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IMPROVING READING COMPREHENSION
OF CONNECTED DISCOURSE: A Study in
Metacomprehension with Adolescents
in a Remedial Reading Class

by

Lorraine M. Wedel

A Thesis

Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements for the Degree
of Masters of Education

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OF CONNECTED DISCOURSE: A Study in
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BY

LORRAINE M. WEDEL

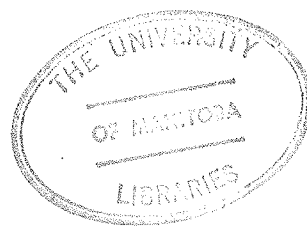
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MASTER OF EDUCATION

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" To Know What You Know and
What You Don't Know is a
Characteristic of One Who
Knows "

- Confucius

ABSTRACT

This thesis examines the facilitatory effects of teacher-induced verbal and visual mediational strategies on the reading comprehension of stories by adolescent poor readers in a remedial class called Transition Seven. It also investigates the relationship between good reading comprehension and accurate self-monitoring. A secondary purpose is to determine if students with an aptitude for visualizing will benefit more from instructions to visualize than poor visualizers. Three groups, blocked according to visualizing aptitude, were randomly assigned to three treatments according to the order in a Latin Square. After being first presented with two baseline stories, they read six stories, two per treatment, using the controlled reader for all stories. The three treatments were: (a) visualizing, (b) interspersed questions, and (c) no mediation. Comprehension was tested first with a Post Test and the next day with a Summative Test.

The results of the study showed that neither visualizing nor adjunct questions had a significant effect on Post Test comprehension, but the questioning treatment significantly improved comprehension on the Summative Test ($p \leq .01$).

The Post Test comprehension was correlated ($r = .506$) with self-monitoring ($p \leq .05$). While this is significant statistically, it may not be meaningful educationally.

There was no difference, in either Post or Summative Test comprehension between good and poor visualizers after visualizing.

Schema theory provides a credible explanation for the results found in this study: comprehension and recall were improved by interspersed questions theoretically because there was mediation between schemata in the stories and the background knowledge brought to the topic by each subject. Also, the ability to self-monitor and other aspects of metacomprehension were found to be important contributors to effective reading comprehension.

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CHAPTER 1

THE PROBLEM AND ITS BACKGROUND

THE PROBLEM

The purpose of this study was to examine the facilitatory effects of two teacher-induced mediation strategies on reading comprehension of connected discourse, and to determine if a positive relationship exists between good reading comprehension and accurate self-monitoring. A second purpose of the study was to inspect the relationship of specific mediators, imaginal and verbal, and the child's natural aptitude for that strategy.

BACKGROUND

What is it that makes the difference between good and poor reading comprehension? Many disabled readers are proficient decoders but dismal comprehenders. The difference may reside in the child's inability to monitor his own understanding. Poor readers seem insensitive to the need for resolving comprehension failures. They are not aware of task difficulty or of the desirability of invoking special strategies for differing material or goals. Most of all, they are not aware of the value of self-monitoring - of mentally asking themselves, did I understand that? Did that make sense? The development of children's metacognitive knowledge, which appears to be associated with

efficient reading, learning, and remembering may provide a critical link in the transition from novice to sophisticated comprehender.

It has been demonstrated that young or retarded readers do not spontaneously generate strategies to understand and remember what they read (Brown and Barclay, 1976; Borkowski and Wanschura, 1974; Hagan, Jongeward and Krail, 1975). However, when they are systematically taught to plan for recall, and are persuaded that there is value to self-awareness and to the use of strategies, they can benefit from teacher-induced mediators.

The eighteen students in this study are early adolescents in the seventh grade, who are not proficient readers despite normal intelligence and adequate word recognition ability. They receive core subject instruction as a small group called Transition Seven. The group had its origin in the sixth grade and was so constituted because there was concern that they would not be successful in a regular grade seven class using the standard curriculum - the concern based on teacher observation and testing. Although they are neither "young" nor "retarded" in the same sense as the subjects in the literature, they exhibit similar problems with reading comprehension, possibly for the same reasons. They are not aware of what they don't know, do not appreciate the need to use mediational strategies, and do not spontaneously generate these strategies.

Subjects were first divided into categories of good and poor visualizers, on the assumption that good visualizers should benefit more from instructions to visualize than poor visualizers would. Three groups were formed, each composed of three good and three poor visualizers. All three groups were presented with eight stories, which were read using the controlled reader, a device which projects the line of print on a screen at a speed comfortable for all. The first two stories, the same for the three groups, provided baseline scores. The remaining six stories were ordered according to a Latin Square so that each group eventually read two stories under instructions to visualize, two stories with interruption for interspersed high-order questions, and two stories with no mediation. Following the reading of each story, subjects answered ten multiple choice questions designated the Post Test. They were instructed to evaluate their own confidence in the correctness of their answers by marking a "1" by those they were certain of, and a "2" by those about which they were unsure. Agreement between a "1" and the correct answer, or a "2" and the incorrect answer constituted a score designated the Self-monitoring Score. As well, on the following day, the group was presented with a set of summative questions, requiring short written answers, designed to probe their long-term recall of each story, and designated the Summative Test.

RATIONALE

Research in education dealing with learning from connected discourse has come from two directions; that which examines the structure of the material to be read, (Meyer, 1977; Clements, 1977; Marshall and Glock, 1978), and that which examines the nature of the mediation brought to the material by the reader. The latter has included the following: the deliberate use of imagery as a mediator, (Paivio, 1971; Pressley, 1977; Steingart and Glock, 1979); the use of interspersed questions as mediators and organizers, (Rothkopf, 1970; Frase, Patrick and Schumer, 1970; Rickarts, 1979; Andre, 1979; Wilson, 1979); and a large body of current research about metacomprehension, which examines the role played by the reader's awareness of his own comprehension, or lack of it, (Brown, 1978; Myers and Paris, 1978; Markman, 1979; Garner, 1980).

While several studies regarding the use of mediational strategies and self-monitoring have focused on adults (Rowe and Paivio, 1971; Tirre, 1979; Steingart and Glock, 1979), and research has been conducted at the other age extreme with primary children (Salatas and Flavell, 1976; Dunham and Levin, 1979; Markman, 1977), or with the mentally handicapped (Brown and Barklay, 1976; Paris, Mahoney and Buckhalt, 1974), there has been little research conducted

specifically with seventh graders of normal intelligence who are not proficient readers, yet in terms of Piaget's stages of cognitive development, this age group is significant. Seventh graders are, theoretically at least, just entering the stage of formal operations with implications for newly acquired abilities to think hypothetically and to understand abstract ideas. Because of the developmental nature of metacomprehension, (Brown, 1978; Myers and Paris, 1978) research conducted with primary or college students cannot be generalized to early adolescents.

Further rationale for this study is provided by the choice of reading selections, and their method of presentation. Studies in metamemory have until recently been mainly restricted to the child's knowledge and control of rote-learning methods of learning meaningless lists of words (Paivio, 1971). Common mnemonic techniques used to encourage rote recall of word lists may not be relevant, when we consider that much real-life learning depends on recalling the gist of connected discourse. The stories to be presented in this study are interesting and contain information which the reader should perceive as suitable to add to his personal store of background knowledge. All of the stories could build on his previous experience, for example, one is about Carol Burnett, another is a tale of the eruption of Mount Vesuvius, a third is an account of experiments in communication done with chimpanzees.

The stories were presented using the controlled reader - a pacing device which projects the line of print on the screen at a pre-set speed. The subjects in the study were accustomed to reading with the controlled reader, which is an effective instrument for directing and maintaining attention (Bottomly, 1961; Witham, 1966). This method of presentation was chosen to circumvent the resistance to reading from books which some of these students, and poor readers everywhere, have developed as a consequence of unsuccessful book reading over the years. It also allowed the experimenter to regulate the reading rate so the stories could be interrupted for visualizing or questions.

A recent investigation into common practices of teaching reading comprehension in the classroom has revealed that it is seldom taught at all (Durkin, 1979). It is customary for teachers to introduce the new vocabulary, which the slow student often does not learn very well, then to assign the reading. The reading is followed by questions suggested in the manual, but not always on the same day on which the story was read. This is followed by heavy reliance on workbooks, and other questions testing comprehension. Despite an almost total absence of direct instruction in comprehension, however, good readers do somehow comprehend what they read. But in every classroom Durkin observed some children who were not making it. "Since reading ability still is a requirement for full participation in classroom

activities, such children are "outsiders" as early as third or fourth grade." (Durkin, 1979, p. 527). These are the children who end up in Transition Seven, and similar classes. They do not select, or call into focus, appropriate schema from their own background knowledge, nor do they seem able to use inference to fill in the variable slots within a selected schema. Filling in the slots with particular values is a routine aspect of the ongoing process of successful comprehension (Pearson, 1980, p.5). Similarly, these children do not seem to have an internalized knowledge of story structures in general. While it is not known that good readers have a better knowledge of story structure, it is a possibility (Whaley, 1981). There are many indications from Durkin's study that some children are the victims of poor or absent instruction in the reading class.

From their cumulative files, a brief survey of the backgrounds of the students in this study indicates that their problems are not new, but indeed have developed over the past six or seven years. While it is not suggested that the interventions proposed in this thesis will resolve all their reading difficulties, it is hoped that they may provide some assistance both for these students and for others like them.

Specifically, this study has attempted to answer the following questions:

1. Will adjunct aids such as (a) inserted questions or

(b) instructions to visualize serve as mediators to facilitate comprehension and thus improve recall of the stories?

2. Will the new information encountered in the story and the gist of the story be remembered the next day?

3. How accurately does the student judge his or her own understanding?

4. Will the visualizing instructions prove to be more facilitating for the subjects identified as having a natural aptitude for visualizing as compared to those who do not?

Research Hypothesis:

The reading comprehension of eighteen adolescents in a remedial reading class, as measured by a Post Test, and the next day by a Summative Test, will be improved by the intervention of interspersed questions or by instructions to visualize during the reading of six stories, as compared to comprehension after reading stories with no intervention. As well, the good visualizers will comprehend better after the visualizing treatment than the poor visualizers. Finally, the good self-monitors will have better comprehension than the poor self-monitors.

Specifically, the following null hypotheses will be tested:

Null Hypothesis (1)

Reading comprehension, as measured by an orally presented multiple choice test immediately after reading, will not be improved significantly by the intervention of either mediator: (a) instructions to visualize or (b) interspersed questions .

Null Hypothesis (2)

Recall of information from the stories, as measured by a short answer test after 24 hours, will not be significantly improved following mediated reading as compared to scores after non-mediated reading.

Null Hypothesis (3)

Those subjects who have an accurate knowledge of their own understanding, as measured by an agreement between their certainty of the answers and the corresponding answers on the Post Tests, will not have significantly better recall on either the Post Tests or the Summative Tests, irrespective of which treatment preceded the test.

Null Hypothesis (4)

Those subjects identified as having an aptitude for visualizing, and who are then presented with instructions to visualize while reading, will not score better in this treatment than in either of the other two treatments. Nor will they score significantly better than the poor visualizers in their groups.

PREDICTIONS:

1. Mediation, whether visual or verbal, facilitates reading comprehension.
2. Awareness of one's own comprehension state facilitates comprehension.
3. Good visualizers benefit more from instructions to visualize than do poor visualizers.

INTRODUCTION

"Most of us have very imperfect control over our attention," says John Holt (How Children Fail, 1964). "Our minds slip away from duty before we realize that they are gone. Part of being a good student is learning to be aware of the state of one's own mind and the degree of one's own understanding. The good student may be one who often says that he does not understand, simply because he keeps constant check on his understanding. The poor student, who does not, so to speak, watch himself understand, does not know most of the time whether he understands or not. Thus the problem is not to get students to ask us what they don't know; the problem is to make them aware of the difference between what they know and what they don't." (Holt, 1964, p.8).

There appear to be two broad categories of poor readers: those designated by Cromer (1970) as "deficit" poor readers, without the vocabulary to decode rapidly what they read, and those he calls "difference" poor readers, who, although they are reading words fluently enough, get few ideas from their reading. It is obvious why "deficit" poor readers cannot abstract information from text when all their energy and attention must be directed to decoding words; it is more of a puzzle why "difference" poor readers do not comprehend.

An important variable in this complex process has recently been identified as metacomprehension, whereby the child is an active agent in "knowing", and is aware of the degree to which he comprehends as he reads. To date, little is known about the mechanisms involved in metacomprehension, how they succeed or fail, how they vary with the nature of the material, or how they develop. However, the study of comprehension proper, should provide a basis for theorizing about metacomprehension (Markman, 1979, p. 644). This is not to say that anything which is difficult to understand will necessarily be difficult to monitor. Quite the contrary is true in the case of very complex, convoluted sentences which the child knows do not make sense. Still, it is astonishing how much gibberish the poor comprehender will allow to wash over his mind as he passively continues to read at the decoding level without stopping to realize

that he is getting no meaning from the words.

Ann Brown calls it a secondary ignorance and it is she who has labelled it "metacomprehension". Part of being a good student, she insists, is learning to be aware of one's own mind and the degree of one's own understanding (Brown, 1978, p.86). Young and retarded children lack insight into their own knowledge states, which involves quite complex forms of reasoning. Brown continues, "Mature problem solvers not only have a reasonable estimate of the accessibility of their known facts, they are also cognizant of which facts cannot be known, and which can be deduced on the basis of what they already know" (Brown, 1977, p.244). Not only do children know less than adults, but their knowledge is often poorly organized, incomplete, and inconsistent. As well, although they are quite capable of using mnemonic techniques when instructed to do so, they fail to use them of their own volition. Explicit prompts, the degree of explicitness dependent on the child's age, are needed before he will use a set of operations such as rehearsal, categorization, elaboration, or visualizing. Both young children and retarded older children can be taught to use strategies but there is limited transfer or generalization to novel tasks. The subjects in this research appear to have similar difficulties.

Comprehension is defined as a series of processes that the reader uses to abstract meaning from discourse (Marshall

and Glock, 1979). The reader takes a series of steps to create a memorial structure for the text that directly reflects the semantic structure of that text. It should be stressed that the comprehension act is bidirectional from discourse to memory and from memory to discourse. "Just as the semantic structure of the discourse can affect the memory structure of the reader, so the memory of the reader can affect the way the text is processed" (Marshall and Glock, 1979, p.50). This idea has been called "schema theory" (Bartlett, 1932; Bransford and McCarrell, 1974; Spiro, 1977; Anderson, 1977). A schema is a loose network of information already in the mind of the reader that can affect comprehension. It is a common observation that the greater amount of experience the reader has with the topic of the discourse, the easier it will be for him to understand it. Spiro (1977), explains that recall is more than mere passive reproduction of stored memories - the memories probably no longer exist in their original form (Spiro, 1977, p.137). The material to be recalled must be isolated from other assimilated information.

While reading, listening, or viewing something, an efficient comprehender picks up enough clues from the particular environment to recognize that a particular schema ought to be brought to bear to aid understanding (Pearson, 1980). "Schema" in the psycholinguistic sense, is defined according to Pearson as a hypothetical, abstract

knowledge structure to which human information processors bind their experience with real world phenomena. The clues are often subtle, so the reader must be actively involved in the story to pick them up. He then anchors the new information to the appropriate pre-existing framework.

Secondly, because he has read, or listened to, or written, many stories, the good reader also has developed a "story schema", an idealized, internal representation of the parts of a typical story and the relationship among those parts (Mandler and Johnson, 1977). He knows intuitively that the Setting of the story will appear first, followed by an event which will begin an Episode. The episode will include a Reaction (how does the character feel?) and the establishment of a Goal. This will be followed by an Attempt, or series of attempts, to reach the goal, via the Goal Path, until eventually there is a Consequence, and a new episode begins (Stein and Trabasso, 1981). Actually, good readers use a story schema in three ways: as a set of expectations from the structure of stories, to facilitate comprehension, and to improve memory of text (Whaley, 1981).

Unfortunately, the use of story schemata for these purposes is not automatic or universal. Older children and adults are much more adept than young children. It is also suggested that poor comprehenders, such as the subjects in this study, do not pick up the subtle clues necessary to

engage the appropriate personal schema, nor do they have well-established "story schemas" to help them out, probably because of limited exposure to story types in general.

One of the reasons children read with comprehension is to update their personal stores of knowledge. If they approach school material as totally unrelated to everything outside of school, they will compartmentalize new information from their reading, differentiating it from prior knowledge as much as possible. Once the comprehension questions have been answered, the new information will not be encoded for storage in long-term memory, will soon be forgotten. The challenge facing the reading teacher is twofold. The reader, any reader, good as well as poor, must first be persuaded, by making the material relevant and comprehensible, that the new information is valuable enough to remember. It must be related to previous experience, and structured so that the superordinate concepts are clear and common attributes are clumped logically. Second, the poor reader, particularly the "difference" kind, must be assisted to process ideas, not simply decode words. He must assimilate to existing schema (or "interiorized schemes", as Piaget calls them) if the material is familiar, or modify his existing schemes to incorporate new knowledge. Asking him to pause and visualize the story presented in a previous paragraph or two, or posing a Why, How, If/then, What if, or Because/then kind of question after a section of the story

should serve to focus his attention on the theme. It should cause him to do a metamemorial backward search, and to process actively, more of the material he is reading. Rumelhart and Ortony(1977,p.112) compare the reader to a scientist who makes a prediction, then seeks evidence either to confirm or to reject it. Goodman and Burke(1980) divide reading into stages of prediction, confirmation and integration at three levels, graphophonic, syntactic and semantic. Spiro(1977) explains that recall is dependent on reconstruction of meaning from schemata established during comprehension.

Good readers have incorporated the complex organizational strategies required for comprehension into their responding repertoires. Levin(1973) found that having "difference" poor readers visualize the thematic content of the passage seemed to direct their attention to the semantic characteristics and relationships within the passage and resulted, at least with older children, in dramatic improvement in reading comprehension (p.23). The "deficit" poor readers with inadequate decoding abilities, were not helped significantly. Apparently a more functional sight vocabulary is necessary before they can benefit from mediational strategies.

Recent research reviewed by Rickarts(1979) has demonstrated as well that the insertion of high level,

adjunct questions in the text significantly enhances the comprehension of poor comprehenders, defined as those readers whose vocabulary levels are average or above, but whose comprehension scores on a reading achievement test are one year or more below average. Intervention with either visualizing or inserted questions seems to be well-supported in the literature as an effective way to improve reading comprehension of prose. Whether or not this improvement is due to better self-monitoring, or "metacomprehension", remains to be seen, and is one of the subjects of this study.

CHAPTER 2

REVIEW OF THE LITERATURE

From Metacomprehension to Schema Theory

The role of metacomprehension, including the use of mediational strategies, has been well reported in the mental retardation literature. Brown and Barclay (1976) evaluated the effects of training educable retarded children to use strategies to remember pictures. The strategies - anticipation, cumulative rehearsal, or labelling - were easily taught even to children with a mental age of six but only the older children (M.A. 8 or above) learned to monitor the effectiveness of the strategy, and even they were unable to generalize to new situations. Brown (1976) is convinced that both the overall intention to be strategic and the efficient monitoring of memorial processes are required in any intelligent attempt to remember.

The good rememberer needs "metamemorial" ability which involves at least three subskills: (a) introspection or knowledge concerning his own memory processes, his capacity limitations, and his personal repertoire of strategic skills; (b) memory monitoring: he must be able to monitor his attempts to be strategic (c) executive control, whereby he

organizes and plans, selecting task-appropriate skills and then deciding to maintain, modify, or abandon them in response to their effectiveness (Brown and Barclay, 1976, p. 72).

The terms "metacognition" or "metacomprehension", cousins of "metamemory", are more likely to be cited in connection with the recall of the gist of connected discourse, then with rote recall of word lists. The terms were first coined in the midseventies by Kreutzer, Leonard and Flavell (1975) although, since the pioneering work of Flavell, Friedrichs and Hoyt (1970), there has been an upsurge of interest in self-awareness related to cognitive development.

In 1976, Salatas and Flavell found no relation between self-knowledge (metamemory) and recall among first graders. However, this is not surprising in the light of some of Brown's (and others) work into the developmental nature of metamemorial knowledge. It has been found that although third grade children have developed a self-awareness equivalent to that of college students when it comes to rote memorization of lists, children as young as first grade are just beginning to develop metamemorial skills. When a task is more complex than simple rote memory, then successful comprehension depends on the match between task demands and the child's cognitive maturity (Brown, 1978; Myers and Paris, 1978).

Myers and Paris (1978) examined the metacognitive variables about reading by asking second and sixth graders about (a) the effects of personal abilities, (b) task parameters, and (c) cognitive strategies involved in reading. They found that although some children were aware of the influence of some reading dimensions such as interest, familiarity with the topic, and length of the selection, they were less sensitive to more complex variables such as the semantic structure of paragraphs, goals of reading, and strategies for resolving comprehension failures. Sixth grade children fared considerably better.

Two noteworthy studies by Markman have contributed further to the metacomprehension literature. In her first study (1977) children in first and third grades were asked to evaluate instructions that contained glaring omissions. In order to determine the completeness of the directions, the child had to first execute the instructions mentally. This the first grade children failed to do, so unless they were reminded to try them out, they were satisfied that the directions were complete and were unaware of their own lack of comprehension. Third grade children picked up the inadequacy of the instructions with minimal probing by the experimenter (Markman, 1977).

Markman's 1979 study, conducted with children in grades 3, 5, and 7, was designed to evaluate students' awareness of comprehension failure while reading material containing

explicit and implicit contradictions. It was found, even with the older children, that when inferences were required to discover the inconsistent material, they were unaware of the problems. When the inconsistencies were explicit in the text, children's performance improved, but it was by no means perfect (Markman, 1979, p. 648). Only when they were informed of the existence of a problem did they succeed in carrying out the inferential processing necessary to find it. Markman suggests that to notice inconsistencies, children have to encode the information in at least two sentences, one contradicting the other, draw the relevant inferences, retrieve and maintain these propositions in working memory, and compare them. Elementary children are capable of carrying out these processes, but do not do so spontaneously.

While it is generally accepted that metamemorial knowledge is developmental, Pearson, Hansen and Gordon's (1979) research into the effect of background knowledge on young children's comprehension of prose indicates that young children with strongly developed knowledge structures perform a variety of cognitive tasks such as recall, metamemorial monitoring, and prediction more like older children than like their knowledge-deficient peers. Apparent developmental changes in cognitive strategies may turn out to be knowledge based differences.

Brown (1977) has found evidence that younger children have some difficulty keeping separate the actual passage

they have read from their background knowledge relevant to this passage. "By third grade children do use their pre-existing knowledge to elaborate and embellish their retention of prose passages" (Brown, 1977, p. 1459). Their background knowledge actually intrudes into their recall protocols. Brown concludes that schemata provide the interpretive framework for comprehending discourse. Ambiguous or incomplete sections of the story are filled in - "disambiguated" - so that the story conforms better to pre-existing knowledge. Brown believes that discourse itself does not carry meaning, but only instructions for the construction of meaning.

Many educational psychologists have been curious about the process of recall and the construction of meaning. When new information is understood, is it stored originally as a self-contained schema, or is it integrated into the reader's semantic network, then reconstructed at the request for recall? Basing his hypothesis on Bartlett's (1932) research into accurate recall, Spiro has shed some light on the problem. Spiro (1977) theorizes that the likelihood of inaccuracy increases with the degree of interaction with pre-existing cognitive structures. The more one relates discourse to prior knowledge, the greater the assimilation into these structures with the resultant loss of the particular identity of the discourse. The boundaries between old and new become fuzzy. We infer the original comprehen-

sion of what was read or heard from the nature of the subsequent recall. Spiro says that if errors have their origin in the comprehension process, they will not increase over time, given that recall is reproduction. However, they do increase over time, so he concludes that, rather than the mere location of a verbatim memory trace, the errors as well as the accurate part of the recall are reconstructed, based on the current state of knowledge (Spiro, 1977, p.137).

"Schemata are data structures for representing the generic concepts stored in memory" (Rumelhart and Ortony, 1977, p.101). Schema theory provides both the concepts and the vocabulary for theorizing about the organization of knowledge. The notion of schemata as varying in abstractness enables quite specific predictions to be made about the relatedness of the memorability of a prose selection and its structure.

"In particular, higher level ideas, ones which are more dominant in the logical structure, are better remembered than particular details, and, they are better remembered if the order of their appearance in the passage is congruent with their priority in the structure" (Rumelhart and Ortony, 1977, p. 130). This agrees with Ausubel's theory of subsumption and his stress on the importance of having a superordinate structure on which to attach the details.

Schemata appear to be the key units of the comprehension process. In a schema-based system, the reader processes the incoming information until he finds schemata to account for it. On having found such a set of schemata, the person is said to have comprehended the situation. The reader tests a theory and then searches for evidence which either confirms it or leads to its rejection.

A brief foray into the literature on memory may help to clarify the comprehension and metacomprehension processes. First, a distinction should be made between involuntary and deliberate remembering (Brown, 1975). Involuntary remembering is largely the result of the incidental learning that accompanies the child's active exploration of his environment. Deliberate remembering is the kind of memory referred to in the context of metamemorial activities. It requires the knowledge of one's capabilities, an evaluation of the difficulty of the task to be learned, and a repertoire of strategies to do so. Secondly, a distinction should be made between episodic and semantic memory (Tulving's terms, 1972). Episodic knowledge is concerned with storage and retrieval of temporally dated, spatially located, and personally experienced events or episodes. In order to regenerate episodic information accurately, the child must engage in intelligent retrieval strategies, and can do so better if warned in advance that such information will be

required. He can then store it strategically, rather than chaotically.

Semantic memory, by contrast, refers to a body of knowledge which is not bound up with time, place or specific data. "It is the organized knowledge a person possesses about words, meanings, relations, concepts, rules, etc." (Brown, 1975, p. 109). Maturation should both expand a child's repertoire of strategies for dealing with episodic reproductive memory, and also should result in gradual changes and expansion of his semantic knowledge system.

"If one assumes that knowing depends on semantic memory and remembering depends on contact with episodic memory, then theories concerned strictly with episodic memory are clearly inadequate to characterize all the processes involved in learning" (Bransford, Nitsch and Franks, 1977, p.34). If memory is organized in this way, it is found that episodic memory, also referred to as "scripts" by Nelson (1977), is characteristic of people of all ages but preschool children tend to rely on it to the exclusion of other forms of organization. By school age they learn to use categorical hierarchies which are part of semantic memory, in verbal tasks. There is a shift from "thinking about" to "thinking in terms of" with regard to taxonomic category systems (Nelson, 1977, p. 236). However, both Nelson and Brown agree that the basic process of concept development is the same throughout development, not different in kind

for children to that of adults. The learner constructs a functional core memory and then relates a novel event to other previously known events within the conceptual system.

Brown has identified two phases in the development of knowledge. Automatic, unconscious acquisition comes first and is followed by gradual increases in active conscious control over that knowledge. The first, sometimes described as the equilibration processes of assimilation and accomodation (Piaget's terms) may remain constant throughout a lifespan, but the ability to exploit and control the knowledge we have - the strategic systems employed in acquiring a knowledge base - differs with developmental maturity. Gagne referred to these strategies as executive control processes while Rothkopf called them mathemagenic behaviors, but they are also currently being referred to as "metacomprehension". A control system must include the following abilities:

(a) to predict its own capacity limitations, (b) to be aware of its repertoire of heuristic routines and their appropriate domain of utility, (c) to identify and to characterize the problem at hand, (d) to plan and to schedule appropriate problem solving routines, (e) to monitor and to supervise the effectiveness of these routines, (f) and to evaluate dynamically these operations in the face of success or failure so that they can be terminated when they aren't effective. "The use of an appropriate piece of knowledge, or routine to obtain knowledge at the right time and in the right place is

the essence of intelligent mental operations, of cognitive maturity." (Brown, 1977, p. 243).

Comprehension facility depends not only on the reader but on the nature of the material being read. A poorly organized text which requires extensive restructuring is harder to understand than one which is hierarchically ordered or "staged" (Marshall and Glock, 1979; Clements, 1977). A study conducted by Steingart and Glock (1979) made use of imagery instruction as a mnemonic to help subjects reorganize a poorly organized text. A comparison group was instructed simply to repeat the information. Two types of text were prepared, one in which the information was scrambled, and the other in which it was "referent organized" so that all the attributes were grouped together with like attributes. This latter text was easier to comprehend regardless of the strategy employed. Imagery supposedly helped restructure non-referent text so that it was like referent text. In fact, even when the text was already referent, imagery helped to maintain the organization. The authors concluded that "the application of an imagery strategy markedly facilitated comprehension of text relationships." (p.81). In light of the work done by other researchers in schema theory, it would appear that asking a reader to visualize a passage after he has read it in effect causes him to develop, or call up, a schema of the information.

Schema theory, then, suggests that schemata serve at least two important functions during comprehension. First they provide a framework for classifying the concepts encountered in the text, the stronger the framework, the more likely that the concepts will be correctly classified and available for recall. Secondly, schemata allow readers to fill in the gaps not completely specified in the text, and to make inferences from the information they do read (Pearson, 1979).

From Interspersed Questions to Visualizing

The literature on the effects of interspersed questions includes two comprehensive recent reviews, one by Andre (1979), and the other by Rickarts (1979). Rickarts, sometimes in company with other researchers (Di Vesta, 1974, Hatcher, 1978), has been conducting research studies using adjunct questions at various levels from literal to high-order, and in various positions in text, over the past fifteen years, indeed since the mathemagenic effect of questions within text was first hypothesized by Rothkopf in 1965.

To be effective, adjunct questions must lead to better semantic encoding of the material being read. After all, from an educator's point of view, a prose passage is a device for altering or confirming the reader's knowledge of the world (Andre, 1979, p.293). On the one hand,

questions in the prequestion position have the disadvantage of limiting the reader's attention to specific details which results in less incidental learning. Rickarts, in his review (1979) reports both specific and general facilitatory effects of adjunct questions in the post-question position, and in both a forward and a backward process. The general forward effect is seen in an increase in attention for the material immediately following the post-question - the same advantage as a prequestion would have - but if the learner develops a set to watch for specific details, he will not recall non-set-related material. A literal-level question will more likely produce this undesirable result than will a high-order question, such as, "What do you think will happen next?". Post-questions also have a backward effect, initiating a mental review of what has been read. Again, a high-order question will generate a more thorough review than will a question which asks for a fact.

Andre (1979) defines question level according to one or the other of two schemes for classifying questions, the well-known taxonomy by Bloom et al (1956) and the classification scheme proposed by Anderson (1972) in which verbatim-factual and paraphrased-factual are distinguished from those questions above the memory level. Application, inference, synthesis, analysis and evaluation questions are considered to be of higher order (Andre, 1979, p. 282).

In general, the research reviewed in Andre's paper has found that the recall of information is directly related to the effort expended on processing for meaning. The belief that different levels of questions will differentially influence learning, based on the assumption that processing more-or-less deeply for meaning will produce differential effects on learning and recall, has not been adequately examined. However, question level has been related to an information processing model, and the model holds that "questions influence the nature of the memory representations formed during instruction and that memory representation controls the way in which stored knowledge can be used" (Andre, 1979, p. 281).

Andre concludes from many samples of the literature on mathemagenic behavior that one effect of higher-order adjunct questions is to direct students to attend to more of the material and thus to encode semantically, then recall information directly related to the information needed to answer the questions. This effect has been labelled the "directed attention effect" (p. 287). Underlying this effect is what he calls the principle of least effort. "The principle of least effort suggests that when students are confronted with more information than they can comfortably assimilate, they will selectively attend to those aspects of the information needed to complete their perceived task of "getting through" the job. Aids such as questions serve to direct the student's attention

by altering the nature of his perceived task"(Andre,1979, p. 287). Questions will have a maximum effect on performance when the subject is operating under conditions of low motivation or ability, as the Transition Seven students in the present study appear to be doing. The interspersed question treatment used here is oral and differs from the usual, printed, in-text question technique. Andre warns that only the student who is targeted to answer, benefits from oral questions so whenever possible each person in the group of six was expected to answer every question. Expressions like, "What do you think, Neil?" were used to involve everyone. Aside from directing or stimulating the reader's attention, questions also force him to become aware of his own comprehension, or lack of it.

A third author, Molly Wilson, has made noteworthy contributions to the adjunct-question literature. Wilson's findings(1979), in her examination of the processing strategies of average and below average readers in response to factual and inferential questions placed in the pre-, post-, and interspersed positions, support the theory that good reading comprehension is related to maturity in thought processes. Good readers have the ability to synthesize and to organize a response, to be objective, to pick up on the author's style and thereby to benefit from the hierarchical structure inherent in the text, while less mature readers

base their answers on intuition, miss the temporal organization of the text, and are dependent on their own experience rather than on the evidence in the story. Wilson's research conducted with sixth and seventh grade children who are, theoretically at least, straddling the line between concrete thinking and formal operations, is relevant to this thesis because the subjects are roughly the same age. Assumedly in Wilson's study, the good readers were already in Piaget's formal operations cognitive stage, while the below average readers remained in the stage of concrete operations. The shift is of course not an overnight, all-or-nothing phenomenon. In fact, many adults may never reach the formal operational stage at all but remain forever bound to concrete thinking.

The stages of development, as seen by Wilson, range from (1) total ability to handle both factual and inferential questions and explain all answers, (2) ability to give a correct answer to an inferential question but for the wrong reasons, (3) ability to give a correct answer to an inferential questions but not to explain why and (4) inability to give a correct answer to an inferential question at all. Every child goes through each stage although the boundaries may not be clear. With regard to question placement, there was evidence that interspersed questions facilitate intentional learning, but question placement in no

way affected ability to produce inferential answers, a skill probably more related to general cognitive maturity.

The hypothesis that poor readers do the same things as good readers did at a less mature stage of development is interesting from the point of view of the literature on mental retardation. Peter Belch (1978) in a study of the effects of different levels of teacher questioning on EMH adolescents found that exposure to, and practice with high-order thought-provoking questions did improve reading comprehension as compared to groups who were given practice only in answering low-order literal questions or no questions at all. It seems the passage from concrete to abstract thinking may not happen as a matter of course, but must be encouraged by providing experience and practice in inferential thinking. The important application is that while most of the questions employed in mathemagenic research have entailed only verbatim recall, the use of higher order questions, questions concerned with Why, How, If/then, and Because (as opposed to Who, What, Where, When questions) are better suited to a mental review of the gist of the text (Wilson, 1979, p.237) and should result in improved reading comprehension by the below average readers in this study.

Visualizing

After several decades of behaviorist-imposed silence with regard to the topic of mental imagery, there has been an upsurge of interest and recent speculation as to the nature of visualizing, its function as a strategy to aid comprehension, and its strengths and limitations. The literature is sometimes contradictory. First, it is agreed that children without adequate word recognition skills cannot improve their comprehension via simple imagery instructions (Dunham and Levin, 1979; Pressley, 1977). Inefficient readers, particularly retarded children, sometimes have an over-reliance on the strategy of memorizing as a way to recognize words in print, and an inability to recognize word meanings in terms of abstract referents. Good readers first employ a strategy of memorizing words when they are beginning to learn to read, but then shift to a strategy which utilizes letter-sound regularity. They learn to use letter-sound patterns to identify words in print. The "deficit" poor reader does not perceive redundant patterns and does not cluster letters into fewer units (phonemes) to facilitate recall. English is quite regular at the letter cluster level of analysis; consonants and many letter clusters have predictable sounds. The deficit poor reader doesn't seem to notice the regularity contained in letter groups, and without this awareness, cannot shift to a letter-sound

identification of new words. "A beginning reading strategy of whole word memorization, an overuse of context to guess unknown words, and a disregard of letter formation may be the outcome" (Mason, 1978, p. 468).

On the other hand, the "difference" poor reader who reads words very well, but ideas rather poorly, may benefit from instructions to visualize. Paris and Mahoney (1974) working with EMR children found that imagery-instructed subjects constructed more inferential relationships and retained more of the semantic information of the stories than did primary or elementary EMR children not receiving imagery instructions.

Pressley (1977), on the other hand, found that normal eight year olds could be trained to form mental images which facilitate their prose learning, but that children younger than third grade seemed unable to benefit from imagery instruction or training, possibly, Pressley speculates, because they were unable to construct an internal image at this age. There is other evidence that imagery training is not necessary with older children beyond fifth grade and that instructions to image are more potent with some populations than with others. Disadvantaged children were benefitted significantly by imagery instructions, as were those readers who did not spontaneously integrate the text despite adequate fluency, defined by Cromer (1970) as "difference" poor readers. However, children classed as

mentally retarded subjects and those whose reading problems were the result of inadequate decoding skills were not helped (Pressley, 1977, p. 613). This is contrary to the findings of Paris and Mahoney (1974) who noted an advantage for moderately retarded children, including those with mental ages equivalent to primary.

In response to the increasing body of evidence pointing toward the ineffectiveness of imagery instructions for children younger than eight or nine years of age, Dunham and Levin (1979) attempted to modify elements of the simple imagery instructions approach to produce positive effects. Children in a "supported" imagery condition were additionally shown real pictures about the contents of the stories to serve as concrete reminders to the children to visualize. In comparison with groups in nonimagery conditions, or in the usual imagery treatment, the "supported" imagery group did no better and the authors conceded that very young children "do not benefit from imagery instructions in a prose learning situation, even when very concrete support is provided" (Dunham and Levin, 1979, p.112).

Tirre (1979), working with adults, conducted research into the effects of using either an imaginal or a verbal strategy and found that the verbal strategy produced better comprehension of prose, as tested two days later, than did the imaginal strategy. He was also looking for a comparison between concrete and abstract passages. He found,

although the concrete passages were comprehended better in general than the abstract passages, that there was no interaction between concreteness and whatever strategy was employed, either verbal or imaginal.

The effects of induced mental imagery upon comprehension of prose by sixth graders was studied by Gambrell, Koskinen and Cole (1981). Comprehension of oral versus written discourse by both above average and below average readers was compared. It was found that mental imagery may be equally effective under either listening or reading conditions. As expected, the above average readers scored considerably better regardless of the condition, suggesting that poor readers suffer from specific comprehension difficulties which do not appear to involve decoding skills. However, mental imagery as a mediator may not be the answer since more below average than above average readers reported an inability to induce mental imagery at all.

Paivio (1971), experimenting with paired associates, found that when given a choice of mediators, subjects will choose verbal mediators when the task is abstract and imaginal when it is concrete. He delineated a hierarchy of ease of recall: objects were easiest to recall, then pictures, next concrete words, and finally abstract words. There is also evidence to suggest that memory is developmental. While young, a child uses images as mediators, then he gradually switches to verbal mediators as he matures,

contrary to Pressley(1977), to Dunham and Levin(1979) and others who have found that very young children, six and under, cannot deliberately visualize. Perhaps, however, there is a difference between mental processes modified by induced visualization and a child's natural use of imagery as a way of exploring his world. Kuhlman(1960) regarded imagery as a mode of thought that is necessary for the pre-verbal child and that becomes habitual because its use is reinforced. With the development of language and the development of adult categories and concepts which are based on language rather than on the perceptual properties of visual stimulus, the use of imagery is normally relinquished. Kuhlman viewed the habitual use of imagery as a vestigial skill in an adult. However, other researchers of her time (Stewart,1965, as reviewed in Paivio,1971) reasoned that individual differences in the uses of imagery would continue into adulthood, indeed, for some people, would be the preferred method for sorting, storing and retrieving concrete memory material.

Paivio has postulated a dual coding hypothesis for encoding into memory which involves both imaginal and verbal codes. Because objects and pictures are easier to recall than their verbal labels, yet the response is verbal in both cases, he contends that they must have been encoded dually. Both or either of the codes may serve as a retrieval cue. Visual memory, however, may be more effective than verbal mediation because the information in the image is

spatially organized permitting a rapid read-out of the relevant components, whereas the information in verbal storage is sequentially organized as a string of "mental words" that may take up more space in memory, or require longer search time with less efficient retrieval of the appropriate response during recall, or both. "Where both systems are relevant to the task, however, they presumably interact continually in their mediational functioning . Imagery mnemonics may be especially effective because they enhance the probability that both symbolic systems will be brought into play in the learning task" (Paivio, 1971, p.391).

Although there is obvious appeal in the simplicity of Paivio's dual code model, it has been criticized as offering explanations only at the level of gross imagery effects and is not capable of providing a complete account of performance in verbal and perceptual tasks "since it lacks the machinery to operate at deeper levels" (Kieras, 1978, p.533). These levels include concepts, properties, features, and meanings, rather than word representations or copies of sensory input. Kieras reviews several models which have been put forth to explain the powerful facilitative effects of imagery as a factor influencing memory for verbal materials. The propositional representation position on the nature of imagery, for example, is based on the argument that all knowledge, regardless of its source modality, can be expressed in a single, uniform, abstract type of repre-

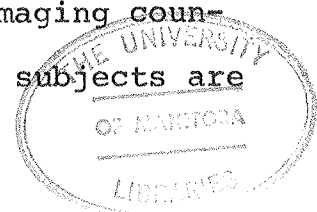
sentation, the proposition. A proposition is best expressed as a network of concepts interconnected by relationships. The concepts are represented in memory by nodes and the relations between concepts as links. The general propositional model, based partly on computer simulations, accounts for both semantic and perceptual information input and retrieval. The image as an "internally constructed perceptual description" (Pylyshyn, 1973) may have a great number of connections between concepts, reflecting the great many spatial relations that objects can have with each other, and thus may provide many avenues of access for retrieval.

Both models, the dual-code and the propositional, assume that perceptual information is more directly related to concrete objects and words than to abstract words. While the dual-code theory infers different systems of associative connections as an explanation, the propositional model makes a cognitively based distinction, in that forming an image for a concrete word requires simply locating the appropriate concept node and retrieving the perceptual representation from the concept; but "forming an image for an abstract word requires additional memory search, which takes more time" (Kieras, 1978, p.540). Even with concrete sentences, images need not have complete correspondence with the sentence meaning in order to be effective mediators.

Regardless of how imagery is represented in memory, it is an undeniable experience and seemingly has a functional

role as a mediator. It is probably not a primitive construct with endless photographs stored in a mental file cabinet, nor is it simply a compendium of propositional representations. Kosslyn and Pomerantz (1977) have put forth some convincing arguments defending the existence of a surface image with emergent properties. An image can be scanned; its size can be manipulated, made larger or smaller or rotated in space, it is clearer at its center and fuzzy at its edges. Perhaps, as Pylyshyn (1973) has suggested, we need a third code, an "interlingua", to translate visual to verbal representations. All these speculations about the inside of Watson's "Black Box" are fascinating to think about but difficult to prove. We can observe, meanwhile, that certain behaviors are characteristic of good visualizers and not of poor visualizers.

Because visualizing is clearly tied to concreteness and verbalizing to abstractness, we would expect to find individual differences among the 12 year olds in this research sample, based on Piaget's stages of cognitive development. Although there is no pure type, except in cases where a child is blind or deaf, there are those whose habitual mode of thought is visual-imaginal, as opposed to verbal, and these natural visualizers would be expected to perform better on the reading comprehension task with the visualizing directions than their more verbal, low-imaging counterparts. It becomes useful to find out which subjects are



good at forming mental images and which are not. What behaviors identify the good visualizer?

Several experimenters have found that high imagers were much superior in incidental learning tasks (Ernest and Paivio, 1969; Sheehan and Neisser, 1969). Paivio's explanation for this is that high imagers perceive and store visual information literally. Low imagers either have less ability in this regard, or they habitually code information verbally. In either case, high imagers would be more likely to see and retain incidental visual clues such as color, but they may not be superior with intentional cues which low imagers can code verbally.

Other studies have been able to show that those children who learn relatively better from pictures than from words on paired-associate learning tasks, also benefit most in a reading task when a visual imagery strategy is induced. (Levin, Divine-Hawkins, Kerst, and Guttman, (1974). In fact, in these experiments with fourth grade children, undertaken primarily to corroborate an earlier study which found that some children learn better from pictures and some learn better from words, there was evidence that the imagery strategy may actually interfere with comprehension in those children whose learning modality is strongly verbal. It is assumed that such subjects have developed successful, non-imagery strategies for processing prose material. This possibility must be born in mind whenever

imaging is induced as a mediator.

Paivio and others found a high correlation between the ability to visualize and the ability to manipulate mentally objects in space. Among the several tests which have been popular in research about imagery are the Flags Test, the Kuhlman-Finch Space Test, Thurstone's Spatial Relations Test, and the Minnesota Paper Form Board (Paivio, 1971, p.490). Criticism of some of the tests is that they do not measure the ability to form mental images, but instead give figural information. Guilford and others claim that tests must be chosen which include a transformational component as well as the visual-spatial component in order for the test to measure ability to visualize. The Minnesota Paper Form Board (MFPB), (Rev. Ed, Likert and Quasha, 1970) which requires mental manipulation of objects in space, is an appropriate test to determine individual differences in this ability. As well, the Space Relations subtest of the Differential Aptitude Test (DAT) fulfills the requirements for a good test of imaging ability. The grade nines in the pilot study had recently been administered the DAT test under standard conditions, so results were easily available. This subtest requires mental manipulation in three dimensional space and is ideal as a test of both spatial and figural transformational ability. The subject must first form a mental image of the object in the diagram, often a kind of box, from a pattern, and then must recog-

nize the made-up pattern from a choice of four three-dimensional pictures in varying positions in space. The MPFB is somewhat similar in that the subject must recognize a pattern from four choices which is made from the component parts diagrammed at the beginning of each set. There are available coefficients of correlation between the two tests, for N equals 63, r is .54 (Manual, Rev. MPFB, 1970). In this pilot study, the raw scores of the two tests were added and the resulting index was rank-ordered. The half with the highest scores were said to be better visualizers.

The MPFB is suitable for use with the grade seven remedial students in this research but the DAT is not as it is too difficult. Since it is customary to use more than one measure in imagery studies to determine individual differences in the ability to form images, a second test was chosen, the Embedded Figures Test (EFT) by Witkin, Oltman, Raskin and Karp (1971). This test provides a measure of field independence which also seems to be positively correlated to visualizing ability, eg., rapid recognition of an embedded figure indicates good field independence - scores are the times in seconds. Pierce (1980) used the results from the Embedded Figures Test to divide her subjects, 78 kindergartners and 65 third-graders, into two groups and in two conditions. Once it was determined which children were field independent and which of them were field dependent,

the groups were divided in half with one half being given directions to form images during ten second breaks in a prose selection, while the group in the control condition were told to "think and remember". Third graders high in field independence showed significantly better recall of the passage than those low in field independence, and also were more likely to recall more prose after imagery than their field dependent counterparts. The kindergartners did not benefit from imagery instructions and were more field dependent than the older children. Pierce feels that field independence develops with age, and concludes that individual differences in field independence permit children who can more easily see figure-ground relations to form images combining parts of a story into pictures. "This facilitates their recall when they are given directions to form images" (Pierce, 1980, p.202).

Field independence and dependence, as well as other traits such as impulsivity and reflectivity, are part of cognitive style. "This variable concerns how sensitive a person is to context or surroundings when perceiving a stimulus or making decisions. A field dependent person is able to perceive a scene comprising interrelated parts but is poor at identifying an incongruity. A field independent person can ignore irrelevant information and concentrate only on the relevant stimulus; such a perceiver is aware of changes in scenes because he or she does not depend on

context (Weiner et al, Discovering Psychology, 1977, SRA Inc., p.274).

Witkin (1977), the author of the EFT, has found that the use of mediators in general is more characteristic of field-independent people than of field-dependent people. The two types seem to have different approaches to reading, with the field-independents taking an hypothesis testing approach and the others a spectator approach. Effective learning may take place either way. The Embedded Figures Test, suitable for use with children over ten years of age, will be given individually to each subject, and the results combined with those of the Minnesota Form Board Test (a group test) to arrive at a visualizing index.

SUMMARY

Metacomprehension, whereby the child "knows about knowing" and "knows how to know" must be included with "knowing" itself (Brown, 1975). "Knowing", of course, refers to the child's developing knowledge of the world which he brings to all comprehending situations, be they deliberate or involuntary. "Knowing about knowing", the child's insight into his own comprehension state, and "knowing how to know", his repertoire of strategies to accomplish "knowing", are also very important. Interspersed questions and visualizing can certainly be included as valuable strategies to mediate between the text and the reader's thoughts.

Schema theory assures us that reading for meaning is a bidirectional process. The child brings his experience, language, expectations, and attitudes and imposes them on the text. By predicting, by matching his own knowledge with what he reads, by knowing what to expect as to how words, sentences and stories go, he makes sense out of print.

"Schema theory has as a fundamental assumption that spoken or written text does not in itself carry meaning. Rather, a text simply provides directions for listeners or readers as to how they should construct the intended meaning using their own, previously acquired knowledge" (Adams and Collins, 1979, in Hacker, 1980).

In summary, a review of the literature supports the contentions that:

1. Reading comprehension can be improved by interspersing high order questions in the text, and by directing the reader to visualize after episodes in the stories.
2. The MPFB and the EFT are suitable tests to measure differences in aptitude for visualizing.
3. Metacomprehension, the ability to keep in touch with, or monitor, one's own comprehension state, is an important aspect of the comprehension process.
4. "Difference" poor readers (after Cromer, 1970), who can decode adequately, need some kind of cognitive intervention to help them overcome comprehension failures.

It seems reasonable, in light of the literature on comprehension, metacomprehension, visualizing and interspersed questions, to undertake this study with "difference" poor readers in an attempt to find ways to facilitate their reading comprehension of prose.

CHAPTER 3

METHOD

INTRODUCTION

The literature refers to very few studies concerned with reading comprehension of seventh grade remedial students of average intelligence who are poor comprehenders despite adequate word recognition ability. In general, the Transition Seven students have experienced problems with reading and with problem solving since the beginning of school. Therefore, it seemed both practical and reasonable to investigate whether verbal or visual mediators would facilitate reading, and to see if there was some connection between their poor reading comprehension and their meta-comprehension. A second objective of the study was to compare the effects of a visualizing intervention on good and poor visualizers.

THE SAMPLE:

The subjects were eighteen students in Transition Seven, a special remedial class for sixth grade graduates who were identified as being unable to handle the total seventh grade program, and so were taught the core subjects

in this small group setting. They were all 12 or 13 years old, with reading levels about two years below grade level according to formal and informal tests. They can be classified as "difference" poor readers rather than "deficit" poor readers, according to categories suggested by Ward Cromer(1970). These students can decode adequately but don't efficiently process what they read for comprehension. In general, they have low-average to average intelligence, normal vision and hearing, and come from middle class backgrounds . There is an equal number of boys and girls. Subjects were given two tests to determine aptitude for visualizing, the Revised Minnesota Paper Form Board Test (Likert and Quasha, 1970), which is a well-known test for measuring mechanical aptitude but which has also been used in studies on imagery to differentiate between good and poor visualizers (Paivio, 1970) and the 1971 edition of the Embedded Figures Test (Witkin, 1950), which is a perceptual test designed to measure an individual difference dimension initially labelled by Witkin as field dependence-independence, and more recently as psychological differentiation (Seventh Mental Measurements Yearbook, p.54). This test is employed in contemporary research on mediational imagery because of a correlation between field independent cognitive style and readiness to benefit from imagery instructions while reading prose (Pierce, 1980). The MPFB was given to the sub-

jects as a whole group, and the raw scores recorded out of a possible 64 items. The EFT was administered individually by a parent volunteer. The average time for the 12 items was divided by 180 seconds (the maximum time allowed per item). This was subtracted from 1 to obtain a parallel score with the first test. (The less time needed to identify each embedded figure, the better the visualizer). The two results were averaged to provide a visualizing index (Appendix A). The subjects were rank ordered according to this index, then divided into blocks of three. One member from each block was picked at random to form the three research groups, which then consisted of three good visualizers (V), and three poor visualizers (P).

Limitations of the Sample

The subjects in the study were a self-contained group (Transition Seven), not representative of the seventh grade population. Their reading scores, when compared to the whole group of grade sevens as measured by the Canadian Test of Basic Skills, were (a) skewed left-mean CTBS score in the 35th percentile, and (b) compressed toward the mean ($k > 3.0$). Although all possible precautions were taken to ensure internal validity (see Chapter 5), the study does not have external validity, because results cannot be generalized to other students this age. An attempt was made, however, to justify generalization to other "difference" poor readers.

VARIABLES

Independent Variables: Methods of Instruction

1. Baseline Stories: Two stories, the same for all, were presented first and the results averaged to provide baseline data. These stories and the other six used in the treatments were randomly assigned; the procedure for presenting the stories was the same for all. Care was taken to ensure that each reading, whether or not there was an intervention, was given equal time (35 minutes). In the baseline stories and the nonmediated stories, more time was allowed to answer the questions, and a brief interval was allowed between the vocabulary introduction before the reading, and then between the reading and the question answering. The baseline stories were read uninterrupted. All eight stories were presented using the controlled reader set at a speed comfortable for all.

2. Visualizing: According to the order of presentation established by the Latin Square design, two stories were presented with interruptions after four episodes. Subjects were instructed to close their eyes for ten seconds and to form a mental picture of the passage they had just read, as though it were on a television screen. (Kosslyn and Pomerantz, 1977, have presented evidence that perception interferes with imaging, and it is common sense as well, that visualizing should be done with the eyes closed . The last instruction was at the end of the story.

Visualizing was done with two stories, on separate days, and the results averaged.

3. Questions: Again two stories were presented and the results averaged. The controlled reader was stopped, as in the visualizing treatment, at the conclusion of episodes and at the end of the story. At each stop, a high-level question relating to the material they had just read or were about to read, was posed to the group of six. Each student was expected to contribute with total discussion limited to two minutes at each of the interruptions.

4. No Mediation: Two stories were read, according to the order in the Latin Square, with no interruption. The same period of time was used by making use of pauses and allowing them to have more time to do the vocabulary exercise.

Moderator Variables:

1. Aptitude for verbalizing was pre-determined by scores on the MPFB and the EFT.

$$\text{Visualizing Index} = \frac{(\text{MPFB}/64 + (1-\text{EFT}/180))}{2}$$

Range of values was $0 \rightarrow +1$, where 1 is a perfect score and 0 is no aptitude (See Appendix A).

2. Self-awareness of own knowledge was checked by having subjects evaluate how sure they were of the answers to the post test comprehension questions by placing a "1" by each answer they were sure of, and a "2" by each answer they were not sure of, or had to guess.

Control Variables:

Differences in ease of readability, interest level, and concreteness of the stories were controlled by using a Latin Square to determine the order in which the stories were presented and by choosing stories which were interesting, factual and therefore concrete, of similar difficulty, and of the same length. The story grammar in each is not complex: episodes range in number from two, in Ashes and Immortality, to six, in Clavus or Carol, but each episode is fairly free-standing. All stories are from Multi-media Controlled Reader Series MM-EA (E.D.L. McGraw-Hill, 1972) supposedly with grade five vocabulary at an adult interest level. The background, new vocabulary, and purpose for reading are pre-recorded on a cassette. The comprehension questions were also pre-recorded, so that inability to read the questions was not a factor, and to ensure uniformity of presentation.

Dependent Variables:

1. Improved reading comprehension was measured by answering ten multiple choice questions, printed and orally presented, immediately after reading each story. They were a combination of six factual and three inferential questions, plus one main idea question.
2. Expanded knowledge base was measured by asking summative questions requiring short written answers given the next day. These questions were intended as probes. Ideally, the researcher would have preferred to have each student retell

the stories individually, at which time open-ended questions such as "Tell me more...", or "And then?" would be used to elicit more information. This was not possible, but the printed questions were kept general in an attempt to serve the same purpose. Exceptions to this policy were a few factual questions querying the student's understanding of the setting - where and when did the story take place and who was the main character. Sadow (1982) suggests that questions should be based on story grammar and should recapitulate the logical progression of events in the main story line in order to foster the development of a story schema. " If children are to become proficient readers, schema theory suggests that they must acquire internal frameworks for organizing text information beyond the sentence and paragraph levels" (Sadow, 1982, p. 519). Questions based on story grammar . elicit both literal and inferential levels of thought , for the reader must employ inferences to interrelate stated facts and ideas with each other. Such questions were therefore employed in both the post tests and the summative tests to see if the student had indeed correctly filled in the slots in the internal framework of his own story schema.

PROCEDURE

Eight stories were read by each group, each on a separate day. The first two stories, the same for all groups, were intended to provide baseline scores. All sessions lasted thirty-five minutes, and all stories were read using the

controlled reader, a pacing device which projects the line of print on the screen at a comfortable speed. The subjects were all familiar with the controlled reader, having used it in regular reading lab classes so there was little novelty effect. All the stories were introduced with a cassette, which, after playing introductory music or sounds to set the scene, presented about ten words of difficult vocabulary to be encountered in the story. Next, students were instructed to fill in the words in sentences on a worksheet. This was corrected, but no discussion was allowed. Following the reading of the story, according to the defined treatment for that day, subjects were asked ten multiple choice questions, designated the Post Test, which, to eliminate the possibility that someone could not read the questions, were both printed on a worksheet and read aloud by means of a cassette player. Subjects were instructed to evaluate their own confidence in the correctness of their answers by marking a "1" by those they were certain of, and a "2" by those about which they were unsure. This was designated the Self-Monitoring Score. One story was read by one group each day in a scheduled reading lab class, to reduce any Hawthorne Effect. If a member was absent during the time the group was scheduled for a story, that story was postponed until all members were present. This occurred three times. There was no experimental mortality, nor invalidity due to maturation, because the study was completed within a month. On the following day the group was required to answer five

summative questions printed on a worksheet and requiring short written answers, designed to probe long term recall of the information in the stories. This test, designated the Summative Test, was an attempt to gauge how well the students had assimilated information from the stories into their personal data stores. It was presented to them by their Language Arts teacher in their own classroom. As much time was allowed as was needed, usually ten minutes, but no discussion was permitted. Like the others, this test was allocated ten marks, but the criteria for good answers was set after considering all 18 responses. In this way, responses were referenced to criteria set internally by the group itself. The Summative Tests were all graded after the conclusion of the experiment, and were shuffled so that the marker was not aware of which treatment had accompanied the test. No feedback from either test was given to the subjects throughout the duration of the study, but they were allowed to earn Smarties for orderly, attentive behavior. The three treatments, Visualizing, Questions, and No Mediation were carried out as described in the section entitled Independent Variables, page 52.

DESIGN

A 3x3 Latin Square design was used to test the null hypotheses. Stories were paired at random and were assigned randomly to each treatment. The order of presentation of the stories is shown at the top of each cell in Table 1. The three groups were assigned their positions in the columns

randomly. (Note that the two baseline stories are not in the Latin Square.) With this arrangement, each of the three groups read a different pair of stories for each treatment so that differences in comprehension scores could not be attributed solely to the story selections. As well, the groups acted as their own controls. Copies of the stories can be found in the publication Do You Read Me?, a booklet which accompanies Controlled Reading Series, Set MM-EA, Educational Developmental Laboratories. (New York: McGraw-Hill, Inc., 1972.)

Table 1

LATIN SQUARE

Group 1	Stories 1,2	Stories 3,4	Stories 5,6
	Q.	V.	N.M.
Group 2	Stories 5,6	Stories 1,2	Stories 3,4
	V.	N.M.	Q.
Group 3	Stories 3,4	Stories 5,6	Stories 1,2
	N.M.	Q.	V.

Q. = Questions

V. = Visualizing

N.M. = No Mediation

The results of the Post Tests and the Summative Tests

identified as comprehensive scores, were analysed by stories and treatment as were the self-monitoring scores. Then, by using comprehension scores again but with the subjects regrouped into Good Visualizers(V) and Poor Visualizers(P), the analysis was repeated, see Appendix A for raw data. The means, standard deviations and sample variances were calculated, and the differences between treatments and between subjects were compared. First, a single-classification Analysis of Variance(ANOVA) was used to test for significant differences among the means derived from the three treatments, Questions, Visualizing and No Mediation. The Baseline data were not considered in these comparisons since it was quite different from the results of the No Mediation treatment - the Baseline mean was 4.83 as compared to the No Mediation mean of 6.23. Although the cause for this difference is unclear, an explanation has been tendered in Chapter Five. As a result, comprehension scores from the three treatments only were compared, the first as measured by the Post Test and the second as measured by the Summative Questions. The significance of the differences was tested by means of the F statistic generated in ANOVA according to Popham and Sirotnik(1973). At the 5% level of confidence for 2 and 51 d.f., the critical F value was 3.18. When significant differences were found, further tests on separate components were made using the Student's t statistic, see Tables 2,3, and 4 in Chapter Four.

The means of the self-monitoring scores were plotted on a scattergram against Post Test comprehension means, Figure 1, and also against the Summative Test results, Figure 2. A correlation coefficient was generated and tested for significance using Student's *t*. The Post Test results were also plotted against the results of the Summative Tests on another scattergram to illustrate the correlation between them, Figure 3. Finally, the Self-Monitoring scores under the three treatments were compared using the *F* statistic, Table 5. This was done to examine the effects, if any, of the treatments on self-monitoring.

The results of Post and Summative Tests by Good and Poor Visualizers were compared, first under Visualizing condition, and secondly, by grand means. These data are found in Appendix A.

CHAPTER 4

RESULTS

The results of this study are presented in this chapter. A discussion of the results relating to the hypotheses will follow in the next chapter.

Tables of raw data can be found in Appendix A. As stated previously, the four null hypotheses that were tested are as follows:

H₀₁ Reading comprehension, as measured by a Post Test, will not be improved significantly by the intervention of either mediator: (a) instructions to visualize, or (b) interspersed questions.

H₀₂ Recall of information, as measured 24 hours after reading by a Summative Test, will not be significantly improved after mediated reading as compared to non-mediated reading.

H₀₃ Those subjects who have an accurate knowledge of their own understanding, as measured by a Self-monitoring score will not have significantly higher scores on either the Post Test or the Summative Test irrespective of which treatment preceded the test.

H₀₄ Those subjects identified as having an aptitude for visualizing will not score significantly better after the visualizing treatment than after the other treatments, nor will they score better than the poor visualizers in their groups.

The hypotheses, numbered one to four, will provide headings for the presentation of results of the statistical tests.

Hypothesis One

The results of a simple analysis of variance of Post Test comprehension scores after three treatments are summarized in Table 2.

Table 2

Analysis of Variance Among Three Treatments

Three Treatments x	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Post Test Comprehension	Between Groups	2	.45	.23	.24
	Within Groups	51	48.75	.96	
	Total	53	49.20		

Critical Values of F (2,51) = 5.06, $p < .01$

F (2,51) = 3.18, $p < .05$

There was no significant difference in Post Test comprehension scores after any of the three treatments: Visualizing, Questions, or No Mediation. This conclusion was made after observing that the F ratio generated by the ANOVA comparing the three treatments was 0.497, much less than the F critical of 3.18 at the 5% level, and the F critical of 5.06 at 1%. Therefore Null Hypothesis One cannot be rejected. The "Baseline" data were ignored. The results from the Baseline stories, presented first, and originally intended for use as baseline information, were quite different from the No Mediation results on the Post Test, in spite of the fact that both sets of stories were read with no intervention. A choice was made in favor of using the No Mediation results, (see rationale, Chapter 5). The significance of the difference between Baseline and No Mediation Post Test results was tested using a t-test, and the t value was found to be 6.417, which shows a significant difference at the 1% level of significance (t critical = 2.326, $p < .01$).

Hypothesis Two

The results of the simple analysis of variance of Summative Test comprehension scores after three treatments are summarized in Table 3. Critical values for F in this comparison were 5.06 at the 1% level of confidence, 3.18 at the 5% level and the observed F ratio was 4.43. The score differences were statistically significant at the 5% level of confidence.

Table 3

Analysis of Variance Among Three Treatments

Three Treatments x	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Summative Test Comprehension	Between Groups	2	27.62	13.81	4.43*
	Within Groups	51	158.92	3.12	
	Total	53	186.54		

Critical Values of $F(2,51) = 5.06, p < .01$

$F(2,51) = 3.18, p < .05$

* $p < .05$

In order to determine the location of the difference, a series of comparisons was made using Student's t distribution to test for significance. This is an appropriate test for making inferences from small samples (Mendenhall, 1975, p. 214). The results are summarized in Table 4.

Table 4

t-Test Comparison of Treatments: Summative Test Comprehension

Treatment	Number	Standard Deviation	Mean Comp. Score	Student's t
Visualizing vs. No Mediation	18	.987	5.095	.938
	18	2.039	4.486	
Questions vs. No Mediation	18	1.475	5.931	2.509**
	18	2.039	4.486	

Critical values of $t(df = 34) = 2.326, p < .01^{**}$
 $= 1.625, p < .05^{*}$

The t-test comparisons show that there is a significant difference ($p < .01$) between Summative Test results after the Questions treatment as compared to No Mediation. There was, however, no significant difference between results after Visualizing and No Mediation. The two interventions, Questions and Visualizing, were also compared using t-tests. No significant difference was found between them, on either the Post Tests or on the Summative Tests. Critical values of t ($df = 34$) were 2.326, $p < .01$, and 1.625, $p < .05$. The observed t -value for Questions versus Visualizing on the Post Test was .938, much less than the critical values, so it can be assumed that there was not much difference in the effects of these two interventions on Post Test comprehension. The t -value for Questions versus Visualizing on the Summative Test was 1.473, also less than the critical values, and therefore not significantly different. Visualizing was not significantly different from No Mediation on either test ($t = .497$ on Post Test, and .938 on Summative Test). Evidently, instructions to visualize did not effect comprehension much at all. Null Hypothesis Two can therefore be rejected in part, as it refers to the Questions treatment.

Hypothesis Three

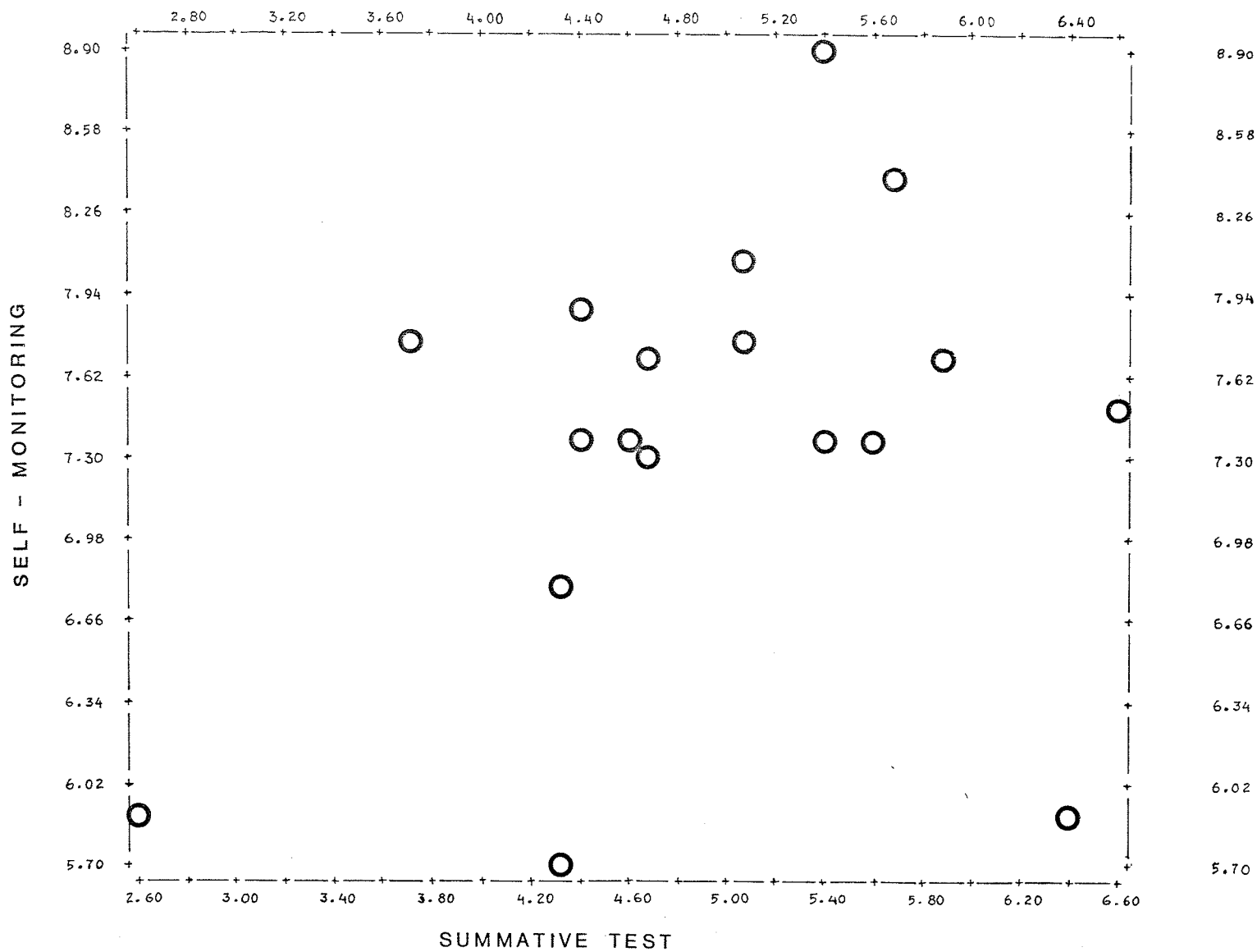
The Self-monitoring mean scores plotted on scattergrams against results from Post Tests and Summative Tests are found in Figures 1 and 2 . The Post Test results were plotted against the Summative Test results in Figure 3.

SELF-MONITORING

SELF-CONFIDENCE

Sig.(Student's t)- .01598

Figure 2: Scattergram - Summative Test vs. Self-Monitoring

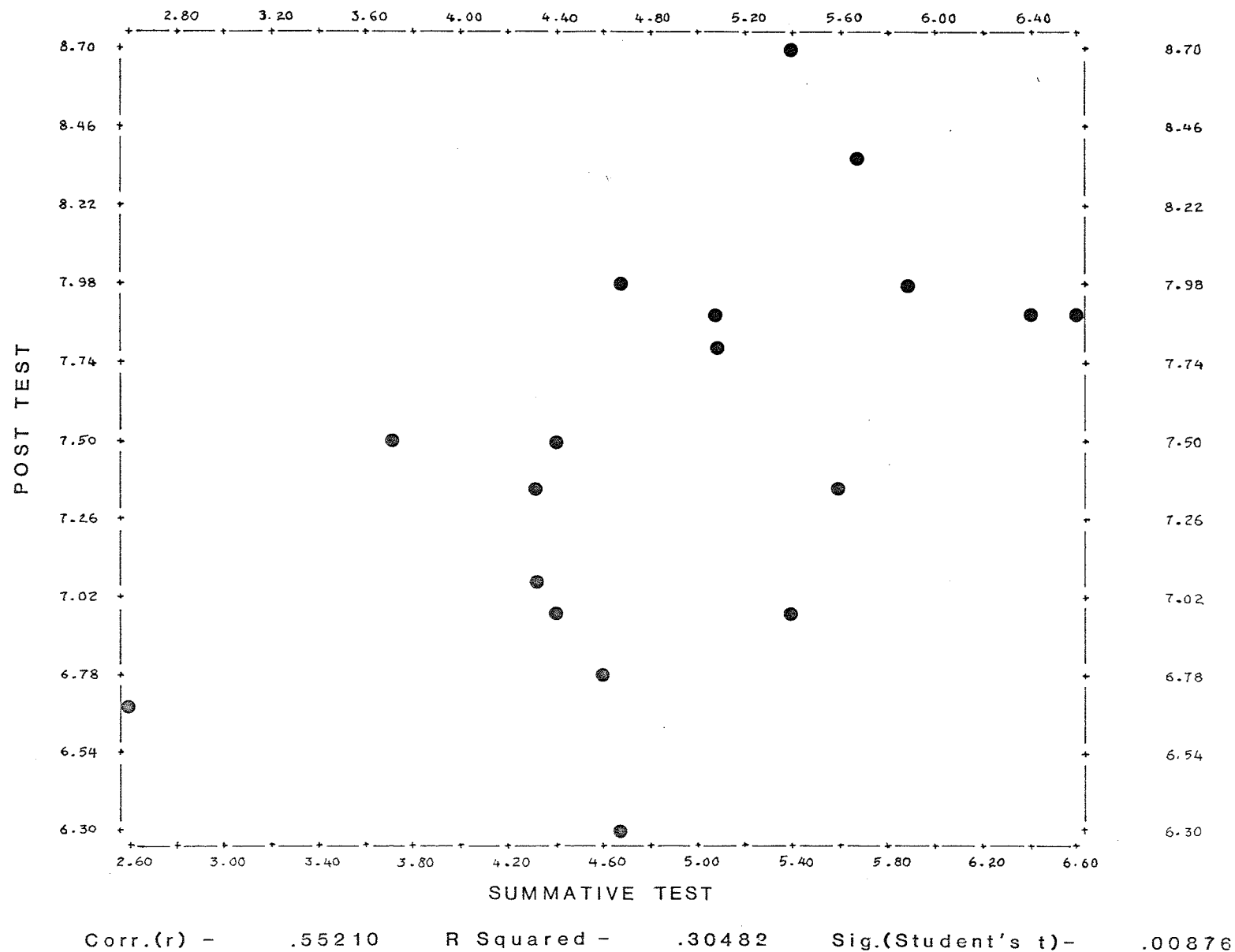


Corr.(r)- .29027

R Squared- .08426

Sig.(Student's t)- .12131

Figure 3: Scattergram - Summative Test vs. Post Test



Correlations between Self-Monitoring means and the two comprehension tests were tested for significance using t-tests. The correlation ($r = .50647$) between Self-Monitoring and the Post Test was significant at the .05 level but not at the .01 level of confidence. While this correlation is considered significant statistically, it probably has little meaning educationally to say that 25 percent of the results on the Post Test can be accounted for by good self-monitoring. The correlation between Self-Monitoring and the Summative Test was not significant ($r = .29027$). As illustrated in the Fig. 1 scattergram, there was a significant correlation ($r = .55210$) at the .01 level of confidence between Post Test results and Summative Test results.

The results of comparing the Self-Monitoring mean scores with the Post Test mean scores using a single-classification analysis of variance are summarized in Table 5.

Table 5

Analysis of Variance Among Three Treatments

(By Self-Monitoring scores on the Post Test)

Three Treatments x	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Self-Monitoring	Between Groups	2	1.68	.84	.497
	Within Groups	51	86.23	1.69	
	Total	53	87.91		

Critical Values of $F(2, 51) = 5.06$, $p < .01$

$F(2, 51) = 3.18$, $p < .05$

Self-monitoring ability is not tempered by treatment, i.e. Questions, Visualizing, or No Mediation. This conclusion was reached after observing that the F ratio of the ANOVA for Self-Monitoring under three treatments was 0.497, much less than the critical value for F of 3.18 ($p < .05$). However, because of the aforementioned correlation between self-monitoring and good comprehension scores on the Post Test, Null Hypothesis Three can rather tentatively be rejected as it as it refers to the Post Test (but not the Summative Test).

Hypothesis Four

The raw data for determining the Visualizing Index, and the results of comparing comprehension of Good Visualizers with that of Poor Visualizers can both be found in Appendix A. In the Visualizing treatment, the mean score for Good Visualizers was exactly the same as for Poor Visualizers, 8.06, on the Post Test, so no further statistical testing was necessary. On the Summative Test, the mean for Good Visualizers was 5.08 and for Poor Visualizers it was 4.83 in the Visualizing treatment, an insignificant difference according to Student's t statistic - t was 0.267. The grand mean for all eight stories in the Post Test was 7.36 for the Good Visualizers, and 7.63 for the Poor Visualizers, obviously not significantly different. Results of the Summative Test grand means were similarly close: 4.79 for the Good Visualizers and 5.04 for the Poor Visualizers. Therefore, on no occasion did the Good Visualizers show better comprehension than the Poor Visualizers, so Null Hypothesis Four could not be rejected.

CHAPTER 5

Discussion and Conclusions

Results of this study were not conclusive. Neither of the interventions, instructions to visualize, nor interspersed questions, were effective in promoting better comprehension as measured by the multiple choice questions given immediately after each story. According to short answer test results, however, the next-day recall of information from the stories was better when the reading had been mediated by inserted questions. In addition, good self-monitors were also good comprehenders, but the treatments didn't affect the self-monitoring scores - make the subjects any more or less sure of the accuracy of their responses. Finally, the good visualizers read with as much comprehension as the poor visualizers. The following is a detailed discussion of each hypothesis.

Discussion of Each Hypothesis

Hypothesis One: Reading comprehension scores as measured by the Post Test were not significantly different after No Mediation, from Visualizing or Question scores, although all the stories in each treatment were better understood than the baseline stories. An attempt must be made to explain why subjects scored poorly in the baseline stories as compared to the non-mediated stories, which were read essentially the same way. Please refer to Table 6, which compares comprehension scores by stories, and to the comparisons of test results by stories and by treatments found in Appendix A.

Table 6

Comparison of Comprehension by Stories

STORY	Post Test Mean	Summative Test Mean	Total Score
Death of a Town	6.3	5.4	11.7
Would You Buy	5.1	2.4	7.5
Ashes	8.2	4.9	13.1
Clavus Mundus	8.7	3.9	12.6
Ape	7.4	5.4	12.8
Immortality	7.9	4.1	12.0
Loch Ness	7.4	6.3	13.7
Girl Named Carol	8.9	6.5	15.4
8 Stories	7.5	4.9	12.4

First, the baseline stories may not provide as valid a comparison as do the non-mediated stories because the difference could reside in the stories themselves. The first story, Death of a Town, was read by all 18 subjects as a large group. All later stories, including Would You Buy A Used Car From This Man?, which was the second baseline story, were presented to the three groups of six separately. Apart from this, all 8 stories were presented in the same way: an introduction on a cassette, vocabulary drill, controlled reading, and then orally read multiple choice questions for the Post Test. The Summative questions were answered the next day in the Language Arts classroom during the first ten minutes of the regular period. During the reading of the first story, the children

were attentive, the story seemed to interest them, and it was not a difficult story, readability 7.2. The total comprehension score from both tests was 11.7 out of a possible 20. Total comprehension for the second baseline story, readability 7.6, was only 7.5, which is very low as compared to, for example, Clavus Mundus, readability 7.2, on which the total mean for both tests was 12.6, or as compared to the grand mean total for all eight stories which was 12.4.

Obviously, the subjects found the first two stories more difficult, either because the concepts were unfamiliar, a landslide in one and a public advocate in the other, or because they weren't comfortable with the controlled reader or with their new groups. They had never been grouped this way for reading lab before, so there was some possible invalidity due to the reactive effect of experimental arrangements. Two checks were done on the use of the controlled reader. In the pilot study, Appendix C, an additional group read from the books, but there was no difference in results as compared to the group who read from the controlled reader without interruption. The second check was made with a different Transition Seven class who had never read with the controlled reader at all. Half the class, randomly assigned, read the story from the book, and the other half read the same story from the controlled reader. Those who read from the CR did better on the comprehension test, a mean of 8.0 as compared to 6.5 for those who read from books. The use of the controlled reader did not appear to have any detrimental effect, quite the contrary.

A further possible explanation for the difference in Baseline and No Mediation scores, for example between Would You Buy..., 7.5 total, and Girl Named Carol, 15.4, may reside in the particular story schemas. Would You Buy has no clearly established setting. It is divided loosely into four episodes, according to story grammar, (a) the Carsons are buying a car, basing their decision on color, (b) Ralph Nader's book Unsafe At Any Speed, (c) Nader's private life and (d) his job as a public advocate. A date, 1965, is embedded in the second episode, and the city of Washington is mentioned in the third episode. The main character is Ralph Nader, but his introduction is obscured by the story starting out to be about Carson buying his car. Another usual step in a story grammar is a statement about how the character feels or reacts, and this is never discussed at all. By contrast, A Girl Named Carol contains several reactive expressions, such as, "They could hardly believe their eyes," "She was excited about the show," "Carol was heartbroken," etc. As for the setting, the story begins with the sentence "She was born in San Antonio, Texas..." Details about her parents and her move to Los Angeles to live with her grandmother are included in the first paragraph. There is certainly no doubt regarding the identity of the main character. The article is divided into five episodes, similar to the Ralph Nader one. It appears that the familiar story schema of the much more successful Carol story could be a contributing factor in explaining the different comprehension scores.

The Post-Summative Tests total for non-mediated stories was 12.46, considerably higher than the 9.66 test total of the combined baseline stories. The non-mediated scores are probably more valid because they were derived from six stories rather than two. Multiple treatment interference could have been a factor in Group One's high non-mediated scores, 13.67 for Group One, because that treatment for them came last, after they had been asked in previous stories to visualize or to discuss the interspersed questions, so it is conceivable that they could have used these strategies on their own to help comprehend the non-mediated stories. But Group Two, who read their non-mediated pair of stories first, as ordered by the Latin Square, scored 11.92, which is not much less than Group One's score. Evidently this is only part of the reason, along with those previously mentioned.

Sources of internal invalidity were controlled as much as possible. The use of the Latin Square design assured that historical experiences and classroom-environmental events were the same for all. As well, each group acted as its own control. The school staff cooperated to ensure no interruptions during a session. Each session was the same length, 35 minutes, conducted in the same place by the same person. All stories were introduced with a tape player and the Post Test questions were pre-recorded. Summative Tests were written in the classroom under the same conditions each time, with no discussion allowed. If a member of a group was absent, the session was

postponed until the next day. The duration of the research, from April 14 to May 15, was only one month, so maturation was not a factor, and there was no experimental mortality. The Hawthorne Effect was minimized because the experiment was conducted during regular reading lab classes. The subjects were pre-accustomed to the controlled reader.

The groups quickly settled into the routine. They could earn candy by quietly settling down to work and by being attentive. They would arrive promptly, sit down expectantly and ask, "What's the story about today?" They were explicitly not told what it was about, but it was soon apparent that they sought out the general schema in the title, in the introduction on the cassette, and in the vocabulary exercise. For example, the new words from Clavus Mundus, Super Salesman were chariot, soot, eruption, etc. It was a story of Mount Vesuvius erupting. They seemed to get used to concentrating while they read and expected to be able to make sense of the stories.

In summary, a reasonable theory to explain why these subjects did so well in the experiment when compared to the baseline stories or their daily work, is that as they became accustomed to the grouping and to the routine which was the same each day, they did three things:

1. They paid attention
2. They were able to take the risks that are necessary to good reading comprehension
3. Their perception of the task changed from "Let's get this over with", to "Let's enjoy this story. It's sure to be

one we can cope with."

While it is conceded that visualizing and adjunct questions did not significantly affect post test comprehension, it must be borne in mind that the sample was very small, $n = 18$, and the stories, although similar were not completely parallel. It has been stressed by Frank Smith and other experts with a psycholinguistic orientation, that meaning does not reside in the text, but in the mind of the reader.

"People carry meanings; linguistic inputs merely act as cues which people can use to recreate and modify their previous knowledge of the world. What is comprehended and remembered depends on an individual's general knowledge of his environment" (Smith, 1978¹, p. 194).

Hypothesis Two: Recall of information was significantly improved only by the adjunct question treatment. This finding corroborates the common sense assumption that the more one works with a piece of discourse, the better it will be encoded into permanent memory. The Summative questions, which were more general than the Post Test multiple choice questions, possibly constituted a better test of comprehension. Certainly they attempted to assess what the child had learned from the story. Frank Smith (1978¹) makes a distinction between comprehension and memory, claiming that deliberate memorization while reading interferes with comprehension. "Comprehension is not a quality but a state - a state of having no unanswered questions" (Smith, 1978¹, p.67). Comprehension takes care of memory when

the material makes sense. In order for information to be established in long term memory, it must be organized, "and it is only through organization that it can be retrieved again" (Smith, 1978², p. 44). The adjunct questions and discussion seem to have helped the reader to organize the information sufficiently so that he could later retrieve it effectively. Test results after Visualizing were not significantly different from results after Questions. Of course, organization of information may have occurred after visualization, too, but because the sample was so small, the facilitatory effects were lost statistically. It is also possible that because the visualizing technique was a new experience for them and they did not use it effectively.

Hypothesis Three: There was a correlation between good comprehension and self-monitoring ($p < .05$), indicating that the better readers were more aware of the nature of their comprehension states. The introduction of mediators did not affect this ability to self-monitor one way or the other.

Metacomprehension, of course, is more complex than simply being able to gauge the accuracy of an answer, and should also include the ability to appreciate the need for mediation and an awareness of one's personal strategic capabilities.

There is little doubt that good comprehenders are good comprehension monitors as shown by Garner's (1980) study on comprehension-miscomprehension monitoring in which good and poor junior high readers were asked to assess the comprehensibility of a deliberately inconsistent story. Only the

good readers noticed when the material ceased to make sense. The advantage in being able to monitor comprehension successes and failures effectively lies in the reader's ability to make processing strategy shifts in instances of perceived failure. "Readers unable to monitor well, on the other hand, will both fail to comprehend and fail to make adjustments" (Garner, 1980, p. 56).

Hypothesis Four: It made no difference to comprehension scores after the Visualizing treatment whether the subjects were identified as good or poor visualizers; the means were identical. Again, this small skewed sample might have failed to exhibit sufficient differentiation in visualizing aptitude. Perhaps they were neither good nor poor but middle of the road as compared to the larger population. Another possibility is that the tests, the MPFB and the EFT, measured something else besides the ability to visualize. While this is unlikely in light of their uses with other research in visualizing, it must be considered.

In view of the plethora of literature supporting the facilitatory effects of visualizing as a comprehension strategy for slow learners, it is disappointing that it was not more effective with this sample. Of course, there is also evidence that some children find it difficult or impossible to form mental images at all. The instructions to visualize did make more of a difference with specific children, for example, V-2 and P-8 were definitely aided, see Comparison of Good and

Poor Visualizers in Appendix A, while V-1 was not helped at all. Other factors such as concentration and attention, of course, have an impact on this strategy. V-1, supposedly with the best visualizing aptitude who could easily see the embedded figures in the EFT and could imagine the completed boxes in the MPFB could not concentrate the necessary ten seconds to visualize a story segment when in his peer group. For him, the more active involvement of the Question treatment was better for reasons which may have had nothing to do with his visualizing ability. It may be concluded that the visualization theories may apply to some data, but not to these data.

General Discussion

According to schema theory, skilled readers are said to process text simultaneously in top-down and bottom-up fashion. Through bottom-up processing, the visual features, words, etc. are automatically propagated up the hierarchy toward more meaningful levels of representation. At the same time, schemata at higher levels are attempting to fill their "variable slots", according to Rumelhart and Ortony (1977) and Adams and Collins (1979), with elements from the levels below by top-down processing. The concept of top-down and bottom-up processing of schemata may help to explain the distinction between "deficit" and "difference" poor readers (Cromer, 1970). Poor readers do not process both ways simultaneously. Reliance on a bottom-up processing system alone, the deficit poor reader,

could create an enormous processing load for the reader, since each input would have to be decoded and then processed for meaning. Such a child would not apply the powerful top-down strategies utilizing higher level schemata that would enable him to read effectively (Frederickson, 1976, in Hacker, 1980). The deficit poor reader who decodes slowly and is intent on reading every word precisely, may have developed what Frank Smith calls "tunnel vision" (Smith, 1978², p.34) in that he can't see the forest for the trees. The difference poor reader, who can decode, but comprehends poorly, may also not be making optimal use of schemata in top-down processing, or he may simply not be attending to the ideas behind the words, reading at a graphophonic surface level rather than at a semantic level.

"Schema theory holds that the understandings a child brings to the reading are as important to comprehension of a selection as are the actual words of the written text. The child, or any reader for that matter, has a fund of knowledge through which he or she filters messages. This knowledge is stored as cognitive frameworks that learning theorists call schemata. Schemata include conceptions of how written content is structured as well as general understanding of a topic" (Hennings, 1982, p.15).

The successful use of schemata by the subjects in this research was an almost visible counterpart to the successful comprehension of the story. It must be assumed that the two baseline stories, which were so poorly understood, served to alert them to the procedure to expect for all the stories.

Then, once they had heard the introduction, had worked through the vocabulary exercise, and had seen the title of the story, they were "tuned in" and could read attentively to the end of the filmstrip. If at any time the reader lost the gist of the story, it immediately became evident through attention loss, but this seldom happened. As has been shown in Chapter Four, the adequacy of the story grammar differed between stories. The baseline story with no established setting, no statement of feelings or reaction, and an obscure introduction to the main character produced the worst comprehension scores.

Successful completion of the Summative Test questions the next day depended on at least two factors:

1. The information in the story must be seen as relevant; it must confirm or augment information already present in the reader's knowledge base. Note that the stories about the Loch Ness monster, always a high interest subject for young adolescents, and the Carol Burnett story scored best on the Summative Test partly because much was already familiar, even though these stories presented some new information. Obviously, the story about Ralph Nader did not build on a very substantial framework of previous knowledge - five of the subjects remembered nothing about it the next day.
2. The information from the story must also be seen as valuable enough to encode into permanent memory. The Clavus Mundus story, for example, was fictional but could have happened and was well understood on the Post Test. The group which

read Clavus in the Question treatment remembered it much better on the Summative Test than the group in the No Mediation treatment. Without assistance from the mediation, the necessary inferences were not made. Readers in the non-mediated treatment did not connect the volcano protection story with the historical account of Pompeii and Mount Vesuvius, and the information was not considered worth remembering.

The ability to self-monitor, and other aspects of meta-comprehension, were not conclusively found to be important contributors to effective reading comprehension. Obviously, however, the careful analysis of a reading passage is necessary at times before it is understood. Markman (1979) has also pointed out that this deliberate analysis may be necessary before we realize that we have failed to understand. Because we are unaware of comprehension failure, there is insufficient effort expended in processing the information. The poor readers in this study appear to have benefited from the intervention of the interspersed questions which functioned as an insurance that enough processing was carried out for good comprehension and recall. The true value of visualizing as a mediational strategy may not have been evident in this study because of the nature of the sample.

Limitations of the Study

1. The most serious limitation of the study was the sample, both in its small size and in its homogeneity. There were only 18 subjects, taken as a group from an established program,

entry into which was partly based on poor reading ability. Because of this, external validity is not high, and generalization should not be made to the grade seven population.

2. The use of the Latin Square design with each group providing its own control, was predicated on the assumption that the stories were very similar in nature. This was important so that the effects of the treatments , and not the effects of differences between the stories, could be observed.

Although the stories appeared very similar on the surface in length of story and sentences, controlled vocabulary and factual content, an analysis of the story grammars revealed important differences which made some stories more difficult than others.

Practical Applications

1. Guided silent reading in classrooms should include high-order, interspersed questions.
2. Children should be encouraged to self-monitor, to form a mental set that requires what they read to make sense.
3. Stories, including those prepared for reading with the controlled reader, should follow familiar story grammars.
4. Material to be read by poor comprehenders should be based on familiar knowledge and experiences.

Suggestions for Further Research

1. A further investigation into the relative merits of mediational strategies is warranted. Research topics should assess the value of instructions to visualize and interspersed questions. Especially important would be further research on the significance of visualizing to "difference" poor readers who decode well but comprehend poorly. A much larger sample chosen randomly from the grade seven population should be used. It would also be helpful to define subjects' individual ability to form mental images.

2. There is much theory in the literature about the value of metacomprehension and its interaction with comprehension. More practical research is needed to determine ways to improve the poor reader's self-monitoring skills.

3. The structure of discourse has a powerful effect on its comprehensibility. Some literature credits this to the effects of "staging", i.e. arranging superordinate propositions ahead of subordinate ones in a hierarchy. A different framework is provided to the reader by various story grammars, based on the assumption that an individual has a mental representation, or schema, of story components and of the way these components fit together. Staging refers to prose in general, while story grammar refers to various categories of stories.

Research into the use of elements from both concepts would be useful, so that discourse might be structured, not only hierarchically, but according to a predictable and familiar grammar.

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APPENDICES

APPENDIX A

Table

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|-----|---|
| A 1 | Raw Data: Results of Post Tests, Summative Tests
And Self-Monitoring |
| A 2 | Comparison of Test Results By Stories |
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| A 6 | Visualizing Index |

Table A 1

Raw Data: Results of Post Tests, Summative Tests, and Self-monitoring

	Ss	Death of			Used Car			Ashes			Clavus			Ape			Immortal.			Loch Ness			Carol		
		Po	S	M	Po	S	M	Po	S	M	Po	S	M	Po	S	M	Po	S	M	Po	S	M	Po	S	M
Group 1	V-1	4	2	6	4	0	7	9	5.5	7	8	2	7	7	7	9	6	4	8	5	5	7	7	7	7
	V-2	7	8	7	3	0	7	8	8	7	9	6	7	7	4	8	10	2	9	9	7	6	8	6	9
	V-3	7	5	7	4	.5	8	8	2.5	7	8	3	9	7	6	9	4	4	5	8	7	8	8	4	6
	P-1	7	6	6	5	6	7	9	7	5	9	8	9	9	8	5	9	4	3	6	6	5	9	6	9
	P-2	7	4	8	2	0	8	6	8	7	10	9	10	8	5	7	9	5	7	8	7	6	9	7	6
	P-3	6	4	5	7	1	4	6	7	5	9	7	9	7	4	5	8	2	3	9	5	6	7	4	8
Group 2	V-4	6	4	6	5	.5	7	9	1	9	9	0	9	9	5	6	9	3	9	7	7	7	10	8	10
	V-5	6	4	6	6	1.5	8	7	2	7	10	4.5	10	10	6	6	7	5	7	9	4	9	9	8	9
	V-6	3	6	3	5	3	7	5	3.5	5	9	0	9	9	7	7	10	3	9	6	6	7	10	5	10
	P-4	9	7	7	8	3	8	10	5	10	10	6	10	10	9	5	10	7	10	7	5	7	10	6	10
	P-5	5	5	8	4	4	4	9	5	10	7	4	6	6	7	5	9	4.5	7	5	7	7	10	9	9
	P-6	5	6	8	7	2	7	10	8	7	9	0	9	9	9	6	7	7	6	7	8	7	10	10	9
Group 3	V-7	9	7	6	4	7	9	8	3	8	8	5	8	8	9	7	7	8	7	9	9	9	9	7	9
	V-8	6	6	5	5	0	3	8	5.5	8	9	6.5	8	8	7	3	8	1.5	8	7	6	8	7	5.5	7
	V-9	7	8	7	6	4	8	10	5.5	10	10	5	10	10	8	5	8	6	8	9	7	7	9	5	9
	P-7	6	8	9	5	5	8	9	6	10	10	2	10	10	8	6	7	2	8	7	4	5	10	8	9
	P-8	7	2	6	8	5.5	7	9	3	9	6	2	6	6	8	6	8	5	9	8	8	9	10	6	10
	P-9	7	6	3	3	0	5	8	2	9	7	0	7	7	5	1	7	1	6	7	5	3	9	5.5	8

KEY: V - Good Visualizer
P - Poor Visualizer

Po - Post Test /10
S - Summative Test /10
M - Self-monitoring /10

Comparison of Test Results by Stories

(Story pairs averaged)

Test	Group	Death Town + Would You	Ashes + Clavus Mundus	Ape + Immort- ality	Loch Ness + Girl Carol
Post Test Summative	One	5.25 ^B	8.25 ^Q	7.58 ^V	7.75 ^{NM}
		3.04	6.08	4.58	5.92
Post Test Summative	Two	5.67 ^B	8.67 ^{NM}	7.92 ^Q	8.23 ^V
		4.0	3.25	5.54	6.92
Post Test Summative	Three	6.08 ^B	8.5 ^V	7.5 ^{NM}	8.42 ^Q
		4.88	3.79	4.31	6.33
Post Test Summative	Grand Mean	5.67	8.47	7.67	8.42
		3.97	4.38	4.81	6.39
Post Test + Summative Test Total		9.64	12.85	12.48	14.81

Key: B - Baseline

NM - No Mediation

Q - Interspersed Questions

V - Visualizing

Table A 2

Comparison of Test Results by Treatments
(Story pairs averaged)

Test	Group	Baseline	Questions	Visual.	No Med.
Post Test	One	5.25	8.25	7.58	7.75
Summative		3.04	6.08	4.58	5.92
Post Test	Two	5.75	7.92	8.33	8.67
Summative		4.00	5.38	6.92	3.25
Post Test	Three	6.08	8.42	8.50	7.50
Summative		4.88	6.33	3.79	4.29
Post Test	Mean	5.69	8.20	8.14	7.97
Summative		3.97	5.93	5.10	4.49
Post Test Standard Dev.		1.165	.807	1.054	1.021
Summative Standard Dev.		1.719	1.475	1.987	2.039
Post Test Variance		1.282	.615	1.050	.985
Summative Variance		2.79	2.054	3.73	3.926
Post/Summative Total		9.66	14.13	13.24	12.46

Table A 3

Table A 4
Ability to Self-monitor
 (on Post Tests only)

Ss	Base- line	Ques- tion Treat- ment	Visual- izing Treat- ment	No Med- iation Treat- ment	Mean Self- Monit. ment	Comprehension Mean Post	Mean Summ.
V-1	7.5	9	8	5.5	7.5	7.88	6.63
V-2	6.5	7	8.5	9	7.75	7.5	3.69
V-3	6.5	7	8.5	7	7.25	6.25	4.69
V-4	4	7.5	8	7.5	6.75	7.13	4.25
V-5	7	7	9	8.5	7.88	7.5	4.38
V-6	7	8	8.5	7.5	7.75	7.88	5.13
V-7	7.5	8	7	7	7.38	6.75	4.63
V-8	5	9	8.5	7	7.38	7.0	4.44
V-9	7.5	8	10	8	8.38	8.38	5.69
Mean	6.53	7.83	8.44	7.44	7.56	7.36	4.78
P-1	6.5	7	4	6	5.88	7.88	6.38
P-2	8.5	7	10	7	8.13	7.75	5.13
P-3	7.5	9.5	8.5	10	8.88	8.63	5.38
P-4	6	7.5	8	8	7.38	7	5.44
P-5	8	8.5	7	6	7.38	7.38	5.63
P-6	6.5	9.5	7.5	8.5	7.63	8	4.69
P-7	4.5	7	4	7	5.63	7.38	4.25
P-8	7.5	7	8	8	7.63	8	5.88
P-9	4	5.5	8	6	5.88	6.63	2.56
Mean	6.56	7.61	7.22	7.39	7.15	7.63	5.04
Mean n=18	6.528	7.639	7.833	7.417	7.354	7.495	4.907
Var.	1.708	.884	2.444	1.285	.692	.623	
S.D.	1.345	.967	1.609	1.166	.856	.367	

Table A 5

Comparison of Good and Poor Visualizers

(Raw data: story pairs averaged)

Comprehension by: Good Visualizers (V)
Poor Visualizers (P)

Ss	Vis. Index	Baseline		Questions		Visualiz.		No Med.		Mean (8)	
		Post	Sum.	Post	Sum.	Post	Sum.	Post	Sum.	Post	Sum.
V-1	.75	6.5	7.0	9.0	8.0	8.0	4.0	8.0	7.5	7.9	6.6
V-2	.74	5.5	2.3	7.0	4.5	8.5	7.5	9.0	0.5	7.5	3.7
V-3	.63	4.0	1.0	8.5	6.3	6.5	5.5	6.0	6.0	6.3	4.7
V-4	.62	5.5	3.0	7.0	5.8	8.5	6.0	7.5	2.25	7.1	4.3
V-5	.61	6.0	2.8	6.5	5.5	9.0	6.0	8.5	3.25	7.5	4.4
V-6	.59	5.0	4.0	8.5	7.0	8.5	3.0	8.5	6.5	7.9	5.1
V-7	.54	5.5	2.8	8.0	5.3	5.5	5.0	8.0	5.5	6.8	4.6
V-8	.52	4.0	5.5	8.5	5.0	8.0	5.5	7.0	1.8	7.0	4.4
V-9	.52	6.5	6.0	9.0	6.0	10	5.3	8.0	5.5	8.4	5.7
Mean		5.72	3.8	8.0	5.9	8.06	5.08	7.83	4.31	7.4	4.79
S.D.						1.33	1.49			0.653	0.904
Var.						1.58	1.97			0.379	0.727
P-1	.51	6.0	6.0	9.0	7.5	9.0	6.0	7.5	6.0	7.9	6.4
P-2	.51	5.5	6.5	8.5	6.0	9.5	4.0	7.5	4.0	7.8	5.1
P-3	.49	8.0	5.0	9.5	6.0	7.0	5.0	10	5.5	8.6	5.4
P-4	.48	4.5	4.5	8.0	4.8	7.5	8.0	8.0	4.5	7.0	5.5
P-5	.47	4.5	2.0	8.0	8.5	8.5	5.0	8.5	7.0	7.4	5.6
P-6	.47	7.5	3.8	9.0	7.0	7.5	2.5	8.0	5.5	8.0	4.7
P-7	.46	6.5	2.5	7.5	7.0	7.5	3.0	8.0	4.5	7.4	4.3
P-8	.45	6.0	4.0	8.0	6.5	8.5	9.0	9.5	4.0	8.0	5.9
P-9	.42	5.0	3.0	8.0	5.3	7.5	1.0	6.0	1.0	6.6	2.6
Mean		5.94	4.14	8.4	6.5	8.06	4.83	8.11	4.47	7.6	5.04
S.D.						0.85	2.57			0.59	
Var.						0.64	5.89			0.32	

Post Test Data: Comprehension - Visualizing vs. No Mediation:
t = .455, not significant at .05

Summative Test Data: Comprehension - Visualizing vs. No Med.:
t = .861, not significant at .05

Table A 6
Visualizing Index

Ss	Raw Score MPFB (64)	MPFB/64 Index	Raw Score EFT/180 (in sec- onds)	1-EFT 180 Index	Combined Index
V-1	40	.63	21.3	.88	.75
V-2	49	.77	51.4	.72	.74
V-3	41	.64	67.5	.63	.63
V-4	41	.64	71.8	.60	.62
V-5	36	.56	63.8	.65	.61
V-6	34	.53	63.9	.65	.59
V-7	30	.47	69.8	.61	.54
V-8	23	.36	57.4	.68	.52
V-9	27	.42	70.9	.61	.52
P-1	26	.41	89	.61	.51
P-2	38	.59	104.6	.42	.51
P-3	39	.61	111.3	.38	.49
P-4	29	.45	89	.51	.48
P-5	23	.36	73.4	.59	.48
P-6	24	.38	78.5	.56	.47
P-7	28	.44	94.9	.47	.46
P-8	29	.45	79.2	.45	.45
P-9	28	.44	107.6	.40	.42

Range of values: zero to plus one, where one is perfect
and zero indicates no aptitude.

$$\text{Visualizing Index (V.I.)} = \frac{(\text{MPFB/64}) + (1 - \text{EFT/180})}{2}$$

<u>Group One</u>		<u>Group Two</u>		<u>Group Three</u>	
V-3	P-1	V-2	P-3	V-1	P-2
V-6	P-5	V-5	P-4	V-4	P-6
V-7	P-7	V-8	P-8	V-9	P-9

APPENDIX B

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Note: Stories are from Do You Read Me?

Controlled Reader Series Set MM-EA

Developed by Multi-Media Education Inc., New York:

E.D.L. McGraw-Hill, 1972

Appendix B

Interspersed Questions

Note: The copies of these stories are marked with Q 1,2,3, 4 and with V1,2,3,4 to indicate the interruptions for Questions (Q.) or for instructions to Visualize (V.)

1. Up From the Ashes

Q1. How was the encounter session supposed to help Roxanne grow up?

Q2. How must a drug addict change his life style in order to kick his habit?

Q3. "He's never with us" - Why was Joe staring at the wall whistling softly?

Q4. What is Phoenix House all about?

2. Clavus Mundus - Super Salesman

Q1. Was Clavus Mundus afraid of Mt. Vesuvius?

Q2. Explain the "super salesman" part of the title.

Q3. Describe two times when Clavus might have escaped being buried alive.

Q4. Explain the last sentence (irony). Why is it kind of funny?

3. And Then This Ape Said To Me

Q1. Is spoken language the only way animals (including humans) can communicate?

Q2. Would you say Washoe was a fast learner? Why?

(Look for fact he was equal in age to human baby and in

5 years had learned 150 signs). Equal to a human baby?

Q3. What human students also learn to communicate this way (signing)?

Q4. Why were chimps and not dogs chosen for the studies on animal communication?

4. Immortality

Q1. Would you like to have your body frozen when you die?

Q2. I wonder how they prepare your body for the frozen state.(prediction)

Q3. For what reasons might you not want to come back to life in the distant future?

Q4. The name "cryonics": Same root word as in "cryovac", the meat wrapper or in "cryogenic", a treatment for cancer. What might this treatment be? What does "cryo" mean?

5. Mystery at Loch Ness

Q1. Have you ever seen a lake monster?

Q2. What other phenomena does this section remind you of? (U.F.O's). Why?

Q3. What do you think they are? (predictions)

Q4. Do you think the people who live near Loch Ness go swimming in the Loch?

6. A Girl Named Carol

Q1. What two happenings contributed to Carol's desire to be an actress?

Q2. What do you think of the incident where Carol and Don are given thousand dollar cheques?

Q3. "New York fell in love with her" means?

Q4. Why was Carol a success?

Post Test Comprehension Questions: Up From The Ashes *

1. From the story you can guess that addicts often feel
...a. angry and afraid. ...c. silly and playful.
...b. happy and secure. ...d. tired and stern.
2. The purpose of encounter meetings is for people to learn
...a. to shout in anger. ...c. to make their beds.
...b. to share their feelings. ...d. to sand the floors.
3. In order to break the drug habit, an addict must
...a. save a lot of money. ...c. take weaker drugs.
...b. read a book. ...d. change his life-style.
4. Encounter meetings do not help addicts
...a. to see themselves as they really are.
...b. to see others as they really are.
...c. to hide from themselves.
...d. to face their own fears.
5. The first step toward moving out of Phoenix House is to become
...a. a cook. ...c. an elder.
...b. a member. ...d. an artist.
6. Addicts sometimes lose the battle to break the drug habit because they
...a. find a high-paying job.
...b. find the process too difficult and too painful.
...c. want a new start.
...d. want to go back to school.
7. Another title for this selection might be
...a. The Fight ...c. Kicking the Habit
...b. The Needle ...d. The Accusation
8. The basic rules of Phoenix House are
...a. "No running" and "No cards"
...b. "No yelling" and "No cars"
...c. "No fighting" and "No drugs"
...d. "No smoking" and "No television"
9. From what you've read about Phoenix House, you can guess that the program works because
...a. the addicts help each other.
...b. the police run the program.
...c. the addicts are given free drugs.
...d. the elders are given jobs.
10. What do you think the writer was trying to say when he wrote the last line in the selection, "That's what Phoenix House is all about"?
...a. Phoenix House is about getting another chance.
...b. Phoenix House is about learning to yell.
...c. The addict can never break his habit.
...d. The addict must live away from the outside world.

* Note: Comprehension tests like this one accompany the Multi-Media program by EDL McGraw-Hill Book Co.

Key:  = Inference

 = Main Idea

-107-
SUMMATIVE QUESTIONS

Up From The Ashes

1. What must an addict do to break the drug habit?
2. What is an encounter meeting for?
3. Describe an encounter meeting.
4. Explain the purpose of Phoenix House.
5. Why did people go to live there, rather than go daily for treatment?

Sample answers earning full marks:

Marks

- | | |
|---|--|
| 2 | 1. "The addict must cope with the problem, find a job and stay clean." |
| 1 | 2. " The meeting is to let your feelings out and share your feelings." |
| 2 | 3. " You sit in a circle and talk. You get help from other people who had drug problems." |
| 3 | 4. "Phoenix House is to help people with drug problems. The people who come to this house must be willing to quit. If they didn't want to quit, they couldn't get in." |
| 2 | 5. "They live there so they won't be tempted to use drugs. They learn to change their life styles there and start again." |

SUMMATIVE QUESTIONS

Clavus Mundus: Super Salesman

- 1.a) When did this story happen?
b) Where did this story happen?
2. Explain what it was that Clavus Mundus sold that earned him the title "Super Salesman".
3. How did it cause his death?
4. Did this story really happen? _____. Now give a reason for your answer.
5. Remember four more things from the story and write them here, each in a separate sentence.

Sample answers earning full marks:

Marks

- | | |
|---|--|
| 1 | 1. a) "A long time ago." |
| 1 | b) " By Rome." "In Italy." "Pompeii." |
| 2 | 2. " Clavus sold fake volcano stuff that he said would not let the volcano come near the peoples" houses." |
| 2 | 3. " He sold protection stuff and got money for it and buried the money. The volcano erupted and he went back for the money and got killed from the lava and ashes." |
| 2 | 4."No. The volcano really happened, but no one can tell about the people who lived there, or even if there was such a person as Clavus Mundus." |
| 2 | 5."He buried his money in the forum." "The volcano erupted."
" Clavus was not afraid of the volcano." "Clavus was foolish and greedy. It killed him." "Pompeii was covered with ashes for hundreds of years." |

SUMMATIVE QUESTIONS

And Then This Ape Said To Me

1. How did the chimps in this story learn to communicate?
2. How did the vocabulary (number of words they knew) compare with that of a human?
3. Which learned words faster, chimps or human babies?
4. Why can't chimps talk?
5. Remember three more things about the story and write them here, each in a separate sentence.

Sample answers earning full marks:

Marks

- | | |
|---|---|
| 2 | 1. " The chimps learned to communicate by sign language." |
| 2 | 2. "They knew quite a few words but not nearly as many as a human the same age knows." |
| 1 | 3. "Human babies learn much faster once they start, about two years old. " |
| 2 | 4. "Chimps have different voice boxes than humans do." |
| 3 | 5. " They could lock and unlock doors." |
| | " Chimps could learn the names of things and people." |
| | " Chimps were used in the space program to try things that might be dangerous for a man." |

SUMMATIVE QUESTIONS

Immortality

1. What does cryonics mean?
2. How does the Cryonics Society preserve bodies? List four steps in the right order.
3. Would you like to be frozen when you die? _____
Tell some advantages (three)
4. Tell some disadvantages (three).
5. Why must a person be legally dead before the body can be frozen?

Sample answers earning full marks:

Marks

- | | |
|---|--|
| 1 | 1. "It means freezing the body after death." |
| 2 | 2. "They give you fluids by a needle, then wrap you in aluminum foil and put you on dry ice. Finally they put you in a tank with nitrogen gas." |
| 3 | 3. Advantages: "You might be brought back to life some day." "You will not rot." " They might find a cure for your disease or cause of your death." |
| 3 | 4. Disadvantages: " When you are finally unthawed, your kids might be older than you or your wife might be remarried and many years older." "You would have no way to earn money." "The style of life might be different." |
| 1 | 5. "It is the law ." "The Cryonics Society won't allow freezing unless you are legally dead." |

SUMMATIVE QUESTIONS

Mystery At Loch Ness

1. How do you think the people who live near Loch Ness feel about the monster?
2. Why do you think people keep trying to prove there is a monster?
3. In what country does this story take place?
4. Do you personally think there is a Loch Ness monster? ____
Give a reason.
5. Draw it.

Sample answers earning full marks:

Marks

- | | |
|---|---|
| 3 | 1. "I don't think they really mind because none of them moved away or anything."

"They are scared of it and they don't want people to find out about it because it would stop the tourists." |
| 3 | 2. "They want to be famous and they want to find out the unknown." " For the publicity and the business." " So they can get rid of him. be safe, and be sure they don't get hurt." |
| 1 | 3. "In Scotland." |
| 2 | 4. " No. Because nothing can live one whole century." |
| 1 | 5. (Picture) |

SUMMATIVE QUESTIONS

A Girl Named Carol

1. Who was the girl named Carol?
2. What was the reason for problems she must have had in her childhood?
3. How did she get her start in show business?
4. How did things go when Carol got to New York?
5. She is a successful person because of the kind of person she is. Tell about two personality traits that helped her succeed. (What kind of person is she?)

Answers earning full marks

Marks

- | | |
|---|--|
| 1 | 1. Carol Burnett |
| 2 | 2. "Her mom and dad were alcoholics and she had to live with her grandma." |
| 1 | 3. "A man came up to her and her friend Don after they put on an act at a party, and gave them a thousand dollars each for a start on Broadway." |
| 2 | 4. "She couldn't find work at first and went to acting school." |
| 4 | 5. " She is kind and thoughtful. She is a good woman because she helps kids with handicaps."
" People like her because she is friendly and trustworthy as well as funny." |

SUMMATIVE QUESTIONS

Death Of A Town

1. What was this story about?
2. Explain why this happened to the town of Saint Jeanne Vianney. What was unusual about this town?
3. Name one of the signs of danger before the accident.
4. What happened to the town after the accident was over?
5. Tell about any other event in the story that you remember.

Sample answers earning full marks:

Marks

- | | |
|---|---|
| 2 | 1. "The story was about a little town in Quebec that was destroyed by an underground landslide." |
| 2 | 2. "The town was built on sand and clay and when the sand got wet the pressure built up on the clay. The whole side of a hill caved in and houses were sucked into the hole in the ground." |
| 2 | 3. "A woman heard water running under her house."
" A man's lawn sank several inches."
" A power pole was swaying." |
| 2 | 4. "The people of Canada set up a fund and the town was rebuilt in a different place. Tourists visit the site of the landslide." |
| 2 | 5. "A bus plunged into the hole."
" Many people and houses were lost in the crater."
" Screams helped the rescuers find victims." |

SUMMATIVE QUESTIONS

Would You Buy A Used Car From This Man?

1. This is a true story about a man who is a public advocate.

What is his name?

2. Who did he work for?

3. He wrote a book Unsafe at any Speed . What was it about?

4. How did one man get Big Business to make better and safer products?

5. Write a sentence giving the main idea of the story.

Sample answers earning full marks:

Marks:

- | | |
|---|---|
| 1 | 1. Ralph Nader |
| 2 | 2. "The public" "No one" |
| 2 | 3. "It was about unsafe cars and says all cars are unsafe, even new cars." |
| 3 | 4. "He wrote a book." "He made speeches threatening companies by telling the public about inferior products." |
| 2 | 5. "It is about a man who is trying to force big business to make better and safer products." |

APPENDIX C

The Pilot Study

Appendix C

The Pilot Study

The pilot study was conducted Spring, 1981 with twenty grade nine students as subjects. They had been identified as poor readers by their teachers and by scores on the Canadian Test of Basic Skills at least two years below grade level in reading comprehension. Many of them, two years before, had been in Transition Seven. There were five groups in the pilot study, with groups one and two acting as controls. Group 1 read the stories from the book uninterrupted, and group 2 read with the controlled reader with no intervention. The first group was a check on the use of the controlled reader, which could be an intervening variable, but there was very little difference in the scores from the two groups with these ninth grade subjects. The controlled reader was used with the other groups and the book-only treatment was dropped from the present study. Group 3 read the stories with instructions to visualize; group 4 read with interspersed questions. Group 5 read with both instructions to visualize and interspersed questions. Because of the already small size of the sample this treatment was also dropped from the present study.

To determine aptitude for visualizing, an index was arrived at by combining scores from the Space Relations subtest of the Differential Aptitude Test (Form S, Revised Edition, 1972), which all grade nines had recently written,

with the scores from the Minnesota Paper Form Board Test, administered at the beginning of the pilot study. Scores were rank ordered, good and poor visualizers were paired, and assigned at random to the five groups. Treatments were also assigned at random. The stories were presented in the same way as previously described, including asking them to evaluate how sure they were of their responses.

Unfortunately, the school year ended before all eight stories were completed, the data was useless and was not analyzed, and what might originally have been the experimental group became the pilot project. However, the experience was invaluable in ironing out snags, and giving practice to the experimenter in administering the stories and tests. The method for the actual research will be quite similar with adjustments made in the story selections because the subjects are only in grade seven, and changes in the choice of tests to determine good and poor visualizers.