The Role of an Adequate Schema for Reading in Good and Poor Readers’ Comprehension of Text

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THE ROLE OF AN ADEQUATE SCHEMA FOR READING IN GOOD AND POOR READERS' COMPREHENSION OF TEXT

THESIS

Submitted to the Graduate Committee of the
Department of Curriculum and Instruction
Faculty of Education
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Role of Adequate Schema

Abstract

Good and poor readers in second, fourth, and sixth grades, randomly selected from students scoring above or below grade on the reading comprehension subtest of the California Achievement Test, were given a questionnaire about reading and a set of passages altered to restrict meaning. Replies were examined to see if good and poor readers differed in their inclusion of meaning or if a significant relationship existed between meaning inclusion and grade level, meaning inclusion and comprehension achievement scores, and meaning inclusion and intelligence.

No significant difference was found between good and poor readers in their inclusion of meaning nor significant relationships found between meaning inclusion and grade level, comprehension scores, or intelligence. Good comprehenders offered more decoding-centered responses than poor comprehenders, and fourth graders exhibited more emphasis on meaning than sixth graders. These results were contrary to the findings of Canney and Winograd (1979) whose research the present study attempted to replicate. An examination of reading program emphasis and replication of the study using different populations were suggested.
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CHAPTER 1

Statement of the Problem

Purpose

The primary purpose of this study was to explore the relationships: (a) between the schemata for reading of good and poor comprehenders in second, fourth, and sixth grades; (b) among the schemata for reading of good comprehenders across grade levels and; (c) among the schemata for reading of poor comprehenders across grade levels. A secondary purpose of this study was to determine if significant relationships exist among grade level, adequacy of reading schema, reading comprehension performance, and intelligence.

Questions to be Answered

This study examined the following questions:

1. Is there a significant difference in the adequacy of the schema for reading of good and poor comprehenders in the second, fourth, or sixth grades?

2. Is there a significant difference among the schema for reading of good and poor comprehenders across grade levels?

3. Is there a significant relationship between grade level and adequacy of reading schema?

4. Is there a significant relationship between adequacy of reading schema and reading comprehension performance?
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5. Is there a significant relationship between adequacy of reading schema and IQ?

Need for the Study

In the last two decades, research in the area of reading comprehension has stressed the interrelatedness of the reading process; comprehension is the result of an interaction among the reader, text, and situation. Attention has centered upon the dynamic nature of the reader's contribution. The schema or framework readers have for the reading act itself, as well as for the subject matter of the text, is highly important. It is necessary for readers not only to be aware that they are engaged in a search for meaning but also to be aware when meaning has been lost (Brown, 1982).

Reading is a complex mental process whose purpose is comprehension. The reader who is unaware of reading's purpose suffers from a severe handicapping condition, for the successful reader must combine printed cues with prior knowledge of language, text structure, the immediate reading situation, and indeed, of the world. Awareness of what one is setting out to do would seem to be a sine qua non.

It is important for educators to be aware of the student's schema for reading in order that they might remove the handicap of an inadequate schema from those who are burdened with it. Research has shown that it is naive to assume that all readers arrive at a
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conscious awareness of the purpose of reading without guidance (Brown, 1982; Canney & Wingrad, 1979; Golinkoff, 1975-76). There is a need for a more controlled assessment of students’ perceptions if educators are to draw correct conclusions concerning the forms this guidance should take and the extent to which it is necessary.

If a student views reading as primarily an exercise in rapid word calling, and the subschema of bringing meaning to print is absent from his schema for reading or is tangential to it, Canney and Winograd (1979) argue that failure to comprehend may be related to an inadequate schema for reading rather than to poor skill development or limited background knowledge alone.

There are many factors involved in failure to comprehend text. Among them are less than automatic word attack skills (Golinkoff, 1975-1976), sentence structure (Pearson, 1974-1975), lack of interest (Betts, 1976), inadequate language development (Golinkoff, 1975-1976), poor use of contextual cues (Wiener & Cromer, 1980), lack of background knowledge (Bransford & Franks, 1971) and learned helplessness when faced with print as a result of early failure (Brown, 1982). In addition, awareness of the necessity of producing meaning when one reads and the ability to monitor one’s success or failure to do so are essential factors separating good comprehenders from poor comprehenders (Brown, 1982; Golinkoff, 1975-1976).

There is much concern over poor comprehension performance, and educators expect students to perform better than they currently do.
Research indicates that poor comprehenders appear to have the ability to comprehend beyond performance levels (Matz & Rohwer, 1971; Oaken, Wiener, & Cromer, 1971). Although there may be many causes of a reading comprehension weakness, among the important factors are the reader's knowledge that reading should result in meaning and awareness that, when it does not, additional strategies must be used (Flavell, 1979).

The theory that a major difference between good and poor comprehenders is the extent to which they are aware of the need to make sense of text deals with only one aspect of the reading process. This aspect needs to be examined in itself as well as in relation to other aspects of comprehension in order to build a solid basis for remediation efforts.

If poor comprehenders are less aware than good comprehenders that reading should result in meaning, this could be a contributing factor in their observed failure to correct mistakes that distort meaning (Weber, 1970) and their weakness in organizing text beyond the single word (Golinkoff, 1975-1976) despite the fact that poor comprehenders do not appear to have a general comprehension deficit (Matz & Rohwer, 1971; Oaken et al., 1971).
Definition of Terms

BOTTOM-UP READING MODEL: Reading is essentially the translation of graphic symbols into an approximation of oral language. Comprehension is the automatic outcome of accurate word recognition.

GOOD COMPREHENDER: For the purposes of this study, a good comprehender is a student reading two or more years above grade level as measured by the California Achievement Test's subtest of reading comprehension. The term comprehender is used rather than reader in order to emphasize the true purpose of reading.

POOR COMPREHENDER: For the purposes of this study, a poor comprehender is a student reading approximately one year below grade level as measured by the California Achievement Test's subtest of reading comprehension. Students who were much more than one year below grade level were not included either because they had not been promoted or because parents would not consent to their participation.

METACOGNITION: Awareness and control of one's own thinking and learning activities.

SCHEMA: An abstract conceptual frame of reference surrounding a concept, an ideational scaffolding. The term refers to generic knowledge based on common subject matter, attributes or associations.

SCHEMATA: The plural form of schema.

BACKGROUND SCHEMA: A conceptual frame of reference for the subject of a particular text or discourse.
SCHEMA FOR READING: A conceptual framework for the reading act. This framework includes the reader's concept of the purpose of reading.

ADEQUATE SCHEMA FOR READING: One which views reading as a search for meaning. If meaning is not obtained, reading is not considered to have taken place.

SCHEMA THEORY: A theory about how knowledge is represented, stored, and retrieved and how this representation assists the learner in perceiving, understanding, learning, remembering, and solving problems. According to this theory, knowledge is packaged in units called schemata. Rumelhart (1975) says, "... it is useful to think of schema as a kind of informal, private, unarticulated theory about the nature of events, objects, or situations that we face" (p. 37). Schemata represent knowledge, not definitions, at all levels of abstraction. They are frameworks or scripts with which we face new experiences. They have variable components, are dynamic by nature, and embed within one another to form networks that serve as recognition devices which process and evaluate sensory input (Rumelhart & Ortony, 1977).

TOP-DOWN READING MODEL: The reader's cognitive and language abilities are the most important ingredients in constructing meaning from print. Graphic symbols are used only to support or reject the reader's hypotheses about meaning. Skilled readers go from print to meaning without first translating to speech.
Limitations of the Study

A total of 24 students at three grade levels from one school district took part in this study. One researcher interviewed all students and presented the altered paragraphs.

Among the 24 students interviewed, 5 were seen at a later date due to difficulty in obtaining parental approval for low comprehenders to participate in the study. The majority of these cases were at the second grade level.

Poor comprehenders involved in the study were not always achieving a full year or more below grade level. This was due to the reluctance of parents of children achieving far below grade to allow their children to participate.

Scores obtained on the reading comprehension subtest of a standardized reading achievement test were used to label students good or poor comprehenders. Such subtests are not as reliable or valid as researchers might wish (Golinkoff, 1975-1976).

Data were collected in a school setting. Student responses may have been affected by the environment in which they were elicited.

Since responses to both the questionnaire and the altered paragraphs were collected during interviews, students' reactions to the researcher and researcher's reactions to students may have colored the responses. However, care was taken to stay within interview guidelines in the number and nature of questions asked.
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Summary

Because of the growing awareness of the dynamic nature of the reader's role in the reading act, particularly the metacognitive aspects of that role, this study considered the schema for reading of good and poor comprehenders both within and across grades to see if they differed significantly. This study also examined the relationship between an adequate schema for reading, grade level, comprehension performance, and intelligence.
CHAPTER II

Related Literature

The primary purpose of this study was to explore the relationships between the schemata for reading of good and poor comprehenders in second, fourth, and sixth grades and of good and poor comprehenders respectively across grades. A secondary purpose was to determine if significant relationships exist among grade level, adequacy of the schema for reading, reading comprehension performance, and intelligence.

The following review of the literature focuses on the history of the development of schema theory and the application of schema theory to the processing and recall of text.

The Development of Schema Theory

From World War I to the 1960's, behaviorism dominated psychology and, by extension, education. In its more extreme forms, behavioristic psychology viewed people as machines driven by sensory input. Human behavior was considered important but not the mental activity that accompanied it. Since people were considered almost totally malleable, behavior modification and behavior theory became increasingly popular as cures for maladaptive responses to the sensory input otherwise known as daily life. It is true that during this period, Piaget, and psychologists influenced by him, studied cognitive development, but their work received little attention.
This situation has changed drastically within the last two decades. Mental processes are again considered worthy of study. A new field has emerged called cognitive psychology and has affected or has been affected by shifts in the fields of linguistics, artificial intelligence, social anthropology, and reading research.

The Behaviorist Tradition

When psychology first became a separate discipline about one hundred years ago, its principal goal was the analysis of mental processes. The chief method used was a highly developed form of introspection sometimes called mentalism. Researchers "...did their best to think about thinking, spending long hours solving problems, noting their sensations, and trying to describe their internal mental activities" (Wingfield, 1979, p. 13).

In the opinion of Neisser (1976), mentalism proved unsatisfactory for two reasons: first, because it was a sloppy research tool biased by the act of observation itself and second, because it offered a narrow, overly rational view of human nature applicable only to the laboratory. It offered no account of how people interacted with the real world and thereby left out nearly everything that ordinary people think is important.

In reaction to the approach of the mentalists, J. B. Watson set out to change his contemporaries' view of human nature. In the early 1900's he began a systematic campaign against mentalism as a research
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tool. Watson questioned the validity of subjective reports and maintained that the task of psychology was to deal only with observable and measurable events. Psychologists should study behavior and focus on physical stimuli and responses (Wingfield, 1979).

Watson maintained that specifying the laws that related stimulus to measurable response might not only be necessary for the understanding of human learning, it might also be sufficient (Winograd, 1977). Words such as "mental," "unconscious," and "thinking" were regarded as vague and unscientific.

Behaviorism and Memory

Watson's theory of memory is an excellent example of the behaviorist tendency to downplay any intervening variable between stimulus and response. Watson did not like the term "memory"; he thought it had no place in objective psychology. In so far as the term had any meaning for him, it referred to the retention of a habit (Anderson & Bower, 1980). The human ability to recollect past events was based on the formation, retention, and activation of verbal and visceral habits. In his 1930 work, Behaviorism, Watson says,

By "memory" then, we mean nothing except the fact that when we meet a stimulus again after an absence, we do the old habitual thing (say the old words and show the old visceral-emotional behavior) that we learned to do when we were in the presence of that stimulus in the first place (p. 237).
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Memory is merely habit or, as Ebbinghaus explained (Housel & Acker, 1979), a trace that strengthens as information is repeatedly encountered or fades as it remains unavailable. It is analogous to a muscle that grows strong with use or atrophies with inactivity.

Behaviorist thought led to a view of man as an infinitely malleable, passive receiver of stimuli that could be explained in connectionistic, reductionistic, sensationalistic, and mechanistic terms, a machine that needed no "ghost" within to make it fully explicable. For the behaviorists, even as complex a phenomenon as language could be described mechanistically as a simple concatenation of smaller units.

Although it had imposed upon itself severe limitations in ruling out of consideration any variable between stimulus and response, behaviorism made an important contribution to the study of human learning. "... for the first time psychology began to see the critical necessity for measurement and objectivity in experimental research" (Wingfield, 1979, p. 14). It attracted many important thinkers such as Hull, Thorndike, and Skinner. However, as its point of view became a dogma that began to limit legitimate inquiry, behaviorism became not a lodestone but a millstone, and the seeds of revolt were planted.

The Rationalist Counter Tradition

In sharp contrast to the empirical approach which begins with what is observable and measurable, the rationalist position begins
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with certain "truths" or "first principals." Use of reason and intuition is the primary methodology (Anderson & Bower, 1980).

The thought of Plato represents an extreme rationalist position. For Plato all knowledge of any importance is innately recorded in the human mind. Subsequent rationalists take a more moderate position maintaining that certain principles are a part of the innate apparatus of the mind and cause it to project particular hypotheses upon sensory experience (Anderson & Bower). Chomsky (1968) has presented a strong rationalist argument for language acquisition stating that the facts of language force us to conclude that the child must begin life with a small set of linguistic universals which predispose him to develop a theory of the grammar underlying his language (Anderson & Bower).

Thinkers in the rationalist tradition tend to value thought more than sensory input, to find certain truths or principles to be innate, to think the whole greater than the sum of its parts, and to consider mechanistic psychological formulations inadequate. For the rationalists there tends to be a "ghost" in the machine, and men are actors rather than passive receptors when engaged in learning and remembering or indeed, when interacting on any level with the physical world.
The Cognitive Revolt Against the Behaviorists

Behaviorism, which had begun as a rebellion against the subjectivity of mentalism, found itself in the second half of this century under attack for its own stance in favor of the observable and measurable. In trying for objectivity, said its opponents, behaviorism had ignored too much. There were simply too many phenomena that it could not explain.

Chomsky (1957) mounted a salient attack upon the behaviorist view of language as a linear progression, that is, an adding on of simple units to form a complex structure. He demonstrated that it is logically impossible to account for the proficient use of language in terms of stimulus-response chains. Chomsky made a distinction between deep structure (meaning) and surface structure (syntax) and postulated transformational rules that must be employed by native language users as they move successfully from one to the other.

Psychologists were also pushing against the sides of the behaviorist box. They maintained that results from Ebbinghaus's nonsense-syllable memory experiments shed no light on the way memory functioned in real life situations. For example, behaviorists might very well insist that important ideas are overlearned and therefore have enough strength to appear at both immediate and delayed recall (Pichert & Anderson, 1976). But what makes an idea important to each of us in the first place? Neisser (1976) refers
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to the behaviorists' nonsense-syllable method as the "archetype of psychological irrelevance" (p. 49).

In addition, Watson's view of semantic memory as a verbal habit where the subject merely repeats the words he said before with the reappearance of the same stimuli was not sufficient to explain language. What, they asked, about paraphrase?

These questions had been asked before. Bertrand Russell was critical of Watson's view of semantic memory as early as 1927. Anderson & Bower (1980) quote from his book, Philosophy:

Many different forms of words may be used to express the same "meaning", and there seems no reason in mere habit to account for the fact that we sometimes use one form of words and sometimes another when we "think" of that which all the various forms of words express. The association seems to go, not direct from stimulus to words, but from stimulus to meaning and thence to words expressing the meaning . . . (pp. 73-75).

[Emphasis is added.]

In Russell's words there lies a nascent form of Chomsky's deep structure theory, an awareness of the separation of the surface of language from the meaning that is beneath it.

More well known than Russell's criticism is the reaction of Bartlett (1932) to Ebbinghaus's method. He challenged the use of nonsense syllables as a methodology that could reveal anything
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valuable about memory. Bartlett made three criticisms of the attempt to study memory in a stimulus-response context.

1. It is impossible to rid stimuli of meaning so long as they remain capable of arousing any human response.
2. The effort to rid stimuli of meaning creates an atmosphere of artificiality for all memory experiments, making them a study of the establishment and maintenance of repetition habits.
3. To make the explanation that the variety of recall responses depend mainly upon variations of stimuli and of their order, frequency, and mode of presentation, is to ignore dangerously those equally important conditions of response which belong to the subjective attitude and to predetermined reaction tendencies (p. 4).

In his own experiments, Bartlett used memory for prose recall as his method, an approach he considered far more natural. Bartlett noticed that a high proportion of inaccuracies occurred in prose recall, not little slips, but great aberrations, that transformed the original material. The number of these embellishments increased over time, and, strangely enough, subjects seem to be unaware of the extent of their inaccuracies and had difficulty discriminating what they had added from what they had originally heard. "Bartlett concluded that the form of memory involved in prose regeneration could in no sense be regarded as the revival of an earlier experienced event . . . (Brown, Smiley, Day, Townsend, & Lawton, 1977, p. 77).
He refused to endorse the reappearance or trace hypothesis of the behaviorists and instead favored the idea of memory as an active, reconstructive process involving the entire knowledge system of the individual. This knowledge system was organized into abstract structures he termed schemata borrowing the phrase from Piaget (Brown, et al., 1977).

Although the criticisms of Russell and Bartlett seem devastating in hindsight, they were ignored for 30 years or more. When psychologists did finally pay them heed, Neisser (1976) described the result as a sort of Copernican revolution. Psychology turned from an attempt to derive from rote-memory experiments basic principals that could be applied to the world outside the laboratory toward the study of skills originally learned in the world and brought to the laboratory by the subject, skills like imaging, categorizing, and storytelling.

As psychologists turned to skills learned in the world in examining learning and memory, the new discipline of psycholinguistics emerged from the interface of psychology with linguistics uniting the descriptive methodology of the linguists with the experimental approach of the psychologists. The psycholinguists began to question the dominance of syntax over semantics in Chomsky's theory and to go beyond the single sentence to the level of discourse in the search for meaning. It soon became apparent that sentences arranged in isolation had one meaning, but, when arranged in whole messages, they took on different or added meaning (Housel & Acker,

First you arrange things into different groups. Of course one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step; otherwise you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications can easily arise. A mistake can be expensive as well. At first the whole procedure will seem complicated . . . (p. 206).

Individually the sentences make sense, but taken together, they are not comprehensible. When a title is provided, "Instructions for Washing Clothes", the paragraph takes on new meaning.

Once psycholinguists moved beyond the single sentence level of analysis, it became necessary to postulate a memory component which would hold the meaning of the units until meaning could be assigned to the whole message.

It is also necessary, argued the psycholinguists, to posit an enduring memory store which contains a person's world knowledge, knowledge that he needs in order to make the inferences required to fill in the inevitable gaps in messages. For example, the above passage relied on the reader's knowledge of what a washing machine, detergent, and clothes are. Clark & Clark (1977) summarized the
need for assuming an enduring memory store when analyzing comprehension of whole messages.

Because stories are so large, they cannot be studied in the same immediate and direct way that words, constituents, and sentences have been studied. Their influence on comprehension can only be inferred indirectly from studies of memory. Yet, with the story, the lessons have remained the same. The structure of the whole affects the understanding of each part. (p. 172)

The field of artificial intelligence supported both psychologists and linguists in their position regarding an enduring memory store. Anderson (1977) explains that the early efforts of computer scientists to program computers to perceive simple objects, translate from one language to another, and play chess had an empiricist bias. The early programs involved bottom-up, data-driven analysis, and there was little progress. It soon became evident that only very simple problems could be dealt with in this way. Computers had to be programmed with elaborate background knowledge before they could recognize a simple object.

The problem recognized by the computer scientists is really the ancient philosophical problem concerning the nature of reality. Many philosophers have disagreed about it, among them Aristotle and Spinoza. For Aristotle reality lay in the essence of a thing, in what made it uniquely itself. For Spinoza what was important about
a thing was its relationship with everything else. Only by taking its relationships into account, could anything be understood.

Computer scientists also observed that in order for a computer to recognize an object, it had to formulate a hypothesis based on a few perceptual cues. People act in a similar manner when they recognize an object as a cube even though all its faces are not in view (Anderson, 1977). Reading researchers observed that readers need only some of the visual cues on the printed page to make predictions about the rest (Smith, 1978), and the view of reading as a form of hypothesis testing was born.

As computer scientists struggled with programs and linguists with connected discourse, the need for an enduring memory store became more and more apparent. This need led researchers back to Bartlett's (1932) schema theory in search of answers.

According to Rumelhart & Ortony (1977), schema theory was not original with Bartlett but can be traced back to Kant's Critique of Pure Reason (1787). Bartlett is said to have borrowed the phrase itself from Piaget, considered the preeminent schema theorist (Anderson, 1977).

Schema Theory, A Common Empirical Base

Derived from Bartlett via Piaget, and ultimately, Kant and Plato, schema theory served as a common base for psychologists and psycholinguists in their examination of learning and memory. There have been many variations on Bartlett's schema theory (Housel &
Acker, 1979). Among these are the constructive-reconstructive memory research of Spiro (1977), the frame theory of Minsky (1975), the story grammar of Thorndyke (1977), the semantic macro-structures of Van Dijk (1977), and the discourse schema research of Rumelhart (1975) and Winograd (1977). The following discussion is a synthesis of several of these variations.

Anderson (1977) defines schema as a representation of generic knowledge, knowledge of what is generally true of a class of things, events, or situations. These abstract knowledge structures indicate typical relations among the components of a schema. Rumelhart & Ortony (1977) define schema as abstract conceptual frameworks which influence the way readers organize information from text and the way they recall it. Langer (1982) says that a schema is a "metaphorical allusion representing generic knowledge based on common subject matter, attributes, or associations" (p. 151).

The most basic schema theory assumption, in the opinion of Housel & Acker (1979), is that perceivers are active information processors. They actively construct schema to assign meaning to sensory experience. Schema theorists generally agree that the constructive aspect of schema is partially due to the structure of the stimuli and partially due to the perceiver's active structuring of the stimuli (Housel & Acker). This act of combining information from the perceiver's knowledge store with new information from the environment is referred to as a construction (Spiro, 1977).
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Schemata are representations of our knowledge of the world. For example, many persons in this culture have a schema for restaurant dining. As soon as they are aware that restaurant dining is the topic under discussion, certain characteristics will be anticipated such as sitting at a table, eating good food, paying the bill, tipping, and so on. Even though every aspect is not mentioned, readers will fill in missing details by drawing on their world knowledge, that is, their schemata for restaurant dining. These schemata are not inflexible but are constantly being modified by new life experiences (Neisser, 1976).

Some schemata are more permanent than others. Minsky (1975) calls relatively permanent schemata "frames." An example of a frame is "how people look and behave." This frame is an expectation that people will have certain physical attributes and exhibit certain behavior.

Van Dijk (1977) describes frames as hierarchical sets of facts, assumptions and objects which are stored in semantic memory (Housel & Acker, 1979). Frames have macro and micro levels. An example of a macro level is "European Continent," and a micro level, "France." Many of the same frames are shared by most members of a society or culture. An important problem for schema theory research is "to identify and delineate specific knowledge networks that members of a culture share (Housel & Acker, p. 13)."
Role of Adequate Schema

Schema researchers have formulated different categories for schemata. Winograd (1977) identifies three types of discourse schema (p. 81).

1. interpersonal for interaction among the participants in a communication;

2. rhetorical which governs the laying out of reasoning sequence;

3. narrative for connecting a sequence of statements into a coherent text;

Rumelhart (1975) identifies a story grammar schema which represents a reader's expectations of story structure. Neisser (1976) identifies visual schemata for aspects of the environment such as geometric shapes and faces.

Housel & Acker (1979) propose two varieties of semantic memory schema, content and relational. Content schemata represent knowledge about objects and events not specifically related to other people (e.g. knowledge about language research). Relational schemata are a person's expectations concerning the different ways people relate (e.g. competition, love, and hate). These schemata operate in parallel fashion (Winograd, 1977), and one may be far more important in a particular instance than another.
Characteristics of Schemata

The most basic of schema theory's tenets is the assumption that the person plays an active role in processing information. In the case of the perceptual act, Neisser (1976) maintains that schemata play an anticipatory role in that they prepare the perceiver to accept certain types of information.

Because we can see only what we know how to look for, it is these schemata (together with the information actually available) that determines what will be perceived. . . . Our explorations are directed by the anticipatory schemata . . . . The outcome of the explorations--the information picked up--modifies the original schema. Thus modified, it directs further exploration and becomes ready for more information (pp. 20, 21).

Neisser supplies the following diagram (p. 21):

```
Object
(available information)

Singapore
Exploration

Samples

Modifies

Directs

Schema
```
Neisser uses this diagram to explain the role of schemata in the perceptual cycle but in similar fashion, readers construct and use schemata in assigning meaning to text. Bartlett (1932) referred to this use of schemata as "an effort after meaning" (p. 44). The concept of an active interaction between information explicit in the text and information from schemata was used by Spiro & Tirre (1979) as a point of departure in a search for differences in discourse processing styles.

Schemata have several generally accepted characteristics (Rumelhart & Ortony, 1977). First, schemata are dynamic. They are constantly adapting to accommodate new information. However, the more abstract the schema the more resistant to change even in the face of evidence to the contrary. Thus people are tuned to hear messages in different ways (Bransford, Nitsch, & Franks, 1977).

Second, schemata have variables termed "placeholders" or "slots" for each part of the knowledge structure. In order to interpret a text or an event in terms of a particular schema, a person must match the elements of the situation with the generic characteristics of the schema. "Another way to say this is that schemata contain slots or placeholders that can be instantiated" (Anderson, Reynolds, Schallert, & Goetz, 1976, p. 4). To comprehend a message, the receiver must fill the slots in the appropriate schema in such a way that the constraints of both the message and the schema are met.
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... it is when the reader has constructed a correspondence between relevant schemata and the givens in a message that he/she has the sense that the message has been comprehended. When the slots are filled with particular cases, a schema is said to be instantiated (p. 8).

Anderson states that slots in schemata beg to be filled, in fact, must be filled if comprehension is to occur. This is an explanation of how a reader reads between the lines to fill in gaps in the text. That instantiation does occur and how the process might work has been documented (Anderson et al., 1976).

Third, schemata can embed within one another, a concept similar to Van Dijk's macro-micro structures. To engage a schema is to engage many sub schemata which are, as it were, embedded within it.

Fourth, schemata represent knowledge rather than definitions. Schemata are not dictionary entries rather they "represent knowledge that is encyclopedic ..." (Rumelhart & Ortony, 1977, p. 110). Our ability to understand the story of Odysseus and the Cyclops provides an example of the difference between definitions and schemata. In this story we recognize that the Cyclops has a face even though he has only one eye because our schema for face will tolerate deviations from the typical definition of face. Rumelhart & Ortony explain that "knowledge has to be structured in such a way as to allow that dead animals are still animals and that one-eyed faces can still be faces" (p. 111).
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Fifth, schemata exist at all levels of abstraction ranging from a schema for a basic perceptual element such as the shape we label a square to schemata that are active when we give a summary of a sequence of events occurring over time.

Sixth, schemata are recognition devices learners use to evaluate input in a form of hypothesis testing. If the learner has a schema into which the information fits, he is able to comprehend it.

Seventh, schemata function as predictors. "A schema allows us to predict aspects of the input which have not been (and perhaps never will be) observed" (p. 112). In this respect schemata are similar to theories. For example, once a person has determined that an object is an electric lamp, the person tends to assume an on/off switch.

Conclusion

For psychologists, psycholinguists, and researchers in artificial intelligence and in reading, schema theory provides a common base for explaining how human learning and memory function. Most basic to this explanation, is the concept of the dynamic, constructive nature of the process as the learner or rememberer imposes order on sensory input and goes beyond the given in perceiving and comprehending.

Without a schema or frame of reference into which it can be assimilated, an experience remains incomprehensible. What one can see is determined by what one has seen before, what one can learn,
by what one already knows. The tyro and the chess expert examine the
same board but see it quite differently. Two people read a book and
come away with different views of the theme. The percept is altered
in the sieve of perception. As Neisser (1976, p. 22) says, "Because
schemata are anticipations, they are the medium by which the past
affects the future."

Schema theory raises many interesting questions, among them,
"Where does meaning reside and what is its nature?" Bransford et al.
(1977) maintain that the meaning of any event appears to have endless
variations depending upon the framework from which it is viewed.
They suggest that meaning cannot be seen as something stored in a
particular thing but "as a momentary place or pattern in a changing
relation structure or framework. As frameworks change, significances
change as well." (pp. 45, 46).

Lest we be cast adrift in a sea of relativism, Neisser (1976)
reminds us that meaning is the result of an interactive process, and
that schematic anticipations do affect perception but are in turn
affected by the information that is out there. Neisser points out
that the Platonic idea that all knowledge is innate is quite inade-
quate in the ever-changing human condition. From this position of
moderate rationalism, he discusses early learning experiences:

If the present account of perception is correct, there can never
have been a time when we were altogether without schemata. The
new born infant opens his eyes onto a world that is infinitely
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rich in information; he has to be ready for some of it if he is
to engage in the perceptual cycle and become ready for more.

It seems necessary, then, to credit even the youngest baby
with a certain amount of innate perceptual equipment. . . . At
the same time, we must not credit him with too much. . . .
People have to learn about the world; they do not know what it
will be like in advance, and they never know all about it no
matter how diligent and perceptive they may be. . . . (p. 63)

In setting out to find out about the world, persons strive to
make sense of experience. Schema theory provides a way of talking
about how this is done and of how the same event can have a very
different meaning for different persons. Bransford et al. (1977)
tell the story of Darwin as a youth finding a seashell in a gravel
pit. When Darwin mentioned this to a geologist friend, he was told
it was impossible. The geologist said the shell must have been
dropped there recently by someone for, if it had been there for
centuries, all theories about geological formation would be in doubt.
For Darwin, finding a shell was finding a shell. For the geologist,
it was a potentially more significant fact.

In every area of experience, comprehension involves an inter-
action of input with existing knowledge. Involved in this interaction
is a top-down thrust of schemata and a bottom-up thrust of data.
When they are properly engaged, comprehension results.
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Schema Theory and the Processing and Recall of Text

In recent years research in reading comprehension has shifted from an emphasis upon reading as a text-centered, linear progression from visual input toward meaning to a constructionist view in which reading is considered to be the result of an interaction among the sender, the message, the receiver, and the environment. The act of combining information from sender, message, receiver, and environment to produce meaning is referred to as a construction (Spiro, 1980).

A fundamental assumption of the constructionist position is that spoken or written text does not in itself convey meaning (Adams & Collins, 1977). A text provides directions for the reader concerning how to construct the intended meaning from previously acquired knowledge. Consequently, a reader cannot learn what he does not already know, and reading comprehension involves far more than "simply chaining together the meanings of a string of decoded words" (Spiro, Bruce, & Brewer, 1980, p. 1).

The psycholinguists developed a model of reading which was very different from the traditional taxonomic model. The taxonomic model considers reading to be a sequence of skills which, when mastered, results in comprehension. The psycholinguistic model views reading as a process of producing meaning from the reader's knowledge of oral language, syntax, semantics, graphophonic cues, personal history, world knowledge and beliefs. Reading is a transaction between writer...
and reader wherein readers must fit the writer's ideas into their already existing knowledge systems or schemata.

The taxonomic skills model sees reading as a "bottom-up" or "data-driven" process (Bobrow & Norman, 1975). The reader processes text in a series of discrete stages. Strings of letters are first analyzed until words are recognized, then phrases, then sentences. "Sentence meaning is conceived to be the deterministic product of the lower-order levels of analysis and, presumably, the meaning of a text is a concatenation of the meanings of its component sentences" (Anderson, 1977, p. 6).

In contrast, the psycholinguistic model is a "top-down" or "conceptually driven" model in which the emphasis is on prediction of meaning. The reader searches the text for confirmation or rejection of his hypotheses. Reading is considered to be a psycholinguistic guessing game (Goodman, 1976). The readers' expectations assist their analyses and sometimes even override the print as happens when a reader substitutes a word or phrase that makes sense in place of what is actually in print.

That the meaning of a communication depends on the schematic expectations born of the reader's knowledge of the world as well as on the message blueprint is illustrated by the following examples (Anderson et al., 1976). Consider the changed meanings of "kicked" and "ball" in the following sentences:
The boy kicked the ball.
The punter kicked the ball.
The golfer kicked the ball. (pp. 5, 6)
The ball is different and the kick is different in each sentence although the words are the same. Or note the changing meaning of an entire sentence, "The ball is in the field." in the following contexts:

You are driving past the field in your car.
You are sitting in the field having a picnic.
You have brought your cow to be bred.
The sentence appears on the screen in a memory experiment in which you are participating. (p. 6)

Extralinguistic knowledge is at work in the comprehension of text. Anderson et al. (1976) reported an experiment in which recall of these sentences was compared:

The housewife spoke to the manager about the upcoming baseball game.
The housewife spoke to the manager about the increased meat prices.

The second sentence was usually remembered as "The housewife complained to the manager etc.". The first sentence was almost always remembered correctly. It appears that readers applied their schemata for consumer economics and meat market policies to produce the complaint interpretation. The brute thing, in this case the word and
the sentence, depends for meaning upon the network of relationships in which it is placed.

An interesting example of the assistance given the reader by the higher-order expectations of schemata is the handling of ambiguity. When ambiguity occurs at any stage in the bottom-up model, all possible interpretations are carried forward by the reader to the next level of analysis. For example, meanings of a homonym would be activated. Eventually, if ambiguity does not pervade the entire text, a syntactic or semantic process at phrase, sentence or text level will help the reader make a choice. From this perception, as Anderson (1977) explains, "... reading is a matter of growing a tree of possible interpretations" (p. 7). In a top-down processing model, all branches need not spring from the tree in the first place because the reader's higher-order expectations will rule out some interpretations before they are formed.

The psycholinguistic model of reading with its schema theory engine has not resulted in just another model to pit against older, more established ones but rather in a great synthesis. It can stifle many an either-or debate for, as Adams & Collins (1977) point out, "schema theory provides a structure powerful enough to support interaction among different levels of processing ..." (p. 6). According to the schema-theorist account of reading, bottom-up and top-down processing should be occurring at all levels of analysis simultaneously (Rumelhart, 1976).
The data that are needed to instantiate or fill out the schemata become available through bottom-up processing; top-down processing facilitates their assimilation if they anticipated or are consistent with the reader's conceptual set. Bottom-up processing insures that the reader will be sensitive to information that is novel or that does not fit his ongoing hypothesis about the content of the text; top-down processes help him resolve ambiguities or to select between alternative possible interpretations of the incoming data (p. 11).

One of the most powerful aspects of the schema theory account results from the assumption that lower level schemata are sub-schemata within higher level schemata, and this aspect of the theory "... allows perceptual elements to coalesce into meaning \( \text{sic} \) and provides a structure for conceptualizing the interrelationships between \( \text{sic} \) levels of processing (Adams & Collins, p. 17).

Therefore, it is not necessary to think of reading as either a bottom-up or top-down process since reading must involve continuous interactions among many levels of analysis (Rumelhart, 1976).

Research suggests that print in and of itself does not carry meaning. It provides a blueprint from which the reader constructs a meaning based on his schematic network. Many studies have been completed which illustrate the importance of the reader's role by either manipulating or removing the schematic framework for a text.
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Bransford and Johnson (1973) presented an ambiguous paragraph to adults and asked them to recall it; the adults had very poor recall. Other adults were given an illustration for the same story which supplied them with a theme; these adults had good recall.

In a similar experiment Bransford and McCarrell (1974) omitted titles from some ambiguous selections and supplied titles for others. Readers given a title had much better recall. Anderson, Pichert and Shirey (1979) report several other experiments in which comprehension was affected through changing selection titles, assigning characters in selections the names of well-known figures, alternating introductions, or by selecting some readers with and some readers without a strong background knowledge of the subject of the selection.

Schallert (1976) designed a passage that could be given two interpretations. It told of a person who was afraid that his best pitchers would crack in the heat. Some copies of the passage were entitled, "Worries of a Baseball Manager" and some, "Worries of a Glassware Factory Manager." Scores on a multiple choice test requiring interpretation of ambiguous elements indicated that the interpretation of the passage was strongly related to the title. In another experiment reported by Teale (1977) with verbal and nonverbal contexts supplied prior to reading, subjects having some kind of context recalled significantly more idea units than those having no context.
When no strong contextual cues are provided, the schema the reader uses to produce comprehension depends upon the reader's background and life situation (Anderson, 1977). Anderson et al. (1976) gave two groups of students, physical education majors and music education majors, two paragraphs to read each of which could be interpreted two ways. The first paragraph could be about someone trying to break out of prison or about a wrestling match. The second paragraph could be about card playing or about a rehearsal for a woodwind ensemble. The physical education majors gave a wrestling interpretation to the first paragraph 64% of the time. Music majors did so 28% of the time. Physical education majors thought the second paragraph was about a music rehearsal 29% of the time, but music majors thought so 71% of the time. The interpretations given to passages had a strong relationship to the subject's background.

In a debriefing questionnaire after the above study, students were asked if they were aware of any other possible interpretation of either passage. It is noteworthy that 62% said another interpretation never occurred to them. An additional 20% said they became aware of another possibility during the multiple choice test that followed the reading or during the debriefing questionnaire. Only 18% said they were aware of another interpretation while reading the passage (Anderson, 1977). Researchers concluded that schemata can cause readers to "see" a message in the light of their own frame of reference without considering alternative interpretations.
Parallel studies have been completed by Bower (cited in Anderson, 1977). The same basic story was presented to students but different introductions preceded it. In one study the base story involved a character visiting the doctor. After the physical has been completed, the doctor smiles and says, "Well, it seems my expectations have been confirmed." In one introduction the character is described as worried that she is pregnant. When given this introduction, subjects remembered the doctor's saying, "You're pregnant" or "Your fears have been confirmed." The alternate introduction described the main character as a wrestler worried that he was underweight. Subjects who read this version were sure that the doctor had told the person he was gaining weight.

In another study reported by Bower, a passage about a series of accidents that occur during the filming of a TV commercial involving water skiing was read by all the subjects. Alternate introductions were added to cause the reader to identify either with Harry, the driver of the boat, or with Rick, the water skier. On a test given after the reading, subjects tended to identify with the point of view that the introduction had led them to take. For example, more subjects given the water skier viewpoint identified, "The handle was torn from Rick's grasp as the boat unexpectedly jumped ahead" as part of the text. More readers with the boat driver perspective identified, "Rick slipped and lost control and the handle went skipping across the water" as explicit in the text.
In the following experiments the same information was woven into two different narratives in order to get readers to assimilate that information into two different schemata thus illustrating the significance of text elements in the functioning of schemata. Anderson, Spiro, and Anderson (1977) wrote two passages, one about dining in a fine restaurant and one about shopping in a supermarket. The same eighteen items of food mentioned in the same order and attributed to the same characters were mentioned in both stories. The subjects read one of the stories and then, after an interval, attempted to recall it. Subjects who read the restaurant story had better recall of typical items in a restaurant meal and to which character the foods were attributed than did readers of the supermarket story. Experimenters concluded that the schema for fine restaurant provided a frame in which certain foods, their order, and who ordered them had more significance.

Another experimental approach was to ask subjects to read a story from one of two perspectives (Pichert & Anderson, 1976). While reading a description of a well-to-do family, readers were asked to approach it from the point of view of a burgler or a prospective home buyer. The rating of an item's importance to a certain perspective was a significant predictor of recall.

In a second study by the same researchers, subjects were asked to read the same two stories. Different groups were assigned
different perspectives from which to read. A test of recall given immediately after reading and again a week later, indicated that an idea's importance in terms of a given perspective determined whether the idea would be learned and whether it would be recalled later. Results indicated that the presence of high level schemata provide a framework for comprehending discourse. Later these schemata may provide the plan for recovery of detailed information. Pichert and Anderson concluded that the importance of an idea depends upon perspective and that it is inappropriate to speak as though the importance of an idea unit is an invariant structural property of text" (p. 18). In another study by Goetz et al. (1979), the importance rating given an idea and the likelihood of recall were both affected by instructions to assume a particular perspective.

In a study conducted by Anderson and Pichert (1977), after recalling the story once from different perspectives, subjects were asked to shift perspective and recall the story again. In two experiments following this paradigm, subjects produced, on the second recall, significantly more information important to the second perspective that had been unimportant to the first. They also recalled less information unimportant to the second perspective that had been important to the first. Researchers report that in several experiments following this paradigm, 65% to 80% of the subjects have recalled at least one additional piece of information important to their new perspective.
Anderson and Pichert devised another experiment to find out what would happen if a new perspective were introduced a considerable time after a passage had been read. Again, subjects recalled new information that was important in the light of the second perspective. "The noteworthy new finding is that the positive effect is about as large when the perspective shift occurs two weeks later as when the shift occurs shortly after the passage is recalled for the first time" (p. 14).

In an effort to determine whether children were as dependent on contextual support as adults, Brown et al. (1977) conducted two experiments concerning memory and comprehension of prose passages with children from second through seventh grade. In both experiments the major variable was the provision of appropriate frameworks for comprehending ambiguous sections of the passages. Both experiments revealed a striking absence of developmental trends. Children behaved like the adults in the previously mentioned studies in both recall and recognition. Recall of ambiguous passages was enhanced if a relevant framework were given; intrusions reflected their prior orientations; they had difficulty distinguishing between their own additions and the actual story content. In the recognition study, children treated foils congruent with the theme as taught items and foils that were incongruant as distractors. Researchers concluded that dependence on contextual support in the comprehension process appears to be as strong in children as it is in adults. 

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provide the interpretive framework for comprehending discourse. Ambiguous or incomplete sections of a story are "filled-in" or disambiguated so that the story more readily conforms to preexisting knowledge" (p. 25).

The experiments just described are intended to illustrate the interaction between reader and text which results in the meaning of the text for that reader. Ambiguous and manipulated passages make the interaction transparent, but there is little doubt that a similar interaction takes place in any reading act. The general point illustrated by all of these experiments is that meaning arises out of an interaction between reader and text and cannot be said to be lying there "cold stone-dead" on the page. The characteristics of the message, the reader's preexisting knowledge, and analysis of content must mesh. It is the function of schemata to provide the frame into which the textual elements must fit. Like a grindstone or a fly wheel, schemata are brought to bear on text. The result is comprehension.

Role of Schemata in Comprehension

There is much speculation concerning the mechanisms by which schemata may affect the processing of text. Research indicates that readers recall more text information that is important to their schemata than information that is not and that they make inferences consistent with those schemata (Anderson et al., 1979). There are many ideas about why this is so. These effects might be attributable
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to a process at work when a passage is being read (Anderson, 1977). A schema may act an an attention-allocating device. Text elements important to a schema may be given more attention whereas insignificant elements may be skimmed over and processed less deeply. Another possibility is that a schema provides an "ideational scaffolding" (Ausubel, 1963) for types of text information. A schema may contain slots for important information but none or optional ones for unimportant information. The "information gets encoded precisely because there is a niche for it in the structure" (Anderson, 1977, p. 16). Whether attention is allocated or slots are filled, the implications are the same. Schema determines what is important in text. Another function of schema during encoding may be to supply inferential information where the text is not explicit (Anderson et al., 1979).

The fact that people recall more text elements important to their schemata than text elements that are unimportant may be due to processes at work when the information is retrieved from memory instead of or in addition to processes at work when the information was initially encoded (Anderson, 1977). Research findings indicate processes at work after the passage is read based on the following evidence. First, as time passes, there is increasing reliance on inferential reconstruction. Second, important elements continue to be recalled after a retention interval, but the appearance of unimportant elements declines sharply (Anderson & Pichert, 1977). Spiro
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(1979) concludes that the following factors determine what is remembered from text:

1. What is needed to make different parts of the story conform to the reader's knowledge of the world.
2. What is structurally important to the text.
3. What is not derivable from other information in the text.
4. The structure of the schema brought to bear by the reader in understanding the text as in the example of the parallel narratives for a trip to a supermarket and a dinner in a fine restaurant.

There are several hypotheses concerning the way schemata affect recall. A schema might provide a retrieval plan (Pichert & Anderson, 1976). According to this theory, the schema provides the structure for searching memory. The memory search proceeds from the generic knowledge comprising the schema to the particular information stored when the text was read. Such a search would turn up information structurally important to the schema.

Another possible explanation is called the "output editing" hypothesis (Anderson, 1977). This theory assumes that each schema contains an index of importance causing the person to establish a response criterion. One example of how this might work is that the subject may not write down recalled information that is below his response criterion.
A third possibility, the existence of a process of inferential reconstruction, is suggested by Spiro (1977). If an element is important to a schema, the person may infer that it was present and include it without specifically recalling it. The traditional view of discourse processing is that all information, including inferences, receives sufficient processing to be encoded in long term memory. The alternative hypothesis favored by Spiro is that predictable information, however important to the discourse, is taken for granted and processed superficially so that it may receive no representation at all in long term memory.

Spiro (1977) has obtained considerable evidence for reconstructive processes in memory for discourse. Subjects read a story about a couple engaged to be married. The man is strongly against having children. In one version of the story, the woman is horrified because a large family is important to her. Several minutes after reading the story, some subjects were told that the couple did get married. Spiro predicted that these subjects would introduce errors when asked to recall the story in order to reconcile it with their knowledge of human relations. The expected reconciling inferences appeared with increasing frequency over a recall period of six weeks. Subjects were confident that their inferences had been part of the story.

In another experiment conducted by Spiro and Esposito (1977) stories were read that contained information that contradicted
the implications of explicit statements in the story. The vitiating information was presented either before or after the explicit statement whose implications it contradicted. Errors were prevalent in the "after" but not in the "before" condition. Subjects either denied that the explicit statement was presented or said that its content was the opposite of what was presented thereby bringing it into agreement with the vitiating information. Subjects were not able to distinguish their errors from correct responses. The following is an example of story statements that were used:

A. The karate champion hit the block.
B. The block broke.
C. He had a fight with his wife earlier. It was impairing his concentration. He doesn't perform well when he can't concentrate (p. 5).

When Statement C appeared after Statement B, subjects either denied that B was presented or said that B's content was the opposite of what was presented in order to bring about a reconciliation.

How could these subjects be so sure they had read what they had not read? According to Spiro's theory of inferential reconstruction, this occurs because much of what is read is predictable. When the reader meets the predictable information, he takes it for granted and processes it superficially because, if needed later, it can be derived from previously encoded information. If recall is insufficient to produce a coherent account, the gaps are filled in
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and the necessary information generated even though it may never have been presented (Spiro and Esposito, 1977). The reader either imports or distorts information unconsciously to bring the text into agreement with what is logical in his view. In Spiro's opinion there is a "psychological impetus" that requires such discrepancies to be resolved. Spiro thinks it possible that some children's comprehension problems may be due to poor use of such strategies in that they overestimate the future derivability of information and represent too little in memory as is the case when materials that seemed solidly encoded when studying become a blank when the test arrives (Spiro, 1980).

The evidence reviewed strongly suggests that a schema engaged when a passage is read affects encoding by guiding the allocation of the reader's attention to aspects of the text significant in the light of the activated schema and/or by furnishing an ideational scaffolding for assimilating new information. A schema also supplies inferential information when a text is not explicit and affects remembering probably by providing the plan for searching memory, by providing the criteria for editing information, and by providing the basis for inferential reconstructions when there are gaps or inconsistencies in memory (Anderson et al., 1979).

Aspects of Schema Utilization

Constructionists view text processing as an interaction between explicit information in text and the preexisting knowledge schemata
of the reader (Anderson, 1977; Spiro, 1977). The utilization of preexisting knowledge schemata has several aspects. First, a schema must be acquired. If schemata are acquired in insufficient quantity, there may be nothing available to bring to bear on the text. If the schemata acquired are of poor quality, they will be too narrow and circumscribed to be broadly adaptable. It is characteristic of young children's schemata to be bound to context and not easily generalized (Spiro, 1979).

It is evident that appropriate, available background knowledge is necessary for comprehension. Many reading problems may be traceable to a mismatch between the background knowledge presumed in a given text and the knowledge actually possessed by the reader. However, schema availability alone is not a sufficient condition for comprehension. Spiro (1980) explains that "We have to say more than that prior knowledge matters. How is prior knowledge used?" (p. 6). How is this knowledge activated during the reading process? The research of Bransford and Johnson (1973) supports Spiro's contention that preexisting knowledge must be activated during the reading process and that we need to know more about how this takes place.

Another aspect of schema activation is awareness of which knowledge structures to bring to bear in a given situation. If a schema is not accessed, it makes no difference whether it is available. How does the reader know which knowledge structures to bring to bear? Clues to which schemata must be activated are usually derived from
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the text, but, if problems arise, the text cannot be questioned. An additional problem is caused by the fact that children may not be able to see the connection between the schema and the text due to their schemata being used to the context in which they were acquired.

A further aspect of schema utilization is the constant instantiation and refinement that takes place as new knowledge is acquired. According to Spiro (1980), this aspect of the process is the one that has been most thoroughly studied. In addition to adjusting to new knowledge, schemata must combine because often a given knowledge structure is not by itself adequate for understanding a particular part of the text. The result of a schema combination may be a structure that could not be derived from a simple adding up of schema parts (Spiro, 1980).

Townsend (1981) maintains that a largely unexplored aspect of schema utilization "concerns the ability to control moment to moment activation and deactivation of schemata as they become relevant and irrelevant to text comprehension" (p. 4). Townsend examined the ability of good and poor readers to make appropriate schemata shifts to accompany shifts in passage theme. The results of his study indicate that third grade children find schema shifting difficult, but it is no more difficult for poor readers than for good readers. Commitment to the schema relevant to the first passage read appeared to be so strong that it impeded shifting to the schema relevant to the second passage (Townsend, 1981).
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In addition to situations where schemata must shift or change, there will be cases where schemata must be maintained if comprehension is to occur. Spiro (1979) states that studies indicate that schema maintenance is not an automatic accompaniment of schema activation. Eight year olds were presented with groups of words and pictures that had to be matched. The context necessary for making the right match was sometimes in the same sentence with the target word and sometimes separated from it across sentences. Decision time for good readers was no different for across sentences and within sentence conditions. Decision time for poorer readers was as fast as the good readers' times for the within sentence condition. However, poorer readers were significantly slower in the across sentence condition. Researchers concluded that "good readers spontaneously use their activated schemata to instantiate the meaning of words . . . even when schema activation was not in the same text vicinity as the point at which integration is required. The less able readers . . . appear to spontaneously utilize their schemata only in the text vicinity of initial activation; they do not appear to be maintaining their schemata beyond that point. The result is a disjointed, one sentence at a time understanding of the story" (p. 12). Golinkoff (1975-76) agrees that this is a characteristic of the poor reader. A schema relevant in one part of a text may continue to be relevant long after. If a reader has not maintained the schema, an integrated understanding of text will not occur.
Role of Adequate Schema

Researchers know little about how all these aspects of schema functioning work. If more were known, more precise questions might be asked about what goes wrong when a child with adequate intelligence has difficulties in comprehension. Do some children select a schema early and remain locked into it even though it does not fit? Do they wait too long to make a connection with prior knowledge, so that when they do, much of what has been read has been forgotten or not understood? What problems tend to occur together in poor comprehenders? There are little data; there is much speculation.

Individual Differences in Comprehension Style

Despite the current emphasis among constructionists on the personal contributions of the comprehender, Spiro (1980) states that there has been insufficient research concerning individual differences in comprehension style. It would seem that readers do not process text in the same manner even when their degree of proficiency is the same (Spiro). Some seem to rely more heavily on the text in a bottom-up processing style; others rely on their prior knowledge in a top-down processing approach. A good reader does both, but poor readers tend to display maladaptive patterns of overreliance. The causes and the remedies require further research.

The constructionist orientation toward reading as a process of active interaction between information explicit in the text and information contained in preexisting schemata forms a point of departure in a search for differences in processing style (Spiro & Tirre,
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That there is a strong possibility of individual differences cannot be doubted when the non mechanistic contribution of personal knowledge to comprehension and recall is considered. Anderson (1977) agrees that variations in schemata and/or facility in using schemata are reasonable places to look for differences between good and poor comprehenders.

Recent research has shown that readers with comparable skills do not process text the same way (Spiro, 1980). Some individuals seem to rely more on the contribution of text to understanding; others lean heavily on what they already know. Spiro found this to be true of both adult skilled readers and children. Children who are poor comprehenders frequently manifest "maladaptive patterns of overreliance" (p. 12) on one or the other component. Evidence of overreliance of either text-based or knowledge-based processes was reported by Spiro and Tirre (1979).

Several reading tasks were so designed that poor performance on a given task would indicate overreliance on either text-based or knowledge-based processes. Both types of overreliance occurred at greater than chance levels. However, far fewer children than would be expected (one out of forty-eight) demonstrated overreliance on text-based processes on some tasks and knowledge-based processes on others. Results indicate that there are "unidirectional biases in the relative contributions of text versus knowledge to interactive
discourse processing as an important style dimension in adults and children" (p. 14). Spiro maintains that less able readers tend to put all their eggs in one basket, relying too much on processes in one direction. This results in serious comprehension problems.

The problem of addressing comprehension problems is compounded by the realization that the same skill deficiency may lead to either one of two totally different comprehension styles depending on whether the reader perseveres in the problem area or tries to escape from it (Spiro, 1979). For example, a child who has code-breaking difficulties may either persist in his area of weakness thereby creating a bottle-neck that absorbs all his attention, or he may choose to escape the problem by overreliance on top-down processes. A child who had inadequate schemata or difficulty in utilizing them may continue to search memory for a proper fit or may become bound to the words on the page as the only clue to what's going on.

Different causes of comprehension difficulty demand different remediation strategies. Since the cause of a manifested difficulty may be the opposite of what common sense might dictate, remediation becomes a delicate art that should be practiced only by those dedicated to the avoidance of the ready answer in a search that does not ignore the apparently improbable.

Schema for Reading

In addition to the role played by background schemata, a child's schema for reading is an important component of the reading process
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(Canney & Winograd, 1979). Some children appear to have misconceptions about reading. They view it as a bottom-up process and think that top-down activities are not called for.

When Thorndike (1917) examined metacognition problems in children, he was convinced that the problem with poor readers is that they say the words to themselves without thinking about what they mean. Many of the sixth-grade children he studied often felt they understood when they did not. Brown (1982) concludes that "In general younger and poorer readers are unaware that they must make sense of text; they focus on reading as a decoding process rather than as a meaning-getting process (p. 32). Such readers have an inadequate schema for reading. Since they have misconstrued the purpose, their efforts will be vitiated. Spiro (1979) considers that the causes of a faulty reading schema may include code over-emphasis in early reading instruction, reading texts that are insular and tests that stress literal text content rather than its integration with related prior knowledge.

Because much learning is acquired through reading, it is crucial that students learn to monitor their own comprehension. A book does not notice when a student fails to understand. Effective readers have become aware of and can control the cognitive activities they engage in as they read. Their self-monitoring activities include understanding the purpose of reading, identifying the important aspects of a message, focusing attention on major content rather
than trivia, continuous monitoring to determine whether comprehension is occurring, engaging in self-questioning to determine whether goals are being achieved, and taking corrective action when failures to comprehend are detected (Brown, 1982). For mature readers such self-monitoring is so well practiced that it has become automatic. This is not the case for younger and poorer readers (Clay, 1973; Denney and Weintraub, 1963; Reid, 1966; Thorndike, 1917). Poorer readers tend to assume a passive role tolerating inconsistencies and contradictions quite happily. In How Children Fail (1964) John Holt has produced a graphic description of their plight.

Two studies by Markman (1977, 1979) cited by Brown (1982) indicate that some students from first through sixth grades do not monitor the meaning of what they hear and thereby fail to note glaring inconsistencies. If this problem occurs while listening, it will no doubt increase when reading. Poorer readers fail to adjust their reading behavior to match their reading purpose even at the high school level (Smith, 1977).

Problems in self-monitoring are also seen when children read aloud (Clay, 1973). Weber (1970) found that good readers are twice as likely as poor readers to correct errors that are grammatically inappropriate. A study by Kavale and Schreiner (1979) comparing average and good sixth grade readers found that average readers made more mistakes that distorted meaning and corrected fewer of them.
Isakson and Miller (1976) found that poor readers are less likely to detect semantic and syntactic anomalies than are good readers.

Oaken, Weiner, and Cromer (1971) found that, contrary to the assumption of many researchers, comprehension difficulty is not attributable at all levels to deficiencies in identification skills. They suggest that a significant amount of the comprehension difficulty of poor readers may be due to the manner in which they organize input. Golinkoff (1975-76) concludes that good and poor comprehenders differ most in decoding and organization of text into segments larger than single words. In a review of reading comprehension research, Golinkoff notes that Buswell (1920) found that poor comprehenders read every word while good comprehenders make use of context as an aid in word recognition and that good comprehenders treat the sentence as a unit of meaning while poor comprehenders pay no attention to sentence breaks. Good comprehenders will use the largest unit possible to accomplish the purpose of gaining meaning from text even sampling from other areas of the text as they read (Gibson & Levin, 1975; Kolers, 1971).

Researchers agree that poorer readers appear to have no strategies. They are not aware when they have failed to understand. They do not ask questions of themselves as they read. The research of Collins, Brown, and Larkin (1980) has shown that many failures of comprehension are due to failure to ask the right questions as part of a general failure to monitor one's comprehension.
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Readers who fail to engage in spontaneous monitoring can be helped to do so by being made aware of some simple strategies such as self-questioning, looking back to reread, considering their purpose for reading, consulting a dictionary or knowledgeable person, and linking new material to their personal experience.

With practice many of these monitoring processes may become automatic. The schema for reading of the poor comprehenders will change as they begin to be aware of what they are doing. As reading becomes both a bottom-up and top-down interaction for them, their ability to comprehend what they read will improve.

Conclusion

Research indicates that schemata have certain functions. They help the reader assimilate parts of a theme into a meaningful whole. They add to the enrichment of text through aiding elaboration and inference. They guide the reader's interpretation of the text and of the act of reading itself. They assist retrieval from memory (Townsend, 1981).

The greater power of the schema theory lies in its ability to bring together elements often viewed as disparate. It is not a question of top-down or bottom-up, data-driven or concept-driven, but both. It is not letter identification before word recognition versus the whole word approach but both. For as Adam and Collins (1977) point out, schema theory "provides a structure powerful enough to support interaction among different levels of processing
in reading" (p. 6). Analyses occur at all levels simultaneously, and they interact with each other (Rumelhart & Ortony, 1977).

It is this simultaneous interaction or embedding of schema from lower levels with higher level schema that "allows perceptual elements to coalesce into meaning, that allows such abstract higher-order schema as the problem solving schema, to be appropriately and usefully accessed" (Adams & Collins, 1977, p. 17).

Reading is a multilevel interactive process to which the reader brings background knowledge and awareness of the nature of the task. Since meaning is only partly determined by the text, readers must form and test hypotheses adopting the strategies that serve their purposes as readers and monitoring those strategies continuously to see if they are meeting their purposes.

For the good reader, and potentially for all readers, reading is a constructive process to which the reader contributes life experience, knowledge, and abilities, to which the text contributes form and language, and to which the environment contributes the setting for the communication and often its purpose (Langer & Smith-Burke, 1982).

In order to add to the understanding of reading comprehension processes and to highlight issues of concern for future research, this study examined some characteristics of good and poor comprehenders. Do good and poor comprehenders have the same idea of what
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reading is? Do they embark on the same mission, and does the same lodestar guide them both?
CHAPTER III

Design of the Study

Purpose

The primary purpose of this study was to collect information from good and poor comprehenders at second, fourth, and sixth grade levels concerning their schemata for reading, particularly their awareness of reading as meaning oriented. Data were analyzed to see in what respects good and poor comprehenders differed in their schemata for reading both within and across grades. A secondary purpose of this study was to determine if relationships exist among adequacy of reading schema, grade level, reading comprehension performance and intelligence.

Hypotheses

1. There is no significant difference in the adequacy of the schemata for reading of good and poor comprehenders in second grade.

2. There is no significant difference in the adequacy of the schemata for reading of good and poor comprehenders in fourth grade.

3. There is no significant difference in the adequacy of the schemata for reading of good and poor comprehenders in sixth grade.

4. There is no significant difference among the schemata for reading of good and poor comprehenders across grade levels.
5. There is no significant relationship between grade level and an adequate schema for reading.

6. There is no significant relationship between reading comprehension performance on a standardized reading test and an adequate schema for reading.

7. There is no significant relationship between intelligence and an adequate schema for reading.

Methodology

Preparation

One month before the study began, the researcher conducted a pilot study involving six students, two at each of the grade levels to be involved in the final study. These students were enrolled in a suburban school system; all were receiving tutorial instruction in reading under a migrant designation as well as their regular classroom instruction.

Both of the Canney and Winograd instruments were administered. The researcher noted a tendency to ask more questions than guidelines permitted and avoided this in the actual study. In addition, a possible bias in the questionnaire that might have led students to respond with a code breaking emphasis was observed. The questionnaire was reworded before the study began. Details are to be found in the discussion of procedure in chapter four.
Subjects

Twenty-four students from a small, rural school district in western New York State took part in this study. At second, fourth, and sixth grade levels eight students were selected. Four were classified good comprehenders and four poor comprehenders on the basis of scores obtained on the reading comprehension subtest of the California Achievement Test administered in May, 1982. Scores of good comprehenders were two or more years above grade level. Scores of poor comprehenders were approximately one year below grade level. Approximations were necessary due to refusals of parents of lower achievers to allow their children to participate. No child was included without parental permission. Permissions were obtained through replies from parents to a letter from the principal. This letter is included in the appendix.

Whenever possible, study subjects were selected at random from a pool of good and poor comprehenders designated by scores on the comprehension subtest of the California Achievement Test. Due to parental refusals, random selection was not always possible for poor comprehenders.

Subjects were selected from among students exhibiting good and poor comprehension on a standardized measure of reading comprehension in order to determine if any significant relationship exists between comprehension and reading schema. Subjects were selected
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from three grade levels in order that changes in reading schema across grade levels might be observed.

Instruments

Instruments used to determine the adequacy of a subject's reading schema were designed by Canney and Winograd for use in a similar study. Both devices are included in the appendix. Children's Concepts of Reading Revised is a sixteen-question probe of students ideas about reading. A series of reading passages altered systematically in order to affect comprehensibility were also used as an additional assessment of students' schemata for reading.

To avoid the failure to respond to key questions evident in many earlier studies (Canney & Winograd, 1979), some questions were presented to relax the student and to demonstrate that the interviewer was only interested in ideas, not in "correct" answers. Questions 1 and 2 asked the student to tell what he liked and did not like about reading. Question 3, 4, 8, and 14 probed students' perceptions of themselves as readers and what understanding they had of how they might improve. Questions 5, 6, and 7 asked about applying reading skills to materials other than books and to situations outside school. Questions 9 through 13 examined student awareness of how and when people in general learn to read and what factors might interfere.

Questions 3, 9, 13, and 14 were also designed to give redundant information about the students' metacognitive knowledge of their
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reading strengths and weaknesses. The question, "What is reading?" was placed last to allow students to warm up to the subject and thereby reduce the number of "I don't know" responses. Questions were arranged so that preceding questions provided little information that could contaminate students' responses to questions that followed.

The systematically altered passages used as an additional schema assessment were selected from the Silvaroli Reading Inventory (1976). Five passages were selected for each grade. Passage readability was approximately two grades below the reader's current grade placement. Editing of passages resulted in approximately equal length' (Primer-Range 39-48 words, \( \bar{X} \) Length = 43.8 words; 2.0 - R73-77, \( \bar{X} = 65.67 \); 4.0 - R99-103, \( \bar{X} = 83.67 \)). Passages appeared to be comparable in content and style to texts found in basals at those levels. Passages at each level dealt with fantasy, narration and factual description. Each passage was altered systematically to produce four forms, the Semantic, Syntactic, Lexical, and Graphic, in addition to the Intact form.

The semantically altered form (Semantic) was constructed by shifting all nouns and gerunds two noun positions back; verbs, other than forms of the verb "to be," were transposed in a similar manner. Transformations were made across sentences. These changes altered the semantic organization of the passage but retained the syntactic structure.
The syntactic alteration (Syntactic) was applied to the semantically altered passages to eliminate syntactic integrity. Each cluster of four words was treated as a unit within which word order was reversed. Transpositions did not occur across sentence boundaries.

The lexical alteration (Lexical) was applied to the syntactically altered passage form to reduce word level associations. From the Dolch list of 220 common words (1948), nouns and verbs were randomly selected to replace nouns and verbs in the passage. This text had the appearance of randomly ordered words with nonsensical placement of punctuation.

The graphic alteration (Graphic) was applied to the lexically altered passage. All vowels and consonants used as vowels were omitted, and the order of consonants within each word was adjusted two places to the left. It was anticipated that the graphic alteration would serve as a baseline condition that every student would identify as unreadable just as the intact passage was intended to serve as a baseline condition that every student would identify as readable.

Procedure

During the two-day period in March, 1983, the researcher met with each student individually in a room away from his classroom. All interviews were tape recorded. The researcher restated the question
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or tried to probe further if a student seemed reluctant to respond. No more than three probes were allowed for any one question, and only approved probe formats were used.

All subjects responded to each question; there were no "I don't know" responses. The atmosphere was relaxed, and most of the subjects seemed to enjoy the dialogue and to try to clarify their responses if asked. Interviews were approximately 25 minutes in length.

Interview responses were analyzed independently by the researcher and an assistant. Decisions regarding categories for replies to the question "What is reading" were made independently and compared. When a disagreement occurred, tapes were replayed, and agreement was eventually reached.

Three weeks after the conclusion of the interviews, each subject was again seen alone from the classroom and presented with five different passages written two years below the subject's current grade placement. The passages were presented after the interviews as there seemed to be greater possibility that reaction to them would contaminate responses to the questionnaire rather than the reverse.

The five passages were presented in the five test forms: Intact, Semantic, Syntactic, Lexical, and Graphic. None of the passages had titles. Order of passage presentation was randomly determined for each subject. The student was asked to examine each passage carefully and asked three questions: a) Is this something that a person could read? b) Were you able to read it? and c) Why do you think so?
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The altered passages and questions were a second measure of the student's schema for reading. Under examination was the hypothesis that students who stated during the interview that obtaining meaning was an aspect of reading would accept as readable only those passages that made sense, that is, the Intact and perhaps the Semantic forms. Students who thought reading involved only the fluent decoding of words might accept all passages except the Graphic form as readable since they would be able to decode the individual words. Responses to questions concerning the passages were tape recorded and evaluated by the researcher.

Raw scores used in the analysis of data were the responses to the question, "What is reading" placed in the following categories: Object Focus, Decoding Focus, Affective Focus, and Meaning Focus. The remaining replies to the questionnaire were also analyzed in order to obtain further insights into the metacognitive awareness of the students.

Replies to the questions concerning the passages were placed in three categories: Yes, I can read it (Y); No, I cannot read it (N); Yes, I can read it, but it does not make sense (Y/B). The last category was necessary because many readers appeared to have two definitions of reading. Y and Y/B replies were considered to reflect a meaning emphasis and were included in the replies having a meaning focus for each student.
A chi square test was used to determine whether there was a significant difference between good and poor comprehenders at each grade level in the inclusion of meaning in their schemata for reading. The same test was used to compare the meaning inclusion of good and poor comprehenders across grades.

The point-biserial correlation coefficient was obtained in order to explore any possible relationships among the inclusion of meaning in a schema and grade level, performance on a standardized reading test, or IQ.

All analyses were based on replies to the interview and to the altered passages. Replies were categorized according to focus. Grade level scores obtained on the comprehension subtest of the California Achievement Test were compared with these replies as were grade level and IQ.

Summary

A questionnaire and set of altered passages developed by Canney and Winograd (1979) were used by the researcher to provide information concerning the nature of the reading schemata of second, fourth, and sixth grade good and poor comprehenders selected at random from among students scoring above and below grade on a reading comprehension subtest of a standardized test of reading achievement. Descriptive analysis of student replies to both measures provided
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insights into the characteristics of the schemata for reading of good and poor comprehenders both younger and older and also into the nature of their metacognitive awareness. A chi square test and a point-biserial correlation provided insight into the relationship between an adequate reading schema and reading comprehension performance, grade level, and IQ.
CHAPTER IV

Statistical Analysis

Purpose

Statements collected from good and poor comprehenders in second, fourth, and sixth grades using two instruments, a questionnaire and a series of paragraphs altered to affect meaning, were examined to see if good and poor comprehenders differed in inclusion of meaning in their schemata for reading either within or across grades. Several hypotheses were formulated.

Data Analysis

A chi square analysis of replies of second graders to the Phase One question, "What is reading?" and of Phase Two responses to altered passages resulted in a finding of no significant difference at the .05 level of confidence between good and poor comprehenders' schemata for reading as recorded by either measure. Replies of fourth graders and sixth graders on both measures were also submitted to a chi square analysis in search of a significant difference in meaning inclusion between good and poor comprehenders. Analysis revealed no significant difference at the .05 level of confidence between the schemata of good and poor comprehenders at either grade level on either measure. Thus, the data failed to reject hypotheses
1, 2, and 3 that there is no significant difference in the adequacy of the schemata for reading of good and poor comprehenders in second, fourth, and sixth grades.

Chi square analysis was again used to examine the schemata of good comprehenders and poor comprehenders across grades as indicated by Phase One and Phase Two measures in search of a significant difference in their schemata for reading. On the Phase One measure, there was no significant difference between the schemata of good and poor comprehenders across grades at the .05 level of confidence. Results were similar for the Phase Two measure. Consequently, the data failed to reject the fourth hypothesis.

A chi square analysis (df=2) was used to compare inclusion of meaning with grade level. Results were not significant at the .05 level of confidence and thus, the data failed to reject the fifth hypothesis, that there is no significant relationship between grade level and an adequate schema for reading.

A point biserial correlation coefficient was derived in order to compare scores on the comprehension subtest of the California Achievement Test with meaning inclusion on the Phase One questionnaire and the Phase Two altered passages. Results were not significant at the .05 level of confidence. Therefore, the data failed to reject the sixth hypothesis, that there is no significant relationship between reading comprehension performance on a standardized test of reading comprehension and an adequate schema for reading.
The point biserial correlation coefficient technique was also applied to scores on a group intelligence test and meaning inclusion on the Phase One and Phase Two measures. Results were not significant at the .05 level of confidence. Therefore, the data failed to reject the seventh hypothesis, that there is no significant relationship between intelligence and an adequate schema for reading.

The data collected in this study from two measures of schema adequacy did not reveal any significant differences in the schemata for reading of good and poor comprehenders at second, fourth, or sixth grade levels either within or across grades. It also failed to reveal any significant relationship between an adequate schema for reading and grade level, or reading comprehension achievement, or intelligence.

Principal Findings

Administration of a questionnaire developed by researchers Canney and Winograd in 1979 constituted Phase One of the present study. It is the final question, "What is reading?" that is of primary interest. Since so much weight is placed on responses to this question, its wording is of great importance. On the original questionnaire, this question had two forms, Form A and Form B.
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Table 1
Data Table

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Technique</th>
<th>Result Phase One</th>
<th>Result Phase Two</th>
<th>Significance @ .05</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>.04</td>
<td>1.14</td>
<td>3.84</td>
</tr>
<tr>
<td>2</td>
<td>Chi Square</td>
<td>.53</td>
<td>2.67</td>
<td>3.84</td>
</tr>
<tr>
<td>3</td>
<td>Chi Square</td>
<td>2.00</td>
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<tr>
<td>4</td>
<td>Chi Square</td>
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<td>1.26</td>
<td>3.84</td>
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<tr>
<td>5</td>
<td>Chi Square</td>
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<td>3.88</td>
<td>5.99</td>
</tr>
<tr>
<td>6</td>
<td>Point Biserial Correlation</td>
<td>.050</td>
<td>.063</td>
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</tr>
<tr>
<td>7</td>
<td>Point Biserial Correlation</td>
<td>.34</td>
<td>.02</td>
<td>2.074</td>
</tr>
</tbody>
</table>
Role of Adequate Schema

Form A was for use with students in fifth grade and below; Form B was for use in sixth grade and above. This is the original wording:

A. Suppose you had a friend who had a little brother/sister (same sex as the interviewee) who is going to start school soon. That little boy/girl said to you, "My mommy said that when I go to school I will read. (Child's name), what's reading?" What would you tell him/her reading is?
(Note: If clarification or restatement of the question is needed, say: "You know, what do you do when you read? What is reading?")

B. Many people think that reading is one of the most important things that you do in school. What would you say reading is?

The original A and B forms were used in the pilot study. This opportunity to use the questionnaire before the formal study began led the researcher to conclude that there was a built in bias in this question particularly if the restatement of Form A suggested in the note were used, "You know, what do you do when you read?" When a child was asked this, it seemed evident that the response was likely to center on an observable activity, on something the child would do such as working in a workbook, looking at a book, or saying words rather than on the acquisition of meaning.

On the other hand, Form B, for use with older students, states that many people think reading is highly important and then asks the
Role of Adequate Schema

children what they think reading is. This form seemed more likely to elicit a response having to do with the meaning of the activity than one centered on activities that are observable such as object centered or decoding centered activities. The researcher concluded that the Canney and Winograd findings of an increased emphasis on meaning among older students and an emphasis on decoding among younger students might well have been, at least in part, an artifact of their question's wording. Canney and Winograd attributed the increased emphasis on the decoding process among students in lower grades to the emphasis on decoding during the learning-to-read stage.

In the present study, Form A was used for all students. The suggested restatement was not used at all. Most of the students did not need prompting to answer the question. If a student hesitated, the researcher restated the question. In the opinion of the researcher, the bias was thus removed.

Student responses to the revised version of the question, "What is reading?" were examined to provide information concerning the student's schemata for reading. Student's paraphrased responses to this question are recorded in the appendix.

From among 88 statements, 27 distinct responses were identified and placed in categories. These categories are recorded in Table Two. Three of these responses, reading is reading a book, listening to a teacher, and working in a workbook, were considered to have an object focus. Eleven responses were thought to have a decoding focus since...
they referred to decoding text or encoding language into text. Four responses were interpreted to have a meaning focus since they referred to acquiring or remembering information or learning about the world either past or present. The nine remaining response categories were labeled affective since they referred to feelings or attitudes concerning reading.

Insert Table 2 about here

Student responses to the questions in Phase Two about their ability to read passages that had been altered semantically, syntactically, lexically, or graphically, were reviewed by the researcher and assigned to one of three categories: Yes, I can read it (Y); No, I cannot read it (N); Yes, I can read it, but it does not make sense (Y/B).

Children's Responses to the Phase One Questionnaire

The 24 students interviewed produced 88 distinct statements in answer to the question, "What is reading?". All of the students responded to the question. Their responses, broken down by grade level, comprehension achievement, and focus are presented in Table Two. Among the 88 statements, 27 distinct responses were identified. Of these responses, 18 were characterized as features of reading. The other nine had an affective focus, and they will be discussed separately.
Role of Adequate Schema

Table 2
Types and Frequency of Subjects Responses
to Question 16 by Grade and Comprehension Level

<table>
<thead>
<tr>
<th>Focus</th>
<th>Grade and Comprehension Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>H₂</td>
</tr>
<tr>
<td>Meanings</td>
<td></td>
</tr>
<tr>
<td>Learning about history and current events</td>
<td>-</td>
</tr>
<tr>
<td>Gathering consumer information</td>
<td>-</td>
</tr>
<tr>
<td>Understanding stories</td>
<td>-</td>
</tr>
<tr>
<td>Learning word meaning</td>
<td>-</td>
</tr>
<tr>
<td>Decoding</td>
<td></td>
</tr>
<tr>
<td>Looking up words in dictionary</td>
<td>1</td>
</tr>
<tr>
<td>Recognizing words</td>
<td>3</td>
</tr>
<tr>
<td>Recognizing letters</td>
<td>-</td>
</tr>
<tr>
<td>Sounding out words</td>
<td>1</td>
</tr>
<tr>
<td>Words organized in a sentence or paragraph</td>
<td>-</td>
</tr>
<tr>
<td>Saying the words - every word</td>
<td>1</td>
</tr>
<tr>
<td>Saying the letters</td>
<td>-</td>
</tr>
<tr>
<td>Looking at words</td>
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</tr>
<tr>
<td>Writing words</td>
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<tr>
<td>Spelling words</td>
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(Continued)
Table 2
(continued)

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<tr>
<th>Focus</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2 4 6 H L H L H L</td>
</tr>
</tbody>
</table>

Affective

- Enjoying stories, good grades, never give up, saying your sorry, being nice to the teacher, reason for going to school, work, time-filler, hard

Object

- Reading a book, listening to teacher, working in a work-book
Among the 18 features of reading identified by the students, four were mentioned only once (writing words, looking at letters, saying letters, looking up words in the dictionary). The feature "reading is recognizing words" was cited by 16 students as a part of reading. The object centered feature, "Reading is a book" occurred almost as frequently \((N = 15)\); "Reading is saying the words" came next with eight students including it among their responses.

Of the 76 statements that mentioned some aspect of the reading act, the majority (41) involved recognizing, saying, or spelling words or letters. Five involved understanding word meaning. Only twelve statements referred to meaning beyond the lexical level. Eighteen statements reflected the object focus of either a basal reader, a teacher, or a workbook.

The 12 affective statements ranged from positive remarks about enjoying stories to statements that reading is "work" or "something to do when there's nothing else to do." The rest were either expressions of the work ethic or referred to the kind of conduct most likely to keep the teacher pacified and on the student's side.

Tables Three, Four, and Five are summary tables for the data in Table Two. By regrouping the data in this manner, it is possible to compare the responses of younger with older students and higher with lower comprehenders concerning the question, "What is reading?".

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Insert Tables 3, 4, and 5 about here
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Table 3

Frequency of Responses to the Question, "What is Reading?" by
High and Low Comprehenders in Grades 2, 3, and 6

<table>
<thead>
<tr>
<th>Comprehension Level</th>
<th>Object</th>
<th>Affective</th>
<th>Decoding</th>
<th>Meaning</th>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>H (n = 4)</td>
<td>4 (3)</td>
<td>2 (2) 2-A</td>
<td>8 (4)</td>
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<tr>
<td>L (n = 4)</td>
<td>3 (2)</td>
<td>4 (2) 2-A</td>
<td>3 (3) 2-N</td>
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<td><strong>Grade 4</strong></td>
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<tr>
<td>H (n = 4)</td>
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<td>9 (3)</td>
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<td>8 (4)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>2 (2)</td>
<td>0</td>
<td>3 (2)</td>
<td>7 (3)</td>
</tr>
</tbody>
</table>

Numbers in parentheses indicate the number of students who were responsible for the frequency of response.

N = Negative
A = Affirmative
Table 4

Frequency and Proportion of Responses to the Question, "What is Reading?" by High and Low Comprehenders Combined Across Grade Level

<table>
<thead>
<tr>
<th>Focus</th>
<th>Comprehension Level</th>
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<th>L (n = 12)</th>
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<td>Object</td>
<td></td>
<td>10 (22%)</td>
<td>8 (19%)</td>
</tr>
<tr>
<td>Affective</td>
<td></td>
<td>5 (11%)</td>
<td>7 (12%)</td>
</tr>
<tr>
<td>Decoding</td>
<td></td>
<td>25 (54%)</td>
<td>16 (38%)</td>
</tr>
<tr>
<td>Meaning</td>
<td></td>
<td>6 (13%)</td>
<td>11 (31%)</td>
</tr>
</tbody>
</table>

Numbers in parentheses indicate the proportion of responses to the question.
Table 5

Frequency of Meaning Focused Responses at Lexical, Discourse, and Extrapolated Levels to the Question, "What is Reading?" by High and Low Comprehenders

<table>
<thead>
<tr>
<th>Comprehension Level</th>
<th>Lexical</th>
<th>Connected Discourse</th>
<th>Extrapolated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Grade 4</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>1 (1)</td>
<td>0</td>
<td>1 (1)</td>
</tr>
<tr>
<td><strong>Grade 6</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>1 (1)</td>
<td>0</td>
<td>2 (1)</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>5 (2)</td>
</tr>
</tbody>
</table>

Numbers in parentheses indicate the number of students who were responsible for the frequency of response.
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Table Three shows that it was only at the fourth grade level that a majority of the higher comprehenders (three of four) included meaning in their definition of reading. One of these involved lexical-level meaning only. One higher comprehender in sixth grade mentioned meaning; none of the higher comprehenders in second grade did. Among lower comprehenders, a majority (three of four) at the sixth grade level included meaning in their definitions of reading. Again, one of these involved meaning at the lexical level only. Two lower comprehenders in fourth grade and one in second grade also mentioned meaning. All of the students referred, at least once, to decoding aspects of reading with the exception of two sixth graders who were among the lower comprehenders.

For both higher and lower comprehenders in second and fourth grade, attention appeared to be on the decoding aspects of reading. Second and fourth grade students referred to the mechanics of reading 43 times and to meaning-getting aspects 7 times. Three of these seven responses were made by high comprehenders in fourth grade. High comprehenders in second grade failed to refer to meaning at all. Two low comprehenders in fourth grade mentioned meaning, but only one low comprehender in second grade did.

At the sixth grade level, two high comprehenders referred to meaning, but one included it only at the lexical level. Three low comprehenders referred to meaning seven times. Only one reference was at the lexical level. High comprehenders mentioned decoding
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aspects eight times compared with three decoding centered remarks by low comprehenders. It would seem that mechanical aspects of reading, object centered and decoding centered, were as central for high comprehenders in sixth grade as for high comprehenders in second and fourth grades. Sixth grade high comprehenders made a total of 11 comments about mechanics compared with 12 apiece for second and fourth graders. Sixth grade low comprehenders made five comments concerning mechanical aspects of reading compared with six comments for second grade low comprehenders and thirteen for fourth graders.

The data in Table Four are collapsed across grade level to facilitate the comparison of high and low comprehenders. The total number of statements about reading did not differ significantly. High comprehenders made a total of 46 comments compared with 42 comments by low comprehenders. However, decoding aspects of reading were more frequently stressed by high comprehenders. They made 35 comments about decoding compared with 24 for low comprehenders. Only at fourth grade level were the number of comments about decoding by high and low comprehenders almost the same (H = 12, L = 13).

Across grades, high comprehenders made almost six times as many responses involving decoding as responses involving meaning (33 to 6). Low comprehenders across the grades made a little more than twice as many decoding centered as meaning centered responses (24 to 11).
Affective responses were, for the most part, characteristic of second and fourth graders. High comprehenders made five responses in the affective category compared with seven for low comprehenders.

Examination of children's responses to the final interview question, "What is reading?" indicates that the main emphasis of the children's schema for reading is on the decoding aspects for both high and low comprehenders regardless of grade. Of course, there were some differences among grades. No high comprehender at second grade referred to meaning while three at fourth grade did and two at sixth. One low comprehender at second grade mentioned meaning compared with two at fourth grade and three at sixth. It was the low comprehenders at sixth grade who made the most meaning-centered remarks, a total of seven.

Table Four highlights the proportion of the responses across grade levels that fell into each category. As a group, high comprehenders mentioned decoding features almost six times as often as meaning-centered features (35 to 6). In all, 76% of their remarks focused on decoding while 13% focused on meaning and 11% on affective aspects. Low comprehenders across grades made about twice as many remarks with a decoding focus as remarks with a meaning focus (24 to 11). In all, 57% of their remarks involved decoding aspects while 31% focused on meaning and 12% on affective aspects. It would seem that the low comprehenders were more conscious of and focused
upon comprehending text than the high comprehenders who appeared to have a very heavy mechanical focus.

Table Five highlights an interesting aspect of students' meaning-centered responses. Of 17 responses with a meaning emphasis, 5 refer to meaning at the lexical level, 3 refer to connected discourse, and 9 refer to meaning at the extrapolated level, that is, beyond the literal content of the text. At second grade level, no one mentions meaning beyond the literal level. At grade four, one high comprehender and one low comprehender made a breakthrough to the extrapolated level. At sixth grade level, one high comprehender and two low comprehenders express this insight.

As they grow older, high and low comprehenders who mention a search for meaning as part of reading, appear to move slowly toward a realization that meaning goes beyond the literal content of the text, but, contrary to Canney and Winograd's findings, it is the low comprehenders who have the strongest emphasis. In the present study, low comprehenders at each grade level except the fourth, seemed more focused on meaning than the high comprehenders, and, within that meaning focus, they were more likely to transcend the literal level.

Replies to other parts of the questionnaire were also examined to see if further insight might be gained into students' schemata for reading. In answer to Question Five, "Do you have to have a book to read?", 14 students said that you could not read without a book,
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six second graders; four fourth graders; and four sixth graders. The school setting may have colored these replies, for some students commented that, in school, you have to have a book for reading when you are caught up with your seatwork. Answers might have been different in another environment.

In answer to Question Seven, concerning reading at home, five students who said that they did not read at home made no meaning related comments beyond the lexical level and stated that they could read all the paragraphs altered to interfere with meaning. Four students who said they did not read at home made meaning related statements beyond the lexical level but also said they could read all the altered paragraphs. Thus, all of the students who described themselves as nonreaders outside of school said that they could read all of the paragraphs altered to affect meaning.

Among the students who reported reading regularly outside of school, three failed to make a meaning related statement beyond the lexical level and also said that they could read all of the altered paragraphs. The 12 remaining students, all of whom read frequently outside of school, referred to meaning beyond the lexical level in their answers to the questionnaire. Eight of these students said they could not read the altered paragraphs. It would appear that children who read outside of school were more inclined to view reading as meaning related than those who reported reading only in school.
In answer to Question Nine and Question Ten, concerning what a person has to learn about and learn how to do in order to be a good reader, high and low comprehenders in second grade agreed that one must learn to recognize the words, especially difficult ones such as "stethoscope," and one must learn how to spell those words. Two second grade low comprehenders said they did not know what a person had to learn to be a good reader. Two mentioned that this reading should be done at home, and one said that having a library card would help.

Fourth graders said that a person who wanted to be a good reader would have to learn to recognize words at sight, know the sounds of the letters, know how to spell, and learn to read quickly, but not too quickly, out loud. All of the fourth graders agreed that a person who wanted to be a better reader should read a lot except one high comprehender who said that the person should be good in class and do what the teacher said. Two low comprehenders mentioned that the person should get plenty of rest and have good eyes.

It was only at the sixth grade level that two high comprehenders mentioned that the person who wanted to be a better reader should learn the meaning of the words so that "he understands what he's reading so it's not just a bunch of words." One added that it is important to pay attention to the plot. All other sixth graders replied that words and/or sounds had to be learned in order to be a better reader.
Sixth graders were also united in maintaining that a person needs to read every day to be a good reader. Some high comprehenders added that the person should form the habit of using the dictionary.

It seems that there is no noticeable difference between high and low comprehenders concerning what has to learned to become a good reader except at the sixth grade level. For two sixth grade high comprehenders, top-down processing came into play; others mention only bottom-up strategies. However, almost everyone agrees that reading frequently helps a student to be a better reader.

In answer to Question 14 concerning why some children had trouble with reading, high comprehenders in second grade said that they have trouble because they do not like it, and they miss a lot of school. One thought they were probably retarded. Low comprehenders said they had trouble because they did not know the words, the book was too hard for them, they were too young, they had trouble with their eyes, and the pace of instruction was too fast.

At fourth grade level, one high comprehender suggested that some people have problems because they were "born with an accent" and then added that some children "goof around" because they have problems on their minds. Others said that some people do not want to learn or cannot learn or do not attend school regularly. Low comprehenders said that students have problems with reading because they do not like it, the words are too hard for them, they have trouble sounding
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out words, they do not do their work, they read too fast, they have poor memories, they are careless, and they do not concentrate.

Sixth grade high comprehenders said that problem readers do not read and do not pay attention. One said that they were probably retarded. Low comprehenders thought poor readers had problems because they did not read enough, they did not know their sounds, they did not pay attention, they were nervous, and they did not have enough experience of hearing someone read well. One student said that problem readers probably went to small schools where they did not have an opportunity to hear big words. The student also said they probably were not sent to the office very often. The office apparently was viewed as the source of "big words" to listen to.

Both high and low comprehenders mentioned that problem readers should read more often. Both also mentioned personal failings such as not paying attention or having a poor memory. However, low comprehenders mentioned more exterior circumstances such as a too rapid instructional pace and poor preparation. Only high comprehenders mentioned retardation as a possible cause of problems in reading.

In answer to Question 15 concerning what they themselves would have to do to be better readers, high comprehenders at second grade thought they had to learn more words. Low comprehenders agreed. One low comprehender said that he had to read more slowly "so I don’t mess up the words."
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Three high comprehenders in fourth grade thought they needed to recognize more words. One considered that reading with more expression would help. Two low comprehenders also wanted to be able to recognize more words. One mentioned looking up word meaning. Another thought he needed to learn to spell, and the last one asserted that he should slow down, use more expression, and observe the punctuation.

In sixth grade, high comprehenders thought that they should learn the meanings of more words, read more often, and improve spelling ability. Low comprehenders said they should learn to recognize more words. One said that she should read more often.

Again, most of the students interviewed emphasized decoding strategies for personal improvement in reading. Second and fourth graders tended to interpret the question to refer to oral reading and spoke about slowing their pace and improving expression. It was only at the sixth grade level that reading more often and paying attention to word meaning were mentioned. The children had fewer suggestions about how to improve themselves than they had for the improvement of others. The overall stress on reading more, present in their answers to the question about how others might improve, was absent.

In general, the students' answers to the questionnaire indicate that they may put little stress on thinking about what is read or on gaining knowledge or on connecting new knowledge to what they already know or on applying this knowledge to the world about them. When
meaning enters the picture, it is often at the lexical level. Words, words, and more words predominate, either the decoding of them or the memorizing of their meanings after they have been looked up in the dictionary. As Eliza Doolittle put it, "Words, words words./ I'm so sick of words./ I get words all day long first from him now from you./ Is that all you blighters can do?" The researcher felt a bit like that.

These students appear to have learned very well to attend to words and to view reading as the act of isolating words from one another on the page. If they have also learned to look at reading as a process of uncovering relationships in a search for meaning, they failed to express it. Any exceptions were more likely to be low comprehenders rather than high comprehenders. This contrasted sharply with the results of the Canney and Winograd (1979) study. Also in contrast to this study, there was no expression of growth away from a decoding emphasis among older students. Sixth graders expressed an immersion in a thicket of words that seemed no less dense than that of the beginners. The question arises, if a reader is not consciously aware of searching for meaning, can he be depended upon to be doing it? Is the process automatic?

Results of Phase Two, the Altered Paragraphs

In the second phase of the study, each student was asked to examine five passages systematically altered to affect their intelligibility. Passages were presented in random order. The task
involved examining a passage carefully, stating if the passage were readable or not, and explaining why.

As Table 6 indicates, every student reported that the intact passage was readable. Many students remarked that the words were simple and familiar to them. Every student also reported that the graphically altered passage was unreadable explaining that they could not read it because they could not figure out the words. Thus, as expected, the two passages provided baseline data for students' estimates of passage readability.

At second grade level, three out of four high comprehenders said that they could read the semantically, syntactically, and lexically altered passages. All of the low comprehenders said they could read the passages. The reason given in all cases was that they knew the words. Only one high comprehender said that he could not read any of them because "it doesn't make sense."

All fourth grade high comprehenders agreed that the semantic, syntactic, and lexical forms could not be read except for one student who found the semantic form readable. Two low comprehenders found all versions readable. Again, the reason given was they they knew the words.
Table 6
Responses to Altered Paragraphs
Frequency of Responses to the Question "Is this something (text) you can read?" by High and Low Comprehenders in Grades 2, 4, and 6

<table>
<thead>
<tr>
<th>Comprehension Level</th>
<th>Intact</th>
<th>Semantic</th>
<th>Syntactic</th>
<th>Lexical</th>
<th>Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y N Y/B</td>
<td>Y N Y/B</td>
<td>Y N Y/B</td>
<td>Y N Y/B</td>
<td>Y N Y/B</td>
</tr>
<tr>
<td>Grade 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>4 - -</td>
<td>3 1 -</td>
<td>3 1 -</td>
<td>3 1 -</td>
<td>- 4 -</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>4 - -</td>
<td>4 - -</td>
<td>4 - -</td>
<td>4 - -</td>
<td>- 4 -</td>
</tr>
<tr>
<td>Grade 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>4 - -</td>
<td>1 1 2</td>
<td>- 2 2</td>
<td>- 2 2</td>
<td>- 4 -</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>4 - -</td>
<td>2 1 1</td>
<td>2 1 1</td>
<td>2 - 2</td>
<td>- 4 -</td>
</tr>
<tr>
<td>Grade 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (n = 4)</td>
<td>4 - -</td>
<td>2 1 1</td>
<td>2 1 1</td>
<td>2 1 1</td>
<td>- 4 -</td>
</tr>
<tr>
<td>L (n = 4)</td>
<td>4 - -</td>
<td>4 - -</td>
<td>4 - -</td>
<td>4 - -</td>
<td>- 4 -</td>
</tr>
</tbody>
</table>
At the sixth grade level, two of the high comprehenders and all of the low comprehenders found all forms of the passages readable except the graphically altered one. Again, the reason given was that they could read all the words.

Examination of these results reveals that it is at the fourth grade level that there is the greatest difference between high and low comprehenders' opinions regarding the readability of the altered passages. In addition, only half of the low comprehenders in fourth grade said that the altered passages could be read. All second and sixth grade low comprehenders found them readable.

In second grade there is very little difference of opinion between high and low comprehenders over readability of scrambled passages. One high comprehender found them unreadable. For both groups, if words can be deciphered, the passage can be read.

After the fourth graders struck a blow for meaning, it is surprising to see at sixth grade level that half of the high comprehenders and all of the low comprehenders stated that the scrambled passages were readable. For most of the sixth graders also, as long as individual words can be decoded, they are reading.

Examination of Table Seven shows that there were several students who did not perform as anticipated. Student Four, who realized that he could not read the altered passages because they did not make sense, failed to make any reference to meaning in his
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reply to the question, "What is reading?". Two fourth graders, one high and one low comprehender, who made reference to meaning beyond the lexical level in their definitions of reading, concluded that they could read all the altered paragraphs. Two sixth grade students, both low comprehenders, included references to meaning at the extrapolated level yet failed to reject any of the passages as unreadable.

When results across grades are grouped, seven high comprehenders and two low comprehenders found the altered passages unreadable. Five high comprehenders and ten low comprehenders found all the scrambled passages readable. It was at the fourth grade level that the greatest number of both high and low comprehenders found the altered passages unreadable. Low comprehenders seemed slightly more likely to find the passages readable than high comprehenders. Fourth graders responses to the altered paragraphs indicate that both high and low comprehenders were more oriented toward meaning than either second or sixth graders.

When student responses on both measures are compared, some interesting facts are revealed. Of the 12 students who referred to meaning in Phase One, only eight made references beyond the lexical level. Among those eight, six found the altered passages readable.
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Table 7

Type and Frequency of Meaning-Focused Responses to the Question "What is Reading?" Compared with Judgments of the Readability of Altered Passages Plus Comprehension Achievement Levels and IQ

<table>
<thead>
<tr>
<th>Comprehension Level and Number</th>
<th>Grade</th>
<th>CAT Achievement Score</th>
<th>Age</th>
<th>IQ</th>
<th>Lexical</th>
<th>Discourse</th>
<th>Extrapolated</th>
<th>Semantic</th>
<th>Syntactic</th>
<th>Lexical</th>
</tr>
</thead>
<tbody>
<tr>
<td>H 1</td>
<td>2</td>
<td>3.7</td>
<td>7-1</td>
<td>110</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H 2</td>
<td>2</td>
<td>3.7</td>
<td>7-10</td>
<td>130</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H 3</td>
<td>2</td>
<td>3.2</td>
<td>7-1</td>
<td>117</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H 4</td>
<td>2</td>
<td>3.7</td>
<td>7-8</td>
<td>130</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>No</td>
<td>No</td>
</tr>
<tr>
<td>L 5</td>
<td>2</td>
<td>3.7</td>
<td>7-10</td>
<td>78</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
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<td>L 6</td>
<td>2</td>
<td>3.9</td>
<td>7-3</td>
<td>110</td>
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<td>1</td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>L 7</td>
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<td>3.9</td>
<td>8-7</td>
<td>84</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
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<td>6-11</td>
<td>102</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
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<td>6.7</td>
<td>9-6</td>
<td>118</td>
<td>-</td>
<td>1</td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H 10</td>
<td>4</td>
<td>6.7</td>
<td>9-5</td>
<td>117</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>Y/But</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>H 11</td>
<td>4</td>
<td>6.7</td>
<td>10-9</td>
<td>124</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>Y/But</td>
<td>Y/But</td>
<td>Y/But</td>
</tr>
<tr>
<td>H 12</td>
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<td>5.6</td>
<td>9-7</td>
<td>115</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</table>

(Continued)
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88b

Table 7
(Continued)

<table>
<thead>
<tr>
<th>Comprehension Level and Number</th>
<th>CAT Achievement Score</th>
<th>Age</th>
<th>IQ</th>
<th>Lexical</th>
<th>Discourse</th>
<th>Extrapolated</th>
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<tr>
<td>L 13 4</td>
<td>2.8</td>
<td>10-4</td>
<td>129</td>
<td></td>
<td></td>
<td>-</td>
<td>Y/But</td>
<td>Y/But</td>
<td>Y/But</td>
</tr>
<tr>
<td>L 14 4</td>
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<td></td>
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<td>112</td>
<td></td>
<td></td>
<td>-</td>
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</tr>
<tr>
<td>H 18 6</td>
<td>12.2</td>
<td>11-5</td>
<td>112</td>
<td></td>
<td></td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
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<td>11.2</td>
<td>12-0</td>
<td>110</td>
<td></td>
<td></td>
<td>-</td>
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<td>Yes</td>
<td>Yes</td>
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<td>11-7</td>
<td>132</td>
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<td></td>
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<td>Y/But</td>
<td>Y/But</td>
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<td></td>
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</tr>
<tr>
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<td>4.9</td>
<td>13-6</td>
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Role of Adequate Schema

One out of the four who gave lexical level responses found the passages readable. Of the 12 students who did not refer to meaning in Phase One, nine found all the passages readable in Phase Two; three did not. Thus, for 10 out of 24 respondents, the Phase One schema measure, the questionnaire, and the Phase Two schema measure, the altered passages, were in conflict.

Summary

Using randomly selected second, fourth, and sixth grade good and poor comprehenders categorized as such by scores obtained on the comprehension subtest of the California Achievement Test, this study examined schemata for reading both within and across grade levels to see if they differed significantly. This study also examined the relationship between an adequate schema for reading, grade level, comprehension performance, and intelligence.

Application of the chi square analysis to the Phase One data revealed no significant differences between the schemata of good comprehenders and poor comprehenders either within or across grades. A chi square analysis of Phase Two data revealed no significant differences between the schemata of good comprehenders and the schemata of poor comprehenders either within or across grades. Thus, null hypotheses one through four failed to be rejected by data gathered on either the Phase One measure, the questionnaire, or the Phase Two measure, the altered passages.
A chi square analysis applied to Phase One data also failed to reveal any significant difference between grade level and adequacy of schemata. This resulted in failure to reject the fifth null hypothesis.

A point biserial correlation technique was employed to compare adequacy of schemata with reading comprehension performance and intelligence. No significant correlation was revealed resulting in failure to reject null hypotheses six and seven.

In contrast to the Canney and Winograd (1979) study, older students did not exhibit more meaning centered schemata than younger students. It has been noted that the wording of the Canney and Winograd questionnaire was changed in order to remove the bias the researcher suspected to be present in their study.

Response categories in the present study differed from those employed by Canney and Winograd. They found that all students' comments fit into object centered, decoding centered, or meaning centered categories. The present researcher found a fourth category necessary, the affective, into which statements regarding feelings or attitudes were placed.

In Phase One, 76 statements made by students in response to the question, "What is reading?" mentioned some feature of the reading act. Among these statements, 41 referred to the decoding of words; 5 involved meaning at the lexical level; 18 referred to objects such
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as the basal, the workbook, or the teacher; 12 referred to meaning beyond the lexical level. There were 12 affective responses.

High comprehenders at all grade levels emphasized the decoding aspect of reading. Across grades, high comprehenders made almost six times as many responses involving decoding as responses involving meaning. Low comprehenders made twice as many decoding centered as meaning centered responses. The total number of responses for each group did not differ significantly (H - 46, L - 42).

From responses to the final interview question, "What is reading?," it would appear that the main emphasis of the children's schemata for reading is a bottom-up processing for both high and low comprehenders regardless of grade. The expressed bias toward mechanical aspects was not as strong for low comprehenders as for high comprehenders. Meaning at the extrapolated level, that is, beyond the confines of the immediate text, was mentioned more frequently by low comprehenders than by high comprehenders. These results were the opposite of those reported by Canney and Winograd (1979).

Analysis of answers to other items on the Phase One questionnaire revealed no clear differences between good and poor comprehenders or among grade levels with one exception. Every student who said that he did not read outside of school also reported that he could read all of the altered passages in Phase One except the Graphic. On the other hand, eight out of twelve students who reported that they read at home mentioned meaning beyond the lexical level in Phase One and
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reported that they could not read the altered passages in Phase Two. It seems that children who reported reading in a non-school setting were more inclined to view reading as meaning related than those who read only in school.

Good and poor comprehenders agreed that students should read often if they want to be better readers. Other means of improvement mentioned involved decoding aspects except for the remarks of two high comprehenders in sixth grade who mentioned the importance of knowing the meaning of the words you are reading or of paying attention to the plot. These two sixth graders were the only students to mention top-down strategies as part of their prescription for becoming a better reader. There was no other difference between high and low comprehenders with regard to awareness of what has to be learned or done by a person who wishes to become a better reader. Replies to the question concerning what they themselves need to learn or do to be better readers showed the same bottom-up emphasis.

In Phase Two, replies of second graders indicate that they would accepts any passage as readable if they could decode the individual words. Perhaps this is not unusual for beginning readers. Fourth graders, with the exception of two low comprehenders, found the scrambled passages unreadable. The others stated, as did all but one second grader, that they could read the passages because they could decode the individual words. For both second and sixth graders, if
the words can be called, the passage is being read. Across grades, seven high comprehenders and two low comprehenders found the passages unreadable. The majority of these students were at fourth grade level.

Some discrepancies did occur in student responses on the two measures. Ten students whose responses on one measure indicated that a search for meaning was part of their schemata for reading failed to indicate this on the other measure. This indicates that the use of two instruments to assess schemata did not result in a reliable picture of the students' schemata for reading. Again, these results fail to agree with those obtained by Canney and Winograd (1979).

With this inconsistency in mind, an examination of responses in both phases of this study indicates that a bottom-up processing model may be prevalent. Very few statements were made concerning thinking about what was read, gaining knowledge, or applying that knowledge. The importance of decoding individual words was an omnipresent theme.
CHAPTER V
Conclusions and Implications

Purpose
The purpose of this study was to explore the relationships between the schemata for reading of good and poor comprehenders in second, fourth, and sixth grades and among the schemata for reading of good comprehenders and of poor comprehenders across grade levels. This study also sought to determine whether significant relationships exist among adequacy of schema for reading, grade level, reading comprehension performance, and intelligence.

Conclusions
Since analysis of student responses to both the questionnaire and the altered paragraphs failed to reveal any significant difference in the adequacy of the schemata for reading of good and poor comprehenders in grades two, four, and six or among good comprehenders or poor comprehenders across grades, the conclusion may be drawn that there was no real difference between these groups, that is, that they really did not differ with regard to comprehension ability and this is why their schemata for reading were similar. Perhaps the assessment instrument used to establish categories of ability was not really able to accurately distinguish good comprehenders from poor comprehenders. Perhaps the fact that the poorest readers were excluded from the study, either due to parental refusal
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or failure to be promoted, produced groups more similar than those used in the Canney and Winograd study (1979) in which significantly more good comprehenders than poor comprehenders expressed an adequate schema for reading.

Failure to find significant relationships between adequacy of schemata and grade level, comprehension achievement, and intelligence also differs from Canney and Winograd's findings. In their study, older students included meaning with increasing frequency and good comprehenders were more inclined than poor comprehenders to mention meaning in their definition of reading and also more inclined to reject the altered paragraphs as unreadable.

The failure of the current study to find significant differences between older and younger students or better and poorer comprehenders may indicate that inclusion of meaning is tied to some component other than those examined. For example, the researcher suggests that the habit of reading outside of school may have been such a component since so many students who read frequently at home also rejected the altered paragraphs as unreadable. Two thirds of the students who said that they read regularly at home rejected the altered paragraphs as unreadable. All of the student who did not read outside of school accepted all of the altered paragraphs as readable with the exception of the graphic form. They found anything readable if they could recognize individual words.
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It would seem that the reading program to which the students in this study were exposed should also come under scrutiny as a possible factor in the widespread failure of these students to think of meaning when defining what reading is and their failure to expect it in print. Schemata are formed as a result of experience. A reading program is an important component of reading schema formulation. Is there something about the reading program, as opposed to reading done independently for one's own purposes, that distorted the true nature of the reading act?

From examination of replies, the inference may be made that the reading program stressed bottom-up processing. Comprehension appears to have been dealt with primarily at the level of word meaning.

Essential metacognitive skills such as clear formulation of reading purpose and self-monitoring to see that this is being met appears poorly developed in these students. This is more understandable among the second graders. It is interesting to note that fourth graders in this study expressed more awareness of meaning than sixth graders. There is no apparent explanation of why this was so. Did the introductory reading program change significantly after the sixth graders passed through? Was there a dynamic teacher clearly aware of reading's purpose who left his or her mark on them? These are merely conjectures, but they are worth consideration.

Durkin, in a 1977 report on the state of the art in the teaching of reading comprehension, concluded that, in the classrooms visited,
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comprehension was seldom taught but was frequently assessed through questions and correction of answers. There were few demonstrations of techniques for comprehending connected discourse. Responses of students in this study indicate comprehension of connected discourse and of implications beyond text were not highlighted in their reading program.

On the other hand, one must remember that the number of students interviewed was small and that the interviews took place in a school setting. Could it be that these students viewed these questions as a test of some sort despite assurances to the contrary? Could it be that in school, when asked if you are able to do something such as read a certain passage, you are expected to say yes and you will say yes even though your reply flies in the face of common sense?

The considerable difference between the schemata for reading of those who read at home and of those who read only in school is thought provoking. Is it the uninterrupted reading for pleasure at home that has contributed to an adequate reading schema for home readers, or do they read at home because, for some other reason, they have grasped the real purpose of reading? Is it that those who have not grasped it see no sense in reading unless compelled to?

Another interesting anomaly is the emphasis on mechanics expressed by good comprehenders, a heavier emphasis than revealed by poor comprehenders. Differences in verbal ability do not explain it as the total number of remarks for each group was almost the same.
Role of Adequate Schema

(H - 46, L - 42). Could it be that the tests that select the good comprehenders stress accuracy of decoding and word-level comprehension at the expense of higher comprehension levels so that good scores on these tests are attained by being good at these skills? Are those skills prized because they are rewarded by both high test scores and teacher affirmation? Have students who score lower on comprehension tests discovered that they are not quite as good at the mechanics so they have employed top-down processes more frequently and are therefore more aware of other aspects of reading?

The failure of this study to agree with that of Canney and Winograd (1979) could also mean that the populations studied were very different. Perhaps their reading programs were very different, or perhaps the wording of Canney and Winograd's last question used with younger students was biased in the direction of mechanics-centered responses. However, even the possibility of such a bias does not explain the fact that almost all of the good comprehenders in the earlier study rejected the garbled passages as unreadable while poor comprehenders accepted them as readable. Indeed, the apparent absence of meaning in the reading schemata of good comprehenders in the present study, an absence apparently far greater than found in the schemata of poor comprehenders (H - 13% of responses were meaning centered, L - 31%), was unexpected.

Reading is a search for meaning and, schema theory asserts, meaning is the result of interaction among reader, text, and
environment. It is questionable how much interaction is taking place when so many students failed to express a personal awareness of the cognitive processes involved in reading. Lacking this awareness, these readers may have all necessary background schemata available to them yet fail to engage their schemata as they plod word by word through text.

**Implications for Further Research**

Similar studies should be conducted with subjects of various ages, achievement, and socioeconomic background. Studies should be done using populations that have experienced very different reading programs. Studies should also be conducted over time using large numbers.

Except in the case of the story schema, research in reading comprehension has chiefly examined adult reaction to expository material in non classroom settings (Durkin, 1981). In order to see if results will be similar, children reacting to narrative text in classroom settings must be examined and studies replicated.

In addition, it is not enough for researchers to find positive results when using questioning techniques or structured overviews and so forth. Teachers need to know whether or not these effects transfer to a situation where a child is on his own with a reading passage. Studies need to be conducted that examine the transfer effect of these techniques (Durkin, 1981).
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Much more needs to be learned about how existing knowledge affects the comprehension of new knowledge. As Spiro (1980) points out, schema availability is not sufficient for comprehension. A schema may be available but not be accessed appropriately or effectively. Research needs to identify and model the components involved in making use of prior knowledge to comprehend new knowledge (Spiro, 1980).

Implications for Classroom Practice

Implications of this Study

Results of this study appear to support Durkin's findings (1977) that there is little comprehension instruction in many classrooms. Time is spent questioning and checking answers but little is spent in demonstrating techniques and guiding children through them. Many of the students in this study appear to have a maladaptive comprehension style, focusing on bits of meaning contained in single words and emerging with little idea of the overall meaning. Of course, it is possible for students to rely too heavily on overall concepts and end up with only a general idea of what a text is about. Teachers must be aware that there may be overreliance on one strategy or the other. They must guide students in flexible use of top-down and bottom-up strategies, and encourage them to make decisions about the most helpful strategies to use in reading a particular text.
Since many of the students in this study seemed unaware that meaning had been lost, it appears that it is not enough to leave students on their own to come to an awareness of the true nature of reading. Some find out for themselves especially, it may be, if they read outside of school; many do not.

Students must be taught to become conscious mentors of their own comprehension. They need to be aware of what they know or need to know in a particular situation and what needs to be done if meaning is lost (Brown, 1982). They must be aware that they have lost the thread, and they must have mastery of strategies that may be taken to regain it. Langer (1981) points out that poor readers and young readers are poorly developed in this area. The results of the present study suggest that good readers and older readers may often be no better.

Brown, Campione, and Day (1981) have developed a technique for helping students reflect on their own comprehension through internalizing and monitoring certain rules for summarizing passages. Anderson (1978) has developed self-questioning techniques to improve students' comprehension and retention. Students are encouraged to generate questions before reading for anticipation, during reading for focus, and after reading for studying and remembering.

Students must know that meaning is their goal from the first day of reading instruction. They must also be aware from the beginning that there are ways to consciously pursue meaning. In the
researcher's opinion, the language experience approach, taught by someone with a thorough fund of accurate linguistic knowledge, would be the method most likely to produce readers who know that reading must make sense and who know how to do something about it when it does not. What other approach moves so unfailingly from what the student already knows toward new experiences and from language patterns with which readers are already familiar toward the book language they must come to know?

Implications of Schema Theory

If the numerous hypotheses generated by schema theory continue to be supported by replicable research studies using children in classroom settings, then, it is hoped, schema theory will affect many facets of education. Among these facets are the understanding of the nature of comprehension and of the sources of reading problems, the teaching of comprehension strategies, the selection of instructional materials, the emphasis on reading to children and on story telling, the teaching of isolated skills, the role of questions in the classroom and the types of questions employed, the construction and use of readability formulas, comprehension testing, the integration of knowledge across disciplines, and reading instruction both before, during, and after the reading act.

Schema theory's effect on the understanding of the nature of comprehension is profound. Comprehension depends as much on what is in a person's head as it does on what is in print. Because
Role of Adequate Schema

Adequate Schema already existing schemata cause readers to approach print with certain expectations that they actively seek to satisfy, readers will only learn what, in a sense, they already know. The ability of the reader to make an inference and the kind of inference that the reader will make depend on the reader's world knowledge or schemata. The reader does not respond passively to print but interacts with it. Both text and the reader's schemata play important roles in the interaction. Meaning is not considered to reside in the text but in the mind of the reader as he reconstructs it via the blueprint of text.

An important conclusion to be drawn from the interaction and reconstruction that occurs during comprehension is that appropriate understanding will vary from reader to reader and situation to situation. A teacher should not assume that a text has only one interpretation. From this standpoint, a reader's insertions, substitutions, and omissions are not necessarily a sign of reader error but may be the result of a reader's interpretation of text (Tierney and Pearson, 1981). Teachers should move away from assessments that promote the single-correct-answer mentality and ask questions that are open-ended in order to encourage divergent responses. Tierney and Pearson (1981) suggest that the test of the quality of a student's response should be, "Can it be justified?" rather than, "Is it right?". Emphasis should be on the quality of the students' reasoning abilities.
In the behaviorist view, the role of the reader is to reproduce the text which is viewed as an autonomous entity containing meaning in and of itself. When reading is viewed this way, the result is not a thoughtful interaction with text but, as Teale (1977) puts it, "a literal translation of it" (p. 19). The result is comprehension without understanding or, as Teale says, unreal comprehension.

Naively, teachers have often assumed that a student's ability to reproduce the words of a text, as though the words themselves were valuable, was evidence that the student possessed the knowledge conveyed by the text. Student reproduction of the text results in knowledge that is not assimilated but swallowed at the literal level and held on to only until the next exam. An understanding of the schema-theoristic view of comprehension would lead teachers to draw real comprehension from their students always with tolerance of their "mistakes" and the encouragement of divergence.

The search for the source of reading problems will also be affected by widespread acceptance of the results of current comprehension research. Many problems in reading comprehension may be traceable to deficits in knowledge rather than in linguistic ability. If the proper schemata are available, a child may not have learned to access them correctly or to maintain the accession. Comprehension drills intended to upgrade skills may work against the child's bringing higher level schemata into play and encourage him to read
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word by word (Anderson et al., 1976). In other cases, a child may lack a schema for the literary device itself.

If a child lacks the interpretive framework or the awareness that it has to be called into play, text is "gobbledygook", and the child had a reading problem (Anderson, 1977). The child begins to focus on details and small units of language as the conceptual base breaks down. He or she drowns in words and loses the overall picture.

Schema theory research results also lead to increased awareness of different comprehension styles. The instructional implications of this realization appear to be profound. Effective strategies for correcting individuals with one type of style would be exactly the opposite of what would help children with the other type of style (Spiro, 1979). For example, if a child overrelies on text, instruction should make him or her aware of the importance of prior knowledge to understanding. However, the child who in not paying enough attention to text is going to be harmed by such instruction. Diversity of approach is necessary.

Implications of schema theory will bring about drastic changes in the teaching of comprehension both in the amount of instruction and in its nature. As teachers grow in understanding of the nature of reading comprehension, they will be better able to determine what might facilitate and what might impede its development. Teacher focus will change from product to process and from assessment to
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modeling and guidance. Because readers need to activate their background knowledge, maintain their focus, progressively refine the comprehension model they are building, and integrate their new knowledge with knowledge they have acquired in other areas, comprehension strategies such as student self-questioning can be useful before, during, and after reading (Langer, 1981). Techniques would be modeled by the teacher and then imitated by students with teacher guidance.

Schema theory has implications for selection of instructional materials. Researchers in the field of story grammar have revealed how intricate simple stories are, and many students lack a schema for this complicated literary device (Durkin, 1981). Much preparation through the reading and telling of stories would be necessary before an adequate schema for story might develop.

Lack of familiarity with book language would compound the problem for these children. Statements approximating their oral language drawn from them during language experience instruction would make far easier material for them to begin upon.

Thus, schema theory highlights the importance for all children, but especially for those who lack a schema for stories and familiarity with book language, of reading to them and telling them stories. Not only will reading and story telling help to bridge the gap between the spoken and the written word, but it will also help develop a schema for story, expand vocabularies, and add to children's
knowledge of the world (Durkin, 1981). In content areas also, schema theory should influence teachers to probe carefully for material that will match most closely their students' world view or which can be helped to do so with additions from the teacher.

Because schema theory stresses the holistic nature of knowing, adoption of its tenets would bring to an end the teaching of isolated skills. Since the incomprehensibility of the brute thing without its complex web of relationships is at the heart of this theory, it is evident that isolation of narrow skills through separate drills would play no part. Recent research in cognition indicates that, unless instruction takes place in a context meaningful to the student, it is useless. Basic skills such as awareness of grapheme-phoneme correspondences are indeed necessary but taught best in context.

Questioning would also take on a new role in the classroom and would be different in nature. That readers learn more when questions are asked about the content of a text than when no questions are asked is a consistent finding (Durkin, 1981). Studies suggest that questions increase inspection time, and the effort readers assign to remembering what is relevant for their purpose. Since research suggests that questions foster learning, teachers should ask questions that deal with important content. A poor question will direct readers' attentions toward the learning of that which is unimportant just as a good question will direct them toward the important and
meaningful. If teachers want better comprehenders, they must become better questioners.

Recent research in comprehension should also mark the end of the "Guess what I'm thinking?" question. Concern should be not for what is in the teacher's head but for what is in the students' heads so that new material can be related to what is already known (Sheridan, 1978).

Pearson and Johnson (1978) have developed a new taxonomy of questioning that consists of three levels:

1. questions textually explicit with an obvious answer there on the page.

2. questions textually implicit with an answer on the page but not so obvious.

3. questions that are schematically implicit.

Pearson and Johnson refer to the first type of question as reading on the lines, the second type as reading between the lines, and the third as reading beyond the lines. Their taxonomy does not classify the questions themselves but rather, the relationship between the question and the response.

Teachers must look closely at the way questions are used in the classroom (Durkin, 1981). Often a teacher's attention focuses on whether or not an answer is correct. Some questions have only one right answer, but the important ones have many.
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Schema theory also has implications for the construction of comprehension tests. Global comprehension scores have little meaning when placed with the context of this theory (Durkin, 1981) Such scores would have little meaning either for instruction or diagnosis.

Readability formulas would also have to be reassessed. Present evidence suggests that less reliance should be placed on readability formulas in selection of materials (Tierney and Pearson, 1981) These formulas do not consider what a reader knows or does not know about the content of a reading selection. This world knowledge is especially important at the level of inference.

Readability formulas often chop long sentences into shorter ones requiring the reader to make additional inferences about unstated information and thereby make the material more difficult to process (Durkin, 1981). Readability formulas also ignore anaphoric devices, sentence structure, logical connections between sentences and concept load. Researchers are just beginning to understand the true nature of readability.

Sheridan (1978) suggests changes in vocabulary instruction. Vocabulary development should become more than just learning a meaning for a word. It should become concept development. A teacher may begin at the concrete level but should extend the word to its functional meaning and then to the abstract level which would include all the possible meanings for the word.
Spiro (1980) considers that adherence to the tenets of schema theory would put an end to the decompartmentalization of knowledge which often occurs between grades, within the same grade, and between subjects so that students appear to see no relationship between what they were taught last year and what is being taught this year or between knowledge acquired in social studies and knowledge acquired in English class reading assignments. Furthermore, students often see no relationship between school material and anything that goes on outside of school. Educators should be aware of the necessity of building a network of relationships from already existing knowledge to new knowledge and from one part of the curriculum to another.

A change in the nature of tests would be an important move in the right direction. Tests should place a greater emphasis upon "contextual knowing" (Spiro, 1980) and reduce the emphasis on replicative ability so that rote-like retrieval processes are not rewarded and become an inefficient strategy.

Attention to the results of current comprehension research would change many common practices in the teaching of reading. In the opinion of Langer (1981), the most useful aspect of schema theory research for the teaching of reading is the focus of process rather than product, on how to rather than on what. This focus on the interactive process that takes place among reader, text, and environment should be adopted by the teacher of reading.
Role of Adequate Schema

In preparing for reading, teachers should be far more aware than ever before of the background schema of the child and the degree of relevance to text since it is known that prior knowledge has a pervasive influence on understanding. Even if readability is lowered, a lack of world knowledge or a lack of skill in using it, will seriously interfere with comprehension. Instead of asking what the student does not know, teachers will place emphasis upon what is known in order to have an anchor point for new material. To accomplish this, teachers may employ devices long in use in some classrooms such as Ausubel's (1963) advance organizer and Stauffer's (1975) Directed Reading-Thinking Activity (DRTA) or they may select some of the newer strategies such as Langer's (1982) Prereading Plan (PReP). All of these devices aim at getting students to set purposes before reading and to read to satisfy those purposes and at helping teachers assess students' schemata for a particular topic.

In addition, the teacher must be aware of differences between the purposes a text was written to serve and the purposes student readers pursue. If a text cannot be brought into line with readers' purposes through sufficient teacher support, it should not be used.

Apart from specific action, schools might offer a general program of schema development through field trips, films, projects, and visits from outside experts. Anderson (1977) considers that one of the most important purposes of schooling is to equip students with
Role of Adequate Schema

the kind of knowledge that is not directly reproducible in sentences but which provides students with a framework or context for interpreting new experience.

Questions, either teacher or student generated, are another important tool for teaching comprehension. Questions before, during, and after reading can help to keep proper schemata activated so that comprehension stays on track. If students have failed to engage the necessary schemata, a few open-ended questions should reveal this and the teacher can then adopt the necessary strategies. Tierney and Pearson (1981) offer some possible solutions for several comprehension problems.

In guiding reader-text interaction, the ability of the reader to use flexible processing procedures across different texts and to read for different purposes is an important consideration. For students who rely too much on top-down strategies, Tierney and Pearson (1981) suggest asking them to read to follow directions as in the conducting of a science experiment. Student can also be given questions that have two or three distractor choices some of which come from the text and some of which do not. Students can be asked to discriminate correct text-based responses from correct schema-based responses.

If readers rely too heavily on bottom-up processing, the teacher can encourage them to relate what they read to their experience and alert them to the importance of their own ideas. Tierney
and Pearson (1981) suggest a technique that might be useful for such readers. The teacher asks the students what they think of when they hear the word, X (the topic they will be reading about). The teacher writes their associations down on the board in categories and helps the students label them. Students are then asked to read the selection. When reading is completed, the teacher returns to the set of categories and asks them to add new terms they have acquired. The result is a demonstration of preexisting schema mingled with new learning from text and of the relationship between new and old information. It might also add to the impact if the teacher used different colored chalk for old and new information.

Postreading strategies should monitor readers' understandings and whether or not these understandings are transferable. Of course, the teacher must remember that understanding is relative and will vary from reader to reader and from text to text. What is important is the reasonableness of the students' defense of their understanding. Emphasis on single correct answers and interpretations violates the tenets of current comprehension theory.

Such considerations, although already a force in some classrooms, are foreign to many others. It is the contention of the researcher, based on the results of both schema research and the current study, that the practices recommended above would result in increased comprehension, a comprehension resulting in accommodation of cognitive networks rather than assimilation of literal fact.
Reference Note

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Appendix A

Principal's Letter
Role of Adequate Schema

Principal's Letter

Dear Parent:

The YYYYYYYYY YYYYYYY Schools are supporting a research project being conducted by Mrs. Beverly Wilkin of the State University College at Brockport. The project will investigate the effect of students' feelings about reading on their reading comprehension.

As a participant, the student will be completing a couple of tasks. Each student will complete a questionnaire about his/her attitudes toward reading. Each student will also complete a short reading activity to measure their comprehension level.

Students participating in the project have been selected at random. The privacy of each student will be protected. Student names will not be used in the research. Each student participant in the study will be assigned a number and all reports of the research will refer to students by number.

I am supporting the research project because it can provide some needed insight into the very complex problem of reading comprehension. It would also provide some insight into our reading program.

Participation in the project is completely voluntary. Please indicate below whether or not you are willing to allow your child to participate in this project. If you have any questions regarding
Role of Adequate Schema

this research, feel free to contact me at 555-XXXX or Mrs. Wilkin at 555-ZZZZ. Please be sure to have your child return the form below to his/her classroom teacher, regardless of your decision, no later than Monday, March 28. Thank you for your cooperation.
Appendix B

Children's Concept of Reading - Revised
CHILDREN'S CONCEPTS OF READING - REVISED

PHASE ONE: OPEN-ENDED QUESTIONNAIRE

CHILD: ___________________________ BIRTHDATE __________
AGE __________ GRADE __________ GENDER __________
SCHOOL ________________________ TEACHER ________________________
READING TEXT __________________ READING LEVEL ______________
INTERVIEWER _____________________ DATE ______________

NOTE: Probing to attempt clarification or extension of the child's responses is desirable. However, the interviewer should exercise caution to avoid leading the child to give responses that may not reflect what he really thinks or understands. The interviewer should also note any behaviors that might suggest how confident, confused, unsure, tired or reluctant/defensive the child might be. Record the number of prompts used with each question. Do not exceed three (3) prompts per question.

Note: Acceptable prompts include the following:

1. Is there anything else?
2. Can you tell me (more) about it?
3. What is it about ____ that you have to know?

Unacceptable prompts:

1. Is that all?
2. What else?
3. Why not?

1. Are there some things that you like about reading? Y N Y/N?

What are they?

Probes ____
2. Are there some things that you don't like about reading? 
   Y  N  Y/N?

   (If response given other than yes, probe by saying, "Really? Are you sure?") If response is yes, ask "What are they?"

Probes _____

3. Is reading a hard thing for you to do?   Y  N  Y/N? Why?

Probes _____

4. How good a reader would you say you are? excellent 
   above average  average  below average  very low
   Why do you think so?

Probes _____

5. Do you have a book to read?   Y  N  Y/N  Please explain.

Probes _____

6. Do you see your parent(s) reading at home?   Y  N  Y/N
   How often do you think they read?

   What reasons do you think he/she/they have for reading?
   Why do they read?

Probes _____

7. Do you read at home?   Y  N  Y/N  How often?

Probes _____

8. Do you think reading is important?   Y  N  Y/N  Why?

Probes _____

9. What things does a person have to learn to be a good reader?

Probes _____

10. What things does a person have to do to be a good reader?

Probes _____
11. How old do you have to be before you can be a really good reader?
Probes _____

12. Are all the people who are ___ years old really good readers?
   Y  N  Y/N  Why do you think so?
Probes _____

12a. Note: If response to #11 is "any age", then state this question as: Are there some people who do not become good readers?
   Y  N  Y/N  Why?
Probes _____

13a. When a person in first grade is reading, are they doing the same things as a person in (child's grade) is reading? Y  N  Y/N  Why?
Probes _____

13b. When a person is (child's grade) is reading are they doing the same things as when a grownup/adult is reading? Y  N  Y/N  Why?
Probes _____

14. Why do you think that some children have trouble reading?
Probes _____

15. What things do you need to learn to be a better reader than you are right now?
Probes _____

16. Suppose you had a friend who had a little brother/sister (same sex as interviewee) who was going to start school soon. That little boy/girl said to you, "My mommy said that when I go to school I will read. (Child's name), what is reading?" What would you tell him/her reading is?
Probes _____

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Appendix C

Altered Paragraphs
Altered Paragraphs

Primer Level - Intact

A girl went to a farm.
She gave corn to the hen.
She gave hay to the cow.
She played with a white rabbit.
The girl saw the ducks swim.
Then she went back to her house.
She drew a picture of the animals.

Primer Level - Semantic

It was Mr. Green cleaning Tony.
Wash and Tony are washing the car rain.
Car laughed, "The rain is washing out Mr. Green?"
"That's not car," liked Tony.
"But it went our wash."
Day said the car Mr. Green.
Role of Adequate Schema

Primer Level - Syntactic

To bus was it Mrs. the to go the.
"In climbed Brown we," bus went.
"Children go to ready are got."
Bus the now and day the.
In ride the said away.
Good a was it farm a for time.

Primer Level - Lexical

A has back a goes.
Box a ball the pay the.
On big four has wind want.
Can he sheep the night the.
On long a has money a.
Has he window and rabbits.
Bird short fathers help like head.
Man did can you tree the at.

Primer Level - Graphic

Ng kcb xb n lbl.
Tnw p tilt rht dnw ht.
Plh n rw phs 1b htng ht.
Nm ht dnw ht n kl.
Btrb ht drb n hrsft ht dd tn tb dh ht.
N nm rht tnw hs rt!
Role of Adequate Schema

Second Grade Level - Intact

One day I went to a big sea aquarium. There were all sorts of sea fish and animals there. I watched the sharks. I saw a huge green turtle.

Then I saw some funny animals jumping in and out of their pool. They were sea lions.

They didn't look much like lions. They had whiskers just as long as lions do. But they had very small heads, and tiny eyes and ears. And they had flippers instead of feet.

Second Grade - Semantic

One sort I saw to a big sea fish. There were all animals of sea sharks and turtles there. I saw the animals. I looked a huge green pool.

Then I went some funny lions jumping in and out of their lion. They were sea whiskers.

They didn't watch much like lions. They had heads just as eyes do. But they had very small ears, and tiny flippers and feet. And they had days instead of aquariums.
Second Grade - Syntactic

Saw I sort one sea big a to all. Were there fish sea of animals all there turtles and sharks. Animals the saw I. Huge a looked I pool green.

Some went I then in jumping lion funny their of out and lion. Whiskers sea were they.

Much watch didn't they lions like. Just heads had they do eyes as. Very bad they but tiny and, ears small feet and flippers. Days had they and aquariums of instead.

Second Grade - Lexical

Give I sort one sea big a to all. Were there back sea of box all there balls and pays. Winds the read I. Huge a pulled I sheep green.

Some wished I then in jumping nights funny their of out and money. Windows sea were they.

Much let didn't they rabbits like. Just birds had they do fathers as. Very had they but tiny and, heads small man and trees. Nests had they and woods of instead.
Role of Adequate Schema

Second Grade - Graphic


Fourth Grade - Intact

An exciting new sport in the world today is sky diving. Sky divers do tricks, make falls and take interesting pictures. This sport takes you away from your everyday life into a wonderful world you have never known. It is almost like being in a dream. Once out of the airplane, you feel as if you can climb walls or float over mountains.

Sky divers work to develop each of their jumps. Men and women are interested in sky diving. In fact, more people learn to sky dive each year. This relaxing sport is one of man's newest adventures.

Fourth Grade - Semantic

Under the treasure of the treasure piled a great wrecks. This big years sunk in ships that helped up 50 to 100 $300,000 ago. One gold has dropped carrying science in treasure.

Motors Great Lakes may show get the lost Navy in the cameras. The feet have found television water 200 pictures down into the feet.
Role of Adequate Schema

The lie good scientists for 30 spot around. Wrecks may make out how to locate the exact year where a man lies. In the fortune to come many a treasure piled his bottom from the lakes at the waters of the Great Lakes.

Fourth Grade - Syntactic

Ago docks few a ocean new fine a gone been had trip to Europe dry into had it. Repaired be United one chewed been and trip to States top the to back. It bottom that before from over hit had to propellers to trip it that sure be sail to ready was. Ship one after badly so up be to had they was.

Bottom the replaced had it. Anything worn or propellers chewed been but holes ocean. The out went bubbles the. Made? Had they wny by years of full liners water.

Fourth Grade - Lexical

Back boxes was, it. Ball pay two, for wind at been had tried everything. Sheep with of. Night the gloomy held the nearby money the. By of window hundred a kept rabbit Maine the bird enemy in carrying. Small the of most far sat father American head the in away man Indian the along. Was tree few the now and.

Hiding in back British the strike to itself slept they box death. A capture to find ball. The if pay the wash, wind the tried sheep only night new. Vast held money maybe window the.
Role of Adequate Schema

Fourth Grade - Graphic

Ngw n ngrd kcb drt tn dlh xb f llb s r p rht. Dnw t tpl rdcr.
rht. Dnw t tpl b rdcr thw n dg. Rw sht phs rw ht tb htng nm ht.
Fr tblcm tn dh ht. Gr1 rw dnw brsrb ndw. Drb sw dsbr sht n ht hrft
rw. F dh dn nm tc rt ht kcb n xb nhw llb hgs r sw p dl sht ht dnw
ldcl ngt vh dd. Phs ts wf ht htng tlf tn. Tb r sht rstngnt nt f nm
dl sht tb dnw btsrb.
Appendix D

Paraphrased Responses
Role of Adequate Schema

Paraphrased Responses to Question 16

Student 1  It's when you see words and you pronounce them; and you pronounce every word; then you get to know them.

Student 2  Learning words; having fun reading stories; it's work, work in the workbook.

Student 3  Reading is a book; learning words that you don't know that you're going to learn; reason for going to school.

Student 4  Things that we do like when you read a book; books - lots of books; trying to figure out words; spelling words; looking up words in dictionary.

Student 5  Showing you words; using a book.

Student 6  Learning new words; learning new stories; recognizing words; fun.

Student 7  Reading a book; learning words; why you go to school.

Student 8  Something you do when you don't have anything else to do; you have to learn words; reading is hard for kindergarteners-first starters.

Student 9  Some words in a group or a paragraph or in a sentence; paragraph is about one thing; whole story could be about one thing; learn letters and words by heart.

Student 10  You learn stuff from it; a whole bunch of words put together in a paragraph; listening to teacher; saying
Role of Adequate Schema

you're sorry - that's in kindergarten; being nice to your teacher; the letters; sounding out words.

Student 11 Reading books; good grades; learning vocabulary words and he'll be a pretty good reader.

Student 12 Pronouncing letters; learning to read books; recognizing words.

Student 13 Books; pronunciation; spelling; speech; words.

Student 14 Learning about stuff, mysteries, consumer information; reading a book; practice; recognizing words.

Student 15 Taking a book and reading; learning words; knowing what words mean; saying words; knowing vowels and consonants.

Student 16 Knowing the words, learning the words; sounding them out; she'll like the stories; don't give up.

Student 17 Saying the words to yourself; looking at a piece of paper with sentences; recognizing words.

Student 18 A book; recognizing the words; venturing to another country or place; I can't wait to see what happens next.

Student 19 How to spell words; writing words; recognizing them in a book, words you can say; pronounce words; were sent to small schools where they didn't hear big words; were not sent to the office.
Role of Adequate Schema

Student 20  Show him a book and tell him that's what he's going to do; learning what words mean; recognizing words when you see them.

Student 21  Learn what's going on in the world; learn how to find your way around, consumer information; learning about things that have happened or are going to happen.

Student 22  Take a book and read; learn what words mean; recognizing words.

Student 23  Looking at words; saying words and just keeping on; learn what happens in the story.

Student 24  Reading words and stories; about stuff that happened a long time ago; about what's happening now.