

EFFECTS OF INSTRUCTION IN THE  
USE OF AN ABSTRACT STRUCTURAL SCHEMA  
AS AN AID TO COMPREHENSION AND  
RECALL OF WRITTEN DISCOURSE,

by

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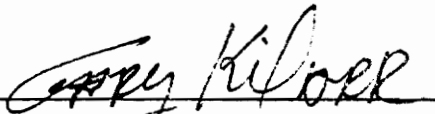
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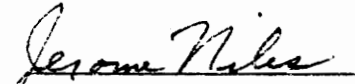
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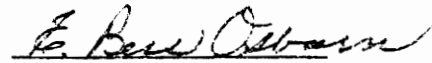
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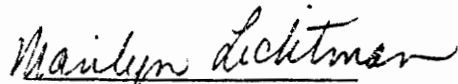
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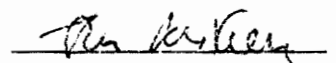
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## Chapter I

### THE PROBLEM

#### Introduction

Since most of the knowledge acquired in schools comes from reading (Olson, 1977), an important goal of education is to help students improve their ability to comprehend and recall information from reading written discourse. However, because approximately 25 percent of the students in the nation read below their ability level (Gibson and Levin, 1975), reading problems have become a national concern. There appears to be a real need to discover an approach that will aid the disabled reader in recovering information from written discourse. The present study represents an attempt to examine the effectiveness of an instructional technique which might do just that, enable the disabled reader to improve comprehension and recall.

#### Rationale

The concern for raising the literacy level across the nation has stimulated much debate about instructional programs (Chall, 1967), but it has also produced research which has attempted to examine reading as a process rather than a product (Goodman, 1973). It is becoming increasingly evident that reading is a language process which involves more than the translation of written symbols to sounds (Carroll, 1972). However, many models of reading suggest that reading is a sequentially ordered set of components which occur in hierarchical

fashion (Gagne, 1970; Venezky and Calfee, 1970; Mackworth, 1972; Posner, Lewis and Conrad, 1972; Gough, 1972; and LaBerge and Samuels, 1974). For example, in an oversimplification of Gough's model (1972), a reader receives graphic input and proceeds from feature analysis to letters, to letter patterns, to phonological representations, to word meanings at a lexical level, to deep structure or semantic interpretation.

Rumelhart and the LNR research group present a different view of the comprehension process, a view which reveals reading comprehension as an immensely complex process involving the interaction of diverse sources of knowledge. These sources include the phonological, syntactic, and semantic aspects of language as well as higher level sources such as inference rules and expectations about the text. They define the model described above as a bottom-up process in which the input is sequentially transformed from low-level information to higher levels in a bottom-up flow. Bottom-up, in the sense as presented by Rumelhart, means that lower level processes occur prior to and independent of higher level processes, and each processing step can only affect a level immediately above it.

The assumption that a reader uses only a bottom-up strategy as described above has been questioned by psychologists as information from computer science has suggested otherwise (Winograd, 1972; Schank, 1973). As programs were written for computers to operate in conversational mode, it became apparent that the comprehension of any language system is more complex than simply parsing sentences in hierarchical fashion. It was found instead, that the programs must be written in ways which

combine syntax and semantics with conceptual networks or schemata so that these systems interact simultaneously, not sequentially, in order that the computer "understand" the English language. In other words, bottom-up systems do not take into account expectations about incoming data or processes which start at the top and work down. Top-down processing has been defined as high level expectations or hypotheses about incoming data which are refined by analysis of context (Rumelhart, 1976).

Studies in artificial intelligence have suggested that understanding discourse is not only a multilevel process but that these levels interact in a top-down or hypothesis-based fashion, as well as a bottom-up manner (Winograd, 1972; Kaplan, 1972; Reddy and Newell, 1974). Top-down processing suggests that readers use their knowledge of language and the world to make certain hypotheses or inferences about the text which fit their expectations. Interaction occurs as both top-down and bottom-up systems work simultaneously. In other words, the sensory information from the text interacts with the reader's experiences and expectations (Rumelhart, 1976).

Computer models (Reddy and Newell, 1974; Kaplan, 1972; Stevens and Rumelhart, 1975) have enabled researchers to explore the various sources of knowledge, to determine how they interact so that information in either oral or written form could be processed. The models were able to demonstrate that the use of multiple sources of knowledge used simultaneously, rather than in linear fashion, leads to dramatic improvement in both accuracy and speed of machine "comprehension".

Rumelhart (1976) and others have applied this lesson learned from computerized analysis to the problems of human processing of written discourse. Since processing systems in this context may be classified into two major types, bottom-up or data-driven, and top-down or concept-driven, the analogy may be applied to the behavior patterns of skilled and disabled readers. Skilled readers, working with familiar material, are highly selective about which information to process (Spiro, 1977). They rely on past experience and stored knowledge to anticipate what is coming and therefore concentrate on relevant cues while skipping rapidly over the irrelevant ones (Smith, 1971). This can be referred to as a top-down or concept-driven approach to processing language. Perhaps the best example of this type of processing is speed reading. With this method, readers are taught to improve their speed by eliminating wasted eye movements, by skipping irrelevant material and by making full use of the the redundancy of language. They would hardly notice the addition of a "the" as in the previous sentence. Although it seems that these readers process more information, (e.g., 1,000 words per minute), in reality they only appear as if they had done so. Thus, theoretically, it might be said that speed readers are those who have increased their reliance on non-visual information or top-down processing (Rumelhart, 1977; Adams, 1977; Norman, 1976).

While the skilled reader, like a listener (Miller, 1962), picks out the most important cues and doesn't process the unimportant ones, the disabled reader cannot differentiate and attempts to process all

the bits and pieces, every letter and word, thus increasing the processing load (Hochberg, 1976). This approach to processing information from the written discourse has been labeled bottom-up. Although research indicates that poor readers do make some use of syntactic and semantic constraints, these readers fail to direct their attention to the most important cues and tend to over-rely on visual information (Smith, 1972; Goodman, 1969).

The disabled reader in the elementary school is frequently defined as one who has not yet mastered decoding skills. Special remedial programs are designed to employ repeated practice of sound-symbol matching in isolation to help the reader master word identification skills (i.e., Distar, Science Research Associates). Yet research suggests that the disabled reader is one who over-relies on visual information and makes poor use of context (Neville and Pugh, 1977). An assumption might be made that this type of instruction may tend to reinforce the use of bottom-up strategies and may provide few opportunities for the development of top-down strategies.

Current literature has supported the notion that learning and comprehension will be facilitated to the extent that the learner is able to adapt an organizational scheme which can act as a retrieval plan (Tulving and Donaldson, 1972). Kintsch and others, (Kintsch, 1974; Meyer, 1975; Norman, 1971; Bower, 1970) have concluded that the semantic structure of memory is not unlike the internal semantic structure that underlies written discourse. There is empirical evidence to support the notion that this structure or schema, as it is frequently

labeled, is stored in memory. Kintsch (1977) and Frederiksen (1972) conclude from their investigations that the structure or schema of written discourse is one of the most important variables in predicting comprehension and recall of a passage. Meyer's research (1977), further substantiates this by suggesting that the skilled reader attends selectively to the most important parts or the top-level structure of a passage, remembers the primary relationships in this top-level, and stores this information in long-term memory. She states that disabled readers, on the other hand, lack any overall organization and relate only fragmented details or isolated low-level information.

It is reasonable to believe that if readers have a mental framework in which to store the information in a story they will be better able to be selective about which information is important, and thus will achieve better story comprehension. In fact, studies by Thorndyke (1977) and Mandler and Johnson (1977) imply that readers use a "story schema", or knowledge of the components and relationships within a story, as an aid to comprehension.

In information processing, schemata are considered the key units of comprehension. If readers understand the structure or schema of a story they are reading, if they selectively process information which fits the schema by matching it to their own schemata or background of experience, they should understand the story. In other words, they would be utilizing top-down inferential processes in order to predict the manner in which information in the story fits into their existing knowledge.



### Statement of the Problem

The literature suggests that skilled readers make use of a set of expectations about the structure of a story which allows them to store information in a meaningful way, thus aiding comprehension. Theory proposed by Rumelhart (1976) and others imply that this is a top-down and bottom-up interactive process. There is some evidence to support the notion that disabled readers tend to rely heavily on a bottom-up process in reading. What is needed at this time is a formal study which will measure the effect of a specific attempt to bridge the gap between theory and instruction by attempting to provide disabled readers with the organizational skills that appear to be employed by the skilled reader.

The purpose of this study then, was to determine if instruction in the use of story schema would, in fact, allow a disabled reader to more effectively comprehend and recall the important ideas in a story. This instruction was labeled the Story Schema Teaching Technique (SSTT).

### Hypotheses

The research hypotheses in this study were as follows:

1. Story comprehension, of fourth grade disabled readers, as measured by the SSS <sup>1</sup> will show increased improvement as the number of exposures to the SSTT increases.

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<sup>1</sup>

Schema Scoring System--A scoring system which rates a student's ability to demonstrate an understanding of the organizational relationships within connected discourse, and the inferences which are generated by that discourse during recall.

2. Story comprehension of fourth grade disabled readers, as measured by the SSS will show a decrease over time.
3. There will be a significant interaction between the number of exposures to the SSTT and time.

### Limitations of the Study

Experimental research is always subject to limitations. The following may be considered limitations of this study:

1. It was assumed that the subjects' retellings reflected their understanding of the stories they read. However, although every effort was made to encourage the subjects to retell as much information as possible, a completely accurate determination of whether or not this occurred cannot be made.
2. The Schema Scoring System, used to analyze the retelling protocols, was somewhat subjective. However, positive inter-scorer reliability was established.

### Definitions of Terms

For this study, a number of operational definitions were determined. Additionally, because of the linguistic nature of the study, other terms have been defined and included.

#### Operational definitions

1. Disabled readers--students whose achievement on the 4th grade SRA Achievement Test places them at or below the 30th percentile.

2. Story Schema Teaching Technique--instruction which exposes the reader to the organizational structure of the story. This is more fully discussed in Chapter 3.

3. Repeated exposure--operationally defined as subjects who are exposed to two or three periods of instruction.

4. Schema Scoring System--a scoring system which rates a student's ability to demonstrate an understanding of the organizational relationships within connected discourse and the inferences which are generated by that discourse during recall.

5. Over time--operationally defined as testing which will occur two weeks after instruction and initial testing.

6. Title I School--identified on the basis of the numbers of low income families present in the school population. The schools randomly selected for this study had a minimum of eighteen percent low income families.

#### Other Terms

1. Top-down processing--when the pattern of processing is determined by hypothesizing about the nature of the input, it is said to be top-down or conceptually driven processing.

2. Bottom-up processing--when the pattern of processing is determined primarily by the stimulus, it is said to be bottom-up or data-driven processing.

3. Schema--a data structure or abstract cognitive representation of a concept stored in memory. It contains the network of

interrelations necessary to the concept. A schema is not a definition, but rather, represents knowledge.

4. Story structure--the basic elements of a story; introduction, plot development and resolution.

5. Episode--a series of events or actions in a story.

6. Story parsing--the process of determining the relationships among the various parts of a story.

7. Proposition--a clause or sentence which contains an action or stative verb.

8. Stative verb--a verb that is used to describe the state of being.

9. Recall protocol--a transcribed retelling of the stories read by the subjects.

#### Significance of the Study

There are major gaps in our understanding of how skilled and disabled readers differ in their ability to process textual information. Miller states,

Of particular interest for understanding reading comprehension would be evidence concerning changes 1) in the probability that a cue will lead to retrieval, and 2) the nature of effective retrieval cues (Miller, 1976 p. 722).

It was the goal of this present research to provide data which may offer insight into the way that the disabled reader processes written information. It may, as well, offer a strategy for improving story comprehension by these readers. The results

should be of substantial assistance to teachers of reading and to publishers of reading programs.

#### Organizational Scheme of the Study

It was the intent of this study to evaluate the effectiveness of an instructional technique which might aid the disabled reader in recovering information. Evidence has been presented which supports the need for this type of study. The following chapters provide a theoretical base upon which the instructional technique was designed, as well as exact procedures carried out to accomplish the investigation. Finally, results and conclusions will be presented in terms of how they support the original hypotheses.

## Chapter 2

### REVIEW OF THE LITERATURE

#### Introduction

The purpose of this study was to examine the effectiveness of instruction in the use of story schema as an aid to comprehension and recall. It was hypothesized that this instruction would improve reading performance in disabled readers.

Although much reading research has focused on word recognition, studies in text comprehension lag far behind. There are major gaps in our understanding of the text comprehension process and the skills needed to make comprehension possible (Miller, 1976). While the literature in this field is in an embryonic stage, there is ample evidence to provide a theoretical framework upon which this study is based.

The advent of an information processing approach to psychology provides a theoretical paradigm for studying the comprehension of written discourse. From an information processing point of view, understanding language in any form, oral or written, is not a simple bottom-up process in which meaning is constructed from input sentences or sensory data received through the eyes or the ears. Instead, language comprehension is an interactive process that combines sensory information with linguistic knowledge and a general knowledge of the world (Rumelhart, 1976).

In an attempt to present a body of literature which provides foundation for this research project, recent developments in four broad areas will be reviewed: information processing, schema theory of comprehension and recall, differences between good and poor readers in the comprehension of discourse, and discourse analysis.

### Information Processing

The development of information theory in the late 1940's and later the advent of computers has strongly affected psychological theory (Hansen, 1971). Viewing the human mind as functioning as a complex information processing device became increasingly popular in the late 60's and early 70's. In this sense, man is seen as an active processor of information (Norman, 1971). Just as the computer transforms information or data through a series of stages which results in an output, information enters the human mind through the senses, undergoes a series of transformations, where some information is lost and some is preserved. The system when properly queried, yields an output (Rumelhart, 1977).

Reading, as a complex human behavior, has been studied in this light by psychologists and linguists. Klieman (1977) suggests that an information processing model of reading also consists of a series of stages. The first stage transforms that data which becomes input to the second stage and so on, until the final stage, at which point comprehension takes place. Different models reflect slightly different transformations, but most models contain similar components. The

models of Venezky and Calfee (1970), Gough (1972), Mackworth (1972), LaBerge and Samuels (1974), contain components for perceiving the written word, for retrieving word meanings, and finally for relating this information to previously stored knowledge. However, these models, like reading models in the past, view reading as a linear sequential process and are considered bottom-up models driven by sensory data (Rumelhart, 1976). Rumelhart suggests that this view prevents any top-down conceptual organization process from affecting any earlier process. No stage can be bypassed and no analysis at a higher level can modify analysis at a lower level.

Bottom-up systems, however, do not take expectations into account. Norman (1976) observes that the human system is guided by conceptualizations of the incoming information, that is, processes that start at the top and work down, and that the most persuasive evidence for the existence of a top-down system is the importance of contextual information in processing.

Computer models first provided some insight into how information from the senses combines with knowledge of language to permit understanding of oral or written language. The "Hearsay" system, a computer program at Carnegie Mellon University (Reddy and Newell, 1974), consists of a set of independent knowledge processes that are capable of cooperating to understand an utterance. There are three major sources of knowledge: acoustic phonetic, syntactic, and semantic. Reddy and Newell report that accuracy at the word level is 40% when only acoustic phonetic knowledge is used. This increases to 65% when syntactic



knowledge is added and to 88% when semantic knowledge is also used. The "Hearsay" system effectively demonstrates how different sources of knowledge contribute to the overall processing of sensory data.

The Augmented Transition Network (ATN) was developed as a model for human language comprehension (Stevens and Rumelhart, 1975). One important feature of the ATN is its ability to demonstrate that expectations and prior knowledge play an important role in the processing of information. Contextual information is of great importance in the speed of perceptual processing. Rumelhart observes that it has the effect of increasing the expectations, thereby reducing the number of stimulus features needed for recognition of a stimulus.

Context is shown, in numerous studies, to affect the recognition of letters and words. In 1897, Pillsbury studied the phenomenon that when reading for meaning typographical errors are not noticed. Subjects reported that the deletion or replacement of one or two letters in a word made little difference in their perception of the word. A number of studies report that letter recognition is faster and more accurate when it is presented in the context of a word (Reicher, 1969; Adelman and Smith, 1971; Wheeler, 1970; Baron, 1973). Nash-Webber (1975) report identification of an ambiguous symbol "ew" as a "w" when in one context and as an "e v" in another context. In 1954, Miller, Bruner and Postman found an increase in the number of letters reported from pseudowords as their letter order more closely approximated English orthography. Rumelhart (1976) cites an experiment by Stevens which found that the reading of orthographically irregular strings of letters

is often distorted and an orthographically regular string is perceived.

Numerous studies have investigated the effects of syntax and semantics on word recognition. Tulving and Gold (1963) determined that a congruous context facilitated word recognition. In two studies, the second correcting a confounding variable in the first, they measured the visual duration threshold for nine letter words. These words were presented in various contexts. However, the second experiment limited the context conditions to three: no context, four word congruous context, and eight word congruous context. Their results from both studies showed that context increased processing speed. In a similar study, Morton (1964) supports these findings. Contrary to the Tulving and Gold study, where subjects were instructed to guess, Morton asked his subjects not to guess, and presents evidence in the study that these instructions were followed. Morton concluded that the context required less dependency on visual information thus speeding processing time. Meyer, Schvaneveldt, and Ruddy (1974) reported experiments which asked subjects to decide whether a string of letters was a word or a non-word. Some words were related (i.e., bread-butter) and others were not (nurse-butter). Reaction time was measured and the results clearly showed that readers increase their expectations for related words and thereby increase the rate at which those words are recognized.

Perhaps some of the best evidence for the importance of syntactic and semantic constraints on word recognition are the investigations of oral reading errors. Goodman's (1973) research strategy is to look at miscues in oral reading. Miscues are mismatches which occur between

the text and the reader's response. Goodman found that substitution miscues were most often the same part of speech as the text word. For example, he found that sixth grade students substituted nouns for nouns 86% of the time, verbs for verbs 84% of the time, etc. He also observed that skilled readers frequently substituted words that were meaningful. Small was substituted for little, etc. Yetta Goodman, (1971) in her study of first graders, found similar results.

Other studies support these findings. Kolers (1970) found that 70% of adult readers' substitution errors were the same part of speech, while Weber (1970) found 90% of the substitutions of first graders were grammatically correct. In their study of oral reading errors by adults, Stevens and Rumelhart (1975) discovered that 80% of the errors were of the same part of speech. If syntax had no influence on word recognition, because it is a higher level process, then oral reading errors should be more closely related to the graphic features of a word. These studies indicate that readers do use higher level processes to facilitate the processing at lower levels.

Further documentation of the importance of context can be seen in the many theoretical works which indicate that word meaning can be totally dependent upon the sentence and that sentence meaning is often determined by the general context of a paragraph. Linguists such as Chomsky (1965), Katz and Fodor (1963), and Fillmore (1968), have demonstrated the ambiguity of our language and how context is vital to the disambiguation in the apprehension of meaning. For example, the word "man" can have many meanings which change depending upon the context

of the sentence.

The man is tall.  
They man the boats.

Sentences such as "They are eating apples," when more information is supplied, can convey an entirely different message (Slobin, 1971).

They are eating apples.  
They are not suitable for cooking.

They are eating apples.  
They are so hungry.

Finally, Bransford and Johnson (1973) carried out a number of experiments designed to explain the role of context in discourse. Subjects were given paragraphs to read with or without context and asked to recall the passage. An example is the following paragraph:

The procedure is actually quite simple. 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. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one never can tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will then have to be repeated. However, that is part of life.

Some subjects were supplied with the title to the passage, "Washing Clothes", and others were not. Those subjects who were told the topic of the paragraph remembered twice as much as those who were not.

Clearly, although background of experience is important to comprehension, meaning is even more critically dependent on context.

To summarize then, it would seem that a reader must frequently use information at a high level of analysis in order to gain meaning at a lower level of analysis. The literature suggests that reading cannot be a simple linear, bottom-up process where letters are strung into words and words into sentences to produce meaning. Other sources of knowledge, working from the top and going down, must contribute to the overall processing of data. It would also appear that the expectations a reader brings to the task of reading may be an important aspect of comprehension. Linguistic inputs are designed to fit into a general framework and are dependent upon that framework to make sense.

#### Comprehension and Recall of Discourse

While the studies previously reviewed show the effect of higher processing levels (syntactic and semantic) on lower levels (letter and word), research also indicates that still higher levels of processing assist in the comprehension and recall of discourse (Norman, 1976). There have been many labels given to these higher levels by researchers working in the field of artificial intelligence but there seems to be a substantial convergence of opinion on the essential components of systems for representing knowledge. Several models are presented for review.

In 1975, Minsky proposed a theory that is based on what he calls

frames. Since then, Charniak (1975), and Winograd (1975), have used this label. A frame is a higher order organizing principle for various kinds of objects, relations, and facts. Van Dijk (1977) states, "Frames define units or chunks of concepts that are not essentially but rather, typically related. They unify concepts of various types and at various levels of representation." For example, the concept of "party" has a network of properties while the frame of 'party' would include objects, actions, and events that are typical parts of a party. Thus, if a reader encounters a party episode in a story, many inferences can be made on the basis of the frame for 'party' that exists in his knowledge structure.

Similar to the frame theory is one proposed by Schank and Abelson (1977). Schank's computer program (SAM) is one which uses his theory of scripts for understanding a story. SAM has a few well defined scripts, one of which is a script for "restaurant." This involves a whole sequence of events that describes going to a restaurant. SAM can not only recall the story about a restaurant in detail, but also can fill in any detail not explicitly stated in the text.

The term schema, in connection with comprehension and recall of stories, was first used by Bartlett (1932). A schema, much like a frame or script, is a data structure which represents a person's knowledge about objects, events, situations, etc. It contains a network of interrelations that are characteristic of the major constituents of a situation or concept (Kintsch, 1977b).

Each of these models suggest that schemata (this term will be used

for the remainder of this review) are the key units of the comprehension process. Rumelhart and Ortony (1977:111-112) state:

Comprehension can be considered to consist of selecting schemata that will account for the material to be comprehended and then verifying that those schemata do indeed account for it. Thus, the bulk of the processing in a schema based system is directed toward finding these schemata which best account for the totality of the incoming information. On having found a set of schemata which appears to give a sufficient account of the information, the person is said to have comprehended.

The authors go on to say that one of the most important aspects of the schema theory of comprehension is the role of prediction which allows the reader to make use of knowledge of linguistic input (i.e., the redundancy of language) to speed the processing of information.

As shown by Schank and the computer program SAM, schemata serve as powerful devices for making inferences. Pearson (1976) observes that it accounts for the relationship between what is in the text and what the reader brings to the text. Thus, if the reader finds the schemata which accounts for the incoming data, he is also able to use this knowledge to more fully develop the statements implied by the text, thereby increasing comprehension.

Rumelhart and Ortony (1977:116) propose that there is a close relationship between remembering and understanding.

Our memories are natural side effects of the comprehension process. In comprehension, various aspects of the input are associated with a configuration of schemata and those instantiated schemata institute our interpretation of the input. Just as comprehension uses schemata to assist in interpreting sensory input, memory utilizes schemata to assist in interpreting fragmented storage.

To summarize, the schema theory of comprehension attempts to explain how prior knowledge is used in high level processing to interpret oral and written discourse. A number of investigations have been conducted which support this theory. The first of these conducted by Bartlett (1932), studied how college students recalled an Indian folktale. He found that after delayed recall, their errors often made the folktale come closer to a more idealized story. He concluded that the subjects used their knowledge of story structure or story schema to reconstruct the folktale.

Kintsch and Van Dijk (Kintsch, 1977a), report a study where some subjects were asked to read a story in a scrambled order and others were asked to read the same story in normal sequence. The average reading time for the scrambled order was 9:05 minutes as compared to 7:34 minutes for ordered stories. However, when subjects were asked to write a summary of the story, both groups did equally well. The conclusions of the authors are that scrambling the order of a well-structured story does not affect comprehension because the use of schema allows readers to match the information in the message to the slots in the schema. On the assumption that story schemata is culturally derived, the authors asked subjects to read a story that had a typical Western European story structure. Other subjects read an Apache myth. The readers' summaries showed that the conventional story structure produced superior summaries. The myth was more difficult to summarize because events were not casually related and because they did not follow a complication-reso-



lution pattern that is normal for Western European stories.

In order to more fully understand the role of schema in comprehension, Kintsch (1977a) reports a study, in progress, with four-year-old children. Subjects were shown pictures of a story and were asked to tell a story about them. The pictures were removed and the children were asked to retell that story. Some subjects were shown pictures in their normal sequence while others were shown pictures in a random order. The pictures were then presented to an adult population in proper order and subjects were asked to tell the story depicted by the pictures. Results showed that in the normal sequence presentation, children's retelling was similar to that of the adult. In the scrambled order presentation, children were apparently trying to make up a story to go with the pictures but did not come up with the one produced by adults. Findings suggest that even very young children have developed knowledge of story schema.

Another study conducted by Mandler and Johnson (1977), asked subjects from first grade, fourth grade, and college students to recall two stories. All subjects were tested for recall ten minutes later for one story and twenty-four hours later for the second. The results indicate that while adults recall more, even the younger children are sensitive to the structure of a story.

Further support of the schema theory is Spiro's investigation (1975). Spiro presented his subjects with a story about an engaged couple. In the story, the boy does not want to have children and

he finally discloses this fact to his fiancée. The story concludes with the couple involved in a fight. The subjects were then casually told the story was true and the couple finally married. Recall was tested six weeks later. Of course after six weeks, many errors were present, but the most common error was the importation of the information which allowed the story to come to a traditional conclusion. Most subjects ended the story with several different versions, but each provided a satisfactory resolution.

Attempts to manipulate schematic knowledge used by subjects have been reported by Sulin and Dooling (1974), and Brown, Smiley, Day, Townsend, and Lawton (1977). The first study used ambiguous biographical passages, and adult subjects could interpret these passages as being about actual famous or fictitious people. Subjects who were told that the story concerned the famous character, injected previous knowledge of that character in their retelling. In a similar experiment by Brown, et al, children were asked to read a passage and were told that the main character was either an escaped convict or a chimp from "Planet of the Apes." Results were similar to those of Sulin and Dooling (1974). Both studies suggest that children and adults use pre-existing knowledge schemata to elaborate and embellish their retention of a story.

The notion that schemata allows for inferencing during reading is supported by Frederiksen's study (1975). Subjects recalled a descriptive essay about Circle Island. On the assumption that during reading, inferences in the form of overgeneralizations take place (Dawes, 1966), Fredericksen looked at the differences between the

subjects' reproductions of the text and the actual text. Any deviation from the text was scrutinized for four properties: overgeneralizations, pseudo-discriminations (or overspecifications), inferences or statements that were implied from the text, (these three were called constructions) and finally, elaborations or new material introduced by the subject. Frederiksen found that in four recall trials the elaborations decreased while the overgeneralizations, pseudo-discriminations, and inferences remained constant. Even though the recall more closely approached the text after the fourth presentation, constructions, (overgeneralizations, pseudo-discriminations and inferences) did not change. Once the subject makes a construction, he retains it on later trials. The researcher concluded that these constructions are made during the reading process.

Paris and Lindauer (1976) also investigated the role of inference in comprehension and memory. An underlying proposition of their research was that in order for a child to remember textual information, there must be an active embellishment of the stimulus material with his own implicit knowledge. Their study supported the hypothesis and also determined that there is increased proficiency in spontaneous inferential operations as age increases.

The research thus far reviewed appears to support the view that comprehension is an interactive process in which the reader's knowledge must be used to interpret and organize written discourse. This knowledge enables a reader to conceptually organize a text and to "fill in" or make inferences whenever information in the text is not explicit.

### Differences Between Good and Poor Readers

In addition to the many investigations into those factors which contribute to comprehension and recall, there is a considerable body of related research which has been conducted to determine the factors related to a lack of comprehension and recall, or reading disability. Most of this has focused on the perceptual-deficit hypothesis (Vellutino, 1977). This theory has been questioned as more recent investigations have revealed the major importance of the various components in the reading process (Mattingly, 1972; Carroll, 1972). Psychologists and reading specialists began to realize that adequate decoding or word identification was insufficient for comprehending prose passages (Gibson and Levin, 1975; Mackworth, 1972). The literature suggests there are four major differences in the manner in which skilled and disabled readers process textual information, each tending to reveal the use of only bottom-up strategies by the less skilled reader.

#### Ability to Use All Cues

The first of these is the ability of the skilled reader to use all linguistic cues to predict or anticipate what is in the text. Frank Smith (1971) proposes that there are two sources of information in reading, the visual, from the printed page, and the non-visual or prior knowledge that the reader possesses. An overreliance on visual information leads to an overloading of the cognitive processing and loss of comprehension. He concludes that the skilled reader makes use of the redundancy of language to select a few distinctive features

for testing against what is expected. Syntactic and semantic constraints operate to reduce the number of possibilities and allow the testing of these possibilities from a minimum visual input.

Craik and Tulving (1975; 292) have shown that processing in the skilled reader is characterized by selective input. Only those low-level analyses necessary to activate higher level processes are carried out. "When a stimulus is highly predictable at the semantic level, only minimal structural analysis, sufficient to confirm expectations would be performed."

Schwartz (1976), on the other hand, reports that disabled readers fail to utilize a variety of information during experimental situations. A study by M. Mason (1975) provides evidence that poor readers did not utilize spatial redundancy patterns. In a comparison between good and poor readers, Jana Mason (1976b) discovered that skilled readers recognize words without extensive orthographic analysis while poor readers tend to rely on orthography and graphophonemic relationships.

Various investigations have determined differences between good and poor readers by analyzing error behavior. Isakson and Miller (1976) examined the sensitivity of fourth grade students to syntactic and semantic constraints in sentences. Their findings support their hypothesis that children who have low comprehension ability ignore syntactic and semantic cues and concentrate on individual words and a graphophonemic analysis. Mason's (1976) examination of errors made by beginning readers indicates that less able readers made errors that reflect an attempt to match sounds and symbols of single letters.

Vellutino, in an attempt to disprove the perceptual deficit theory, conducted several investigations into the reading behaviors of unskilled readers (Vellutino, Harding, Phillips and Steger, 1975; Vellutino, Steger, DeSetto and Phillips, 1975; Vellutino, Smith, Steger and Kaman, 1975). His conclusions support the notion that poor readers do not use implicit linguistic cues (phonological, semantic, and syntactic redundancies) that could alert them to critical differences in letters and words and thus decrease processing time. Consistent with these findings are the conclusions of an experiment conducted by Waller (1976). After assessing a reader's awareness of meaning and structural characteristics of sentences, he found that poor readers are less effective in utilizing a linguistic code. The author suggests that this is because poor readers rely more heavily on a visual code.

Analyses of reading miscues (Goodman and Burke, 1973) support the notion that poor readers over-rely on visual information. Substitutions made by good readers are most frequently semantically acceptable in the passage and do not change meaning. Poor readers' substitutions are more graphically and phonemically similar to the text word and are frequently semantically and syntactically unacceptable. The authors conclude that while miscues do not disappear as readers develop proficiency, there is a qualitative difference in the miscues which indicates the reader's ability to use all three cue systems, graphophonemic, syntactic and semantic, simultaneously. Other investigations using the Reading Miscue Inventory (Goodman and Burke, 1972) uphold these findings (Page, 1970; Menosky, 1971; Gutknecht, 1972).

### Error Correction

A second major distinction between good and poor readers is the ability to correct an error that is not sensible. Clay (1966) found in her study of 100 beginning readers that self-correction was a more accurate predictor of success in reading than either readiness tests or intelligence. The top readers corrected one in every three or four errors while for the low group, error correction rates were as low as one in twenty. The author reasons that to correct an error, a reader must be aware of all available cues: meaning, grammatical structure, letter forms, letter-sound relationships and even pictures. These must be used as a guide for search and check procedures so that efficient information processing can occur.

Investigations of oral reading errors between skilled and disabled readers support Clay's findings. Gutknecht (1976) analyzed oral reading miscues of learning disabled children. Using previous research of normal readers' miscues for comparison, he observed that a major difference between the two was the correction strategy utilized by the reader with learning problems. Disabled readers only corrected on the basis of graphic mismatches while skilled readers corrected because they detected a disruption in meaning.

### Ability to Organize Language

A third reported difference between skilled and unskilled readers is the ability to organize language into meaning units. Clay and Imlach (1971) found that disabled seven-year-olds were unable to group words

syntactically. This forced them to rely on slow word-by-word reading. In contrast, Tinker (1965) found that fluent readers were able to group words in phrases that are meaningful and are syntactically sensible. Other eye-voice span studies (Levin and Kaplan, 1970; Rode, 1974) support these findings. Poor readers can only anticipate a word or two ahead while skilled readers are able to anticipate whole phrases.

Cromer (1970) conducted an experiment to determine if phrase grouping would facilitate comprehension in poor readers. He divided his adult subjects into two groups, a deficit group or one who had a deficiency in vocabulary, and a difference group, who had adequate I.Q. and vocabulary skills. The difference group was considerably helped by this presentation. In a later study (Oaken, Wiener, and Cromer, 1971), further experiments with fifth graders postulated that adequate word identification was not sufficient for text comprehension. Poor readers were given word identification training; good readers were not. Comprehension was measured for an oral as well as a written presentation. The results indicated that word recognition training did not improve the poor reader's comprehension, and that good and poor readers did equally as well on oral presentation. The authors suggest that the skilled readers used linguistic organization as an aid to comprehension. Poor readers, even with word identification training could not subordinate word recognition to organize text into meaning units. Barganz (1974), with a different experiment encountered a similar outcome. He suggested that good readers have strategies that allow them



to focus on meaning units while poor readers attend to the surface structure of the text.

In an extremely meaningful investigation, Neville and Pugh (1977), compared performance of skilled and unskilled readers on three types of cloze tests. The first was a normal cloze reading test, the second, a listening cloze, and the third, a modified reading cloze, where the message was restricted in display in a manner similar to the listening test. It was hypothesized that if linguistic redundancies aided anticipation, and diminished processing load, differences in performance should be found between the normal cloze reading test and the restricted one where the reader, like the listener, cannot look back or ahead in the content. The researchers not only compared performance on the three presentations but also examined reading errors. Their findings indicate that skilled readers perform better on a normal cloze test than on a listening or restricted reading cloze. Poor readers, on the other hand, performed similarly on all three tests. More significant is the analysis of errors which revealed that better readers in the reading cloze, made fewer errors which only took preceding text into account, while on the listening and restricted cloze, errors were extremely similar to those made by poor readers on all three tests. The authors suggest that strategies of poor readers are like those used by younger readers. Poor readers fail to structure or organize language and do not use the expectation-confirmation approach used by more facile and experienced readers even though they are aware of syntactic constraints.

### Ability to Recall Important Information

In addition to an inability to organize language into syntactic and semantic units, poor readers also do not organize the ideas in a text so that the most important information can be recalled. Meyer's work (1977) supports this notion. In her studies, she found that higher ability students remember more ideas that are high in the content structure than low ability students. Less fluent readers appear to lack overall organization and relate only to low-level or fragmented details. Smiley, Oakley, Worthen, Campione and Brown (1977) found similar results with seventh graders. Two groups, one above grade level in reading and one below (these were Title I students), were tested for comprehension and recall of fairy tales. The researchers found that the skilled readers were more sensitive to gradations of importance units in the text. The poor readers, not only recalled less information but also recalled relatively less important information. Since the experiment included both an oral and written presentation and the Title I subjects did equally as poor on both presentations, the authors conclude that poor readers have a comprehension deficit that doesn't involve decoding skills.

Marshall's investigation (1976: 23) provided evidence of different comprehension patterns for fluent and less fluent readers. "The fluent reader can recreate the author's schema or general framework and can use this framework to organize ideas from the text into a synthesized whole." This reader is capable of inferring information not

explicitly stated by using prior knowledge and expectations. The less fluent reader appears to rely more heavily on explicit statements and is unaware of the importance of using relational information. This reader does not use the structural information in the text to facilitate and organize recall.

In summary, this review implies that disabled or unskilled readers appear to employ a bottom-up approach to reading. They do not call upon the higher level processes to facilitate comprehension.

### Discourse Analysis

Many of the investigations discussed above have been accomplished as a result of recent developments in linguistics (Fillmore, 1968; Grimes, 1975; Halliday, 1970). In order to determine whether or not a subject has correctly recalled the meaning of a passage, the researcher must be able to tell what the meaning is, and, in order to determine how the meaning of a passage affects its comprehension, the researcher must be able to represent that meaning. Discourse grammars have been developed to make this research possible. These grammars are structural models of connected logical discourse which allow studies in comprehension to be examined in a quantitative manner.

Carroll (1972) has reviewed much of the experimental research with discourse. Many studies have measured acquired semantic knowledge by one index such as advance organizers and questions (Ausubel, 1967; Carroll, 1972). However, most of these earlier studies provide little information about textual cohesion and its effects on the readers.

Frederiksen (1977: 314) states:

The property that makes discourse more than a collection of unrelated simple sentences is coherence. A major objective of discourse studies is to explain what makes a text coherent. One level at which one can study coherence is at the level of relations between sentences and clauses in a discourse... Discourse can also exhibit coherence at the propositional level.

Textual coherence, at the level of relations between sentences may be studied in terms of thematic organization or staging (Perfetti and Goldman, 1975; Grimes, 1975), which is really looking at a hierarchically arranged display of the content of the passage. Coherence may also be viewed in terms of the relationships between sentence meaning and presupposed knowledge either within the text, such as reference, substitution, ellipsis, and conjunction, or outside the text, such as exophoric reference (Halliday and Hasan, 1976). Kintsch (1977) suggests that the textual coherence can serve as a basis for segmenting a text into higher order structural units.

At the propositional level, a researcher would determine relations among propositions such as causal, conditional, time, or location. Some of these relations would not be explicitly stated but would be inferred by the reader (van Dijk and Kintsch, 1977). According to van Dijk (1977), in coherent discourse, the sequence of propositions or micro-structures can be organized into semantic macro-structures or global descriptions. Any propositions which are not explicitly or implicitly related to other proposition do not contribute to the coherence of the text and are not considered part of the text. A discourse may have a macro-structure and a super-structure (i.e., conventional or organiza-

tional pattern of a fairy tale, Propp, 1968).

Numerous researchers have made major contributions to the field of discourse analysis. For the purpose of this study, only four will be reviewed: Frederiksen, Meyer, Rumelhart and Stein and Glenn.

Frederiksen's notions of discourse analysis have as their basis the concept of semantic networks (1975). Semantic networks are graphs consisting of semantic concepts which are connected by relational links. Since his investigations have dealt primarily with descriptive essays, he has concentrated on analyzing the semantic content of the text. This content is represented as a set of conceptual classes connected by set relations. In his 1972 study of the effects of specific task induced cognitive operations on comprehension and memory, he attempted to match a set relation in a subject's retelling to the corresponding set in a graph. In analyzing the mismatched relations he was able to determine that inferencing occurs as part of the reading process. Later works (Frederiksen, 1976), describe twenty-six types of text-based inferences the author is currently studying.

Meyer's research (1974, 1975) into discourse analysis is based upon the work of Grimes rhetorical relations (1975) and Fillmore's case relations (1968). Case relations consist of semantic relationships between noun phrases and verbs. The verb and set of noun phrases that relate to it form the proposition of the sentence. The inter-sentence relations are viewed as a set of semantic hierarchies. A passage is segmented into propositions, a predicate and its role. Predicates and their roles are organized in hierarchically arranged tree diagrams, which show how the

content of the passage is organized. One important feature of Meyer's model is that it specifies the relationships between ideas in a passage. More important ideas are located at the top levels of the tree diagram, while less important ideas are found at the bottom. In her investigations into comprehension, Meyer (1974) found that underlying semantic representation of a text is a better predictor of recall than the surface structure, and that subjects consistently recall information that was located at the top of the underlying structure with greater frequency than information that is less important.

Rumelhart (1975, 1977) has confined his work to narrative discourse. He postulated that narratives have their own internal or idealized structure which he labeled story schema. The schema is represented by a tree structure, composed of high order nodes for each category in the story (i.e., episodes and events), and terminal nodes for single propositions. Sentences in a story are parsed and placed into the tree structure to provide a graphic representation of the story. This configuration illustrates the ideal schema of a story as conceptualized by an adult.

Rumelhart states that a reader uses this schema to organize, summarize and retrieve events. Narrative dependencies among events allow the reader to generate certain expectancies based on knowledge about the internal structure of stories. According to Rumelhart, during encoding the schema acts as a general framework within which detailed comprehension takes place. In order to analyze narrative discourse, he developed a grammar or a set of syntactic and semantic rules. The syntax represents the constituent structure of stories, (i.e., setting, episodes, and events)

while the semantic interpretation determines the underlying meaning or relations between events. Relationships can be categorized into a number of semantic and syntactic categories. For example, a "then" category denotes the relationship between two events that are temporally sequenced. Because Rumelhart's characterization of story structure applied to a very narrow range of stories, several researchers have used modified versions of his story grammar (Thorndyke, 1977; Mandler and Johnson, 1977; Stein and Glenn, in press).

Stein and Glenn (in press) developed a similar system of analyzing stories. Because they encountered difficulty in using Rumelhart's system, they created a grammar which eliminated some of the cumbersome and more restrictive aspects of his form, such as the use of a double system, to explain relationships. In their grammar, a story is composed of a setting category and an episode system. Connecting these is an ALLOW relation, a relationship that makes another episode possible but does not cause it. The setting category contains information which introduces the characters and describes the context in which the story will occur. The remainder of the story is organized by the episode system. This system is composed of one or more episodes, each of which is represented by a logical chain.

Specific categories for relations between, as well as within episodes were defined by Stein and Glenn, a feature the Rumelhart grammar lacked. Within an episode, five categories were established to explain the sequence of information presented by the author: the initiating event which sets the stage for the goal; the internal response, or the affective

state of the character plus a goal plan; the attempt or action to accomplish the goal; the consequence or result of the goal attempt; and finally, the reaction of the character to the consequence. The authors acknowledge that many stories have episodes that delete one or more of these categories but in order for an episode to be considered complete, it must contain at least a goal, an attempt and a consequence. They assume that the remaining categories are inferred by the reader.

Most stories contain two or more episodes which relate to each other in several ways. Episodes are connected by one of three relations: AND, THEN and CAUSE. The AND relation assumes the episode is occurring at the same time as another, the THEN relation is a temporal one, and the CAUSE relation implies that one episode is caused by the other. The authors have conducted many studies to validate the story grammar (Stein, 1978a; Stein, 1978b; Stein and Nezworski, 1978; and Stein and Glenn, in press.)

Stein (1978a) discusses several studies which investigated the notion that if a story sequence corresponds to the ideal or expected sequence, recall should be better than when the sequence deviates from this expectation. She assumed that reorganization of incoming information would occur, thereby making the recall conform to an expected sequence. In one study (Stein and Glenn, 1978) seven and eleven-year-old children were asked to make a good story from twelve sentences. A significant positive correlation was found between their stories and the Stein-Glenn grammar. Story sequence was then manipulated by creating deviations from an expected sequence. Results indicated that in almost



all the cases, recall followed an expected sequence rather than the presented sequence. When amount of recall was compared between a control group, who received an expected sequence, and the experimental group, receiving the deviations, the findings showed a significant decrease in accurate recall for the experimental group.

In order to verify an adult concept of story schema, Stein and Nezworski (1978) presented subjects with two texts that deviated from an ideal sequence. When asked to recall a good story, recall was nearly identical to the expected sequence rather than the order of the text that was presented to the subjects.

### Conclusions

In summary, it appears that there is substantial evidence to support a schema-based theory of comprehension. While evidence is not conclusive, it would appear that skilled readers may make use of structural schemas to aid in comprehension and recall, while poor readers lack this organizational strategy.

The notion that providing a conceptual framework to improve comprehension and recall is not new. Ausubel's theories (1965) of "advance organizers" and Collins and Quillan's work (1972) on the structure of semantic memory both indicate that prior exposure to high level concepts should help a reader to store important information in memory. However, the research supporting these notions is inconclusive. Some studies found that advance organizers are effective (Ausubel, 1960; Hershberg and Terry, 1965), while others report they are not (Allen,

1970; Schultz, 1966). Since little or no evidence is available to make a decision about the value of instruction in the use of an abstract structural schema, it seems that the potential for this line of inquiry might contribute in a small way to the improvement of educational practice.

## Chapter 3

### PROCEDURES

#### Introduction

This study attempted to determine if instruction (Story Schema Teaching Technique or SSTT) would improve reading comprehension of fourth grade disabled readers as measured by the Schema Scoring System (SSS). The number of exposures to the SSTT was manipulated, and testing occurred at two intervals, immediately after treatment and two weeks later. A no-treatment group served as a control to establish the degree of effect of the treatment.

The purpose of this chapter is to explain the methodology utilized in the study. A description of the sample, the stimulus materials, and the data collection procedures and analysis, is presented. Details of the pilot studies conducted prior to the main study are also included.

#### Population and Sample

Of the thirty-two Title I schools in Fairfax County, four schools from a group of sixteen in one area were chosen at random to participate in the experiment. Selection was limited to one geographical area because this area represents the schools with the highest incidence of low income families. The percentage of low income families in the selected schools ranged from eighteen to thirty-nine.

From the total number of fourth grade disabled readers in each

school, a pool of twenty were randomly selected. Each reader scored at or below the 32nd percentile on the reading subtest of the SRA Achievement Test and was either enrolled in a Title I class for reading or, as in one school, where no Title I program existed for fourth grade students, was receiving remedial reading instruction daily from the reading teacher. From this pool of disabled readers, twelve subjects in each school (six boys and six girls) were randomly selected to participate in the experiment.

Each of the four schools was then randomly assigned to the control or one of the experimental groups (one, two, or three treatments). Hereafter, these groups will be referred to as Group 1 (one treatment), Group 2 (two treatments), and Group 3 (three treatments).

The means and standard deviations of the SRA Reading Achievement subtest scores for the final control and experimental groups are reported in Table 1. A one-way analysis of variance revealed no significant differences between the groups ( $F = .90; 3, 4, p > .05$ ).

Table 1

Means and Standard Deviations of SRA Reading Scores

	Raw Score	Standard Deviation
Control	13.16	.97
Group 1	13.66	1.05
Group 2	13.33	.96
Group 3	13.08	1.21

### Stimulus Materials

Two stories with an equivalent internal structure (Mandler and Johnson, 1977) were used for testing. This structure includes a setting and introductory episode, two episodes for development, and a concluding episode. One story, "Little Mo and the Dragon", was adapted from a third grade basal story (Houghton Mifflin Co., 1976). Adaptation occurred in several ways. First the readability level was lowered, and second, the episodes in the complication or middle of the story were elaborated and strengthened to conform to a more ideal structure (Bartlett, 1932; Rummelhart, 1975, 1977; and Stein and Glenn, in press).

The second story, composed by the researcher was developed in a theme that would be familiar to most fourth grade children. "Billy the Strike-Out King" was carefully constructed to have an equivalent internal structure. An attempt was made to include many of the concept words used in "Little Mo and the Dragon" (i.e., charm, luck, etc.). The episodes in both stories conformed to complete structure requirements (Stein and Glenn, in press).

The Spache Readability Formula (1974) was employed to insure that both stories had a similar readability. This formula uses two factors, sentence length and vocabulary, to evaluate the reading difficulty of material below fourth grade level. According to this formula, "Little Mo and the Dragon" and "Billy, the Strike-Out King" have a reading level of 2.0 and 2.1 respectively.

### Instrumentation

The Schema Scoring System (SSS) was developed to rate students' ability to demonstrate an understanding of the organizational relationships within a story, as evidenced in their retelling of that story. The design of the system is based on the work of Rumelhart (1975), Mandler and Johnson (1977), and Stein and Glenn (in press).

These researchers developed a grammar to represent the reader's concept of the internal organization of a story. The grammar defines categories of relationships which are organized by a set of rewrite rules into a tree structure, thus providing a graphic representation of the schema. (See Figure 1.)

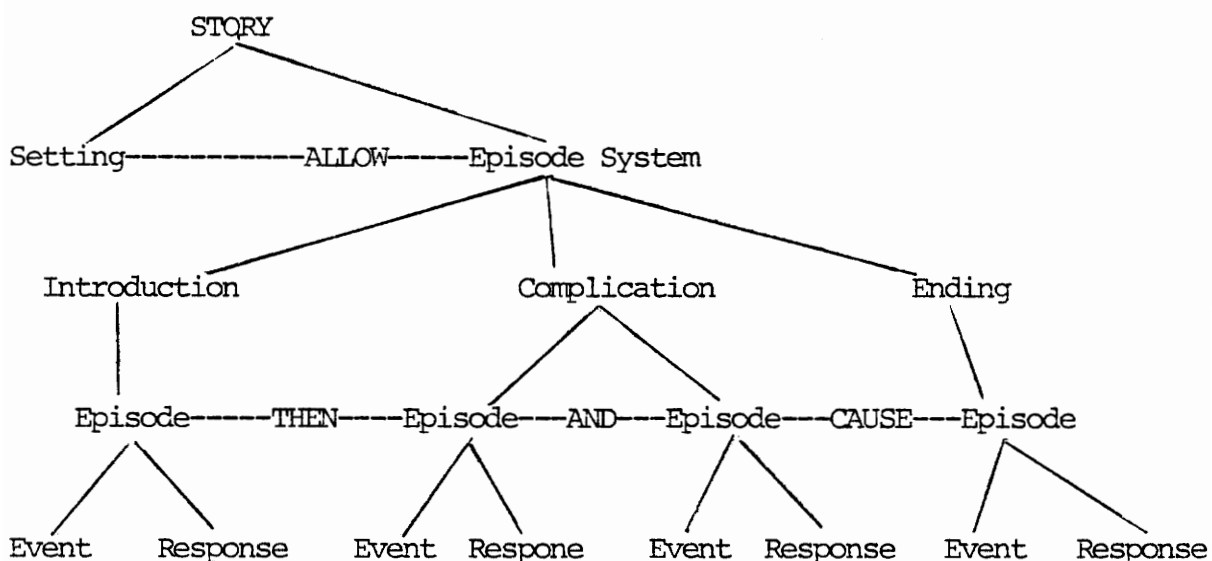


Figure 1: Representation of Story Schema

Figure 1 is based on the assumption that a story is composed of a setting and one or more episodes. The setting is connected by an ALLOW relation (a relationship that makes the first episode possible, but does not cause it). The episodes may be divided into three broad categories: 1) exposition or introduction which includes the problem or goal, 2) plot development or complication, and 3) conclusion, which includes the resolution or final outcome. Each of these contains a series of events that form the episode system.

Each episode is connected to another by one of three relations: AND, THEN and CAUSE (Stein and Glenn, 1978). The AND relation is one not frequently used in simple stories because it indicates the two episodes are occurring simultaneously. This might be signalled in the surface structure by words such as "meanwhile" or "back at home \_\_\_\_ was happening." The THEN relation occurs when two episodes have a definite temporal sequence, while the CAUSE relation implies a causal connection between two episodes.

Each episode involves events and the characters' reactions or responses to those events (See Figure 1). An internal response, that is, the mental response of a character to an event, is frequently not stated in the surface propositions of a story. Then the reader is required to make inferences about the response based on preceding action, in order to fully comprehend the relationships between events (Frederiksen, 1975; Stein and Glenn, in press).

With this theoretical base, the Schema Scoring System was developed for this study. It was applied to the stories in the following manner:

1. Each story was segmented into propositions. A proposition was defined as a clause or sentence which contains an action or stative verb. For example, the sentence "Little Mo was a mouse who lived in a castle" contains two propositions: 1) Little Mo was a mouse, and 2) who lived in a castle.

2. Any inferences the reader was required to make to understand story relationships were included as propositions.

3. A measure of structural importance was obtained. To do this, raters selected those propositions in each episode which were essential to the story line.

4. Retellings were scored by allowing one point for each proposition recalled, an additional point for each inference stated, and a third point for each proposition that was judged structurally important. Incorrect statements were not scored.

#### Methods and Procedures

In an attempt to control for the variable of decoding skills, each subject was asked to read a list of twenty words, that were taken from the stimulus stories (Appendix A). The words were chosen because they were concept words and it was assumed that if these words were not decoded, comprehension would be severely hampered. The words were presented in isolation and in the context of a sentence. Since most of the students tested were able to identify the words without the use of context, only those who had immediate recognition of ninety percent of the words were permitted to remain in the study. Those subjects who did not



attain this criteria on the word recognition test were replaced by the random selection of another student from the original pool. Only six subjects out of the original forty-eight were replaced.

### Instructional Technique

The members of each group of twelve subjects were told they were going to participate in an experiment. It was explained to each group that the researcher wanted to see how much fourth graders could remember about stories they read. Before testing, fifteen minutes were spent with individual subjects in the control group, establishing rapport and discussing the concepts behind some of the words on the word recognition test (See Appendix B). Concepts emphasized were knights, knighthood, castles, dragons, witches, contest, and good luck charms. Subjects were able to make analogies with current television cartoon shows or other stories they knew to demonstrate their understanding of the words. For example, one subject noted that the giant in "Jack and the Beanstalk" lived in a castle.

The experimental groups did not review concepts. Instead, they were exposed, in groups of six, to varying periods of instruction. It was assumed that rapport would be established during the instruction. Each group of six subjects in Group 1 received twenty to twenty-five minutes of instruction. This was repeated on two consecutive days for the subjects in Group 2 and for three days in succession for Group 3. Details of each instructional session may be found in Appendix C. The structure of each session included questions and discussion about

the parts of a story and the information which might be found in each of these parts. Subjects were then provided with an outline (Appendix D) that explicitly stated the ingredients of a story (i.e., the characters, setting and problem are presented in the beginning). A familiar fairy tale was then recalled and the outline was used as a guide to focus on the important information. Finally, the subjects read a story and an activity was provided to reinforce the concepts of story organization. For example, during the second lesson, subjects were required to fill in a worksheet (See Appendix E). At no time were the test stories or their structure discussed.

#### Testing Procedure

All subjects in the study were tested individually. A very short practice story was read and retold by each subject to clarify the testing procedure (See Appendix F). The specific directions before and after reading were as follows:

Before: "I'd like you to read the story to yourself carefully so that when you are through you will be able to retell it to me."

After: "I'd like you to retell the story to me. Your retelling will be taped so that I don't have to write down what you say."

To minimize any story effect, half the subjects in each group were randomly chosen to silently read and retell one of the stimulus stories; the other half followed the same procedure with the alternate story. The directions were repeated before and after a story was read.

When subjects appeared to indicate that they had completed their

retelling (i.e., a pause of at least thirty seconds), an attempt was made to elicit as much information as possible. They were asked, "Can you tell me anything else?" or "Do you remember anything else?" If a remark was unclear, the examiner asked "What do you mean?" No other queries or probes were employed.

Two weeks later, each group was tested in the same manner with the alternate story. Those who had read "Little Mo and the Dragon" at the initial test period, read "Billy, the Strike-Out King" for the second testing and vice-versa. Subjects were reminded of the procedure followed during the first testing and directions were repeated.

#### Scoring Procedures

The propositions in each story were listed consecutively and then segmented into episodes. Each story contained ninety-two propositions and four episodes (Appendix G and H). Included in each of the stories were five inferences that were implied by the surface propositions. Most of these were internal responses, such as proposition twenty-one in "Little Mo and the Dragon", (Little Mo had to fight the dragon) or reactions, such as proposition twenty-eight (Little Mo was afraid).

In order to assess recall of important information, forty-two graduate students were asked to select the most important propositions for each story. The raters were directed to first choose no less than five nor more than ten propositions in each episode that were critical to maintain the story line. They were then asked to rank those chosen in order of importance. Of the propositions most frequently chosen, only

those that had been ranked as fifth or above in importance by at least five students were selected as the final choices. Using the Pearson Product Moment Correlation, an intra-group correlation was obtained ( $r = .93$ ). The important propositions are presented in Appendix I and J.

The transcribed protocols were then scored for the number of statements accurately recalled. Accuracy was defined as gist recall rather than exact reproduction of words or phrases. If the semantic content or the main point of a proposition was retained, it was considered accurate (Stein and Glenn, 1978). Since the investigation was concerned with the structural characteristics of recall rather than the egocentric use of pronouns, a proposition was considered accurate even if it contained an incorrect pronoun. For example, one subject used "he" to denote every person in the story about Billy, including a reference to Billy's mother.

The protocols were then scored for important propositions and inferences. When either of these were present, an additional point was awarded. For example, it was possible for a subject to receive three points if he or she recalled the gist of proposition twenty-one in "Little Mo and the Dragon," since it was classified as both an inference and an important proposition.

To insure against researcher bias an additional scorer was trained in the scoring procedure. One-third of the protocols were randomly selected for blind scoring. Inter-rater reliability was established at  $r = .96$  with the Pearson Product Moment Correlation.

### Pilot Studies

Preliminary research, undertaken by this investigator, was conducted to ascertain the effectiveness of the Schema Scoring System. The story, "A Line Down the Middle of the Room", was analyzed according to the SSS (See Appendix K). Fourteen fourth grade students from an elementary school in Fairfax County, Virginia, were used as subjects in the study. Seven skilled readers who scored above the 70th percentile, and seven disabled readers scoring below the 30th percentile, on the reading subtest of the Metropolitan Achievement Test (MAT), were asked to silently read and retell the story. No questions were asked during the retelling. The skilled readers showed a significantly greater efficiency in recall according to the SSS than the disabled readers ( $t = 9.67$ ;  $df, 12$   $p < .001$ ). The Pearson Product-Moment correlation yielded a positive correlation ( $r = .95$ ) when the SSS scores were compared with the reading subtest of the Metropolitan Achievement Test.

A second investigation was conducted to field test the stories used in the main study to determine if the SSS would provide similar results. The same procedures used in the first study were followed with three skilled and three disabled readers (as defined above). The twelve retellings were scored and correlated with the subjects' scores on the MAT. The Pearson correlation was positive ( $r = .93$ ). These correlations were expected to be excessively high because the sample was drawn from the extreme ends of a normal curve.

A third study explored the potential of the Story Schema Teaching

Technique. Three of the disabled readers from the original pilot were individually tutored for twenty minutes with the technique. A t-test showed a significant improvement in their scores. ( $t = 6.04; 2 p < .05$ )

### Analyses of the Data

The data were analyzed using a 4 x 2 mixed analysis of variance (treatment and time) with repeated measures on the second factor (Dayton, 1970). The first factor consisted of four levels: no treatment or control, one exposure, two exposures and three exposures to the SSTT. The second factor, time, had repeated measures across both levels. The first factor yielded comparisons between the means of the groups to test the prediction that the treatment would have a significant effect and that each successive treatment would have significant effects. The second factor provided an F ratio to test the retention effect of the treatment. It was predicted that although a loss would occur over time, those subjects who received the most treatments would attain significantly higher scores on the SSS. It was anticipated that a significant interaction would occur. The Newman-Keuls procedure (Winer, 1963) was employed to determine where the significant differences occurred.

### Summary

This chapter has attempted to specify the methods and procedures of this study in sufficient detail so that the experiment can be replicated. A description of the population, the instructional technique and

the testing and scoring procedures were included. The pilot studies, conducted prior to the major research tended to support the effectiveness of the scoring system as well as the instructional technique.

## Chapter 4

### RESULTS

#### Introduction

This study examined the hypothesis that helping poor readers to understand that stories have a structure, and teaching them how to anticipate that structure, would improve their retelling and comprehension of stories. Forty-eight fourth grade Title I students were randomly divided into four groups; one control and three experimental, each of the latter receiving a different number of treatments from one to three. Each subject silently read and retold a story after the last treatment. Two weeks later, both experimental and control subjects read and retold a second story. The retellings were scored by the Schema Scoring System (SSS).

A mixed factor analysis of variance with four levels of the treatment variable and two levels of trials was performed on these data. Since there is a highly restrictive set of assumptions concerning the variance-covariance structure that underlies a repeated measures design, it was necessary to determine if these assumptions were met. Therefore, before analysis of the data was undertaken, tests for 1) homogeneity of the four treatment level variance-covariance matrices, and 2) symmetry of the pooled matrix were conducted. Results indicated that univariate analysis procedures were appropriate to test hypotheses of equality of the means, in as much as individual matrices were homogeneous and the pooled matrix was symmetric (Kirk, 1968).



### Hypotheses

Three hypotheses were tested. First, it was expected that when the mean scores of the control and experimental groups were compared, increased exposure to the Story Schema Teaching Technique (SSTT) would result in a correspondingly significant increase in the means. Second, it was hypothesized that there would be significant differences between the means of the repeated measure, that is, that time would negatively affect the mean scores of the SSS. And finally, it was expected that the rate of forgetting would not be the same for each group. More treatments would lead to a slower rate of forgetting.

The null hypotheses are as follows:

$$\text{Hypothesis 1: } H_0: u_{A_1} = u_{A_2} = u_{A_3} = u_{A_4}$$

$$H_a: u_{A_1} \neq u_{A_2} \neq u_{A_3} \neq u_{A_4}$$

There will be no significant differences between the mean scores of the control group ( $A_1$ ) or any of the three experimental groups ( $A_2$   $A_3$   $A_4$ ).

$$\text{Hypothesis 2: } H_0: u_{AB_1} = u_{AB_2} \quad H_a: u_{AB_1} \neq u_{AB_2}$$

There will be no significant differences between the mean scores of the treatment groups (A) over time ( $B_1$ ,  $B_2$ ).

$$\text{Hypothesis 3: } H_0: (u_{A_1B_1} - u_{A_1B_2}) = (u_{A_2B_1} - u_{A_2B_2}) = (u_{A_3B_1} - u_{A_3B_2}) = (u_{A_4B_1} - u_{A_4B_2}) \\ H_a: (u_{A_1B_1} - u_{A_1B_2}) \neq (u_{A_2B_1} - u_{A_2B_2}) \neq (u_{A_3B_1} - u_{A_3B_2}) \neq (u_{A_4B_1} - u_{A_4B_2})$$

$(u_{A_3B_1} - u_{A_3B_2}) \neq (u_{A_4B_1} - u_{A_4B_2})$ . There will be no significant interaction between treatment and time.

### General Findings

The initial treatment of the data involved the calculation of the cell means and standard deviation for both factors, treatment, and time. These are summarized in Table 2.

Table 2  
Means and Standard Deviations  
by Time and Treatment

			Treatment				
			Control	One Treatment	Two Treatments	Three Treatments	Total $\bar{X}$
T I M E	Test 1	$\bar{X}$	13.25	28.00	40.00	52.25	33.37
		S	3.54	6.10	11.39	7.99	
E	Test 2	$\bar{X}$	10.75	22.41	31.00	41.66	26.45
		S	6.35	6.63	10.50	8.79	
Total		$\bar{X}$	12.00	25.20	35.50	46.95	

The results indicated graphically in Figure 2 show the average scores for the control and experimental groups, after treatment and two weeks later.

The data were subjected to a mixed factor analysis of variance with four levels of the treatment variable (between) and two levels of trials (within) to determine significant effects. The ANOVA summary table is presented in Table 3.

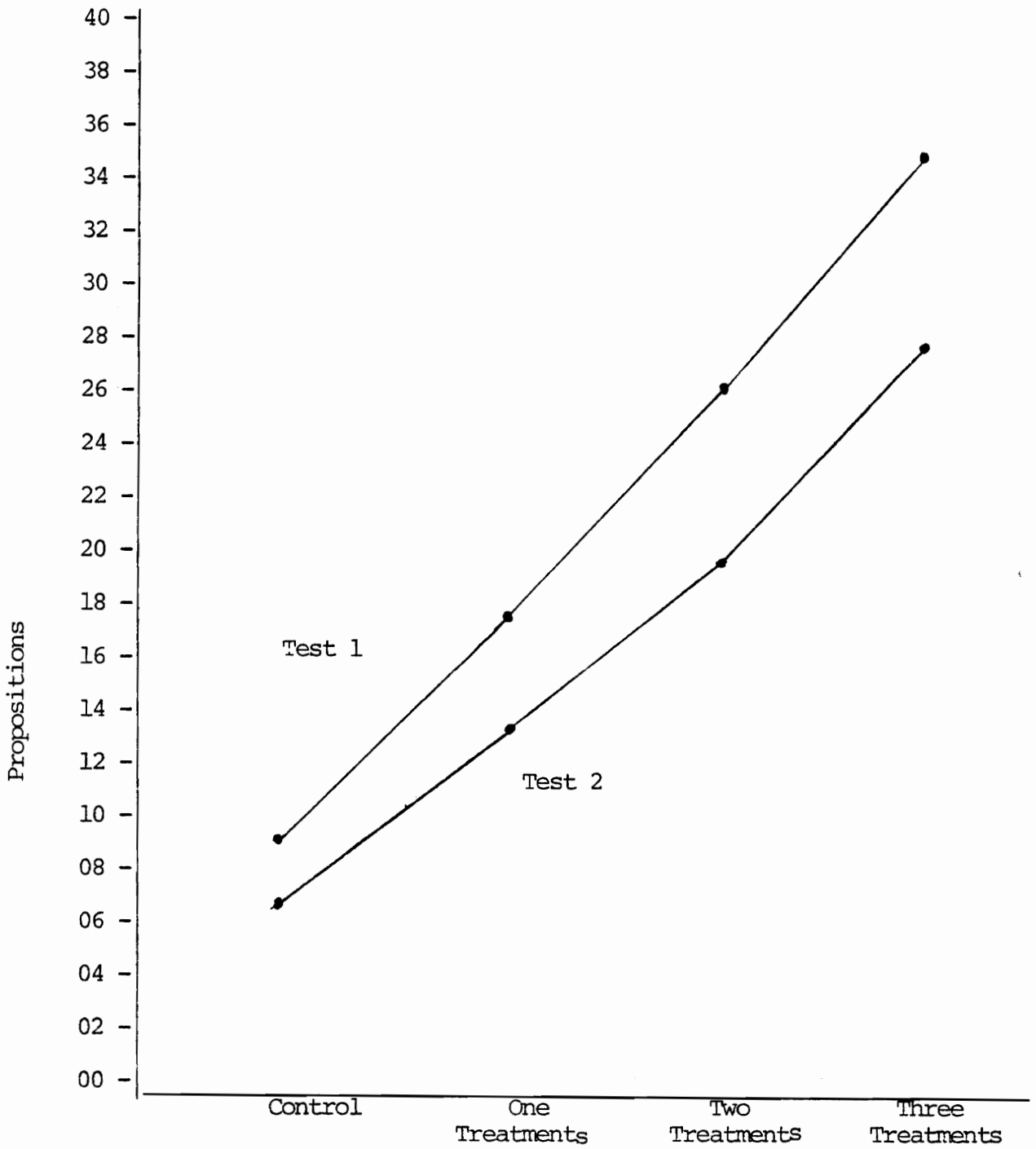


Figure 2: Mean number of total propositions recalled by each group

Table 3  
Summary Table for Analysis of Variance  
Using the Schema Scoring System

Source	df	MS	F
Between Ss	47		
Treatment (A)	3	5321.87	55.00 **
Error: between	44	96.76	
Within Ss	48		
Time (B)	1	1155.09	35.90**
A X B	3	78.84	2.45 (ns)
Error: within	44	32.18	

\*\*p < .01

The level of significance of the F ratio for the treatment variable ( $F = 55; 3, 44, p < .01$ ) led to the rejection of the first null hypothesis. However, in order to verify the results predicted by the research hypotheses, a Newman-Keuls test was applied to the means to determine which means were significantly different. Table 4 indicates the differences between the means of each level of treatment across the repeated measures factor. The analysis shows the difference to be significant ( $p < .01$ ) between all possible pairs.

The research predictions, that treatment would improve recall and comprehension and that successive treatment would further increase this recall were supported by the data.

The analysis also yielded significant effects for the repeated measure factor of time ( $F = 35.90; 1, 44, p < .01$ ), permitting the

Table 4

Results of Newman-Keuls Test for Treatment

Main Effect

		3tr.	2tr.	1tr.	Control
	Mean	46.95	35.5	25.20	12.0
3tr.	46.95		11.45**	21.75**	34.95**
2tr.	35.5			13.75**	23.50**
1tr.	25.20				13.2**
Control	12.0				

---

\*\*p < .01

---

rejection of the second null hypothesis. As expected, the mean scores were lower after a two-week period had elapsed. A Newman-Keuls multiple comparison test was employed to examine the retention effect for each group. There was a significant loss between the first and second testing for each experimental group, but not for the control group.

Firm evidence was not obtained to reject the third null hypothesis, since the data resulted in a non-significant interaction ( $F = 2.45; 3, 44, p > .05$ ). The tabled value at the .05 level is 2.82.

Although an interaction did not occur, further exploration of the data was conducted for several reasons. First, it was suspected that gains were maintained over the two-week time period and it was important to verify this possibility. Second, if these gains were maintained, it would provide further support that even after a time lapse, the treatment was still having an effect. Therefore, a post hoc analysis was performed, using the Newman-Keuls test. Tables 5 and 6 show the results of the simple main effects for each test. The analysis supports the notion that significant differences between groups were maintained, despite the significant time effect.

Since there was a quantitative relationship between the treatment levels, the data were considered suitable for trend analysis. The relationships between the dependent and independent variables as shown in Figure 2 are clearly linear. Therefore, only a test for the significance of the linear component was conducted. Results indicated

Table 5

Results of Newman-Keuls Test for Treatment  
Effect on Test 1

		3tr.	2tr.	ltr.	Control
	Mean	52.25	40.0	28.0	13.25
3tr.	52.25		12.25**	24.25**	39.00**
2tr.	40.00			12.00**	26.75**
ltr.	28.00				14.75**
Control	13.25				

\*\*p < .01

Table 6

Results of Newman-Keuls Test for Treatment  
Effect on Test 2

		3tr.	2tr.	1tr.	Control
	Mean	41.66	31.00	22.41	10.75
3tr.	41.66		10.66**	19.25**	30.91**
2tr.	31.0			8.59*	20.25**
1tr.	22.41				11.66**
Control	10.75				

\*\*p < .01 \*p < .05



that the linear component accounted for 49.88 percent of the treatment variance.

#### Data From Other Dependent Variables

The Schema Scoring System combined several scores: total propositional recall, structurally important propositional recall, and inferences. Because important propositional recall and inferences have been shown in other studies (Meyer, 1977; Marshall, 1976) to be poor in disabled readers, additional statistical treatments were performed, using each of these as a dependent variable.

#### Important Propositional Recall

Figure 3 graphically represents the data from the structurally important recall. The form of this graph is similar to that of the graph plotted with the SSS or combined dependent variables. A steady increase between control and experimental groups can be observed. The expected loss between testing is also apparent. Table 7 summarizes the cell means and standard deviations for important recall as a dependent variable.

The same mixed factor analysis of variance with repeated measures across one factor was employed to analyze this data. The summary table for the statistical treatment is presented in Table 8.

Analysis of the structurally important propositions recalled revealed significant main effects ( $F = 64.16; 3, 44, p < .01$ ) for

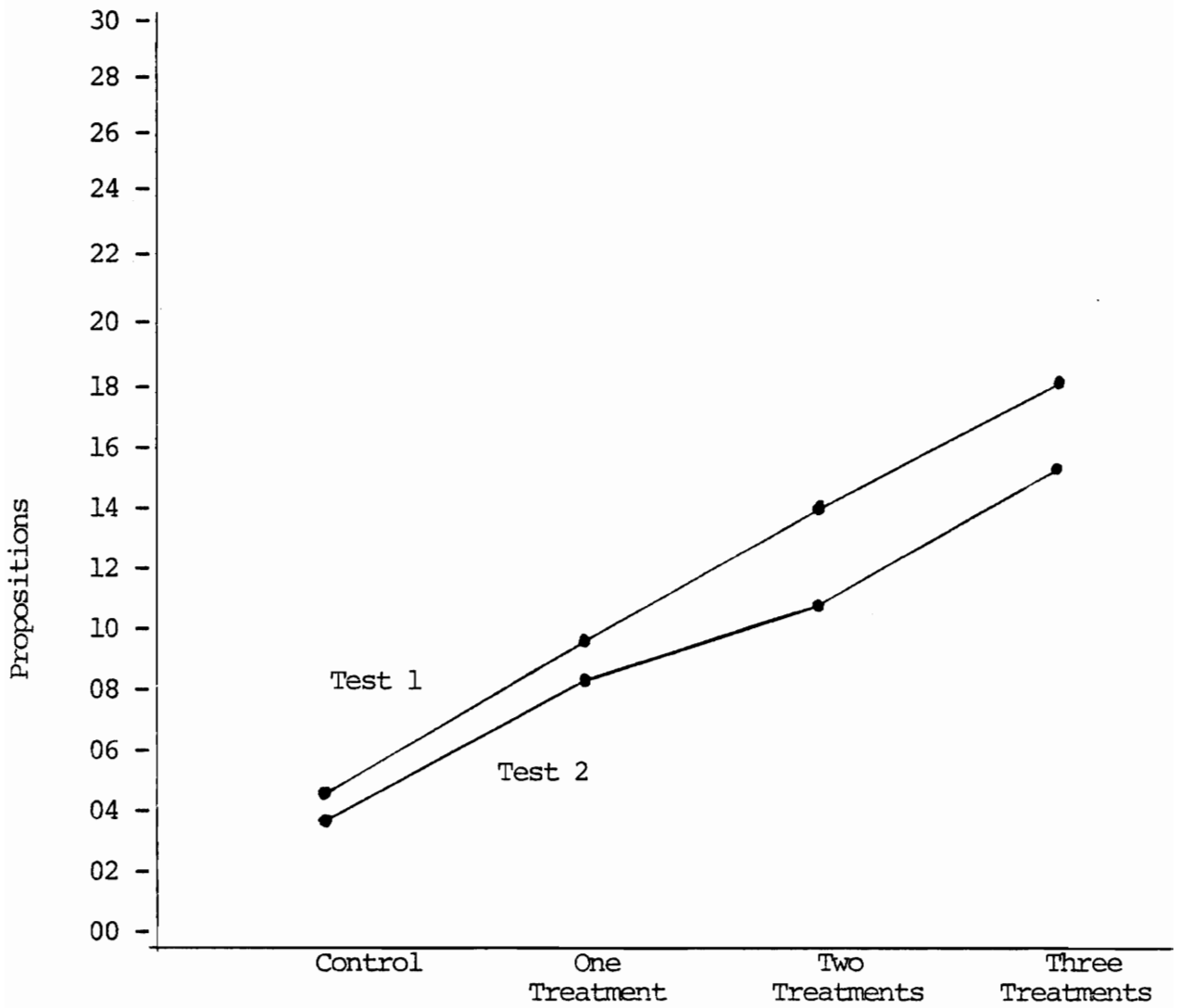


Figure 3: Mean number of important propositions recalled by each group

Table 7

Means and Standard Deviations for  
Important Propositional Recall

		Control	One Treatment	Two Treatments	Three Treatments
Test 1	X	4.30	9.50	13.70	17.60
	S	1.50	2.40	3.80	1.90
Test 2	X	3.40	8.30	10.80	14.60
	S	2.60	2.70	3.20	3.10

Table 8

Summary Table for Analysis of Variance  
Using Important Propositional Recall

Source	df	MS	F
Between Ss	47		
Treatment (A)	3	643.54	64.16**
Error: between	44	10.03	
Within Ss	48		
Time (A)	1	98.01	19.64**
A X B	3	6.62	1.33 (ns)
Error: within	44	4.49	

\*\*p < .01

the treatment variable, and ( $F = 19.64; 1, 44, p < .01$ ) for the time variable. The Newman-Keuls comparison (Table 9) indicates significant gains over the control group for each experimental group and significant differences between each experimental group.

Table 9  
Results of Newman-Keuls Test for Treatment  
Using Important Propositional Recall

		3tr.	2tr.	1tr.	Control
	Mean	16.10	11.98	8.72	3.85
3tr.	16.10		4.12**	7.38**	12.25**
2tr.	11.98			3.26**	8.13**
1tr.	8.72				4.87**
Control	3.85				

\*\*p < .01

### Inferences

Table 10 presents the cell means and standard deviations for the inference variable. Since the number of inferences recalled were so few, the data had to be collapsed across the two trials and only the treatment effect was examined.

Table 10  
Means and Standard Deviations by Treatment  
for Inferences

	Control	One Treatment	Two Treatments	Three Treatments
Mean	.125	.416	.455	.916
S.D.	.33	.78	.93	1.17

When the mean proportion of inferences recalled were plotted (see Figure 4), there appeared to be a steady increase in the number of inferences recalled from the control group to the three-treatment group. However, no further statistical treatment was undertaken because even the three-treatment group obtained an average of less than one inference.

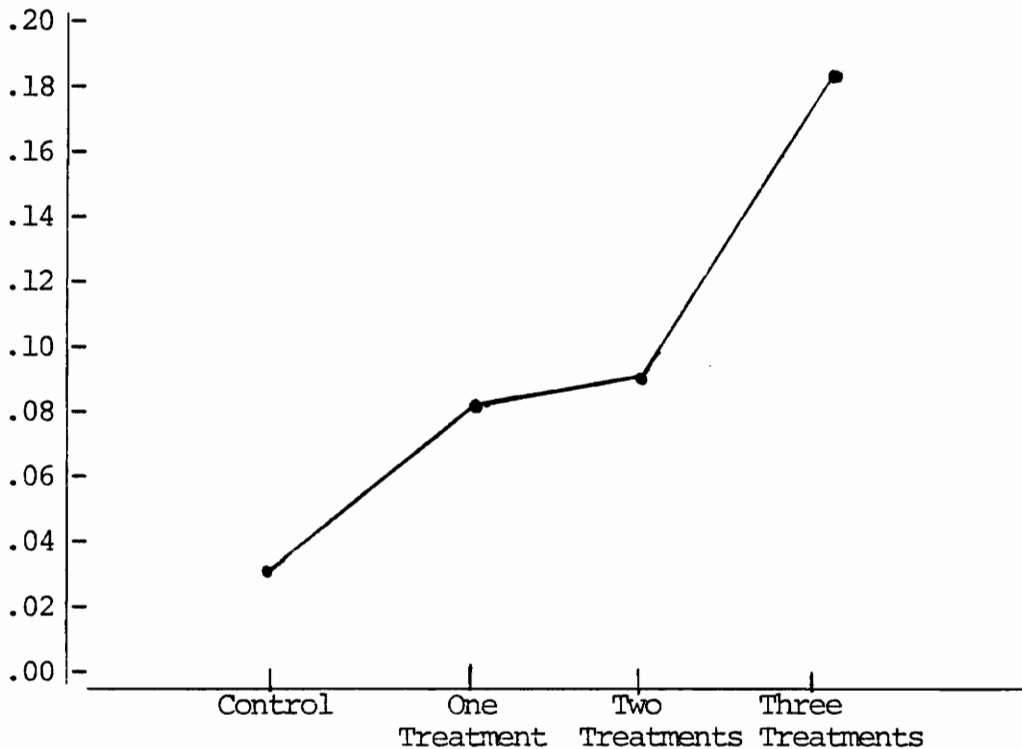


Figure 4: Mean proportion of inferences recalled by each group

### Total Propositional Recall

Previous studies (Meyers, 1977; Smiley et al. 1977) suggested that poor readers, when compared to good readers, were unable to recall structurally important propositions. Since the dependent variable was composed of not only inference and important proposition subscores, but also, a total propositional recall subscore, it was possible to compare total with important propositional recall. Figure 5 graphically displays the mean proportion of total propositions and structurally important propositions recalled. After 3 treatments, subjects recalled an average of 63% of the structurally important propositions on the first test and 52% on the second. In each group, the proportion of important propositions recalled was greater than that of the total recall.

### Additional Findings

To further analyze the ability of the subjects to recall structurally important propositions after treatment, the recall protocols of the above average readers (those scoring above the 70th percentile on a standardized reading test) from the pilot study were scored for presence or absence of structurally important propositions. Although the sample from this group was small, the mean and standard deviations were computed. Information about the mean and standard deviation for the treatment effect with each dependent variable is presented in Table 11. The means and standard deviations for the control and exper-

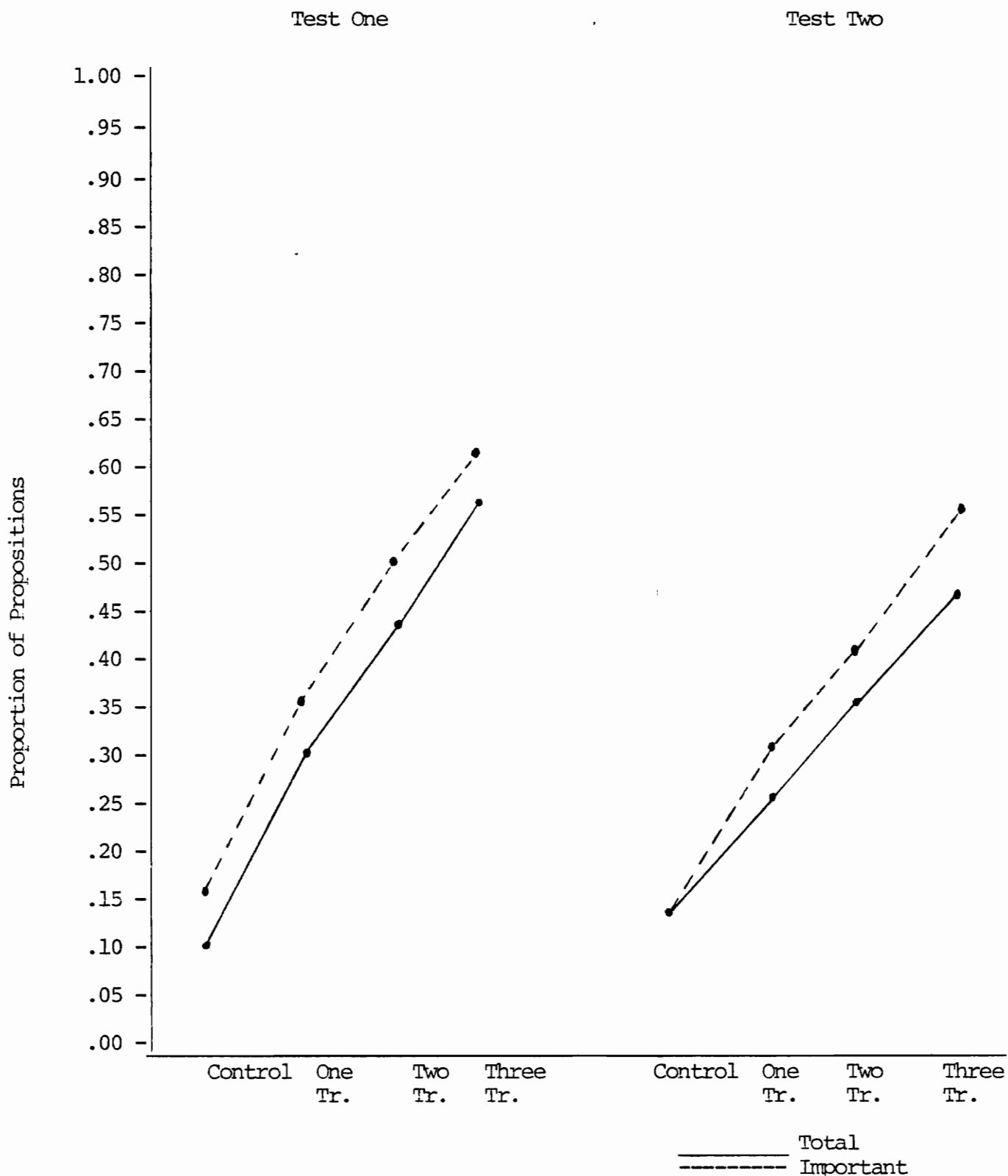


Figure 5: Mean proportion of total propositions and structurally important propositions recalled by group and test

imental groups are also included. While the total number of propositions recalled by the above average readers is considerably higher than by any of the experimental groups, it is apparent that each successive treatment produced results which more closely approximated the important propositional recall of the above average group.

TABLE 11

Means and Standard Deviations of Treatment Effect for Control, Experimental and Pilot Study (Above Average) Groups Using Total and Important Propositional Recall

		TOTAL	IMPORTANT	MEAN
		RECALL	RECALL	PROPORTION
				IMPORTANT
Control n=24	Mean	8.0	3.88	.14
	S.D.	3.34	2.13	
One Treatment n=24	Mean	15.83	8.91	.32
	S.D.	4.67	2.55	
Two Treatments n=24	Mean	22.83	12.25	.49
	S.D.	8.03	3.76	
Three Treatments n=24	Mean	30.04	16.08	.62
	S.D.	7.31	2.95	
Above Average Readers n=6	Mean	58.16	20.33	.73
	S.D.	7.75	2.80	

### Episode Recall

Further analysis of the recall protocols was made to determine the number of structurally important propositional recalls for each



major unit of the story (introduction, episode 2, episode 3, and concluding episode). It was expected that recall would be greatest for the conclusion and least for the middle two events (Stein and Glenn, 1977). The mean scores of the important propositional recall are presented in Table 12. Note that the total possible for each section is different for each story.

Table 12

## Means of Important Propositions by Story and Episode

MO STORY				
Story Episode	I	II	III	IV
Total Possible	7	7	7	7
Control	1.06	.66	.16	.66
One Treatment	3.40	2.08	1.56	2.41
Two Treatments	3.55	3.00	2.00	3.25
Three Treatments	4.55	3.41	3.25	4.33
BILLY STORY				
Story Episode	I	II	III	IV
Total Possible	6	5	7	10
Control	1.75	1.08	.25	2.08
One Treatment	2.00	1.41	1.16	3.83
Two Treatments	3.08	1.75	2.41	5.60
Three Treatments	3.75	3.08	3.08	6.83

Table 13

Means of Important Propositions  
Recalled by Story, Episode and Trial

	Test 1				Test 2			
	MO							
Episode	I	II	III	IV	I	II	III	IV
Total Possible	7	7	7	7	7	7	7	7
Control	1.3	1.2	.16	.83	.83	.16	.16	.5
1tr.	3.5	1.8	1.7	2.5	3.3	2.3	1.3	2.3
2tr.	3.3	3.8	2.6	4.0	3.8	2.2	1.3	2.5
3tr.	4.8	3.8	3.7	4.7	4.2	3.0	2.8	4.0
	Test 1				Test 2			
	BILLY							
Episode	I	II	III	IV	I	II	III	IV
Total Possible	6	5	7	10	6	5	7	10
Control	1.8	1.5	.33	1.7	1.7	.66	.16	2
1tr.	2.2	1.7	1.2	4.7	1.8	1.2	1.2	3
2tr.	3.3	1.8	3.0	5.7	2.8	1.7	1.8	5
3tr.	3.8	3.8	3.3	7.3	3.7	2.3	2.8	6

$N_s = 12$  for each story

Table 13 breaks down the totals by trials for each group. The totals of the control group indicates higher recall for the introduction and conclusion sections and lower totals for the middle episodes, particularly the second episode. While recall increases in each section, the disparity of scores for the four sections is greater for the control group than for any of the three-treatment groups. Figure 6 graphically illustrates these results.

### Story Effect

Although every precaution was taken to eliminate observable story differences, it became apparent, upon examination of the data, that the control group and the two-treatment groups recalled a greater number of propositions when retelling the Billy story, while the one- and three-treatment groups did slightly better with the Mo story. The means across trials were subjected to t-tests to determine if these differences were significant. Table 14 reports these results. Only the differences for the control group ( $t = 2.41$   $p < .05$ ) were significant.

Table 14

Comparison of Propositional Recall for Each Story by Group

	Mean		df	t
	Mo	Billy		
Control	6.5	9.5	22	2.41*
One Treatment	17.5	14.1	22	1.83
Two Treatments	21.08	23.08	22	.81
Three Treatments	30.0	28.41	22	.55

n = 24  
\*p < .05

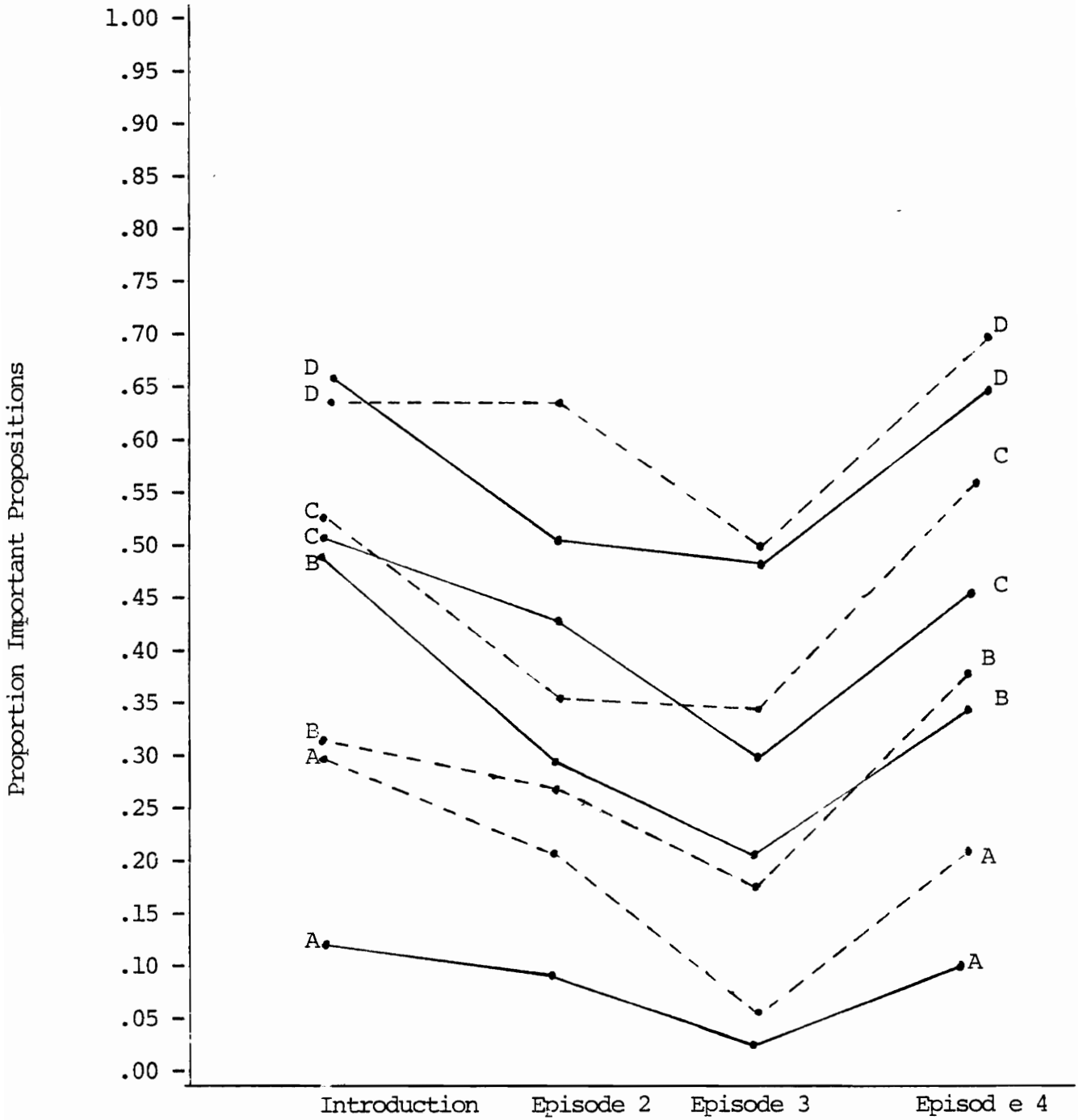


Figure 6: Mean Proportion of Important Propositions Recalled in Each Episode by Story and Group

— Mo  
 - - - Billy  
 A--control  
 B--one treatment  
 C--two treatments  
 D--three treatments

Sequence

Since sequential recall might be considered an important factor in using story schema during retrieval, an analysis of the number of propositions which were presented out-of-sequence was undertaken. A proposition was considered out-of-sequence only when it was an importation from another section. For example, a proposition from the introduction might be included in the recall about the conclusion. Propositions recalled after the query "Can you tell me anything else?" were also included. The data is reported in Table 15.

Table 15

## Out-of-Sequence Propositions

	Number of Protocols	Propositions Out-of-Sequence	Proportion of Total Recall
Control	11	19	.10
1tr.	9	21	.06
2tr.	7	20	.04
3tr.	1	2	.002

According to the table, more out of sequence propositions appeared in the protocols of the control group than in any of the experimental groups. There was a sharp decline from .002 to .04 between the two- and three-treatment group. Ten percent of the total propositions recalled by the control group were out-of-sequence.

## Summary

The problem investigated in this study was the effect of teaching poor readers to use story schemata as an aid to comprehension. Two independent variables, treatment and time were tested using a 4 x 2 analysis of variance with repeated measures across the time factor. The results of this analysis led to the confirmation of two of the three research hypotheses. There was a significant treatment effect as well as a significant time effect. A strong linear component was found to support the treatment effect. The anticipated interaction did not materialize.

After the initial treatment, further analysis with the components of the dependent variable was undertaken. Findings were similar when data from important propositional recall were analyzed.

A closer examination of the structurally important propositions revealed interesting patterns. Treatment brought one experimental group within eleven percentage points of a sample of above average readers. A significant story effect was noted for the control group. A complete discussion of these results as well as the presentation of anecdotal findings and their implications are undertaken in Chapter 5.

## Chapter 5

### CONCLUSIONS AND IMPLICATIONS

#### Summary of the Investigation

Current research in discourse processing indicates that textual information is understood and recalled with the aid of schemata. The schema theory of comprehension suggests that as encoding occurs, existing schemata set up expectations which assist the reader in processing the information. This is accomplished by a matching process, or by filling in the "slots" in a schema, and it enables the reader to selectively attend to the more essential elements of the text (Rumelhart and Ortony, 1977). During recall, the schema acts as a retrieval plan (Tulving and Donaldson, 1972) and also assists the reader in recovering information not present in the surface structure of the text (Shank and Abelson, 1977).

The literature further suggests that while skilled readers use these top-down processes to read more efficiently to help them predict and decrease processing time, disabled readers do not (Adams, 1977; Craik and Tulving, 1975). They do not make effective use of all available cues nor do they organize the concepts of the text into a coherent structure. This reveals itself in many ways, but particularly by the ineffective retrieval of the important elements of the text (Smiley, Oakley, Worthen, Campione and Brown, 1977; Meyer, 1977).

The purpose of this investigation was to test an instructional

technique from the schema theory of comprehension to help disabled readers improve their recall and comprehension of stories. Fourth grade Title I students, all reading at or below the 32nd percentile on the reading subtest of the SRA Achievement Test, were randomly selected and assigned to either a control or one of three experimental groups. Each experimental group received an increased exposure to the Story Schema Teaching Technique (i.e., Group 1 received one treatment, Group 2 two treatments, and Group 3, three treatments). All subjects read and retold two stories, one immediately after treatment and one two weeks later. The retellings were analyzed by the Schema Scoring System (SSS) for total recall of information, for recall of important information and for recall of specific inferences.

Three hypotheses were tested using a 4 x 2 analysis of variance with repeated measures across the time factor. Significant main effects for treatment and time were found. This chapter will review the results of each hypothesis as well as the findings from additional statistical analyses performed on the data.

### Conclusions of the Study

#### Hypotheses Tested

The first hypothesis, that increased exposure to instruction in the use of story schema would produce significant differences, was confirmed. It appears that by making students aware of the structure of simple stories, they were better able to organize the textual information along these lines for retrieval. According to the schema theory



of comprehension, the more efficient recall pattern of the experimental groups can be attributed to the students' ability to predict, in advance, the structure of the story and use it as a plan for retrieval. Post hoc analysis of the data revealed that significant differences were apparent between the control and between each of the experimental groups.

When the components of the Schema Scoring System were subjected to statistical treatment, similar results occurred. That is, the experimental groups were able to recall more high level or important propositions than the control. These findings would appear to support the first hypothesis for recall of important information. Successive treatments enabled subjects to selectively attend to the salient points in the story.

The second hypothesis, that there would be a significant loss over time, was also confirmed. The analysis showed a significant loss of retention over two weeks for each experimental group. The differences over time for the control group were non-significant, an expected result if the treatment was effective.

The significant interaction as predicted by the third hypothesis did not occur. The rate of forgetting appeared to be similar for all treatment groups.

#### Post Hoc Analyses

Despite the apparent loss over time, further statistical treatment of the data revealed that a significant instructional effect continued

after two weeks. In other words, although performance did decrease over time, those subjects who received the most instruction were still better able to retrieve information about the story.

A trend analysis further supported the hypothesis that successive treatments increased performance. The strong linear trend indicates that extended exposure increases the possibility that the quality of recall will be improved. However, within a linear trend there is always an optimum level, a point at which further instruction is no longer effective. The scope of this study precluded extension of instruction to that point. Additional research should be conducted to determine the optimal number of treatments necessary to maintain improved comprehension and recall over an extended period of time.

Based on the findings of this study, it would appear that instruction in the use of story schema can improve disabled readers' ability to more effectively process information, by allowing them to focus their attention on the most informative aspects of the text. Some additional findings tend to further support this implication. When compared with a small number of skilled readers (from the pilot study), the experimental group receiving the maximum number of treatments recalled only eleven percent less of the important propositions in the stories. Although the number of subjects in the skilled reader group was small, this finding would appear to contradict the conclusions drawn by Smiley et al. (1977), who believe that disabled readers suffer from a verbal comprehension deficit. However, the conclusions of that study are based on an experiment that required the subjects to report

their retellings in writing, thus confounding the results. It is unclear if the retellings of the disabled readers were poor because of an inability to express themselves in writing or because of some deficiency in their ability to comprehend verbal or written discourse. If it can be assumed that the populations in both studies are similar, then what may appear to be a deficit can possibly be corrected through instruction.

The results of this study imply that the employment of the Story Schema Teaching Technique may improve story comprehension of disabled readers. This finding should not be interpreted to mean that parts of a story be taught like parts of speech, to be memorized and identified. The subjects in this study unconsciously knew the ingredients of a story. Even when retellings had little resemblance to the text, a "story" was recalled. The instruction provided simply attempted to help students utilize what they already knew, to capitalize on their knowledge of story organization and employ it as a framework for storing information. Anticipation of what was coming next resulted in an improved ability to focus on the important information in the story.

### Additional Findings

#### Episode Recall

To further investigate the effect of treatment, an analysis was made of the important propositions recalled in each episode of the story. Each group showed a decrease in the amount of information recalled about

the middle episodes. However, Group 3 showed less discrepancy between episodes than any other group. The episodes in each story used in this study are temporally related or connected by a THEN relation. Stein (1978) has shown that these are not the most easily recalled but rather that those connected by a CAUSE relation appear to be more frequently recalled. In this case, the fact that Group 3 was better able to recall the middle episodes, despite the weaker relationship, may be an indication that they had a better understanding of the structure of a story.

### Inferences

There were several findings from the study that were not anticipated. The first was the universal absence of recalled inferences. Although the maximum treatment group did recall more inferences than any other group, the highest mean was less than one out of a possible five. There may be several explanations for this. One might be that disabled readers experience a level of difficulty with implied statements that cannot be corrected with only three treatments. Another is that the inferences were made, but the subjects did not include them in their retellings. Perhaps the most plausible explanation is that the inferences in these stories were not important enough to either be made during encoding or to be recalled, although they might have been recalled with direct query. Previous research indicates that inferences are likely to be made during encoding (Kintsch, 1974)

if they are essential to comprehension, or at recall, if extra information or test questions cue them (Spiro, 1975). A study conducted by Goetz (1977) indicates that inferences are more likely to be made if they are important to the development of the story. Four of the ten inferences in the present case were considered unimportant by the raters. The Stein and Glenn (in press) research found that inferred statements are not recalled if they represent redundant information. For example, in the Billy story, one of the scored inferences was "Billy was happy". Perhaps the information that, "everyone was yelling and patting him on the back," and that, "he was jumping up and down," made this conclusion so redundant as not to be stated during retelling. Their research also found that simple internal responses and reactions were not always recalled. Each of the scored inferences were in one of these two categories.

### Story Effect

The second unexpected result was the story effect for the control group. While there was some variability in the means of the groups for each story, only the control group showed significant differences. The Billy story was obviously easier for them to comprehend and recall, even though during the pretest all the concepts needed for understanding the Mo story were discussed and reviewed. Since the theme of the Billy story represented a very familiar social situation, it might be concluded that organization is not as important when the topic is such a familiar

one. Their well developed schemata for a baseball situation may have allowed them to reconstruct or fill in the gaps for the Billy story, while this was not the case for the less familiar content of the Mo story. However, since the groups were fairly evenly matched in reading ability, it would appear that this effect should have carried across to the treatment groups. Perhaps understanding the organization of the story allowed the experimental groups to overcome the less familiar theme of the Mo story. Since the stories were structurally equivalent, this seems plausible.

#### Sequence

If story schema is being employed as a strategy for recalling information, then the temporal order of the recall should match that of the text (Stein, 1978). The results of this study provide some support for that theory. When the recall protocols were analyzed for out of sequence propositions, only the maximum treatment group came close to the anticipated match. Eleven protocols from the control group included one or more propositions that were importations from another episode. This amounted to ten percent of their total recall. The group receiving the most treatments contained only one recall protocol which lacked exact temporal sequencing. In this case, the subject in recalling the Mo story, stated that the knights didn't return because they were tied to a tree. While this was scored as an importation from the last episode to the first, it is more likely evidence of a constructive process taking place during recall. The subject inferred the causal link

between the two statements even though they were presented at opposite ends of the surface representation of the story. Stein and Glenn (in press) reported similar findings.

The fact that the control group was less able to recall the text in sequential order should not be interpreted to mean that story sequence should be taught to improve comprehension and recall. These findings simply indicate that the use of sequence is a by-product of organization and that the use of an organizational plan for retrieving information should directly affect sequencing performance.

#### Anecdotal Findings

During the course of this study, a large amount of information that cannot be statistically analyzed was accumulated. This information is presented here because it seems to provide additional insight into those factors which interfere with comprehension.

#### Data from Subject Behavior

The initial treatment in each experimental group required the researcher to determine what information the groups already possessed about the structure of a story. Consequently the groups were queried as to what was in a story. Initial responses to "What are the parts of a story?" were not only unexpected but quite revealing. Answers included "letters, words, periods, capitals" etc. It is apparent that these children do not always think in terms of meaning when discussing

written discourse. In an attempt to help them focus on story, rather than on the process of reading, the query was rephrased to include listening. No more than two subjects in each group were able to respond with an appropriate answer, such as beginning, middle, and end.

When probed further about the information contained in a beginning or an end, not one subject appeared to be consciously aware of the ingredients of a story. Here, "consciously" must be emphasized, for during the practice retellings, it became obvious that everyone, including the no-treatment group could construct a story. In other words, all subjects appeared to have a schema for stories even though they were not making use of it during the reading process.

#### Additional Data from Recall Protocols

In analyzing the recall protocols, the Mo story yielded the most interesting results. The concluding episode of the story was not always completely understood. The fact that the dragon runs away because he is afraid of mice was not explicitly stated in the story. The actual wording of this section of the story is as follows:

"'I am not a knight. I am a mouse and my ears are just right,'" said Little Mo in a loud voice.

"'A mouse,' yelled the dragon. 'Oh, EEEEEEEE.' The dragon ran as fast as he could. He ran down the road and out of the forest."

Many subjects were unable to draw the conclusion that the dragon was afraid of mice. Some subjects said the mouse yelled at the dragon and that was why he ran away. Others told of Little Mo "beating up"



or fighting the dragon (his original goal) and winning. One subject described how Little Mo saw the dragon, went back to the castle to obtain the sword, and then returned to slay the dragon with the sword. Each time, it seemed apparent that the students were attempting to use their schema for fighting and slaying dragons to fill in for the inadequate information gained from the text. It appears that the surface structure of the text, particularly the graphic representation of the scream (EEEEEEEEEEEE), interfered with comprehension, and prevented them from making the necessary inference.

There were other protocols where comprehension was distorted because a schema was instantiated that was not necessarily appropriate for the context of the story. A particularly interesting protocol revealed that the subject interpreted the lucky charm the witch gives Little Mo, to mean the cereal "Lucky Charms," and included in the retelling a dialogue interaction where Mr. Z, the wizard, tells Little Mo that one lucky charm is not enough. Little Mo must eat many before he can become charming. In another retelling, the subject instantiated a schema for castle which included kings. This time, Mr. Z, the wizard, is transformed into a king, who promises Little Mo half the kingdom if he successfully slays the dragon.

In the Billy protocols, many subjects placed Billy at a baseball game, instead of a contest, and his longest hit became a home run. Several subjects made Mr. Goodman, whose relationship to Billy was never explicitly stated in the story, the coach of the baseball team. As a coach, Mr. Goodman would normally help Billy practice, which is what

occurred in the story, consequently, this schema did not cause too much loss of comprehension. This type of interference in comprehension is well described by Schank and Abelson (1977) and is apparently not limited to disabled readers.

Finally, the lack of language maturity and inability to elaborate was very evident during the retellings. Overgeneralizations such as "strucking", "while he was strucking out", and "fighted", are indications that these children are developmentally closer to first or second grade children in their language ability than to their peers (Cazden, 1972). More than half the subjects found it difficult to be specific when describing an event, a problem well documented in the language literature (Bernstein, 1962; Loban, 1976). "All that stuff" and "you know" were favorite fill-ins. It appeared to the examiner that the students lacked the flexibility in their use of language which might enable them to retell with more specificity. It may be this lack of flexibility in their use of language cues during the reading process which hampers their application of top-down processing.

#### Implications

The findings of this study strongly support the large body of research on the schema theory of comprehension. The study suggests that existing schemata determine the information a reader can acquire from a text. In this case, the schema for the structure of a simple story helped readers organize the concepts for more efficient retrieval. This is not to intimate that the readers did not already possess this

schema but rather that they were made aware of how to use it as a strategy for comprehension.

The evidence presented implies that disabled readers, like their better achieving peers, do read for important information. (A study recently conducted by Taylor (1978) confirms this notion). The anecdotal data also suggest that some top-down processing is occurring during reading, that children frequently endeavor to "make sense" of what they read. However, it seems apparent that inappropriate top-down strategies are repeatedly used, and that "making sense" is not always sensible in the context of the story. Importations and distortions seem to be indicative of an attempt to fit the information into the confines of their own knowledge structure without regard to the author's intended message. They appear to have little flexibility in using compensating strategies when the text in any way deviates from their knowledge structure.

Based on these findings, the following recommendations for instruction are made:

1. Disabled readers need to become aware of top-down strategies that will help them process textual information more efficiently.
2. Before every instructional reading experience, disabled readers should be exposed to the structure of the story they are about to read. While the stories in this study were made to conform to an ideal structure, most reading is not confined to simple episodic tales. Therefore,

wide reading and listening to stories with a variety of structures must be part of the instructional program.

3. Publishers can greatly assist teachers with this procedure by expanding the Preparation for Reading sections of the basal manuals to include information about the structure of the story. However, it is not suggested that story parsing be taught in the same manner that English grammar is presented. On the contrary, the schema should be viewed as a framework to guide the reader.
4. Readiness or the preparation for reading is frequently limited to a review of the new words in the story to ensure proper decoding. For disabled readers, this readiness period should be greatly expanded to include a different focus. Emphasis should be placed on reviewing the schemata needed to understand the story. This will provide the proper expectations during reading so the appropriate schemata may be instantiated. The teacher must understand that a child's schema for a particular concept may be different or not as fully developed as that of an adult. In this case, additional experiences must be provided before comprehension of the text can occur.
5. Discussion and retelling of stories should be a frequent

substitute for the pencil and paper tasks generally required of students after reading. Story retelling will increase students' opportunity to practice language and to organize their ideas into the meaningful units dictated by the structure of the story.

6. Students should be made aware of the relationships in stories (i.e., causal, temporal). An understanding of these relationships would enhance comprehension and provide a basis for understanding more complex discourse.
7. Finally, since other research suggests that acquisition of story structure is developmental (Smiley et al, 1977; Mandler and Johnson, 1977; Stein, 1978), it might be profitable for parents to read to their children at an early age, and to continue to read to them even after they are able to read by themselves. In this way, they are exposed to more complex structures which will prepare them for more difficult reading.

#### Recommendations for Further Research

This study has attempted to translate the theoretical body of knowledge about story comprehension into a practical educational tool. From it, many more questions deserving further investigation have arisen.

First, additional research using story structure with disabled readers is needed. A replication of this study over a longer period of time would provide additional insight into the retention effect of the

teaching method.

Second, little research has been conducted to investigate the strategies used by skilled readers to maintain a high level of recall even when reading an unfamiliar story. An increase in our knowledge about skilled readers will allow us to improve instruction for the disabled reader.

More developmental research into the acquisition of story schemata and the changes which occur with age is necessary. If definite developmental patterns can be established, it may be possible to discover if the disabled reader is simply slower in the acquisition of schemata or if he suffers an aberration in development.

Finally, the current tools for eliciting recall from a reader are far from perfected. The use of different kinds of probes and their effect on retrieval could assist not only the researcher but also the teacher and the test maker in their attempts at measuring comprehension.

## References

- Adams, Marilyn Jager. "Failures to comprehend and levels of processing in reading". (Technical Report No. 37). Urbana, Ill.: University of Illinois, Center for the Study of Reading, April 1977.
- Alderman, D. and Smith, E. E. "Expectancy as a determinant of functional units in perceptual recognition." Cognitive Psychology, 1971, 2, 117-129.
- Allen, D. "Some effects of advance organizers and level of question on the learning and retention of social studies material". Journal of Educational Psychology, 1970, 61, 333-339.
- Ausubel, D. P. "Cognitive structure and facilitation of meaningful learning." In R. C. Anderson and D. P. Ausubel (Eds.), Readings in Psychology of Cognition. New York: Holt, Rinehart, and Winston, 1965.
- Ausubel, D. P. "The use of advance organizers in the learning and retention of meaningful verbal material". Journal of Educational Psychology, 1960, 51, 267-272.
- Barganz, Robert. "Phonological and orthographic relationships to reading performance." Visible Language, Spring 1974, 8, 101-122.
- Baron, J. "Phonemic stage not necessary for reading." Quarterly Journal of Experimental Psychology, 1973, 25, 241-246.
- Bartlett, F. C. Remembering. Cambridge: The University Press, 1932.
- Bernstein, B. "Linguistic codes". Language and Speech, January, 1962.
- Bower, G. H. "Organizational factors in memory." Cognitive Psychology, 1970, 1, 18-46.
- Bransford, J. D., and Johnson, M. K. "Considerations of some problems of comprehension." In W. Chase (Ed.), Visual Information Processing. New York: Academic Press, 1973.
- Brown, A., Smiley, S., Day, J., Townsend, M., and Lawton, S. Intrusion of a Thematic Idea in Children's Comprehension and Retention of Stories. (Technical Report No. 18) Urbana, Ill.: University of Illinois, Laboratory for Cognitive Studies in Education, February 1977.
- Carroll, J. "Defining language comprehension: some speculations." In J. Carroll and R. Freedle (Eds.), Language Comprehension and Acquisition of Knowledge. Washington, D.C.: Winston and Sons, 1972, 1-29.

- Cazden, C. B. Child Language and Education. New York: Holt, Rinehart, and Winston, Inc., 1972.
- Chall, J. S. Learning to Read: The Great Debate. New York: McGraw Hill, 1967.
- Charniak, E. "Organization and inference in a frame-like system of knowledge." In R. Schank and B. Nash-Weber, (Eds.), Theoretical Issues in Natural Language Processing. Cambridge, Mass.: Bolt, Beranek and Newman, Inc., 1975.
- Chomsky, Noam. Aspects of a Theory of Syntax. Cambridge: MIT Press, 1965.
- Clay, Marie. "Emergent Reading Behavior." Unpublished doctoral dissertation, University of Auckland, 1966.
- Clay, M., and Imlach, R. "Juncture, pitch and stress as reading behavior variables." Journal of Verbal Behavior and Verbal Learning, 1971, 10, 133-139.
- Collins, A., and Quillian, M. "How to make a language user." In E. Tulving and W. Donaldson (Eds.), Organization of Memory. New York: Academic Press, 1972.
- Craik, F., and Tulving, E. "Depth of processing and the retention of words in episodic memory." Journal of Experimental Psychology, 1975, 104, 268-294.
- Cromer, W. "The difference model: A new explanation for some reading difficulties." Journal of Educational Psychology, 1970, 61, 471-483.
- Dawes, R. M. "Memory and distortion of meaningful written material." British Journal of Psychology, 1966, 57, 77-86.
- Dayton, C. M. The Design of Educational Experiments. New York: McGraw Hill, 1970.
- Fillmore, C. J. "The case for case." In E. Bach, and R. T. Harms (Eds.), Universals in Linguistic Theory. New York: Holt, Rinehart, and Winston, Inc., 1968.
- Frederiksen, C. H. "Effects of task induced cognitive operations on comprehension and memory processes." In J. Carroll and R. Freedle (Eds.), Language Comprehension and the Acquisition of Knowledge. Washington, D. C.: Winston and Sons, 1972.



- \_\_\_\_\_. "Effects of context-induced processing operations on semantic information acquired from discourse." Cognitive Psychology, 1975, 7, 139-166.
- \_\_\_\_\_. "Discourse comprehension and early reading." In L. Resnick, and P. Weaver (Eds.), Theory and Practice of Early Reading. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1976.
- \_\_\_\_\_. "Structure and process in discourse production and comprehension." in M. Just, and P. Carpenter (Eds.), Cognitive Processes in Comprehension. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1977.
- Gagne, R. m. The Conditions of Learning. New York: Holt, Rinehart, and Winston, 1970.
- Gibson, Eleanor J., and Levin, H. The Psychology of Reading. Cambridge, Mass.: MIT Press, 1975.
- Goetz, Ernest T. "Inferences in the comprehension and memory for text." (Technical Report No. 49). Urbana, Illinois: University of Illinois.
- Goodman, K. S. "Analysis of oral reading miscues: Applied psycholinguistics." Reading Research Quarterly, 1969, 5, 9-30.
- Goodman, K. S., and Burke, C. Theoretically Based Studies of Patterns of Miscues in Oral Reading Performance Final Report, Project No. 9-0375, Washington, D. C.: U. S. Department of Health, Education and Welfare, Office of Education, Bureau of Research, April, 1973.
- Goodman, Y. M. Longitudinal Study of Children's Oral Reading Behavior. U. S. Department of Health, Education and Welfare, Final Report, Project No. 9-E-662, Dearborn, Michigan: University of Michigan, 1971.
- Goodman, Y., and Burke, C. Reading Miscue Inventory. New York: Macmillan Publishing Co., 1972.
- Gough, P. B. "One second of reading." In J. F. Kavanaugh, and I. Mattingly (Eds.), Language by Eye and by Ear. Cambridge, Mass.: MIT Press, 1972.
- Grimes, J. E. The Thread of Discourse. The Hague: Mouton, 1975.
- Gutknecht, B. "A Psycholinguistic Description of Oral Reading Behavior of Selected Children Identified as Perceptually Handicapped." Unpublished dissertation, Wayne State University, 1972.

- \_\_\_\_\_. "Learning disabilities." in P. D. Allen (Ed.), Findings of Research in Miscue Analysis: Classroom Implication. Urbana, Ill.: ERIC, NCTE, October, 1976.
- Halliday, M. A. K. "Language structure and language function." In J. Lyons (Ed.), New Horizons in Linguistics. Baltimore: Penguin, 1970.
- Halliday, M. A. K., and Hasan, R. Cohesion in English. London: Longman, 1976.
- Hansen, D. N. "Information processing models for reading skill acquisition." In F. D Davis (Ed.), The Literature of Research in Reading with Emphasis on Models. U. S. Dept. of Health, Education and Welfare, Washington, D. C., 1976.
- Hershberger, W. A., and Terry, D. F. "Typographical cueing in conventional and programmed texts." Journal of Applied Psychology, 1965, 49, 55-60.
- Houghton Mifflin Basal Series. "Pip Squeak, mouse in shining armor." in Tapestry. Boston: Houghton Mifflin Co., 1976.
- Isakson, Richard, and Miller, John. "Sensitivity to syntactic and semantic cues in good and poor comprehenders." Journal of Educational Psychology, 1976, 68, 787-792.
- Hochberg, J. "Reading as intentional behavior." In H. Singer and R. Ruddell (Eds.), Theoretical Models and Processes of Reading. Newark, Del.: International Reading Association, 1976.
- Kaplan, R. M. "Augmented transition networks as psychological modes of sentence comprehension." Artificial Intelligence, 1972, 3, 77-100.
- Katz, J. J., and Fodor, J. A. "The structure of a semantic theory." Language, 1963, 39, 170-210.
- Kintsch, W. The Representation of Meaning in Memory. Hillsdale, N. J. Lawrence Erlbaum Associates, Inc., 1974.
- \_\_\_\_\_. "On comprehending stories." In M. Just, and P. Carpenter (Eds.), Cognitive Processes in Comprehension. Hillsdale, N. J.: Lawrence Erlbaum Associates, Inc., 1977, (a).
- \_\_\_\_\_. Memory and Cognition. New York: John Wiley and Sons, 1977, (b).
- Kintsch, W., and van Dijk, T. A. Recalling and Summarizing Stories. University of Colorado, 1975.

- Kirk, Roger E. Experimental Design: Procedures for the Behavioral Sciences. Belmont, Calif.: Brooks/Cole Publishing Co., 1968.
- Klieman, C. M. "The effect of previous context on reading and individual words" ERIC ED 134, 941, February 1977.
- Kolers, P. A. "Three stages of reading." In H. Levin and J. P. Williams (Eds.), Basic Studies on Reading. New York: Basic Books, 1970.
- La Berge, D., and Samuels, S. J. "Toward a theory of automatic information processing in reading." Cognitive Psychology, 1974, 6, 293-323.
- Levin, H., and Kaplan, E. "Grammatical structure and reading." In H. Levin, and J. Williams (Eds.), Basic Studies on Reading. New York Books, 1970.
- Linton, M., and Gallo, P. S. The Practical Statistician. Monterey, California: Brooks/Cole Publishing Co., 1975.
- Loban, Walter. Language Development: Kindergarten through Grade Twelve. Urbana, Ill.: National Council of Teachers of English, 1976.
- Mackworth, J. F. "Some models of the reading process: learners and skilled readers." Reading Research Quarterly, 1972, 7, 701-733.
- Mandler, J. M., and Johnson, N. S. "Remembrance of things parsed: story structure and recall." Cognitive Psychology, 1977, 9, 111-151.
- Marshall, Nancy. "The Structure of Semantic Memory for Text." Unpublished doctoral dissertation, University of Virginia, 1976.
- Mason, J. M. "Overgeneralizations in learning to read." Journal of Reading Behavior, 1976, 8, 173-182, (a).
- \_\_\_\_\_. "The roles of orthographic, phonological and word frequency variables on non-word decisions." Journal of Reading Behavior, 1976, 8, 199-206.
- Mason, M. "Reading ability and letter search time: effects of orthographic structure defined by single letter positional frequency." Journal of Experimental Psychology, 1975, 104, 146-166.
- Mattingly, I. G. "Reading, the linguistic process, and linguistic awareness." In J. F. Kavanaugh, and I. G. Mattingly (Eds.), Language by Ear and by Eye. Cambridge, Mass.: MIT Press, 1972.

- Menosky, D. M. "A Psycholinguistic Description of Oral Reading Miscues Generated During the Reading of Varying Portions of Text by Selected Readers from Grades Two, Four, Six, and Eight." Unpublished doctoral dissertation, Wayne State University, 1971.
- Meyer, B. F. "Identification of the structure of prose and its implications for the study of reading and memory." Journal of Reading Behavior, 1975, VII, 1, 7-47.
- \_\_\_\_\_. "The Organization of Prose and its Effects on Recall." Doctoral dissertation, Cornell University, 1974.
- \_\_\_\_\_. "The structure of prose: effects on learning and memory and implications for educational practice." In Anderson, Spiro, and Montague (Eds.), Schooling and the Acquisition of Knowledge. Hillsdale, N. J.: Lawrence Erlbaum Associates, Inc., 1977.
- Meyer, D. E., Schvaneveldt, R. W., and Ruddy, M. G. "Functions of graphemic and phonemic codes in visual word recognition." Memory and Cognition, 1974, 2, 309-321.
- Miller, G. A. "Decision units in the perception of speech." IRE Transactions on Information Theory, 1962, IT-8, 81-83.
- \_\_\_\_\_. "Text comprehension skills and process models of text comprehension." In H. Singer, and R. Ruddell, (Eds.), Theoretical Models and Processes of Reading. Newark, Del.: International Reading Association, 1976.
- Miller, G., Bruner, J., and Postman, L. "Familiarity of letter sequences and tachistasopic identification." Journal of Genetic Psychology, 1954, 50, 129-139.
- Minsky, Marvin. "A framework for representing knowledge.: In P. Winston (Ed.), The Psychology of Computer Vision. New York: McGraw Hill, 1975.
- Morton, J. "The effects of context on the visual duration threshold for words." British Journal of Psychology, 1964, 55, 165-180.
- Nash-Webber, B. "The role of semantics in automatic speech understanding." In D. Bobrow, and A. Collins (Eds.), Representations and Understanding. New York: Academic Press, 1975.
- Neville, M., and Pugh, A. K. "Context in reading and listening: variations in approach to Cloze tasks." Reading Research Quarterly, 1976-77, 1, 15-31.

- Norman, D. A. "Human information processing." Bulletin of the School of Education. Indiana University, 47, 4, July 1971.
- \_\_\_\_\_. Memory and Attention. New York: John Wiley and Sons, Inc., 1976.
- Oakan, R., Weiner, M., and Cromer, W. "Identification, organization, and reading comprehension for good and poor readers." Journal of Educational Psychology, 1971, 62, 71-75.
- Olson, David R. "The languages of instruction: On the literate bias of schooling." In Anderson, Spiro, and Montague (Eds.), Schooling and the Acquisition of Knowledge. New Jersey: Lawrence Erlbaum Associates, Inc., 1977, 65-89.
- Page, W. "A Psycholinguistic Description of Patterns of Miscues Generated by a Proficient Reader in Second Grade, and Average Reader in Fourth Grade and an Average Reader in Sixth Grade Encountering Basal Reader Selections Ranging from Preprimer to Sixth Grade." Unpublished doctoral dissertation, Wayne State University, 1970.
- Paris, S. G., and Lindaver, B. K. "The Role of Inference in Children's Comprehension and Memory for Sentences." Cognitive Psychology, 1976, 8, 217-227.
- Pearson, David. "Scripts, texts, and questions." Paper presented at National Reading Conference, St. Petersburg, 1976.
- Perfetti, C. and Goldman, S. "Discourse functions of thematization and topicalization." Journal of Psycholinguistic Research, 1975, 4, 257-272.
- Pillsbury, W. B. "A study in perception." American Journal of Psychology, 1897, 8, 315-393.
- Posner, M. I., Lewis, J. L., and Conrad, C. "Component processes in reading: A performance analysis." In J. Kavanaugh and I. Mattingly (Eds.), Language by Ear and by Eye. Cambridge, Mass.: MIT Press, 1972.
- Propp, V. Morphology of the Folktale. Austin: University of Texas Press, 1968.
- Reddy, R. and Newell, A. "Knowledge and its representation in speech understanding system." In L. W. Gregg (Ed.), Knowledge and Cognition. Potomac Md.: Lawrence Erlbaum Associates, 1974.

- Reicher, G. M. "Perceptual recognition as a function of meaningfulness of stimulus material." Journal of Experimental Psychology, 1969, 81, 274-280.
- Rode, S. S. "Development of phrase and clause boundary reading in children." Reading Research Quarterly, 1974, 16, 124-142.
- Rumelhart, D. E. "Notes on a schema for stories." In D. Bobrow, and A. Collins (Eds.), Representation and Understanding: Studies in Cognitive Science. New York: Academic Press, 1975.
- \_\_\_\_\_. "Toward an interactive model of reading." (CHIP Report No. 56). Center for Human Information Processing, University of California, San Diego, March 1976.
- \_\_\_\_\_. Introduction to Human Information Processing. New York: John Wiley and Sons, Inc., 1977.
- Rumelhart, D. E., and Ortony, A. "The representation of knowledge in memory." In Anderson, Spiro, and Montague (Eds.), Schooling and the Acquisition of Knowledge. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1977.
- Schank, R. C. "Identification of conceptualizations underlying natural language." In R. C. Schank, and K. M. Colby (Eds.), Computer Models of Thought and Language. San Francisco: Freeman, 1973.
- \_\_\_\_\_. "SAM--A story understander." (Research Report No. 43). Yale University, Committee on Computer Science, August 1975.
- Schank, R. C., and Abelson, R. P. Scripts, Plans, Goals, and Understanding. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1977.
- Schultz, R. W. "The role of cognitive organizers in the facilitation of concept learning in elementary school science." Unpublished doctoral dissertation, Purdue University, 1966.
- Swartz, Robert M. "Strategic processes in beginning reading." (A Technical Report No. 15). Urbana, Ill.: University of Illinois, Laboratory for Cognitive Studies in Education, November 1976.
- Slobin, D. I. Psycholinguistics. Glenview, Ill.: Scott, Foresman and Company, 1971.
- Smiley, S., Oakley, D., Worthen, D., Campione, J., and Brown, A. "Recall of thematically relevant material by adolescent good and poor readers as a function of written versus oral presentation." Journal of Educational Psychology, 1977, Vol 69, 4, 381-387.

- Smith, F. Understanding Reading. New York: Holt, Rinehart, and Winston, Inc., 1971.
- Spache, G. Good Reading for Poor Readers. Champagne, Ill.: Garrard Publishing Co., 1974.
- Spiro, R. J. Inferential reconstruction in memory for connected discourse. (Technical Report No. 2). Urbana, Ill.: University of Illinois, Laboratory for Cognitive Studies in Education, October 1975.
- \_\_\_\_\_. "Remembering information from text: The 'state of schema' approach." In Anderson, Spiro, and Montague (Eds.), Schooling and the Acquisition of Knowledge. New Jersey: Lawrence Erlbaum Associates, Inc., 1977.
- Stein, Nancy. "How children understand stories: A developmental analysis." (Technical Report No. 69). Urbana, Ill.: University of Illinois, Center for the Study of Reading, March 1978 (a).
- \_\_\_\_\_. "Children's understanding of stories." Paper presented at International Reading Association Convention, Houston, Texas, 1978 (b).
- Stein, N., and Glenn, C. "An analysis of story comprehension in the elementary school children." In R. O. Freedle (Ed.) Discourse Processing: Multidisciplinary Perspectives Vol. II. Hillsdale, N. J.: Ablex, Inc., in press.
- Stein, N., and Nezworski, T. "The effects of organization and instructional set on memory." (Technical Report No. 68). Urbana, Ill.: University of Illinois, Center for the Study of Reading, January 1978.
- Stevens, A. L., and Rumelhart, D. E. "Errors in reading: Analysis using an augmented network model of grammar." In D. A. Norman, D. E. Rumelhart, and the LNR Research Group, Explorations in Cognition. San Francisco: Freeman, 1975.
- Sulin, R. A. and Dooling, D. J. "Intrusion of a thematic idea in retention of prose." Journal of Experimental Psychology, 1974, 103, 255-262.
- Taylor, Barbara. "A Comparison of Good and Poor Readers' Ability to Read for Meaning." Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, 1977.
- Thorndyke, Perry W. "Cognitive structures in comprehension and memory of narrative discourse." Cognitive Psychology, 1977, 9, 77-110.

- Tinker, M. A. Bases for Effective Reading. Minneapolis: University of Minnesota Press, 1965.
- Tulving, E., and Donaldson, W. Organization of Memory. New York: Academic Press, 1972.
- Tulving, E., and Gold, C. "Stimulus information and contextual information as determinants of tachistoscopic recognition of words." Journal of Experimental Psychology, 1963, 66, 319-327.
- van Dijk, T. A. "Semantic macro-structures and knowledge frames in discourse comprehension." In M. Just, and P. Carpenter (Eds.), Cognitive Processes in Comprehension. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1977.
- van Dijk, and Kintsch, W. "Cognitive psychology and discourse." In W. N. Dressler (Ed.) Trends in Text Linguistics. New York: De Grayter, 1977.
- Vellutino, F. "Alternative conceptualizations of dyslexia: Evidence in support of a verbal-deficit hypothesis." Harvard Educational Review, 1977, Vol 47, 3, 334-354.
- Vellutino, F., Harding, C., Phillips, F., and Steger, J. "Differential transfer in poor and normal readers." Journal of Genetic Psychology, 1975, 126, 3-18.
- Vellutino, F., Smith, H., Steger, J., and Kaman, M. "Reading disability: age differences and the perceptual deficit hypothesis." Child Development, 1975, 46, 487-493.
- Vellutino, F., Steger, J., DeSetto, L., and Phillips, F. "Verbal vs. non-verbal paired associates learning in poor and normal readers." Neuropsychologia, 1975, 13, 75-82.
- Venezky, R. L., and Calfee, R. C. "The reading competency model." In H. Singer, and R. Ruddell (Eds.), Theoretical Models and Processes in Reading. Newark, Del.: International Reading Association, 1970, 273-291.
- Waller, T. "Children's recognition memory for written sentences." A comparison of good and poor readers." Child Development, 1976, 47, 90-95.
- Weber, R. "First graders use of grammatical context in reading." In Levin, and J. P. Williams (Eds.) Basic Studies on Reading. New York: Basic Books, 1970.



Wheeler, D. D. "Processes in word recognition." Cognitive Psychology, 1970, 1, 59-85.

Winer, B. J. Statistical Principles in Experimental Design. New York: McGraw Hill, 1963.

Winograd, T. "Understanding natural language." Cognitive Psychology, 1972, 3, 1-191.

\_\_\_\_\_. "Frames and declarative-procedural controversy."  
In D. Bobrow, and A. Collins (Eds.), Representation and Understanding.  
New York: Academic Press, 1975.

## APPENDIX A

### Word Recognition Test

dragon

The dragon had fire coming out of his mouth.

mouse

The cat ran after the mouse.

knights

The knights rode their horses into battle.

witch

The mean witch put a spell on the prince.

charm

I always wear my lucky charm when I play games.

wizard

The wizard is a wise old man.

fight

The boy was in a fight and got a black eye.

forest

The forest has many trees and animals.

castle

The king lives in a castle.

ears

The rabbit's ears are long and pointed.

baseball

The boys need a bat and ball to play baseball.

strike

You can strike out when you miss the ball.

luck

My ring brings me luck.

believe

Do you believe in Santa Claus?

contest

I won the contest and got a batting hat.

practice

You have to practice hitting the ball if you want to be good.

score

The score in the game was tied, 3 to 3.

team

Joe and Mike are on the same team.

ahead

I will run ahead of you so I can get there first.

batter

The batter went up to bat and he hit the ball.

## APPENDIX B

## Outline of Concepts Discussed with Control Group

1. Review the following words from the word recognition test:  
dragon, knights, witch, charm, wizard, castle, luck, and contest.
2. Ask students the following questions about each word:
  - a) What is \_\_\_\_\_?
  - b) Have you ever seen \_\_\_\_\_?
3. Ask student if they had heard a story, seen a movie or T.V. show or could tell of an experience that illustrates the word (i.e., discuss the wizard's role in The Wizard of Oz.)

## APPENDIX C

## Story Schema Teaching Technique

## Lesson I

1. Elicit from students: What is in a story? What are the parts?

Beginning--characters--who  
setting--where, when  
problem

Middle--Things or actions that happen because of the problem  
what happened first?  
next?  
then?

End--how was the problem solved?  
what was the lesson the story taught?

2. Discuss "The Three Pigs."
3. Use outline to retell story. How does author show character's feelings?
4. Read "Old Man and the Donkey" silently. Use outline to retell story.
5. Test for One-Treatment Group

## Lesson II

1. Elicit parts of story from students. How does author show character's feelings?
2. Read "Line Down the Middle of the Room." silently.
3. Ask students to fill in worksheet with information from the story.  
(see page\_\_\_\_\_)
4. Test for Two-Treatment Group.

## Lesson III

1. Elicit parts of a story from students. Include how author shows character's feelings.

2. Read "The Tiger, the Man, and the Fox."
3. Ask students to divide the story into beginning, middle, and end. Elicit the information in each episode that belongs in the three sections.
4. Test for Three-Treatment Group.

## APPENDIX D

## Outline for Lesson One

## UNDERSTANDING STORIES

## Beginnings have--

Characters	*Who?
Setting	*Where?
	*When?
Problem	*What problem does the character have?

## Middles have--

Action that happens because of the problem

- \*What happened first?
- \*What happened next?
- \*Then what happened?
- \*Did this happen because...?

## Endings have--

An answer to the problem

- \*How was the problem solved?
- \*What lesson did you learn?
- \*Why did the author write this story?

APPENDIX E

Worksheet for Lesson Two

Beginning

Characters (Who)

---

---

Setting (Where, When)

---

---

Problem

---

---

Middle (Things that happen because of the problem)

What happened first?

---

---

What happened next?

---

---

End

How was the problem solved?

---

---

What was the lesson in the story?

---

---



## APPENDIX F

Practice Story

The ice cream man was coming. Mary wanted some ice cream. She ran home to get some money. When she came back, the ice cream man was gone.

## APPENDIX G

## LITTLE MO AND THE DRAGON

## Scoring Protocol

## Episode 1

1. Little Mo was a mouse
2. who lived in a castle.
3. He rode a big white rabbit
4. and chased dragonflies.
5. But he wanted to fight a real dragon.
6. Little Mo watched the knights.
7. He wanted to learn how to fight a real dragon.
8. The knights told Little Mo he was too little to be a knight
9. and his ears were too big.
10. Little Mo said I am not a knight.
11. I am a mouse
12. and my ears are just right.
13. One day the knights got on their horses.
14. We are going to the forest to fight the big dragon they said.
15. Can I help asked Little Mo.
16. This is a job for a man not a mouse said one of the knights.
- + 17. (The knights refused to let Little Mo go with them.)
18. Good luck said Little Mo.
19. In a little while the horses came back without the knights.
20. Only Little Mo was left.
- + 21. (Little Mo had to fight the dragon)
22. So he got on his big white rabbit
23. and rode into the forest.

## Episode 2

24. He had not gone far when he saw a witch.
25. Oh me oh my said Little Mo.
26. Maybe I should turn back.
27. She looks so mean.
- + 28. (Little Mo was afraid)
29. But if I can't meet a witch how will I fight the big dragon.
30. So Little Mo rode up to the witch.
31. When the witch saw Little Mo she laughed.
32. You are a very small knight with very big ears.
33. I am not a knight
34. I am a mouse said Little Mo

+inference

5. trying to be brave.
36. I am going to fight the dragon.
37. You will need a lucky charm said the witch.
38. That is the only way you can fight the dragon.
39. You are so little
40. the dragon will eat you.
41. You need my lucky charm.
42. It will make you brave.
43. I need to be brave.
44. I will take your lucky charm said Little Mo.
45. Then he rode away on his white rabbit.

### Episode 3

46. Soon Little Mo met a wizard.
47. You are a very small knight to be riding so fast said the wizard.
48. I am not a knight
49. I am a mouse said Little Mo.
50. Who are you.
51. My name is Mr. Z.
52. I live in the forest
53. and help animals.
54. I have seen many knights go into the forest and never come back.
55. I am happy you are not a knight
56. so you don't have to fight the dragon said Mr. Z.
57. But I do have to fight the dragon said Little Mo.
58. How will you fight the dragon asked Mr. Z.
59. I don't know said Little Mo.
60. But the witch gave me a charm to make me brave.
61. You don't need a charm said Mr. Z.
62. You must be wise.
63. I can't help you fight the dragon.
64. But I can tell you that everyone is afraid of something.
65. When you find out what the dragon is afraid of you will know what to do.
66. Thank you Mr. Z said Little Mo.
67. And he rode away on his big white rabbit.

### Episode 4

68. Suddenly Little Mo saw the dragon.
69. He was very big
70. and he looked angry.
71. Oh me oh my said Little Mo.
- + 72. (Little Mo was afraid.)
73. The dragon laughed.
74. What a small knight with such big ears said the dragon.
75. You will make a good dinner.

+inference

76. I am not a knight.
77. I am a mouse
78. and my ears are just right, said Little Mo in a loud voice.
79. A mouse yelled the dragon.
80. Oh, EEEEEEEEEE.
- + 81. (The dragon was afraid of mice.)
82. The dragon ran as fast as he could.
83. He ran down the road
84. and out of the forest.
85. This was a job for a mouse said Little Mo.
86. He saw the other knights tied to a tree.
87. He untied the knights
88. and set them free.
89. They sang all the way home to the castle.
90. They made Little Mo a real knight.
91. They even gave him a sword.
92. Little Mo said Now I really am a little knight with big ears.

+inference

## APPENDIX H

## BILLY THE STRIKE-OUT KING

## Scoring Protocol

## Episode 1

1. Billy was on the Tigers baseball team.
2. He didn't play very much.
3. He wasn't very good.
4. He was so little
5. the other boys called him Mouse.
6. Most games Billy sat on the bench.
7. When he did play Billy would strike out.
8. This year there was a batting contest.
9. The winning team went to see a real baseball game.
10. Billy wanted to be in the contest.
11. But the Tigers wanted to win
- + 12. (The other boys didn't want Billy to be in the contest)
13. so they said Mouse you strike out too much.
14. Then the news came.
15. All the players had to be in the contest.
16. The other players didn't like that.
17. They said Billy would strike out
18. and then they would lose.

## Episode 2

19. Billy walked home slowly.
20. He was sad.
21. Then he talked to his mother.
22. The tigers are right.
23. I will not help them.
24. I will make them lose.
25. You need some luck said his mother
26. so she gave him a rabbit foot.
27. This will bring you luck she said.
28. Just rub the foot before you bat
29. and then you will do well.
30. Do you really think it will work asked Billy.
31. If you believe, it will work said his mother.
32. But you must really believe you can do it.

+inference

## Episode 3

33. Billy took his rabbit foot outside.
34. He saw Mr. Goodman
35. Look what I have Mr. Goodman, said Billy.
36. It will bring me luck.
37. Why do you need luck, Billy asked Mr. Goodman.
38. Because I'm in the batting contest said Billy.
39. I really want our team to win
40. but the Tigers said I will strike out.
41. Now my lucky foot will help me.
42. It is good to have luck said Mr. Goodman
43. but you need something more.
44. What do I need said Billy.
45. Well, said Mr. Goodman, you must learn how to bat.
46. I think you need to practice.
47. You must bat the ball again and again.
48. You must do it many times
49. and each time you practice you will get better.
50. The contest is in three days said Billy.
51. Who will help me practice.
52. I don't have much time.
53. I can help you said Mr. Goodman.
54. Mr. Goodman and Billy went into the street.
55. He threw the ball
56. and Billy tried to hit it.
57. They practiced every day for three days.

## Episode 4

58. And then it was time for the contest.
59. First the Tigers were ahead
60. and then the Giants were ahead.
61. It was Billy's turn
62. and the score was tied.
63. Billy was the last batter.
64. Here comes Mouse
65. the strike-out king said one of the Tigers
66. We'll never win now.
67. Oh no, said Billy.
68. Maybe I shouldn't try.
- + 69. (Billy was nervous or scared.)
70. Then he took out his rabbit foot
71. and he rubbed it hard.
72. The other boys laughed.

+inference

73. You really do need luck they said.
74. Billy picked up the bat.
75. The first ball was a strike.
76. The Tigers laughed.
77. The second ball was a strike.
78. I knew it said one of the Tigers.
- + 79. (The Tigers were afraid Billy would strike out.)
80. Just then Billy saw Mr. Goodman.
81. You can do it Billy, he called.
82. Billy hit the next ball.
83. He hit it so hard
84. it went a long way.
85. It was the longest hit of the contest.
86. All the Tigers were jumping up and down
87. and they patted Billy on the back.
- + 88. (They were happy.)
89. Billy jumped up and down too
- + 90. (Billy was happy)
91. because he won a batting hat for getting the longest hit in the  
contest.
92. And the Tigers went to see a real baseball game.

+inference

## APPENDIX I

## Important Propositions

## LITTLE MO AND THE DRAGON

## Episode 1

- 1. Little Mo was a mouse.
- 5. But he wanted to fight a real dragon.
- 8. The knights told Little Mo he was too little to be a knight.
- 14. We are going to the forest to fight the big dragon they said.
- + 17. (The knights refused to let Little Mo go with them.)
- 19. In a little while the horses came back with the knights.
- + 21. (Little Mo had to fight the dragon.)

## Episode 2

- 24. He had not gone far when he saw a witch.
- + 28. (Little Mo was afraid.)
- 29. But if I can't meet a witch how will I fight the big dragon.
- 36. I am going to fight the dragon.
- 37. You will need a lucky charm said the witch.
- 42. It will make you brave.
- 44. I will take your lucky charm said Little Mo.

## Episode 3

- 46. Soon Little Mo met a wizard.
- 57. But I do have to fight the dragon said Little Mo.
- 60. But the witch gave me a charm to make me brave.
- 61. You don't need a charm said Mr. Z.
- 62. You must be wise.
- 64. But I can tell you that everyone is afraid of something.
- 65. When you find out what the dragon is afraid of you will know what to do.

## Episode 4

- 68. Suddenly Little Mo saw the dragon.
- + 72. (Little Mo was afraid.)
- 77. I am a mouse.
- + 81. (The dragon was afraid of mice.)
- 82. The dragon ran as fast as he could.
- 87. He untied the knights.
- 90. They made Little Mo a real knight.

+inferences



## APPENDIX J

## Important Propositions

## BILLY THE STRIKE-OUT KING

## Episode 1

1. Billy was on the Tigers baseball team.
2. When he did play Billy would strike-out.
8. This year there was a batting contest.
10. Billy wanted to be in the contest.
- + 12. The other boys didn't want Billy to be in the contest.
15. All the players had to be in the contest.

## Episode 2

21. Then he talked to his mother.
25. You need some luck said his mother.
26. She gave him a rabbit foot.
28. Just rub the foot before you bat.
31. If you believe, it will work, said his mother.

## Episode 3

42. It is good to have luck said Mr. Goodman.
43. But you need something more.
45. Well, said Mr. Goodman, you must learn how to bat.
46. I think you need to practice.
49. Each time you practice you will get better.
53. I can help you said Mr. Goodman.
57. They practiced everyday for three days.

## Episode 4

58. Then it was time for the contest.
62. And the score was tied.
63. Billy was the last batter.
70. Then he took out his rabbit's foot.
75. The first ball was a strike.
81. You can do it Billy he called.
82. Billy hit the next ball.
85. It was the longest hit of the contest.
91. Billy won a batting bat for getting the longest hit in the contest.
92. And the Tigers went to see a real baseball game.

+inference

## APPENDIX K

## Line Down the Middle of the Room

## Pilot Scoring Protocol

## Setting/Episode 1

1. Victor and Billy are brothers.
2. Billy broke Victor's plane.
3. Victor tries to make Billy say he's sorry.
- + 4. Billy refuses.
5. (Victor gets angry.)
6. Victor puts tape down the middle of the room.
7. Victor tells Billy he can't step over the line.

## Episode 2

8. Victor forgets to turn off the light.
9. He asks Billy to turn it off.
10. Billy refuses.
11. Because the light is on Victor's side of the line.
12. Victor turns off the light.

## Episode 3

13. Victor is cold.
14. He asks Billy to shut the window.
- + 15. Billy decides to get even.
16. He refuses to shut the window.
17. Because he is not cold.
18. Victor says he will shut the window.
19. Billy tells him the window is on his side of the room.

## Episode 4

20. The wind blows in through the window.
21. It blows Billy's papers all over the room.
22. Victor tells Billy to shut the window and pick up the papers.
23. Billy shuts the window.
24. Billy says he can't pick up the papers because of the line.
25. Victor says the line is crazy and pulls up the tape.

+inference

EFFECTS OF INSTRUCTION IN THE  
USE OF AN ABSTRACT STRUCTURAL SCHEMA  
AS AN AID TO COMPREHENSION AND  
RECALL OF WRITTEN DISCOURSE

by

Gloria M. McDonell

(ABSTRACT)

Current research in discourse processing indicates that textual information is understood and recalled with the aid of schemata. The schema theory of comprehension suggests that as encoding occurs, existing schemata not only set up expectations which assist the reader in processing information, but also act as a retrieval plan during recall (Rumelhart and Ortony, 1977). The literature further suggests that while skilled readers use these top down processes to read more efficiently, disabled readers do not (Meyer, 1977). The purpose of this investigation was to measure the effectiveness of an instructional technique which would provide the disabled reader with the organizational skills that appear to be employed by the skilled reader.

Forty-eight Title I students, reading at or below the 32nd percentile on the reading subtest of the SRA Achievement Test, were randomly selected and assigned to either a control or one of three experimental groups. Each experimental group received an increased exposure to the instructional treatment. All subjects read and retold two stories, one immediately after treatment and one two weeks later. The recall protocols were assessed by a discourse analysis scoring system.

Three hypotheses were tested using a 4 x 2 mixed analysis of variance with repeated measures on the second factor. Significant main effects for both treatment and time were found. There was no evidence to support a predicted interaction. Further analysis of the treatment variable revealed significant differences between the control and between each of the experimental groups. It appears that by making students aware of the structure of simple stories, they were better able to organize the textual information along these lines for retrieval. According to the schema theory of comprehension, the more efficient recall pattern of the experimental groups can be attributed to the students' ability to predict, in advance, the structure of the story and use it as a plan for retrieval. Although the retelling scores decreased after a two-week period, post hoc analysis of the data revealed that a significant instructional effect was maintained.

Additional findings indicated that successive treatments also improved the recall of high level or important information. Increased instruction enabled subjects to selectively attend to the salient points in the story.