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The Use of Mnemonic Strategies in Reading Comprehension

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FIELD PROJECT ACCEPTANCE

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TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

Research has generally shown that mnemonic techniques can improve the recall of poor readers. This experiment investigated the effect of verbal rehearsal and visual imagery strategies on the reading comprehension of 47 fourth-grade poor and average readers. The students were randomly assigned to one of four conditions: unaided, verbal rehearsal, visual imagery, and combined visual imagery plus verbal rehearsal. Subjects were taught a strategy (depending on the group assignment) and given a chance to practice. Following this, all subjects read a 1,000-word story. They were then given a 20-question test. As predicted, poor readers in the unaided condition recalled less than average readers. Among the poor readers, those in the visual imagery condition recalled significantly more than those in the verbal rehearsal or unaided conditions. The results are discussed in relationship to previous research and the implications for reading instruction as well as future research in this area.

Chapter I

INTRODUCTION AND REVIEW OF THE LITERATURE

Introduction

As children progress through school, an increasing amount of reading is required. For some students, the comprehension of written prose is very difficult. Hence, methods or techniques which facilitate the processes of attending and storing information for later retrieval are of great interest. Developmental studies have shown that children begin to be able to utilize strategies beginning at approximately the second grade level. However, most children do not show this ability until about the age of nine years. Few of the research studies to date have investigated the effect of the strategies on the recall of written prose. However, that kind of information is necessary if students are to be helped to understand and remember what they read.

Review of the Literature

Various factors have been proposed to explain individual differences in reading comprehension ability. Carr (1981) suggested that differences in reading skill are multiply determined and that many information processing skills influence comprehension performance. However, several theories have held that differences in short-term memory performance are related to reading ability. Jorm (1979, 1983) suggested that deficits in the auditory-verbal and visual short-term memory stores are responsible for reading difficulty. Other studies indicate that short-term memory deficits are related to deficient

phonological coding processes (Stanoviche, 1982). Several researchers have argued that poor readers showed a production deficiency, or a lack of inclination or ability to apply efficient mnemonic strategies (Lange, 1973; Moely, Olson, Halwes, & Flavell, 1969; Torgesen, 1977; Torgesen & Goldman, 1977). Mnemonic strategies are techniques of learning that improve recall. The strategies ". . . generally rely on facilitating two processes basic to memory: chunking (that is, forming higher-order subjective units of the material to be learned) and retrieval" (Harre & Lamb, 1983, p. 397). Levin (1973) made a distinction between two types of poor readers, those who exhibited deficits, and those who exhibited differences in comparison to good readers. The "difference" reader is one who possesses adequate skills, but fails to spontaneously utilize techniques to improve recall. On the other hand, "deficit" readers are those who lack necessary skills such as decoding or vocabulary knowledge.

Various studies have investigated the use of such mnemonic techniques as verbal rehearsal (Flavell, Beach, & Chinsky, 1966; Rose, Cundick, & Higbee, 1983; Tarver, Hallahan, Kauffman, & Ball, 1976; Torgesen & Goldman, 1977; Wong, Wong, & Foth, 1977), visual imagery (Anderson & Kulhavy, 1972; Carver, 1982; Clark, Deshler, Schumacher, Alley, & Warner, 1984; Maher & Sullivan, 1982; Rose et al., 1983), self-questioning (Clark et al., 1984), language and semantic tasks (Bobrow & Bower, 1969; Mistler-Lachman, 1974; Shriberg, 1982), use of theme (Dooling & Mullet, 1973), and categorizing (Lange, 1973). Research has generally shown that these techniques can improve the recall of poor readers (Stanoviche, 1982). However, the research has

infrequently used reading comprehension as a dependent variable, and the literature has sometimes been confusing with respect to the type of subjects studied, learning disabled (LD) or poor readers not identified as LD. Instead, many researchers have used serial, free, or paired associate recall in comparing poor and good readers' ability to utilize mnemonic strategies.

For example, Lange (1973) investigated the use of clustering in a recall task consisting of four conditions: serial recall, standard free recall, labeling free recall, and labeling cued recall. Subjects in grades kindergarten, fifth, and ninth were instructed to view and recall sets of categorized picture stimuli. The results indicated that kindergarten and fifth grade children were able to utilize conceptual skills but failed to continue to categorize when experimenter-provided instructions wre discontinued. The use of a theme as a mnemonic strategy was investigated by Dooling and Mullet (1973). An appropriate thematic title for a prose passage was presented before, after, or not at all. They concluded that knowledge of theme before beginning to read aids retention.

Language and semantic tasks have also been used to improve recall. Bobrow and Bower (1969) studied paired associate learning using a technique that required subjects to read or generate a sentence linking noun pairs. They found a significant difference in recall in favor of the group which composed their own sentences and explained the results in terms of better comprehension of the subject-generated versus subject-read sentences. Another experiment involving somewhat different language tasks also resulted in the conclusion that

deeper comprehension results in better recall of material in sentences (Mistler-Lachman, 1974). Subjects were instructed to perform three language tasks on semantically heterogeneous sentences: judge the meaningfulness of the sentence, judge whether a sentence followed from context, and invent a sentence to follow a stimulus sentence. A third experiment (Shriberg, 1982) involving a language task compared two experimental strategies (semantically and phonetically based) with two control conditions (listing the terms and a second reading of the material) on a prose passage with eighth grade students as subjects. The results indicated that both experimental strategies led to better delayed recall although the semantic strategy was superior to the others in the immediate recall condition.

Many studies have investigated the use of verbal rehearsal as a mnemonic strategy. For example, Flavell, Beach, and Chinsky (1966) administered a nonverbal serial recall task to children in kindergarten, second, and fifth grades. They found that older children were more likely to verbally rehearse the stimulus names and explained their results via the production deficiency hypothesis. Tarver et al. (1976) also studied the development of verbal rehearsal strategies in normal and LD boys aged 8, 10, and 13 using a serial recall task. Results indicated that the younger LD boys as well as older LD boys used a verbal rehearsal strategy. The authors concluded that the LD population probably evidences a developmental lag of about two years, but that performance can be improved when appropriate strategies are provided. In another experiment, second and fifth grade good and poor readers were given a sequential recall task under

two conditions: delayed recall and labeling (Torgesen & Goldman, 1977). Again, the results suggested that the poor readers failed to spontaneously utilize verbal rehearsal to improve recall. When poor readers utilized the strategy, the difference between the recall of the two groups was not significant. Finally, Wong et al. (1977) also investigated the utilization of verbal rehearsal by good and poor (LD) readers for the recall and clustering of verbal materials. The authors interpreted the results as demonstrating a performance deficiency in that the poor readers failed to produce appropriate strategies to aid recall.

A number of researchers (Clark et al., 1984; Lesgold, McCormack, & Golinkoff, 1975; Levin, 1973; Maher & Sullivan, 1982; Ruch & Levin, 1979) have used imagery as a mnemonic technique to increase the recall of prose passages. For example, Levin (1973) presented good and poor fourth grade readers with stories in either printed or pictorial form. Half of the subjects receiving the printed version were given visual imagery instructions; recall was significantly higher as compared to those not using the technique. Good and poor readers did not differ in recall of the material presented pictorially. The authors commented that the pictorial form might have yielded better recall if the subjects had been instructed to verbally rehearse each picture as it was viewed. In addition, visual imagery instructions were more facilitative for poor readers possessing adequate basic reading skills but lacking organizational strategies than those poor readers who had deficits in their skills (i.e., vocabulary or decoding).

Ruch and Levin (1979) used partial pictures to elicit visual imagery in first grade children presented with oral prose. When the partial pictures were presented during the recall test, children recalled more than if presented with pictures only during the story time. A retrieval-inefficiency explanation was used to account for the findings. However, the authors state that older children ". . . profit from simple imagery instructions" (Ruch & Levin, 1979, p. 275).

Maher and Sullivan (1982) investigated the effects of visual imagery using oral and print stimuli on good and poor fourth and sixth grade readers. Results indicated that recall was significantly better with the oral rather than the printed mode for both fourth and sixth grade readers. However, the written form yielded different results for the fourth and sixth graders in that poor readers' scores were significantly lower than good readers' scores. Consistent with research reviewed above, imagery was an effective learning strategy with fourth grade students.

Lesgold et al. (1975) taught third and fourth grade poor readers to draw cartoons for each story and to paraphrase the content of each story. Their results indicated that cartoon training was effective in improving the children's ability to learn prose.

Clark et al. (1984) taught visual imagery and self-questioning strategies to six secondary LD students using a multiple baseline across strategies design. Five of the students mastered the strategies and applied them resulting in greater comprehension of grade level materials.

Anderson and Kulhavy (1972) also instructed secondary students in the use of mental imagery on a 2,000-word prose passage; their results indicated no difference between the mental imagery group and a control group. However, not all of the subjects in the imagery group complied with the instructions, and those students who reported using the strategy performed significantly better than those who reported that they did not use the strategy.

Lastly, Carver (1982) investigated the effect of induced visual imagery as a stage-setting strategy (the experimenter described the major themes contained in the reading passage) and as a storage-retrieval strategy (the subjects made mental pictures of what they read) with fifth grade average and above average readers. The results of the study indicated no significant difference between the two strategies.

Reese (1970) stated that "Imagery is effective because it makes the material sensible or meaningful, and meaningful material is easier to remember" (p. 405). Jorm (1979) suggested that the dyslexic child's long-term memory is not deficient, and that the semantic richness of the material is a factor in the ability of the dyslexic to encode information into long-term storage. A recent study (Rose et al., 1983) investigated the effects of verbal rehearsal and visual imagery strategies on the reading comprehension of LD children with a mean age of eight years, nine months. Results indicated that both strategies were effective in increasing reading comprehension. However, the authors noted that the visual imagery strategy required more effort and that the children did not have the opportunity to

verbally express what they were imaging. It has been suggested that recall might be improved if children were instructed to use a combination of the verbal rehearsal and visual imagery strategies (Levin, 1973; Rose et al., 1983).

Statement of Purpose

The purpose of the present experiment was to compare the recall of written prose by fourth grade average and poor readers who had been given one of four treatments: unaided, visual imagery, verbal rehearsal, and a combined visual imagery plus verbal rehearsal.

Hypotheses

It was hypothesized that there would be no difference in performance between the "difference" poor readers and the average readers since the difference poor readers would be taught the strategies to aid recall. However, it was also hypothesized that the average readers would recall more than the poor readers in the unaided condition. Finally, it was hypothesized that the readers in the combined strategies group would recall more than those in the other groups.

Chapter II

METHOD

Subjects

Subjects were 47 fourth graders from one school in a medium-sized school district. Of the 47 subjects, 23 were male, and 24 were female. Half of these students were enrolled in a Chapter I remedial reading program, while the remainder were average "grade level" readers. Group achievement test scores revealed a mean reading level at the 67th percentile for the average readers, and a mean reading level at the 31st percentile for the Chapter I readers.

Materials

A 74-word paragraph for the sample training session was taken from the Gilmore Oral Reading Test. A picture illustrating a child reading a book while imagining at the same time was used in the training session. Two approximately 1,000-word passages were chosen from the Reading Caravan series (Witty & Freeland, 1964). The Dale-Chall readability estimate for the fourth grade level was 4.7 and the Spache readability formula indicated a 3.4 level of difficulty for the third grade level passage. A red dot was placed at intervals throughout each story. Each child was provided an answer sheet on which he or she wrote the answer to 20 orally presented questions. The questions were composed such that both content- and inference-type information was tapped.

Procedure

The 23 Chapter I and the 24 average readers were randomly assigned to four groups: unaided, verbal rehearsal, visual imagery, and verbal rehearsal plus visual imagery. Each group contained six average and six Chapter I readers with the exception of the visual imagery group of Chapter I readers, which had only five subjects. All subjects were taught the vocabulary words contained in the stories before the day of the experiment. Subjects were seen in groups of approximately five. Subjects in each condition received the sample training paragraph. Those in the unaided condition simply read the paragraph before receiving the story. However, all other subjects practiced their strategy or strategies while reading the sample training paragraph. Following the presentation of the training paragraph, subjects in the three experimental groups were asked to report on their images, paraphrases, or both depending on their group assignment. This was done to insure that all understood the technique(s).

For example, subjects in the visual imagery condition were shown the picture depicting a child reading a book while imagining what was happening in the story. These subjects were asked to pause at the red dots placed at intervals throughout the story and "make pictures or a movie in your mind about what you reading." After the subjects practiced on the sample paragraph, they were given the story and the instructions were repeated. In addition, they were asked to try to remember as much of the story as possible because they would be asked questions about the story afterwards. As soon as a student finished a

story, the copy was collected in order to prevent further study. When all subjects in the group had finished, the answer sheets were distributed and the children wrote the answers to the 20 questions. They were instructed to cover each question after answering, to prevent them from returning to a question as well as to shield their answers from their neighbors' view. Next, the answer sheets were collected and the students were asked if they had used any kind of strategy in the past to help them recall what they had read. Subjects were also asked about the extent to which they used the new strategy during their reading of the story (none of the time, some of the time, most of the time, or all the time).

The verbal rehearsal groups were conducted in a similar manner, except that the students were instructed to "say in your own words what the story is describing." The students did not see a picture in this condition. The verbal rehearsal plus visual imagery groups received instruction in both strategies. Subjects in the unaided condition read both the training paragraph and the story, but were instructed only to read the material carefully as they would be expected to answer questions about it later.

Chapter III

RESULTS

It was predicted that there would be no difference between the poor readers who were given a strategy and the average readers, and this was not supported. It was further predicted that the Chapter I readers in the unaided condition would recall significantly less than those in the other conditions, and this was supported. Lastly, it was predicted that the subjects in the verbal rehearsal plus visual imagery condition would recall more than those in the other conditions, and this was also supported.

Performance was defined in terms of the number of correct responses (out of 20 possible) written after reading the passage. The design was a 2 (reading classification) by 4 (mnemonic strategy) treatment by blocks. Seven of the eight cells contained six subjects and one contained five. Therefore, it was necessary to compensate by substituting the mean of the eighth cell for the missing score (Myers, 1979). Consequently, one degree of freedom was lost from the error degrees of freedom.

It was predicted that there would be no difference between the average and Chapter I readers; however, the average readers recalled significantly more than the Chapter I readers, $F(3, 39) = 34.59$, $p < .001$. It was hypothesized that there would be an interaction between group and strategy, and this was supported, $F(3, 39) = 3.58$, $p < .05$. Simple effects for mnemonic strategy at each level of reading classification were computed, and there was a significant

effect for strategies of Chapter I readers, $F(3, 19) = 5.72$, $p < .01$, indicating that different strategies have different effects on the two types of readers.

The interaction between groups and strategies is shown in Figure 1. A Duncan procedure was calculated to compare the Chapter I strategy means. The pairs of groups which were significantly different at the .05 level were: visual imagery plus verbal rehearsal from unaided, visual imagery from unaided, and visual imagery from verbal rehearsal. A t test comparing the performance of subjects by gender was not significant.

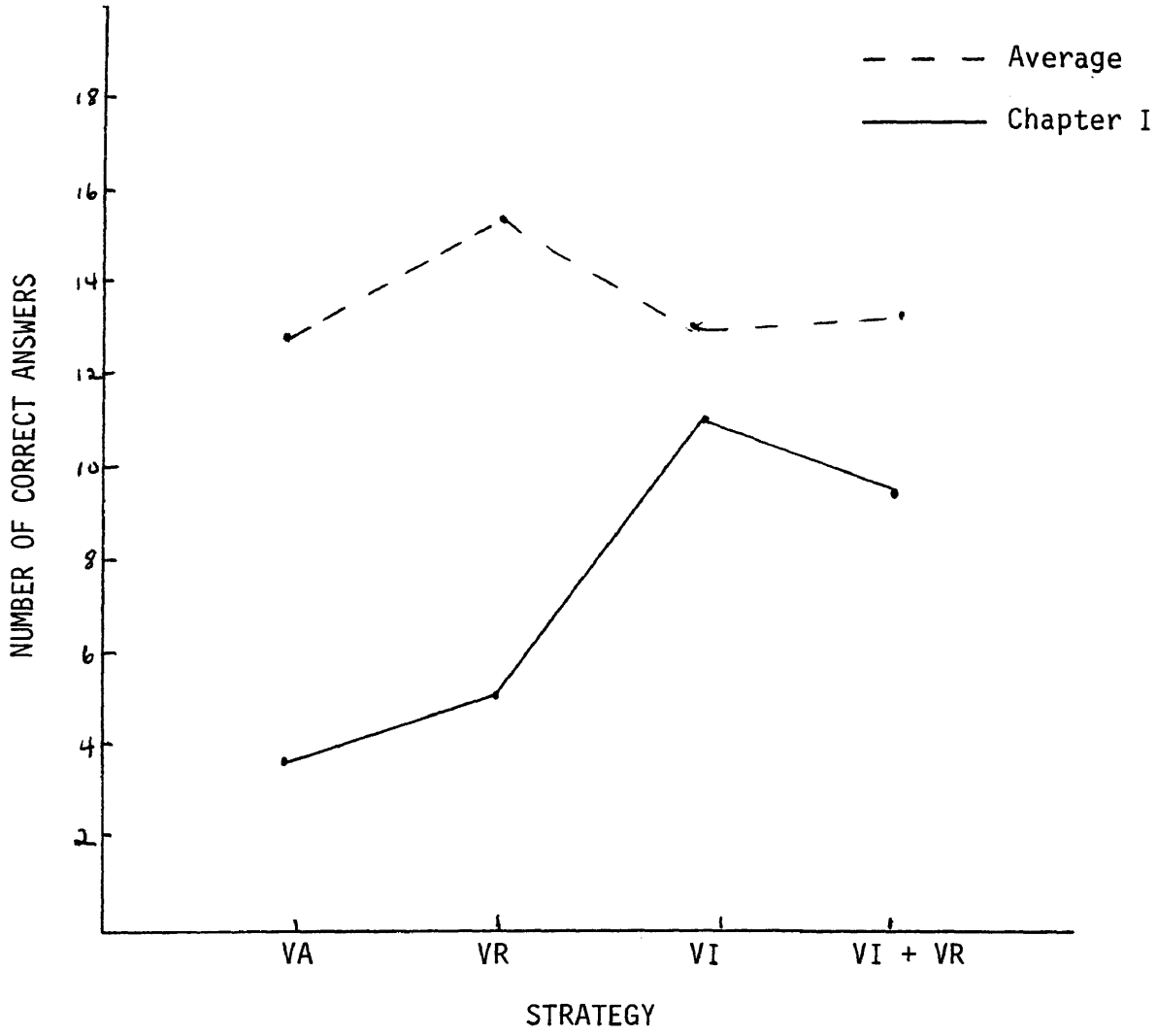

Figure 1. Number of questions answered correctly as a function of mnemonic strategy taught.

Chapter IV

DISCUSSION

It was predicted that the Chapter I readers would recall less than the average readers in the unaided condition, and that was confirmed. Secondly, it was hypothesized that those students who were taught the strategies would perform similarly whether they were average or poor readers. However, this was not the case, as the average readers recalled significantly more than the poor readers. The average readers did well regardless of which (if any) method was used. In contrast, the poor readers differed in the number of questions answered correctly depending on which strategy had been taught to them.

Figure 1 illustrates the relationship among the means of the four groups of Chapter I readers. The visual imagery plus verbal rehearsal group as well as the visual imagery group alone both recalled significantly more than the unaided group. In addition, those in the visual imagery condition recalled significantly more than those in the verbal rehearsal condition. The poor readers in the visual imagery condition performed almost as well as the average readers. Because all three strategy groups recalled more than the unaided group, results are consistent with previous research indicating that poor readers show a production deficiency. Thus, the Chapter I readers in this experiment seem to be what Levin (1973) called "difference" poor readers; that is, those who possess adequate skills, but fail to spontaneously use techniques which improve recall.

These results differ from previous research by Rose et al. (1983) in which both verbal rehearsal and visual imagery were equally effective in increasing reading comprehension, whereas the present experiment found the visual imagery strategy to be superior to the verbal rehearsal strategy. Speculation as to why visual imagery was just as effective as the combined strategy in the present study led in several directions. First, Rose et al. (1983) stated that the visual imagery strategy required considerable effort. It is possible that the processing required by the combined strategies was too time consuming and difficult. Secondly, it is difficult to determine the extent of the subjects' compliance with the instructions, although the subjects generally reported using the strategy most or all of the time they were reading. A third possibility involving strategies which the students may have been using before participating in the experiment was explored. The subjects were questioned about their methods for remembering what they had read. The Chapter I readers in the unaided condition reported using no strategies for that purpose. Those in the other groups reported that they reread the material. Among the average readers, strategies reported included rereading, summarizing, and finding a topic sentence. Interestingly, two subjects in the visual imagery group (average readers) also reported using a verbal rehearsal strategy when they read material for class. Observation of the students indicated that most or all in the various groups were using the strategy which they had been taught. Therefore, it appears unlikely that previous experience with strategies could account for all the differences found among the Chapter I readers.

A fourth possibility relates to the nature of the reading passage. The content of the passage involved concrete action oriented events that could be easily visualized. It is possible that the nature of the material facilitated the use of the visual imagery strategy. The use of more abstract, less easily visualized passages may result in improved recall by those using the combined strategies. In addition, the significantly better performance of the visual imagery group over the verbal rehearsal group may not be found if the material is of an abstract nature. Because this experiment used a relatively small number of subjects, replication with a larger group of subjects might be useful in clarifying the conditions under which these strategies are most beneficial.

The importance of this kind of research is clear when one considers the amount of instruction presented in written form in the classroom. The literature indicates that mnemonic strategies increase recall and improve reading comprehension. An emphasis on the use of mnemonic strategies for improving reading comprehension appears to be most beneficial to "difference" readers such as those students in Chapter I reading programs. However, it is necessary to understand which strategies are useful with what kind of student and what type of reading material. The present experiment yielded some tentative answers to that question. The results seem to indicate that the visual imagery strategy is most beneficial to Chapter I readers when the content is fairly concrete. Directions in which further research might lead include investigating the use of mnemonic strategies with somewhat more abstract reading material, and the extent to which

instruction in mnemonic techniques generalizes to reading in the students' regular classroom. In addition, the circumstances under which generalization takes place should be explored. It seems that if students could learn to generalize the mnemonic strategy to their class reading, their recall might approach that of average readers.

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