ability might be "text-governed" or specific to the style of instructional material. In the study at hand it was observed that children's notions of the nature of a written sentence seemed to be influenced by the sentence length in the basal reader rather than the placement of punctuation. It has been noted by others that children's perceptions of words may also be influenced by texts using mostly one-syllable words. Therefore, a question that future research needs to answer is whether or not various kinds of printed language styles such as simple vs. complex sentence structure or monosyllabic vs. polysyllabic texts can produce real differences in print awareness during the first few years of learning to read.

In conclusion, despite the few difficulties of administration, the Concepts About Print Test seems to render more useful information about actual reading behavior than most traditional readiness tests whose profiles are more general. In contrast, Clay's (1972, 1979c) tests give a specific indication of whether or not a child understands the direction in which print should be processed, the difference between letter and word units, the function of punctuation and the concept that separate letter clusters each represent spoken words. These and other aspects of reading covered by the test offer the classroom teacher very detailed information of what a child knows about deciphering written messages. Further, given the minimal time involved in administration (7-10 minutes), the Concepts About Print Test potentially represents in this writer's view, one of the more productive diagnostic instruments yet devised for assessing pre- and early reading behavior and is highly recommended for use particularly by kindergarten teachers or first grade teachers at the beginning of the year.

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APPENDIX A

Parent Permission Form

Moore Public Schools

Administrative Service Center
400 North Broadway
Moore, Oklahoma
73160

Office of the Assistant Superintendent
Research

Dear Parent:

We are requesting permission to give your child a ten-minute individual test, "Early Detection of Reading Difficulties." Other educational data will be assessed with these test scores for the purpose of (1) predicting which children will have reading difficulties in later years and (2) improving your child's curriculum. We plan to re-evaluate these same children when they are in fourth, fifth, and sixth grades. Confidentiality of each child's scores will be assured.

Only first grade youngsters will be involved in this study. We plan to test Fairview children during the week of April 12-16. David Yaden will be doing the testing.

Results of the test will be given to parents by the end of May.

Please sign and return this form to your principal, Scott Blythe, Fairview Elementary, by March 31, 1982.

Thank you,

Lois Evans

Lois Evans
Assistant Superintendent,
Research

I give my permission to test my child._____

_____
Parent Signature

I do not give my permission to test my child._____

_____
Parent Signature

APPENDIX B

Gender Differences

Table A

Percentage of Males and Females Answering Each Concepts About Print Item Correctly Grouped by Factor Pattern

Item		Present Study M	Present Study F	Day et al.(1980b) M	Day et al.(1980b) F
BOOK ORIENTATION CONCEPTS					
1	Identifies front of book	93	97	100	100
2	Print (not picture) carries meaning	100	100	96	100
11	left page before right	98	100	100	100
PRINT-DIRECTION CONCEPTS					
3	starts top left	100	100	96	100
4	moves left to right	100	100	100	100
5	return sweep to next line	100	100	96	100
6	matches spoken to written word	98	98	93	96
7	first and last (lines, words or letters)	98	98	93	96
9	Movement along inverted print	95	97	78	96
16	Identifies period	84	87	82	88
LETTER-WORD CONCEPTS					
8	recognizes inverted picture	100	98	85	88
19	identifes upper/lower case letters	96	97	93	92
21	identifies one and two letters	86	94	96	100
22	identifies one and two words	93	95	78	88
23	identifies first and last letter in a word	95	92	74	96
24	identifies capital letter	93	94	30	46
ADVANCED-PRINT CONCEPTS					
10	recognizes inverted lines	48	65	30	42
12	recognizes incorrect word sequence	13	15	30	42
13	recognizes incorrect letter sequence	16	21	30	62
14	recognizes incorrect letter sequence	16	19	26	42
15	identifies question mark	73	77	70	83
17	identifies comma	32	34	33	46
18	identifies quotation marks	30	37	11	21
20	distinguishes between was/saw and no/on	88	84	78	88
N=		56	62	27	24

APPENDIX C

CAPT Totals for Three Studies

Table B

Percentage of Total Subjects Answering Each Concepts About Print (Stones) Item Correctly Grouped by Factor Pattern

Item		Present Study Total	Total[a]	Total[b]
BOOK ORIENTATION CONCEPTS				
1	Identifies front of book	95	100	100
2	Print (not picture) carries meaning	100	98	100
11	left page before right	100	98	100
PRINT-DIRECTION CONCEPTS				
3	starts top left	100	98	100
4	moves left to right	100	100	100
5	return sweep to next line	100	98	100
6	matches spoken to written word	98	94	93
7	first and last (lines, words or letters)	98	94	93
9	Movement along inverted print	96	86	87
16	Identifies period	86	84	80
LETTER-WORD CONCEPTS				
8	recognizes inverted picture	99	86	90
19	identifes upper/lower case letters	97	92	92
21	identifies one and two letters	91	98	88
22	identifies one and two words	94	90	93
23	identifies first and last letter in a word	93	82	92
24	identifies capital letter	93	84	83
ADVANCED-PRINT CONCEPTS				
10	recognizes inverted lines	57	37	35
12	recognizes incorrect word sequence	14	35	22
13	recognizes incorrect letter sequence	19	45	32
14	recognizes incorrect letter sequence	18	33	32
15	identifies question mark	75	76	77
17	identifies comma	33	39	32
18	identifies quotation marks	34	16	18
20	distinguishes between was/saw and no/on	86	82	72
N =		118	51	60

Note: Factor pattern previously identified by Day and Day (Note 5).

[a]Data from Day, Day, Spicola & Griffen (1981), April testing.
[b]Data from Johns (1980), May testing.