AN APPLICATION OF PROTOCOL ANALYSIS IN IDENTIFYING THE REASONING STRATEGIES USED BY SEVENTH-AND EIGHTH-GRADE REMEDIAL READING STUDENTS

DISSERTATION

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By

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The major purpose of this descriptive study was to identify the reasoning strategies used by seventh- and eighth-grade severely disabled remedial reading students when attempting to comprehend expository and narrative prose. Additional research questions dealt with the most frequently used strategies; correct responses to questions through the use of strategies; strategies used when responding to narrative and expository prose; strategies used when answering literal and inferential questions; and the strategies used by individual students.

Methodologically, the technique of protocol analysis, adapted from problem-solving research, was used. Ten students were randomly selected from those students attending a remedial reading laboratory in a large metropolitan school district. Each student was asked to read twelve short passages and to respond to the two questions following each passage by thinking aloud why each answer choice was accepted or rejected. The verbal responses or protocols, which were taped and later transcribed, were studied in order to identify the reasoning strategies. Eight reasoning strategies were
identified and the frequency distribution of the use of the eight strategies by the ten subjects was tallied. A tally was made of the protocols of the correct response to each question in order to determine the degree of success obtained when the various strategies were used. Tallies were made showing the strategies used when answering questions following narrative and expository prose and showing the strategies used when responding to inferential and literal questions. Finally, the strategies of each individual subject were examined in order to ascertain the strategy preference of each subject.

Results indicated that severely disabled remedial reading students do use various types of reasoning strategies in order to obtain appropriate responses to questions following prose discourse. Eight reasoning strategies were identified and definitions describing each strategy were developed.

Remedial students appear often to be willing to sacrifice understanding by focusing on a specific word in the question or choice and developing an answer to a question based on the presence or absence of that word in the passage. When remedial students use information explicitly stated in the passage or make logical inferences, they are successful seventy-five per cent of the time. When responding to questions following both narrative and expository prose, remedial students appear to remember detail better in narrative prose;
however, remedial students show little variation in the strategies selected when responding to questions following both types of prose. Remedial students tend to be inconsistent in matching the appropriate strategy with the corresponding question type. The use of the identified reasoning strategies varies greatly from one individual student to another. Finally, pedagogical implications are suggested for the relationship between reasoning strategies and remediation; and methodological implications for further use of protocol analysis in reading research are cited.
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CHAPTER I

INTRODUCTION

Problem and Background

Beginning with the landmark studies of Thorndike (1917) there has been a continued interest in the nature of the mental skills involved in reading. Thorndike described reading comprehension as a very complex procedure and concluded that comprehension in reading is much the same as reasoning in mathematics. However, in spite of a vast amount of literature about reading which has been produced over the last 70 years, the workings of the mind during reading remain a profound mystery. Yet, as Strang (1967) stated, "The most basic and practical research in reading should concentrate on how students approach, perceive, and respond to a selection" (p. 3).

Only a small number of researchers, reading specialists, and educators have addressed the problem of trying to understand how students process written discourse by the use of reasoning skills (Spearritt, 1952; Strang, 1967; Kavale & Schreiner, 1979). Yet, Skinner (1965) has cautioned that "a really effective educational system cannot be set up until we understand the processes of learning and teaching" (p. 8).
As Ngandu (1977) pointed out, the little work done in the area of reasoning skills has not focused on the reasoning behaviors of those students needing the most help—remedial students. Furthermore, understanding the process of reading, or what occurs in the reader's mind when the reading act is being performed is particularly important to students beyond the primary grades who are presented with a large amount of content material. This study, which determined the reasoning strategies used by remedial students, provides implications that can point the way toward better instructional practices for the teachers of these students.

Since the comprehension process is inaccessible to direct observation, research designed to shed light on the process is limited to dealing with behaviors. The technique of protocol analysis, as described by Newell and Simon (1972) was used in order to isolate and categorize the thought processes of seventh- and eighth-grade remedial students.

Purpose of the Study

The major purpose of this study was to identify, through the use of protocol analysis, the reasoning strategies used by seventh- and eighth-grade severely disabled remedial reading students when attempting to comprehend expository and narrative prose. Answers to several research questions were sought:
1. Do remedial students have a preference for the same general types of reasoning strategies?

2. Does the use of some strategies produce more correct responses than the use of other strategies?

3. Are the strategies used by remedial students in comprehending narrative prose the same as those used for comprehending expository prose?

4. Are particular reasoning strategies associated with inferential and with literal questions?

5. Does an individual student tend to prefer a particular strategy?

Abandonment of A Priori Hypotheses

Educational and psychological research has demonstrated a growing interest in the use of varied techniques for approaching a study. Bronfenbrenner (1977) suggested the use of more variety in approaches if researchers are to make progress toward a better understanding of human development. In discussing some of these approaches, several researchers (Bronfenbrenner, 1977; Willems & Raush, 1969; Wilson, 1977; Wolf & Tymitz, 1976-1977) suggest the abandonment of a priori hypotheses. Willems and Raush (1969), in summarizing the proposals made by six authors, stressed the value of an investigator approaching behavioral phenomena as if for the first time, with minimal determination by prior theoretical categories. Glaser and Strauss (1967) described several
advantages of an open approach over a prestructured study: (a) Data is not forced into preselected categories. (b) Hypotheses are permitted to emerge on their own. (c) The researcher can be more objective and less theoretically biased.

The technique of protocol analysis requires that the researcher study the protocols of the subjects without making any prior assertions about expected outcomes. Therefore, no a priori hypotheses were formed. But as Guba (1978) cautions, the abandonment of a priori hypotheses does not mean that the researcher has no plan at all.

Thus, while no a priori hypotheses were formulated for this study, the collection and analysis of the protocols were guided by the purposes of the study and the specific procedures as delineated in the section on methodology.

Significance of the Study

This descriptive study focused on the identification of the reasoning strategies used by severely disabled seventh- and eighth-grade remedial reading students when attempting to comprehend narrative and expository discourse. Research which illicits the process of comprehension is an important step toward a basic understanding of the entire field of reading comprehension. Research concerned with process can do much to improve ways of studying individual differences and can "furnish useful basis for determining the
effectiveness of different educational methods" (Bloom & Broder, 1950, p. 20).

Definition of Terms

For the purpose of this study, the following definitions of basic terms were adopted:

**Remedial**, when applied to the subjects in this study, refers to students who are functioning four or more grade levels below their grade placement.

**Retrospection** is a research technique which requires the subject to read an entire passage and then describe what the subject thought when he or she was reading the passage.

**Introspection** is a research technique which instructs the subject to report the process as it is happening. Usually, the subject is asked to theorize about his or her feelings.

**Protocols** are the complete records of the subject's oral verbalizations during the investigation.

**Protocol analysis** refers to the research technique which consists of collecting, taping, typing, and analyzing the verbalizations of the subjects.

**Narrative**, as used in this study, describes a passage which tells a story.

**Expository** describes a passage which contains content from the social sciences, the natural sciences, or the arts.

**Literal**, when used to describe a question in this study, is defined in the strictest sense and applies only to a
question which asks something that is explicitly stated in the passage.

Inferential, when used to describe a question in this study, applies to a question that asks the subject to infer the answer, to see the logical relationships between different parts of a passage, to summarize, to find the main idea, to infer feelings, or to understand the reason for an action when it is not directly stated.

Limitations

This study was limited in several ways. The small sample size which was deemed necessary for the in-depth investigation of each subject, required that generalizations of the research must be made with caution. The method of protocol analysis is limited by the necessity for objective analysis (Olshovsky, 1976-1977). However, Newell and Simon (1972) state that objective data analysis is possible only if categories and process are determined from the data, rather than imposed on the data. Another limitation concerns the time of day when the students were tested. Since each student was tested during the time she or he normally attends the reading laboratory, the time of day may have influenced the performance of the subjects. Finally, the experimental setting which employs the use of verbalizations may inhibit thought. Subjects may not reflect all of the thought process, but only the portion that is known to the subject.
CHAPTER II

SYNTHESIS OF RELATED LITERATURE

Introduction

The need for the investigation of the process of reading is revealed in the review of the related literature for this study. Although Thorndike's (1917) study of errors in paragraph reading pointed the way toward a conception of reading as a high-level thinking process, the bulk of the research in reading has focused on the product rather than the process. In their study of the thought processes of college students, Bloom and Broder (1950) cautioned,

Until the educator knows and understands the relations between the solutions given by students to academic problems and the thought-processes which led to the solutions, he is unable to determine whether instructional procedures are effective. (p. 3)

For too long, "we have relied almost exclusively on outcome measures to study and comprehend the reading process" (Wolf & Tymitz, 1976-1977, p. 5). The most important reason for the dearth of research on the reading process is the fact that the process cannot be observed with the naked eye and cannot be taken to the laboratory for dissection (Piekarz, 1956). To understand process, researchers must examine the minds of readers as they read (Smith, 1967).
Numerous methods have been used to study the reading process (Fareed, 1971). Thorndike (1917) and Dewey (1933) both focused on the mistakes made by students and made inferences as to the processes used by the readers. Holmes (1976) and Singer (1976) used a factorial analysis procedure to study the reading process. However, Fareed stated that the validity of the factorial analysis approach has been questioned by some researchers. On the other hand, retrospection (Cafone, 1966; Fareed, 1971; Gibson & Levin, 1975; Letton, 1966; Ngandu, 1977; Piekarz, 1956), introspection (Ames, 1966; Squire, 1964; Strang & Rogers, 1965), and protocol analysis (Olshavsky, 1976-1977; Kavale & Schreiner, 1979), appear to be more positive and direct methods of examining the reading process. (These methods will be investigated more thoroughly in a separate section of the review.)

In the past decade, information providing theoretical insights into the reading comprehension process has been obtained. Kintsch (1977) with text base; Rummelhart, Lindsay, and Norman (1972) and their work with semantic memory; Freedle and Carroll (1972) and Schank (1972) in understanding language, have all made significant contributions to the understanding of the reading process. However, the work of these theorists has focused on the product of reading rather than the process of reading.
Problem Solving and Reading

Thorndike (1917) described the process of reading by viewing reading as a problem-solving process. He posited that reading "consists in selecting the right elements of the situation and putting them together in the right relations, and also with the right amount of weight or influence or force for each" (p. 329). Gibson and Levin (1975) concurred when they stated that "the psychological processes characterizing mature reading go beyond perception, to remembering and problem solving and organization of conceptual knowledge for better extraction of meaning" (p. 46). Since comprehension seems to contain an element of problem solving (Carroll, 1972), an investigation of problem-solving techniques used while reading, will lead to a better understanding of the reading process.

"Problem solving may be regarded as the process by which the subject goes from the problem or task as he sees it to the solution which he regards as meeting the demands of the problem" (Bloom & Broder, 1950, p. 7). Bloom and Broder conducted a study in an effort to understand more about the processes of thinking involved in problem solving. Rejecting problems that would require recall of specific information as the sole factor in securing a solution, and puzzles that could be solved only by trial and error, the investigators chose questions and test situations taken from various academic tests and examinations. Each of the subjects--all
college students—read the problems and questions, then verbalized aloud as he or she went about finding a solution to the problem. The investigators studied these verbalizations, inferred why the subjects thought as they did, and then made some generalizations as to the thought processes used by each subject. They concluded that the problems and protocols revealed differences in the ways in which individual students approached and solved problems. They concluded, "We are convinced that a study of problem-solving processes is basic to an understanding of individual differences--their measurement and control" (p. 103).

Good and Poor Comprehenders

Although it is not difficult to find numerous studies that purport to compare good and poor readers, a limited number of studies have been made in which the focus has been placed on the characteristics of remedial students who are reading four or more years below their grade placement. In fact, the literature seems to indicate that the definition of a poor or remedial reader is relative and usually refers to a student who merely does not read as well as the good reader. In her comprehensive review of the research regarding good and poor comprehenders, Golinkoff (1975-1976) listed no study that described the poor reader as a student reading more than a year and a half below grade placement. A review of comparative studies not included in the Golinkoff study,
revealed a similar finding. Guthrie's (1973) disabled readers were reading approximately one year below level while Weinstein's and Rabinovitch's (1971) low-level fourth-grade subjects could read fourth-year material. Drum's (1977) below average eighth graders were able to comprehend passages with a readability of 7.4 to 8.0. Finally, Smith's (1967) poor readers were high school seniors who were able to read selections written for seventh- and eighth-grade readers. In all of the studies reviewed, none of the poor readers appeared to be severely disabled.

However, referring to disabled readers, Strang (1967) said, "If their successful reading processes were known, these could be taught and ineffective methods eliminated" (p. 38). Thus, there appears to be a need for research which attempts to learn about the thought processes of severely disabled remedial reading students.

Students with severe reading problems who are in the seventh and eighth grades have seldom been used as subjects for reading research. In the 18 studies reviewed by Golinkoff (1976-1977), only one study included seventh- and eighth-grade remedial readers. In the other comparative studies reviewed above, only Drum (1977) used eighth graders.

Techniques for Studying the Process of Reading

Among the techniques that have been used to study process, retrospection, introspection, and protocol analysis
are all methods which reveal the mental process of reading. In all three methods the reader is asked to tell about his thoughts at various times during the reading act. Studies using these methods were carefully examined in order to determine which of the three would be best for obtaining reasoning strategies used by remedial students.

**Retrospection**

Retrospection, which requires that the subject examine what she or he was thinking while reading, has been used in several studies. Piekarz (1956) and Gibson and Levin (1975) combined retrospection with a case study approach. In both of these studies the subjects were asked to tell what they thought they did when they read. In another study, Letton (1966), who used ninth-grade students whose IQ scores were above 102, concluded that retrospection is effective in identifying the processes used by good and poor readers as they interpret poetry. Cafone (1966) examined the individual differences in the reading processes of severely retarded ninth graders by having the subjects read a selection, answer some questions and then tell how they arrived at their answers. He concluded that remedial students used a wide variety of processes and that they showed much difference in the quality of their preferences. Ngandu (1977), when she analyzed the discussions of remedial students after they had completed reading a variety of selections, concluded that
although remedial students use a wide variety of behaviors as they read, many of the behaviors are inefficient.

Fareed (1971) used retrospection to compare the processes used by readers as they interpreted both a biology and a history passage. His sixth-grade subjects, who all read above their grade level, read a passage, discussed the content, and then read it again in small sections and reported thoughts, feelings, and reactions. These verbalizations were then analyzed and placed in seven classifications. Fareed concluded that the material had a high degree of influence on the responses of the subjects. He further noted the unique patterns of interpretive responses for each reader, and suggested that analyzing retrospective verbalizations may give remedial reading teachers immediate help in identifying the reader's particular problem.

Several objections have been raised with regard to the retrospective technique. Bloom and Broder (1950) stated, "It is very difficult for a person to remember all the steps in his thought-processes and to report them in the way in which they originally occurred" (p. 6). Too often, they continued, retrospective accounts focus on only the high spots of the thought-processes and ignore the minute details involved in the series of steps of thought. Olshavsky (1976-1977) objected to the use of retrospection because the subjects are asked to read an entire selection before
reporting what they can remember doing or thinking during the reading act. Thus, several limitations have been found for the technique of retrospection.

Introspection

The introspective method attempts to analyze mental processes by getting the subjects to tell about their thoughts, reactions, and feelings as they perform a certain task. Reading research which has used introspection has divided the prose selections into small segments. Therefore, the primary distinction between retrospection and introspection is that with introspection the report is given with a minimum of delay (Fareed, 1971). I. A. Richards (1965) in his book, How to Read a Page, pointed out the importance of using introspection in order to understand the process of reading. He said, "If we are to get any light on the reading process, on why it goes wrong and on how it might be improved, we must look as closely as we can into our own minds as we read" (p. 24). The act of looking into one's own mind is introspection, providing that the time between the reading and the verbalization is short.

By dividing four short stories into small segments, Squire (1964) asked his subjects to use the introspective technique by responding to each segment immediately after reading each brief section. The responses were then divided into six categories plus a miscellaneous section. Squire
concluded that this kind of investigation appears to provide a valid portrait of the reading process, and that verbal responses used with introspection seemed to be closer to the actual process of reading than did studies which required the subject to write what was remembered.

Strang and Rogers (1965) used introspection to examine individual differences in the interpretive responses of low, average, and high eleventh-grade readers when reading a short story. These researchers concluded that introspection is a valuable method of investigating how students read a short story.

An introspective technique was used by Ames (1966) in determining the process of the use of verbal context as an aid to word meaning. The subjects, all doctoral students in education, were asked to supply every fiftieth word which was omitted from an article from The Saturday Evening Post or the Reader's Digest. Subjects were asked to tell why each choice was made, and these explanations were analyzed and placed in 14 categories. The investigator concluded that this adaptation of introspective techniques made it possible to identify distinct categories of the types of contextual aids used by readers.

A recent study by Bowling and Laffey (1977) combined the introspective and retrospective techniques to determine the reasons why readers respond inaccurately to specific test items. Although the researchers did not describe the reading
levels of the subjects, their findings showed that 96 of the
99 reports indicated that the response was the result of
some reasoning process.

**Protocol Analysis in Research**

Protocol analysis, the third technique, requires the
reader to think-aloud as she or he solves a problem. As
early as 1950, Bloom and Broder investigated the reading
process by asking subjects to think-aloud as they solved
problems. Although several studies have used introspective-
retrospective techniques, the use of these techniques with
problem solving has been largely ignored in the reading
research literature. However, two recent reading studies
(Olshavsky, 1976-1977; Kavale & Schreiner, 1979) have indi-
cated a renewed interest in the problem solving aspect of
reading through the use of protocol analysis.

Protocol analysis, the term coined by computer scien-
tists as they have attempted to ascertain the thought
processes involved in human problem solving, purports to
explain behavior, not just describe it. Clarkson (1963)
described a protocol as "a transcript of the verbalized
thought and actions of a subject when the subject has been
instructed to think or problem-solve aloud. Thus, the tran-
script is a record of the subject's thought processes while
he is engaged in making a decision" (p. 349).
Newell and Simon (1972), leaders in the use of protocol analysis, have found the use of verbal behaviors and the subsequent analysis of the protocols to be useful techniques in studying information processing. The complexity of problem solving has led them to conclude that classical experiments in research are not too useful for determining processes. Newell and Simon consider their data analysis techniques to be more like those of the biochemist or archaeologist than those of the agricultural experimenter.

Forehand (1966) called protocol analysis the classic method for studying human information processing because he felt that information processing approaches are concerned with describing the precise nature of the internal events and processes of problem solving. DeGroot (1966), a computer scientist in Amsterdam, emphasized the importance of studying protocols in trying to build computers that simulate human processes. He says, "We need good, old-fashioned introspection along with modern methodology of protocol analysis" (p. 29).

As mentioned earlier, two recent reading studies (Olshavsky, 1976-77; Kavale & Schreiner, 1979) have made use of protocol analysis. Olshavsky, after comparing the benefits of introspection, retrospection, and protocol analysis, concluded that protocol analysis came closer to matching the actual thought processes of the reader. Each of her subjects read an independent clause silently and then verbalized what happened and what the reader thought about the happening.
The protocols were taped, typed, and analyzed in order to identify strategies that were used by the subjects. Her subjects, tenth graders who read with some proficiency, demonstrated that good readers used certain strategies in reading significantly more than poor readers. Olshavsky concluded that the type of strategies identified lend support to the theory that reading is a problem solving process.

The most recent study in reading using protocol analysis was conducted by Kavale and Schreiner (1979). These researchers used standardized measures of reading comprehension with average and above-average readers in the sixth grade. After reading a short passage aloud, each subject was asked to look at each possible answer to the presented question and think aloud as to why he or she accepted or rejected each of the four or five answers. These protocols were analyzed and placed in one of the 16 categories that had been established before the experiment. (By using predetermined categories, Kavale and Schreiner did not follow the guidelines of protocol analysis as developed by Newell and Simon (1972) who stress the importance of not establishing predetermined categories. Newell and Simon emphasize that the categories should emerge from the protocols.) However, Kavale and Schreiner reported findings that indicated that above-average readers showed more applications and successes with the most often used strategies, but the average readers showed greater variability
in strategy use but often used less efficient reasoning strategies. Kavale and Schreiner found the use of protocol analysis an effective technique for comparing the reasoning strategies of average and above average reading students.

Protocol analysis has been used also by Flower and Hayes (1977, 1980) while studying the writing process. They have found the technique an effective way of examining the thought processes of writers.

In conclusion, a review of the literature related to this study presented the importance of studying the process of reading. Discussion was presented which views reading as a problem-solving process. Studies which compared good and poor comprehenders were examined. A void was found in the research in regard to seventh and eighth graders who are reading four or more years below level. The theory of viewing reading as a reasoning process was discussed, and retrospection, introspection, and protocol analysis were reviewed as possible ways of studying the reading process. The strengths and weaknesses of each technique were discussed.

The present study addressed the need of identifying the reasoning processes of remedial students in the seventh and eighth grades who are reading four or more levels below
their grade placement. Protocol analysis was the technique selected.
CHAPTER III

METHODS AND PROCEDURES

Selection of the Research Approach

Since the goals of the present research were to examine the reasoning strategies of remedial students, a descriptive study seemed to be the most appropriate approach. As Kaplan (1964) explained, there are some things in the behavioral sciences about which researchers cannot make predictions but must be willing to merely describe in hopes that from the descriptions an explanation will emerge that may eventually lead to predictions. Magoon (1977) stated that the scientific goal is often not the traditional goal of accurate prediction but instead, a careful description.

The techniques of retrospection, introspection, and protocol analysis, as described in the review of the literature, were considered as possible approaches for studying the reasoning strategies of the subjects of this study. Retrospection, the first technique investigated, was rejected for the following reasons: (a) the lengthy selection required might place too much stress on remedial students who are easily frustrated; and (b) the time-span between when the selection is read and the actual protocols are given seems
to be less likely than some other options to reflect the pro-
cess used in reading.

The second technique considered, introspection, was
rejected because of the emphasis placed on the feelings and
attitudes of the subject, with little attention being paid
to the thought processes used in reading and problem solving.
Simons (1971) maintained that an important limitation of
introspection is the difficulty of establishing the relation-
ship between the actual thought process and the introspective
verbalizations.

Protocol analysis, as developed by Newell and Simon
(1972) appeared to be the most promising technique for de-
termining the reasoning processes used by readers. In
protocol analysis, the subjects are asked to verbalize their
thoughts as they solve a problem. They are not asked to tell
about feelings or impressions but merely to report the infor-
mation and intentions that are in their sphere of conscience
awareness while working a problem or answering a question.

Consequently, protocol analysis eliminates the major
problems associated with introspective and retrospec-
tive methods; that is, the confusion of present and
past knowledge found in retrospective techniques and
the subject's theorizing about reported behavior in-
volved in introspective methods (Kavale and Schreiner,
1979, p. 106-7).

In protocol analysis, the verbalizations are not treated
as introspections. "The protocol is a record of the subject's
ongoing behavior, and an utterance at time t is taken to in-
dicate knowledge or operation at time t" (Newell and Simon,
Newell and Simon further describe protocol analysis as a technique which depends on the researcher to extract the meaning from the verbal utterances of the subject, to propose statements about the operations that can be attributed to the subject, and to construct inferences that lend support to these attributions.

The time lapse between reading and verbalization can be kept at a minimum through the use of protocol analysis since the subject is asked to think aloud at the time the process is taking place. Therefore, the method of protocol analysis was selected because it offers a direct and positive way to determine the reasoning strategies of remedial students.

Selection of Materials

In a pilot study conducted by the researcher, various materials were used in order to find a text that would permit the subjects to verbalize about reasoning strategies. A lengthy prose story was rejected because of the short attention span of remedial readers. It was decided that some type of testing device whereby the subject could read a short selection and answer brief questions about the selection would be best.

Numerous types of tests were used in the pilot study and eliminated. The relevancy of life-skill and minimum competency tests to current curriculums, led the researcher to investigate several of the competency tests on the market.
However, since most of the questions on these tests were literal, subjects, when asked to explain why a particular choice was made, responded, "It says so." The investigator decided that it was necessary to include inferential questions because the subjects would be required to infer answers from the information given, from previous experiences, and from prior knowledge.

Next, several sample items from standardized tests were explored with the pilot subjects. It was decided that selections from the Gates-MacGinitie Test, Level C, Form 1, would be used for the following reasons:

1. The selections are brief, so the length is not frustrating for remedial students.

2. A variety of narrative and expository selections are presented.

3. Both literal and inferential questions are found in the test.

Twelve selections were chosen from this test to be used in the study. In working with the pilot subjects, it was determined that the entire battery of 22 passages was too lengthy to hold the attention of the subjects. However, 12 passages seemed to be a reasonable number.

The selection of the passages was made using the following procedure:
1. The 22 selections on the test were designated narrative or expository by the researcher according to the terminology for this study.

2. The investigator marked each of the 44 questions either literal or inferential according to the operational definitions of these items. A literal question asks something that is explicitly stated in the passage. An inferential question requires the subject to infer the answer from what is stated, to see the logical relationships between different parts of a passage, to summarize, to find the main idea, to infer feelings, or to understand the reason for an action when it is not directly stated.

3. A panel of experts judged the questions using the operational definitions. The experts were a graduate student in education and two doctoral candidates in reading. When any member of the panel did not agree with the researcher on the designation of a passage, that passage was eliminated from the study.

4. The remaining questions were arranged according to difficulty. The developers of the test items provide the percentages of the students in the norming group who answered each item correctly. These figures were used as the basis for item difficulty. The range of the correct responses of the norm group on the items selected is from 31% correct to 88% correct.
5. All of the narrative passages were arranged in order of difficulty. The six easiest narrative passages were selected for the study. The same procedure was used for selecting six expository passages. An equal number of inferential and literal questions are found in each type of prose. These 12 selections provided 96 responses from each of the 10 subjects. (Appendix A includes a sample of the selected passages.)

In working with the pilot group, it was found that a warm-up exercise was helpful in encouraging the students to verbalize their thoughts. A copy of the exercise, "Catch the Crook," which was used in the beginning of the session, can be found in Appendix B.

Three practice passages were prepared from selections not used in the study in order to be certain that the subjects understood the procedure. Not all samples were used with every subject.

During the pilot study, the investigator determined that the total testing time would be less than one hour. However, the total test battery of 44 questions normally is administered in one session of 35 minutes. Therefore, it seemed feasible to require the subject to complete the 12 selections (24 questions) in one session. This procedure gave continuity to the testing time and necessitated just one training session for each subject. Actual testing time,
including the training and practice stories, ranged from 35 to 55 minutes.

Selection of the Subjects

The subjects in this study were 10 seventh- or eighth-grade students, ranging in age from 12 to 15 years, attending the remedial reading laboratory of a middle school (grades seven and eight) in a large metropolitan area. Students were assigned to the laboratory on the basis of their scores on the Gates-MacGinitie Reading Test, Level C, Form 2, administered at the beginning of the school year, and by the judgment of the instructors of the reading laboratory through the use of an informal reading inventory. All students functioning below an estimated grade level score of 4.0 were assigned to the laboratory.

The total population from which the sample was drawn consisted of 49 boys and 15 girls ranging in age from 11 to 15 years of age. This population contained 22 Anglos, 36 Blacks, and 6 Mexican Americans. Only students who were performing at a 2.0 to 4.0 grade level were considered since the subjects needed to be able to decode the passages and questions with some proficiency.

The number of subjects was limited to 10 for the following reasons:

1. An in-depth study of a few students was judged to be better for answering the research questions than a survey of a larger number of subjects.
2. Studies similar to this study used 16 or fewer subjects. Fareed (1971) used 12 subjects while Kavale and Schreiner (1979) had 16 subjects. However, the Kavale and Schreiner study used just 40 responses per subject for a total of 640 protocols. The present study used 96 responses from each subject for a total of 960 responses.

3. The total of 960 responses provided a manageable amount of data that was sufficient to provide a broad and accurate sample in order to determine a pattern of reasoning strategies of the subjects.

Two students were chosen from each class enrollment of 12 to 15 students using standard randomized procedure. Written permission was obtained from the parents of the students selected. A copy of this form is in Appendix C. Six of the subjects were Black boys, one was an Anglo boy, two were Black girls, and one was a Mexican American girl. Five subjects were seventh graders and five were in the eighth grade.

Specific Procedures for Obtaining the Protocols

All of the data was collected by the researcher and the sessions were held during the student's regular reading class. A screened-off portion of the laboratory was used in order to insure a maximum amount of privacy and a minimum amount of interruptions.

At the beginning of the session the researcher said:
You will receive full credit for your classwork today while you spend some time with me. I am trying to find out how students your age think. I am not concerned now with how you read, so you can count on me to help you with any words that give you trouble.

We are going to do several activities during which I want you to say aloud what you are thinking. Since you are not used to thinking aloud, we will practice first. When you think you understand what I want you to do, we will begin. I will tape what you say so that I can listen to this session later.

The first activity was the warm-up exercise, "Find the Crook." During this exercise the researcher, through the use of limited prompts, encouraged the subject to think out loud. In addition, an attempt was made to establish a non-threatening and relaxed atmosphere.

Following the completion of the warm-up exercise, the researcher played a tape which demonstrated the thinking-aloud procedure. (A verbatim transcription of a portion of this tape is included in Appendix D.) The subject then practiced with one or two sample passages until she or he felt comfortable with the procedure.

Each of the 12 passages as well as the sample passages was typed on a 5 X 8 inch card so that the subject could consider each passage separately. The questions were placed under each passage with the four possible answers under each question. A marker was used so that the subject could focus on one item and verbalize about that item before moving on to the next choice. The cards were shuffled for each subject to prevent order effects.
The following procedure was used for each passage:

1. The subject was directed to read the passage aloud. The researcher gave help with any decoding problems.

2. The subject was instructed to read the passage silently.

3. The subject was asked to read the first question and the first answer choice, and to verbalize why the choice was accepted or rejected. The same procedure was used for each of the four possible choices. After reading and verbalizing about all four of the possible choices, the subject stated which answer she or he chose.

The same procedure was used for each of the 12 passages.

From the pilot study the researcher recognized the necessity of using prompts when the subject forgot to think out loud. With the subjects used for the pilot, as well as the 10 subjects used in the study, a prompt at the time of the reading of the first response was usually sufficient until the next question. Non-directive questions were used as prompts to elicit what the student was thinking. A minimum of prompts was used in order for the subject to be permitted to verbalize responses with as little interference as possible.

The prompts, which were typed on a card and placed in front of the researcher during the sessions, were limited to the following:
Preparing the Data

A typed transcript of the responses of each subject was made from the tapes. The goal was a verbatim transcript indicating the hesitations as well as all verbalizations. Each subject was assigned a number so that the tapes could be identified. This same numbering system was continued onto the transcripts to permit identification of the subjects. In the event that a word or phrase on the tape was incomprehensible, a blank was left in the typed transcript.

Procedures for Analysis of the Data

Identification of the Reasoning Strategies

After the protocols had been transcribed, a preliminary analysis was conducted. Each of the 960 protocols was typed on a separate index card. The protocols were read many times. Careful examination was made of each response in order to begin to recognize any reasoning strategy.

The cards were then sorted for each subject, placing similar responses together. This classification process was repeated four or five times until the identification of the reasoning strategies was made. Although the first sort
was a broad classification of passage dependent, passage independent, and other, each sort produced a more refined classification.

Following the guidelines of Newell and Simon (1972) for the use of protocol analysis, the researcher did not identify reasoning strategies prior to the study. The procedure for the analysis of the data was based on the assumption "that if the subject employs definite processes . . . there may occur enough repetitions of essentially the same situation to allow us to induce what the processes are and to have some faith in their reality" (Newell and Simon, 1972, p. 191).

During the first few sortings, little attention was paid to names of classifications. It then became necessary to determine why certain protocols were grouped together. Eventually, eight reasoning strategies were identified and operational definitions were written for each strategy. Twice again the cards of protocols were sorted to be certain that the sortings and the definitions matched.

Data Analysis

The remaining step in the data analysis consisted of tallying the 960 protocols on four charts showing the percentage of responses for each strategy. Although the 96 protocols for each subject were kept separate, similarities among the 10 subjects were tallied under the same classifications. A tally also was made of the protocols of the correct
response to each question, and a record was made of the degree of success produced by each of the reasoning strategies. Tallies were made showing the strategies used when answering narrative and expository prose, and inferential and literal questions. Finally, the strategies of each individual student were examined in order to ascertain the strategy preferences of each participant in the study.

Validation of the Identified Reasoning Strategies

Three independent raters, all reading specialists knowledgeable in the field of information processing, were asked to validate the assignment of the protocols to the eight identified reasoning strategies. The protocols of one of the subjects were chosen at random. Each rater was asked to assign the 96 protocols of that subject by using the definitions of the identified strategies. There was a minimum of 85% agreement between the assignments of the raters and those of the researcher. Thus, the researcher's judgment in the assignment of the categories was validated.
CHAPTER IV

ANALYSIS, DISCUSSION, AND CONCLUSIONS

Introduction

The purpose of this study was to identify the reasoning strategies used by seventh- and eighth-grade severely disabled remedial reading students when attempting to comprehend prose discourse. Protocol analysis, a technique developed in the field of problem solving, was employed to obtain and examine the data.

The process leading to the actual identification of the reasoning strategies is reported. Sample protocols are presented in order to clarify the operational definition of each reasoning strategy. The remaining data from this study are organized and discussed in terms of the specific purposes of the study: (a) the strategies most frequently used by the subjects; (b) the strategies which resulted in the most correct answers; (c) the strategies most frequently used with narrative and expository passages; (d) the strategies most frequently used when responding to literal and inferential questions; and (e) the strategy most frequently used by individual subjects. Each section contains the analysis, discussion, and conclusion for that portion of the study.
Analysis and Identification of Strategies

Newell and Simon (1972), who maintain that it is essential to find out how an individual is processing information by examining verbal behaviors of individuals, have outlined the following guidelines for using protocol analysis:

1. No hypotheses are formed prior to the analysis of the protocols.

2. All of the verbalizations and utterances of the subjects are recorded and transcribed.

3. The protocols are read and reread so that a pattern of the process used by the subject will be recognized by the researcher.

Following the above guidelines, a careful examination was made of the 960 protocols. No previous list of strategies was formulated; instead, a careful transcript was made of each of the protocols for the 10 subjects. A description and discussion of the process used to determine each of the categories is given below.

Definitions of Categories

Primary categories. After numerous readings and sortings of the protocols, three primary categories were identified. These categories were labeled Passage Dependent, Passage Independent, and Unclassified Source. Prior to further sortings of the protocols, an operational definition
was developed for each of the three primary categories. These operational definitions are given below:

1. **Passage Dependent.** A response was classified as Passage Dependent when it could be inferred that the subject's response was based on information found in the passage. The subject would state, "The story says . . .," "It says so in the story," or a similar response.

2. **Passage Independent.** A response was classified Passage Independent when it could be inferred that the subject's response relied on knowledge not presented in the passage. The subject accepted or rejected an answer choice by providing information not given in the story.

3. **Unclassified Source.** A response was classified as Unclassified Source when the protocol was too abbreviated or fragmentary for the examiner to infer if the strategy used by the student was either Passage Dependent or Passage Independent. It was decided to separate the protocols that could not be classified as Passage Dependent or Passage Independent in order not to cloud the data with incorrectly labeled sources.

**Secondary categories.** Each of the protocols in the three primary categories were further examined in order to determine if more than one reasoning strategy could be identified in the categories of Passage Independent and Passage Dependent, or if the primary category of Unclassified Source
needed further divisions. Five secondary categories were identified and a new label, Personal Schema, was applied to the protocols classified as Passage Independent. Responses which were classified as Passage Dependent were divided into secondary categories of Unitary Focus and Expanded Explanation. Responses which qualified as Unclassified Source were divided in the secondary categories of Statement, No Response, and Misunderstood Question. Prior to further sortings of the protocols, an operational definition was developed for each of the five secondary categories. An explanation of the necessity of a new label for Passage Independent and the operational definitions of the secondary categories are given below:

1. **Passage Independent/Personal Schema.** An examination of the primary category labeled Passage Independent revealed that all of the responses assigned to this category contained knowledge which the reader had before reading the passage. Therefore, it was determined that this category needed no further divisions. However, since this category was then identified as one of the reasoning strategies, a more descriptive label was required. Thus, for further clarification, the term of Passage Independent was changed to Passage Independent/Personal Schema. Since Personal Schema is the only strategy identified in the category of Passage Independent, this strategy usually will be referred to by the shortened name of Personal Schema.
2. **Passage Dependent/Unitary Focus.** A response was classified Passage Dependent/Unitary Focus when the student responded by stating that nothing or something was said about the choice in the passage without stating what was actually said. Unitary Focus was limited to the responses in which the student replied, "It says something about that in the story," or "It doesn't say anything about that in the story."

3. **Passage Dependent/Expanded Explanation.** A response was classified Passage Dependent/Expanded Explanation when the student accepted or rejected a choice to a question by expanding or explaining why a decision was made. All Passage Dependent responses that gave a reason for a particular choice beyond the strategy of Unitary Focus were considered Expanded Explanation.

4. **Unclassified Source/Statement.** A response was classified as Unclassified Source/Statement when the student responded to a choice by saying, "No, it's not that one," or "Yes, that's the one." It is quite probable that when the student replied with a "yes" or "no" that she or he was using a definite strategy. However, the information provided in the response was too limited for a definite classification to be made.

5. **Unclassified Source/No Response.** A response was classified Unclassified Source/No Response when the student failed to respond to an answer choice or when the student's
response could not be discerned from the tape. Although a conscientious effort was made to obtain a response to every choice, this was not always possible.

6. **Unclassified Source/Misunderstood Question.** A response was classified Unclassified Source/Misunderstood Question when the student misinterpreted a question or did not understand a choice. The student usually responded with "I don't understand what they mean," or "I don't know what that word means."

**Trinary categories.** Each of the secondary categories was further examined in order to determine if any further divisions of the categories were necessary. It was decided Passage Independent/Personal Schema, Passage Dependent/Unitary Focus, and the three categories of Unclassified Source needed no further divisions. However, the secondary category of Passage Dependent/Expanded Explanation required six trinary categories. The six trinary categories were labeled Literal, Incorrect Recall, Inference, Definition, Elimination, and Inference-Not Implied. An operational definition was developed for each of the six trinary categories. These operational definitions are given below:

1. **Passage Dependent/Expanded Explanation/Literal.** A response was classified Passage Dependent/Expanded Explanation/Literal when the student accepted or rejected a choice by restating literal information provided explicitly in the
passage. "No, the answer is not a beaver because the story says a fisher is a member of the weasel family," was considered Passage Dependent/Expanded Explanation/Literal because the statement in the passage says, "The fisher is a member of the weasel family."

2. **Passage Dependent/Expanded Explanation/Incorrect Recall.** A response was classified Passage Dependent/Expanded Explanation/Incorrect Recall when the student's response was based on incorrect or irrelevant recall. The student stated that the story contained a fact not actually in the passage. An example of this response was when the student said, "The ripe berries are black." This was considered Passage/Expanded Explanation/Incorrect Recall because the passage states that the ripe berries are red.

3. **Passage Dependent/Expanded Explanation/Inference.** A response was classified Passage Dependent/Expanded Explanation/Inference when the subject used information given in the passage in order to make a logical inference that would explain why a choice was accepted or rejected. "Yeah, they were pleased because they wanted to hang the picture on the wall," was considered Passage Dependent/Expanded Explanation/Inference because it is stated in the passage that the parents wanted to hang the picture on the wall, but the student had to infer that this act indicated that they were pleased.

4. **Passage Dependent/Expanded Explanation/Definition.** A response was classified Passage Dependent/Expanded Explanation/Definition.
Explanation/Definition when the student's acceptance or rejection gave an explanation of what the choice word meant. When the response to the choice word crowded was, "It was crowded because there was a whole bunch of people in the building," the response was considered Definition because the passage talks about the "whole audience" but does not use the word crowded. It was inferred that this subject selected this choice because she knew what the word crowded meant.

5. Passage Dependent/Expanded Explanation/Elimination. A response was classified as Passage Dependent/Expanded Explanation/Elimination when the student stated, "I choose this one because it is not any of the other choices." It was inferred that the student felt confident that the other three choices were incorrect so by the process of elimination the fourth answer was selected as the correct response.

6. Passage Dependent/Expanded Explanation/Inference—Not Implied. A response was classified as Passage Dependent/Expanded Explanation/Inference—Not Implied when the student added information not given in the passage, made assumptions not implied by the passage, or jumped to unwarranted conclusions. When the subject responded that Mr. Winkel's house was not old but "kind of new," the response was considered Passage Dependent/Expanded Explanation/Inference Not-Implied because the passage states, "Mr. Winkel lived in a little house." The subject's inference that Mr. Winkel's house was new was not implied in the passage.
The six trinary categories were again examined, but no further categories were evident to the researcher. This process of defining the categories resulted in the identification of eight reasoning strategies. Three types of responses were also labeled Unclassified Source. Table 1 gives an outline of the classifications.

Table 1
Reasoning Strategies Identified (with letter code indicated)

<table>
<thead>
<tr>
<th>I. Passage Dependent</th>
<th>PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Unitary Focus*</td>
<td>UF</td>
</tr>
<tr>
<td>B. Expanded Explanation</td>
<td>EE</td>
</tr>
<tr>
<td>1. Literal*</td>
<td>LIT</td>
</tr>
<tr>
<td>2. Incorrect Recall*</td>
<td>IR</td>
</tr>
<tr>
<td>3. Inference*</td>
<td>INF</td>
</tr>
<tr>
<td>4. Definition*</td>
<td>DEF</td>
</tr>
<tr>
<td>5. Elimination*</td>
<td>ELM</td>
</tr>
<tr>
<td>6. Inference-Not Implied*</td>
<td>NI</td>
</tr>
<tr>
<td>II. Passage Independent (PI) - Personal Schema*</td>
<td>PS</td>
</tr>
<tr>
<td>III. Unclassified Source</td>
<td>US</td>
</tr>
<tr>
<td>A. Statement</td>
<td>S</td>
</tr>
<tr>
<td>B. No Response</td>
<td>NR</td>
</tr>
<tr>
<td>C. Misunderstood Question</td>
<td>M</td>
</tr>
</tbody>
</table>

*Identified strategies.
A tree diagram was drawn to illustrate the classifying of the responses of the students. The diagram, which is an aid in understanding the process involved in the identification of the strategies, can be found in Figure 1, page 44.

**Classification Examples**

In order to provide illustrations of the analysis of the protocols, several sample passages along with sample questions and responses are given below. Passages, questions and choices are underlined. No attempt was made to correct student deviations from standard English. At least one example is given for each of the eight strategies and the three types of Unclassified Source. Each passage is marked narrative or expository, and the questions are labeled inferential or literal. For further clarification, an explanation is given as to why a protocol was considered as representing a particular reasoning strategy. The passages are typed in the form used by the subjects. Fictitious names have been given to the subjects.

**Rod. Passage 4. (Narrative)**

Maria brought a finger painting home from school. It was full of bright colors and nice shapes.

"I like that!" said her father. "May I hang it here on the wall?"
Figure 1. Tree diagram of identified reasoning strategies with letter code indicated.
Her mother said it made her think of sunshine on a spring day.

How did Maria's parents feel? (Inferential Question)

Protocol: sad . . . I think they feel happy. They like to see the painting.

Interpretation: This response was classified PD/EE/INF. The passage states that the father said, "I like that." Rod rejected this choice by expanding why he rejected the choice. He inferred that if they liked the painting, they must be happy, so they couldn't be sad.

Protocol: sleepy . . . No, no one was sleepy . . . 'cause it didn't say they wanted to take a nap or something.

Interpretation: This response was considered PD/EE/INF. The subject inferred that since nothing was said about taking a nap, evidently no one was sleepy.

When Maria's mother saw the painting, she thought of (LITERAL Question)

Protocol: nice shapes . . . Well, it was on the . . . uh . . . finger painting.

Interpretation: The classification of this response was PD/EE/LIT because it is stated in the passage that the painting was full of bright colors and nice shapes. The subject does not state that this is the correct response
but he restates what the passage says about bright colors and nice shapes.

Protocol: **hanging it up** . . . Maria's mother wanted to hang it on the wall.

Interpretation: This response was classified as PD/EE/IR because it is stated in the passage that Maria's father wanted to hang it up.

Protocol: a **sunny day** . . . It was sun . . . I don't think it was a . . . she didn't want . . . yes, it was a sunny day. She wanted to hang . . . hang it on the wall in the sunshine.

Interpretation: This response was classified as PD/EE/IR because Maria's mother said the picture made her think of a sunny day, but she didn't say she wanted to hang the picture in the sunshine. (The subject chose this choice as the correct response.)

Don. Passage 8. (Expository)

When **people** have enjoyed a **performance**, they **clap** their **hands**. Once in a **while**, after an outstanding **performance**, the **whole audience** will stand up to **clap** and **cheer**. This response is called a **standing ovation**.
A standing ovation shows that the audience is (Literal Question)

Protocol: crowded . . . It was crowded because there was a whole bunch of people in the building.

Interpretation: This response was classified as PD/EE/DEF because the subject responded by giving a definition of the word crowded.

Protocol: ready to leave . . . It's . . . it's not ready to leave 'cause everybody stayed to see the other half of the show.

Interpretation: This response was classified as PD/EE/NI because the subject made an inference that goes beyond the information given in the passage. No mention is made about where in the program the standing ovation is given.

To receive a standing ovation, a performance must be (Inferential Question)

Protocol: repeated . . . No, it's not repeated because it didn't say nothing about it in the story.

Interpretation: This response was classified as PD/UF because the subject rejected this response because the word was not mentioned in the passage.
Mike. Passage 6. (Expository)

After the flowers of the peanut plants wilt, the stalks bend and push the seed-pods down into the sandy soil where the peanuts grow. When the peanuts have grown, the farmer pulls them up and dries them in the sun.

Peanuts develop in the (Inferential Question)

Protocol: air . . . Naw . . . I don't think it develops in the air 'cause it didn't say nothing about no air. It needs air but it don't develop in the air.

Interpretation: This response was classified as PI/PS. Although the subject started out by using Unitary Focus, he concluded by giving information about how plants grow that was not found in the passage.

Protocol: water . . . Naw . . . it couldn't be water 'cause all they'd do is fall over or something . . . and too much water either'd kill it . . . or . . . it'd grow faster in soil than it would in water.

Interpretation: This response was classified as PI/PS because the subject used knowledge that was not found in the passage. Nothing is stated or implied about water.
The fisher is a large member of the weasel family. It is one of the fastest and boldest hunters in the Canadian forest. It often hunts the prickly porcupine. It may also attack animals bigger than itself, such as beavers or even deer.

The fisher eats mostly (Inferential Question)

Protocol: meat . . . No . . . yeah . . . no . . . They say it doesn't eat meat . . . it attack . . . he attacks . . . . . . I don't know.

Interpretation: This response was interpreted as PD/EE/ELM because after the subject responded to the other three choices and rejected each of them, she decided that meat was the best choice.

Protocol: berries . . . No . . . he don't eat berries.

Interpretation: This response was judged to be US/S because the protocol does not contain enough information to determine if the response is Passage Dependent or Passage Independent.

Protocol: fish . . . It don't say he eats fish either.

Interpretation: This response is PD/UF because the choice was rejected because the word fish is not mentioned in the passage.
Protocol: insects . . . No . . . it don't say he eats insects either.

Interpretation: This response is PD/UF because the choice word was not in the passage.

Protocol: So he eat meat . . . 'cause it didn't say he eat any of the other three.

Interpretation: This protocol is part of the response to the choice word meat and further explains why the response to meat was classified as PD/EE/ELM.

Clara. Passage 5. (Narrative)

Mr. Winkel lived in a little house on a hillside in old Los Angeles. A flower path led to his house. Mr. Winkel loved flowers and dogs. When stray dogs came his way, he felt sorry for them and gave them a home.

Mr. Winkel's house was (Literal Question)

Protocol: old . . . No . . . it was kind of brand new.

Interpretation: This response was classified as PD/EE/NI because it was stated in the passage that the house is small. Clara made an inference that was not implied by the passage.

Protocol: sad . . . No . . . 'cause he wasn't sad.
Interpretation: This response was classified as US/M because the subject has evidently forgotten that the question asked about the house and not the man. It was not possible to infer if the response was Passage Dependent or Passage Independent so it was not classified.

Preferred Reasoning Strategies Used by Remedial Students

A specific purpose of this study was to determine if remedial students demonstrate a common preference for the same reasoning strategies when responding to prose discourse. In order to determine which strategies were preferred (i.e., most frequently used), two approaches to the data were considered. One approach, used by Kavale and Schreiner (1979), was to consider only the responses given to the correct answer choice for each question. However, a more thorough approach was needed to obtain data that would be helpful in determining some of the difficulties experienced by remedial students who often respond incorrectly to questions about written discourse. Therefore, all 960 protocols were considered for this section of the study in order to obtain a more complete picture of the frequency of the strategies used by remedial students. Tallies were made of the number of times an individual reasoning strategy was used by the 10 subjects. The total of the tallies for a given strategy was then divided by the total number of responses (960). The
result was expressed as a percentage and reflected the amount of times a particular reasoning strategy was used. The eight strategies were then arranged in order of response frequencies.

The three strategies preferred above all the others by the 10 subjects were Unitary Focus (29%), Literal (26%), and Inference (20%). Inference-Not Implied was used for 6% of the total responses and Personal Schema was used for 5% of the responses. The strategy of Incorrect Recall was used for 2% of the responses, while the strategies of Elimination and Definition were each used for less than .5% of the 960 responses. Eleven percent of the responses were considered to be Unclassified Source. This information can be found in Table 2 on page 53.

Unitary Focus, which was used more than any other strategy, is a reasoning strategy that may produce a correct response in many instances. For a student to reject an answer choice because nothing is said in the passage about the choice is a legitimate response. However, many of the responses of these remedial students which were classified as Unitary Focus were incorrect because the student ignored synonyms given in the choice of words found in the actual passage. For example, the choice word of small was not found in the passage, but the synonym of little was used. "No, it doesn't say anything about small in the story," was an inappropriate response. In other instances, the subject
Table 2
Strategies Most Frequently Used
By Subjects for All Responses

<table>
<thead>
<tr>
<th>Reasoning Strategy</th>
<th>Percent of Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary Focus (UF)</td>
<td>29%</td>
</tr>
<tr>
<td>Literal (LIT)</td>
<td>26%</td>
</tr>
<tr>
<td>Inference (INF)</td>
<td>20%</td>
</tr>
<tr>
<td>Inference-Not Implied (NI)</td>
<td>6%</td>
</tr>
<tr>
<td>Personal Schema (PS)</td>
<td>5%</td>
</tr>
<tr>
<td>Incorrect Recall (IR)</td>
<td>2%</td>
</tr>
<tr>
<td>Definition (DEF)</td>
<td>0%*</td>
</tr>
<tr>
<td>Elimination (ELM)</td>
<td>0%*</td>
</tr>
<tr>
<td>Unclassified Source</td>
<td></td>
</tr>
<tr>
<td>Statement (S)</td>
<td>9%</td>
</tr>
<tr>
<td>Misunderstood Question</td>
<td>1%</td>
</tr>
<tr>
<td>No Response</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note. Percentages rounded to nearest whole.

*Less than .5%.

apparently disregarded what was asked in the question and merely focused on the choice word that could be found in the passage. Several subjects responded to all four choices of a question with the strategy of Unitary Focus and then were forced to make a selection for the final answer.
Furthermore, the data which shows Unitary Focus to be the most used reasoning strategy of these remedial students, tends to indicate that reading has very little to do with remedial students personally. It appears that these students do not expect many of the answers to make sense and are willing to respond to questions without considering if the responses correspond with their own personal experiences. Anderson and Ortony (1975) maintain that comprehension must go beyond the context of a passage and must involve the reader's knowledge of the world. When using the strategy of Unitary Focus, the subjects did not integrate their own experiences with the data from the passage, but seemed to divorce themselves personally from the act of reading.

A conclusion of this study is that the students' use of the reasoning strategy of Unitary Focus above all the other strategies tends to suggest that these remedial students are often willing to sacrifice understanding by focusing on a specific word in the question or choice and developing an answer to a question based on the presence or absence of that word in the actual passage. The requirement of an answer to a question appears to be more important to the student than understanding the passage.

It can be inferred from the data indicating the reasoning strategies most frequently used by remedial students that these students do use some appropriate reasoning strategies when responding to prose discourse. The second most
frequently used strategy, Literal, accounted for 26% of all the responses while the third strategy preference, Inference, was used for 20% of the 960 responses. Because the passages used in the study were taken from a test designed to determine comprehension ability, all of the items could have been answered by the use of the two reasoning strategies that were designated Literal and Inference. The fact that these two strategies were used for just 26% (Literal) and 20% (Inference) would tend to indicate that although the subjects were able to use the strategies of Literal and Inference, they do not use them as often as necessary. Therefore, another conclusion of this study is that remedial students do have an understanding of two useful reasoning strategies, Literal and Inference; however, remedial students do not use these strategies as often as necessary for effective reasoning.

One further observation can be made from the data on preferred strategies of remedial students. Although the ten subjects used a total of eight strategies, only three of these strategies, Unitary Focus, Literal, and Inference were used with any amount of frequency. These three preferred strategies were used for 75% of the responses. In other words, 720 of the 960 responses were classified as either Unitary Focus, Literal, or Inference. The students used one of the remaining five reasoning strategies when answering 25% of the total responses. Students who are severely disabled in reading appear to be very limited in the number of
reasoning strategies that they use frequently and tend to use three strategies for three out of every four responses.

Therefore, it can be concluded that students who are severely disabled in reading are very limited in the variability of the reasoning strategies used by them while attempting to respond to questions following prose discourse.

Success of Reasoning Strategies

Another research question of this study was the success (i.e., number of correct responses) achieved by remedial readers when applying the identified reasoning strategies. The subjects answered 171 of the 240 questions correctly. Only the response given to the correct answer choice for each question was considered for analysis regardless of whether the response was correct or incorrect. This procedure narrowed the focus to the most relevant aspects of the responses. Thus, the 960 protocols were limited to the 240 responses to the correct answer choice for each question.

Each response to the correct answer was tallied under the appropriated reasoning strategy, noting if the use of the strategy produced a correct or incorrect response. The correct and incorrect responses for each strategy were then totaled and the percentage of the times each strategy produced a correct or incorrect response for the subject was recorded.
The use of the strategies of Personal Schema and of Elimination produced a correct answer each time one of these strategies was used. The use of the strategy of Inference gave a correct response for 82% of the times it was used. The use of the strategy of Literal produced a correct response 79% of the times it was used and the use of Incorrect Recall proved to be correct for 63% of the times it was applied. The use of Unitary Focus had a success rate of 40%, and the use of the strategies of Definition and Inference gave no correct responses. The use of the Unclassified Sources of Statement and Misunderstood Question was successful for 83% and 33%, respectively, for the times they were used. This information can be found in Table 3 on page 58.

The results of this portion of the study indicate that the students obtained a correct answer each time they applied the strategies of Elimination and Personal Schema. However, since the strategy of Elimination was applied to just one of the correct answers, no conclusions can be made other than the observation that Elimination is a strategy seldom used by remedial students.

The students applied the strategy of Personal Schema when responding to seven of the correct answer choices and all seven responses were the correct answer. This success tends to suggest that when the reader uses his or her own knowledge while comprehending a passage, the degree of success can be high. However, as discussed in the section on
Table 3

Percentages of Correct Responses Produced By Application of Reasoning Strategies

<table>
<thead>
<tr>
<th>Reasoning Strategy</th>
<th>Percentages of Correct Responses Produced when Strategy was Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary Focus</td>
<td>40%</td>
</tr>
<tr>
<td>Literal</td>
<td>79%</td>
</tr>
<tr>
<td>Incorrect Recall</td>
<td>63%</td>
</tr>
<tr>
<td>Inference</td>
<td>82%</td>
</tr>
<tr>
<td>Elimination</td>
<td>100%</td>
</tr>
<tr>
<td>Definition</td>
<td>0%</td>
</tr>
<tr>
<td>Inference-Not Implied</td>
<td>0%</td>
</tr>
<tr>
<td>Personal Schema</td>
<td>100%</td>
</tr>
<tr>
<td>Unclassified Source</td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>83%</td>
</tr>
<tr>
<td>No Response</td>
<td>0%</td>
</tr>
<tr>
<td>Misunderstood Question</td>
<td>33%</td>
</tr>
</tbody>
</table>

Note. Percentages rounded to nearest whole.

preferred strategies, the students applied the strategy of Personal Schema infrequently.

The use of the strategy of Unitary Focus, which was the most frequently used strategy, led to a correct answer only 40% of the times it was used. This lack of success is an indication that the remedial students often used this strategy inappropriately.
However, when the students applied the second most used strategy of Literal, they were successful 79% of the time. When the students applied the third most preferred strategy of Inference, they were successful 82% of the time. The students applied the strategies of Literal and Inference for a total of 46% of the 960 responses. The data indicate that the students are successful four out of five times when answering questions following prose discourse when applying the reasoning strategy of Literal and Inference.

Therefore, it can be concluded that, generally, remedial students are able to use the reasoning strategies of Literal and Inference in order to produce correct answers.

The data concerning the success of the various reasoning strategies suggest that the students often guess when answering questions which follow prose discourse. The use of the two strategies of Incorrect Recall and Misunderstood Question should lead to incorrect answers each time these strategies were used. However, the use of the strategy of Incorrect Recall produced a correct answer to the question 63% of the time; the use of the Unclassified Source/Misunderstood Question produced a correct answer to the question 33% of the time. Therefore, it can be inferred that these remedial students often guessed which answer was best.

The use of Statement provided correct answers for 83% of the 18 times this strategy was used. Responses were
classified Unclassified Source/Statement when the student responded to a choice by saying, "No, it's not that one," or "Yes, that's the one." The 83% correct responses when this strategy was used tends to indicate that the students were using some strategy; however, the information provided in the protocol is too limited for a definite conclusion to be reached. Therefore, no conclusions are formed from this portion of the data.

**Strategies Used with Narrative And Expository Passages**

Another purpose of this study was to describe the reasoning strategies used by remedial students when responding to questions following both narrative and expository prose. In order to keep the data base manageable, only the responses for the correct answers to the questions were used for this portion of the study. The passages were labeled narrative or expository (six of each) and tallies were recorded of the strategy used when responding to the correct answer choice. The percentage of the times a given strategy was used was found by dividing the number of times a strategy was used by the total possible number of responses (120).

When answering questions which referred to narrative passages, the subjects preferred the strategies of Inference (37%), Literal (34%), and Unitary Focus (16%). These three strategies were used for 87% of the responses to questions following narrative prose. The subjects used the strategies
of Incorrect Recall for 4% of the questions following narrative passages and Inference-Not Implied for 1%. The strategies of Elimination, Definition, and Personal Schema were not used by the subjects when responding to questions following the narrative passages. Nine percent of the responses to narrative prose were classified as Unclassified Source.

When answering questions following expository prose the students preferred the strategies of Inference (33%), Literal (24%), and Unitary Focus (22%). These are the same three strategies used most often by the students when responding to questions following narrative discourse. When responding to questions following expository prose, the subjects used these three strategies for 79% of the total responses to questions. The remaining responses to the questions following the expository passages were divided among the strategies of Personal Schema (6%), Incorrect Recall (3%), Inference-Not Implied (2%), and Elimination (1%). Ten percent of the responses were considered to be Unclassified Source. These data are reported in Table 4 on page 62.

An examination of the data concerning the strategies used by remedial students when responding to questions following narrative and expository prose suggests that remedial reading students tend to use the same strategies for both narrative and expository prose. For both types of discourse, when the responses to the correct choice were
Table 4

Percentages of Strategies Used when Responding To Questions Following Narrative And Expository Passages

<table>
<thead>
<tr>
<th>Reasoning Strategy</th>
<th>Narrative</th>
<th>Expository</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary Focus</td>
<td>16%</td>
<td>22%</td>
</tr>
<tr>
<td>Literal</td>
<td>34%</td>
<td>24%</td>
</tr>
<tr>
<td>Incorrect Recall</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Inference</td>
<td>37%</td>
<td>33%</td>
</tr>
<tr>
<td>Elimination</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Definition</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Inference-Not Implied</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Personal Schema</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Unclassified Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>No Response</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Misunderstood Question</td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note. Percentages rounded to nearest whole.

considered, the preferred strategies used by the subjects were Inference, Literal, and Unitary Focus. Inference was used more than any other strategy for the two types of prose.

However, for narrative prose, a higher percentage (34%) of the responses were attributed to the use of the strategy of Literal as compared to the 24% used when responding to questions following expository prose. Evidently, remedial
students find it easier to remember details found in narrative prose than to recall information explicitly stated in expository prose.

The subjects used the strategy of Unitary Focus somewhat more (22%) when responding to questions following expository prose than when responding to questions following narrative prose (16%).

The use of the three strategies of Inference, Literal, and Unitary Focus accounted for 87% of the responses to questions following narrative prose and for 79% of the responses to expository prose. The data indicate that remedial students vary little in the strategies used when responding to questions following both narrative and expository prose. However, the percentages indicate that details in narrative prose are recalled more readily than details in expository prose.

Therefore, it can be concluded that remedial students remember detail better in narrative passages than in expository passages, but that generally, remedial students vary little in the strategies selected when responding to the two types of passages.

**Strategies Used with Literal And Inferential Questions**

Another purpose of this study was to determine the reasoning strategies used by remedial students when answering both literal and inferential questions. Tallies were made
of the protocols for the correct response to each of the literal and inferential questions. The total responses for each reasoning strategy were then divided by the total possible responses for each question type.

When responding to literal questions the subjects applied the strategy which was classified as Literal for 45% of the responses. The subjects used the strategy of Unitary Focus for 24% of the responses, and Inference for 12%. The students used Incorrect Recall for 5% of the responses and Inference-Not Implied for 1% of the responses. The subjects did not use the strategies of Elimination, Definition, and Personal Schema when responding to literal questions. The subjects responded to the remaining questions through the Unclassified Sources of Statement (9%), Misunderstood Question (2%), and No Response (1%).

When responding to inferential questions, the subjects applied the strategy of Inference for 67% of the responses. The subjects used the strategy of Unitary Focus for 11% of the responses and the strategy of Literal and Personal Schema for 7% each. The students used the strategies of Incorrect Recall for 2% of the responses, Elimination for 1%, and Inference-Not Implied for 1% of the responses. The subjects did not use the strategies of Definition when responding to inferential questions. The subjects responded to the remaining questions by using the Unclassified Sources of
Statement for 5% of the responses. This information can be found in Table 5 below.

Table 5
Percentages of Strategies Used when Answering Literal and Inferential Questions

<table>
<thead>
<tr>
<th>Reasoning Strategy</th>
<th>Literal</th>
<th>Inferential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary Focus</td>
<td>24%</td>
<td>11%</td>
</tr>
<tr>
<td>Literal</td>
<td>45%</td>
<td>7%</td>
</tr>
<tr>
<td>Incorrect Recall</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Inference</td>
<td>12%</td>
<td>67%</td>
</tr>
<tr>
<td>Elimination</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Definition</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Inference-Not Implied</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Personal Schema</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>Unclassified Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>No Response</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Misunderstood Question</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note. Percentages rounded to nearest whole.

The data of the strategies used by remedial reading students when responding to literal and inferential questions indicate that there is a relationship between the strategy used and the type of question asked. The students used the strategy of Literal most frequently when answering literal
questions and chose the strategy of Inference most frequently when responding to inferential questions. However, when responding to literal questions the students used the strategy of Inference for 12% of the responses even though the correct answer was explicitly stated in the passage. Making an inference when the information is explicitly stated in the passage is an inappropriate strategy. Too, the students used the strategy of Unitary Focus for 24% of the responses to literal questions and for 11% of the responses to inferential questions. Merely noting the absence or presence of a choice word in the passage is obviously not the most appropriate strategy for responding to a question that requires that a subject make an inference from information provided in the passage.

It would have been possible for the students to answer all of the literal questions by using the strategy of Literal and to answer all of the inferential questions by using the reasoning strategy of Inference. The students did use the reasoning strategy of Literal more frequently than any other strategy when responding to literal questions. They did use the reasoning strategy of Inference more frequently than any other strategy when responding to inferential questions. However, the students were not consistent in their use of the most appropriate strategy with the corresponding question type.
Therefore, it can be concluded that although remedial students do use the strategy of Literal more than any other strategy with literal questions and the strategy of Inference more than any other strategy with inferential questions, the students are not consistent in matching the appropriate strategy with the corresponding question type.

**Strategy Preferences of Individual Students**

The final purpose of this study was to determine the strategy preferences of each individual student used in the study. The tallied results of the strategies used for the 96 protocols for each student were used for this portion of the study in order to determine the frequency of the use of the eight identified strategies by each student. The percentage of responses that were classified as a specific strategy was found by dividing the number of times a student used a specific strategy by the total possible responses (96). The strategies used by each subject are given and discussed below. Possible implications for individualized instruction are also discussed.

**Fred**

Fred, who answered 50% of the questions correctly, used the strategy of Unitary Focus for 85% of his responses. He gave an Expanded Explanation for just 14% of the responses (5% Literal, 5% Inference, 1% Incorrect Recall, and 3%
Inference-Not Implied. Fred had just one response (1%) that was classified as Unclassified Source.

Apparently Fred seldom looks beyond a choice word and the absence or presence of that word in the passage when answering questions concerning prose discourse and fails to gain much meaning from the use of that word in the passage. This failure to make a judgment of the use of a word in a passage is what Thorndike (1917) called the vice of the poor reader. Thorndike maintained that the poor reader says the words to himself without actively making judgments concerning what the words reveal. Thorndike further suggested that a student who tends to isolate one word needs less oral reading and more silent reading in order to overcome this handicap. However, this student was 100% successful when he used the strategy of Inference and was 75% correct when using the strategy Literal. Fred could use instruction which would guide him in finding details and in making inferences.

Rod

Rod, who answered 67% of the questions correctly, used the strategy of Literal for 30% of his responses. He used the strategy of Inference for 26% of the responses, Unitary Focus for 22%, Incorrect Recall for 11%, Personal Schema for 4%, and Inference-Not Implied for 1% of the responses. The remaining 5% of Rod's responses were of Unclassified Source.

An examination of the strategies used by Rod gives an indication of why this student answered 33% of the questions
incorrectly. Although the subjects were permitted to look back at the passages, this subject relied on his memory and appeared to have difficulty remembering literal facts found in the passage as indicated by the use of the strategy of Incorrect Recall for 11% of the responses. Even when he used the strategy of Literal his success was only 57%. However, when using the strategy of Inference he was correct for 75% of the times this strategy was used. These data would tend to indicate that Rod needs assistance in remembering details. Merely being encouraged to reread may also prove helpful.

Don

Don, who answered 75% of the questions correctly, used the strategy of Inference for 29% of his responses. He used Literal for 26%, and Unitary Focus for 24% of the responses. Don also used the strategies of Personal Schema (11%), Inference-Not Implied (3%), Definitions (2%), and Incorrect Recall (1%). Three percent of Don's responses were of an Unclassified Source.

Although Don used seven of the eight identified strategies, he was able to answer just three out of every four questions correctly. Only the use of four of the strategies, Unitary Focus, Literal, Inference, and Personal Schema provided correct answers for Don. Instruction which would build on the success of these four strategies should prove helpful to Don.
Mike

Mike, who answered 96% of the questions correctly, used the strategy of Literal for 50% of his responses. His other choices were the strategies of Inference (21%), Unitary Focus (13%), Personal Schema (11%), and Inference-Not Implied (1%). Mike stated that he did not understand one of the questions so the four responses to that question were classified as Unclassified Source. This is the only question Mike answered incorrectly.

Mike was the only student who answered over 80% of the questions correctly. He demonstrated his ability to use the strategy of Unitary Focus effectively. Although he chose this strategy for 13% of his responses, the use of this strategy did not produce any incorrect responses. His use of the strategies of Literal, Inference, and Personal Schema all produced correct responses to the questions. These data tend to indicate that Mike apparently has reasoning strategies that he is able to use effectively, at least on the level of the passages used for this study.

Alan

Alan, who answered 75% of the questions correctly, used the strategy of Unitary Focus for 50% of his responses. Only 18% of Alan's responses could be classified as Expanded Explanation (6% Literal, 11% Inference, and 1% Incorrect Recall). He used the strategy of Personal Schema for 2% of
his responses, and the remaining 28% were classified as Unclassified Source.

Alan's use of the strategies of Literal and Inference provided correct responses each time these strategies were applied to the correct answer choice, and the use of Unitary Focus produced one correct response. His use of the strategy of Unitary Focus for half of the questions tends to suggest that Alan, like Fred, needs assistance in relating isolated words to the rest of the text. The fact that he used the strategy of Literal for just 6% of the total responses could be an indication of his need for instruction that would help him in answering literal questions.

Clara

Clara, who answered 63% of the questions correctly, preferred the strategy of Inference-Not Implied for 29% of the responses. Her other choices were Literal (28%), Inference (22%), Personal Schema (11%), and Incorrect Recall (5%). Four percent of her responses were Unclassified Source.

Clara was the only one of the ten subjects who did not use the strategy of Unitary Focus. Instead, she tended to enlarge and expand the information provided in the passage and frequently added information that was not given or implied in the passage. Although her expanded explanations were often elaborate and creative, the use of this strategy
did not provide her with any correct responses. However, the use of both the strategies of Literal and Inference enabled her to answer at least three out of every four of the questions when she used one of these strategies. It would seem that Clara needs experiences which would enable her to give an explanation of her responses to both literal and inferential questions. Too, her creativity and imagination could be channeled into creative writing experiences.

**Marie**

Marie, who answered 67% of the questions correctly, used both the strategies of Unitary Focus and Literal for 38% each of the total responses. She also used the strategies of Inference (10%), Inference-Not Implied (5%), and Incorrect Recall (1%). Six percent of her responses were classified as Unclassified Source.

Although Marie answered six questions correctly by using the strategy of Literal and six other questions correctly by using the strategy of Inference, she did not use either of these two strategies as often as needed to obtain more correct answers. She evidently needs experiences in reading which will help her to look beyond an isolated word to the use of the word in the passage. Too, her ability to have some success when using the strategies of Literal and Inference could be encouraged and further strengthened.
Paul

Paul, who answered 75% of the questions correctly, preferred the strategy of Inference for 38% of the responses. His other choices were Unitary Focus (27%), Literal (5%), Inference-Not Implied (4%), and Personal Schema (4%). Twenty-two percent of Paul's responses were Unclassified Source.

Although over half of the questions could be answered by quoting directly from the passage (the strategy of Literal), Paul applied this strategy for just 5% of his responses. Instruction which would encourage him to find the section of the passage which answers a specific question should be helpful to him in improving his comprehension of a passage.

Donna

Donna, who answered 79% of the questions correctly, preferred the strategy of Literal for 34% of her responses to the questions. She also used the strategies of Unitary Focus (21%), Inference (17%), Inference-Not Implied (2%), Incorrect Recall (1%), Definition (1%), Elimination (1%), and Personal Schema (1%). Twenty-two percent of her responses were Unclassified Source.

Donna was the only subject who used all eight of the identified strategies. However, the use of only four of the classified strategies, Unitary Focus, Literal, Elimination, and Inference, produced any correct answers for her. It would
appear that Donna could use some additional instruction in how to use more effectively the strategies that are already useful to her.

**Ray**

Ray, who answered 71% of the questions correctly, preferred the strategy of Literal for 31% of his responses. He also used the strategies of Inference (21%), Unitary Focus (11%), Inference-Not Implied (9%), Personal Schema (5%), and Incorrect Recall (3%). Nineteen percent of his responses were classified as Unclassified Source.

Ray was able to answer the questions correctly by using the strategies of Literal, Inference, Incorrect Recall, and Personal Schema. Ray evidently needs instruction that would help him to be more successful when using the strategies that he already has a degree of success when using. Table 6 lists the strategies used by the subjects.

**Discussion**

These data concerning the strategy preferences of the individual subjects indicate that remedial students do show preferences in the strategies that they use when comprehending prose discourse, but that the use of these strategies varies greatly from one individual to another. Therefore, the real value in knowing the preferences of an individual student would be in the understanding gained by the
instructor. This understanding could lead to more effective instruction for remedial students.

Table 6
Reasoning Strategies Used By Individual Subjects

<table>
<thead>
<tr>
<th>Reasoning Strategy</th>
<th>Fred</th>
<th>Rod</th>
<th>Don</th>
<th>Mike</th>
<th>Alan</th>
<th>Clara</th>
<th>Marie</th>
<th>Paul</th>
<th>Donna</th>
<th>Ray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary Focus</td>
<td>85%</td>
<td>22%</td>
<td>24%</td>
<td>13%</td>
<td>50%</td>
<td>0%</td>
<td>38%</td>
<td>27%</td>
<td>21%</td>
<td>11%</td>
</tr>
<tr>
<td>Literal</td>
<td>5</td>
<td>30</td>
<td>26</td>
<td>50</td>
<td>6</td>
<td>28</td>
<td>38</td>
<td>5</td>
<td>34</td>
<td>31</td>
</tr>
<tr>
<td>Incorrect Recall</td>
<td>1</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Inference</td>
<td>5</td>
<td>26</td>
<td>29</td>
<td>21</td>
<td>11</td>
<td>22</td>
<td>10</td>
<td>38</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Definition</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Elimination</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Inference-Not Implied</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>29</td>
<td>5</td>
<td>4</td>
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<td>9</td>
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<tr>
<td>Personal Schema</td>
<td>0</td>
<td>4</td>
<td>11</td>
<td>11</td>
<td>2</td>
<td>11</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Unclassified Source</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>6</td>
<td>22</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>No Response</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Misunderstood Question</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Percentage Correct</td>
<td>50</td>
<td>67</td>
<td>75</td>
<td>96</td>
<td>75</td>
<td>63</td>
<td>67</td>
<td>75</td>
<td>79</td>
<td>71</td>
</tr>
</tbody>
</table>

Note: Percentages rounded to nearest whole.
A better understanding of the reasoning strategies of remedial students and particularly of each individual student has strong implications for teaching. For instance, the students used in this study need experiences which will help them to go beyond focusing on a single word in a passage. Although many of the students demonstrated an ability to use literal information and to make inferences, much practice is needed in order to determine when it is best to use a strategy. Kavale and Schreiner (1979) suggest that strategy usage might best be taught by the teacher serving as a model and answering the questions with an appropriate reasoning strategy.

Furthermore, because each of the subjects demonstrated different weaknesses and strengths in the use of reasoning strategies, it is quite possible that for seventh- and eighth-grade students the program should be individualized. For example, the student who adds elaborate explanations to information not given or implied in the passage requires different assistance than the student who mainly uses Unitary Focus.

It can be concluded that the use of the identified reasoning strategies varies greatly from one individual student to another. This conclusion has valuable educational implications for developing programs for severely disabled remedial reading students.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Specific Purposes of the Study

The major purpose of this study was to identify the reasoning strategies used by seventh- and eighth-grade severely disabled remedial reading students when attempting to comprehend expository and narrative prose. Answers to several research questions were sought:

1. Do remedial students have a preference for the same general types of reasoning strategies?

2. Does the use of some strategies produce more correct responses than the use of other strategies?

3. Are the strategies used by remedial students in comprehending narrative prose the same as those used for comprehending expository prose?

4. Are particular reasoning strategies associated with inferential and with literal questions?

5. Does an individual student tend to prefer a particular strategy?
Specific Procedures for the Collection of Data

The methodology. Protocol analysis, a technique developed by Newell and Simon (1972), was the method adopted to collect and analyze the data for this descriptive study. In protocol analysis, the subjects are asked to verbalize their thoughts as they solve a problem. The use of this technique in the field of reading asks the subject to read a short passage and the question that follows the passage and to think out loud why each response is accepted or rejected. These protocols are recorded and later transcribed for further analysis.

Subjects. The subjects in this study were 10 seventh- or eighth-grade students, attending the remedial reading laboratory of a middle school (grades seven and eight) in a large metropolitan area. All of the students, who were randomly selected, were reading on 2.0 to 4.0 grade level.

Material. Twelve selections from the Gates-MacGinitie Test, Level C, Form 1, containing both short passages and questions were used. The passages were identified as either expository or narrative, and the questions were determined to be either literal or inferential.

Collection of the data. When it was felt that the subject understood the procedure, each subject was asked to read orally and then silently each of the passages. After
each passage, the subject read and responded to two questions by reading the choices aloud and telling why a choice was rejected or accepted. The same procedure was used for all 12 passages. The entire session for each of the 10 subjects was recorded and later transcribed.

Analysis of Data

Each of the 960 protocols were placed on separate cards and carefully read and sorted by placing similar responses together. After numerous readings and sortings, eight reasoning strategies were identified and operational definitions were written for each strategy. In order to answer the specific questions of this study, all of the protocols were tallied in a chart which showed the frequency distribution of the use of the eight strategies by the 10 subjects. A tally was made of the protocols of the correct response to each question, and a record was made of the degree of success produced by each of the reasoning strategies. Tallies were made showing the strategies used when answering narrative and expository prose, and inferential and literal questions. Finally, the strategies of each individual student were examined in order to ascertain the strategy preferences of each participant in the study.

Results

Analysis and identification of strategies. The result of the analysis of the protocols was the identification of
eight reasoning strategies and three types of responses that were classified as Unclassified Source. These eight strategies were used by the 10 severely disabled remedial reading students when responding to prose discourse. The eight identified reasoning strategies and a brief description of each are given below.

1. **Personal Schema.** A response was classified Personal Schema when it could be inferred that the subject's response relied on knowledge not presented in the passage.

2. **Unitary Focus.** A response was classified Unitary Focus when the student responded by stating that nothing or something was said about the choice in the passage.

3. **Literal.** A response was classified Literal when the student accepted or rejected a choice by restating literal information explicitly stated in the passage.

4. **Incorrect Recall.** A response was classified Incorrect Recall when the student's response was based on incorrect or irrelevant recall.

5. **Inference.** A response was classified as Inference when the subject used information given in the passage in order to make a logical inference that would explain why a choice was accepted or rejected.

6. **Definition.** A response was classified as Definition when the student's acceptance or rejection of a choice was an explanation of what the choice word meant.
7. **Elimination.** A response was classified as Elimination when the student stated, "I choose this one because it is not any of the other choices.

8. **Inference-Not Implied.** A response was classified as Inference-Not Implied when the student added information not given or implied in the passage, or jumped to unwarranted conclusions.

**Preferences of reasoning strategies.** A study of the strategies most used by the subjects indicated that the strategies of Unitary Focus, Literal, and Inference were the three most preferred reasoning strategies of the subjects. In addition, only 5% of the responses were classified as Passage Independent. The majority of the responses were directly based on the passage and were, therefore, classified as Passage Dependent. Finally, the preferred strategies of Unitary Focus, Literal, and Inference were the only strategies which were used with any amount of frequency.

**Success of reasoning strategies.** Although the use of Elimination and Personal Schema produced a correct response each time they were used by a subject when responding to a correct answer choice, both reasoning strategies were used infrequently. However, the use of the three most preferred strategies provided a correct answer for 71% of the responses for which one of these three strategies was used. The use of the strategies of Literal and Inference appear to produce more correct answers than any of the other strategies.
Strategies used in narrative and expository passages. When answering questions which referred to narrative passages, the subjects preferred the three strategies of Inference, Literal, and Unitary Focus. The subjects preferred the same three strategies when answering questions following expository prose. Inference was used more than any other reasoning strategy for both types of prose.

Strategies used with literal and inferential questions. The subjects preferred the strategy of Literal when answering literal questions and the strategy of Inference when answering inferential questions. However, the students did not use the most appropriate strategies with any consistency.

Strategy preferences of individual students. An analysis was made of the reasoning strategies used by each individual subject and implications for future instruction were given. Each subject had one or two strategies which she or he used more than any of the other strategies. The frequency use of the eight strategies varied greatly from one individual to another.

Conclusions

Several conclusions were reached from this study which identified the reasoning strategies used by severely disabled remedial reading students in the seventh and eighth grade when responding to questions following prose discourse.
As outlined in the section on limitations, due to the small sample size, all generalizations are made cautiously. The conclusions of this study are,

1. Severely disabled remedial students do use various types of reasoning strategies in order to obtain appropriate responses.

2. Remedial students are often willing to sacrifice understanding by focusing on a specific word in the question or choice and developing an answer to a question based on the presence or absence of that word in the passage.

3. Remedial students generally are able to use the reasoning strategies of Literal and Inference in order to produce correct answers.

4. Remedial students remember detail better in narrative prose than in expository prose, but, generally, remedial students vary little in the strategies selected when responding to questions following both narrative and expository prose.

5. Although remedial students do use the strategy of Literal more than any other strategy with literal questions and the strategy of Inference more than any other strategy with inferential questions, the students are not consistent in matching the appropriate strategy with the corresponding question type.

6. The use of the identified reasoning strategies varies greatly from one individual student to another.
Implications of the Study

This study, which has identified the reasoning strategies of severely disabled remedial reading students, has several implications. It has been demonstrated that it is possible to use students who are severely disabled as subjects for research in reading. The review of the literature revealed that students who are reading several years below their grade placement have seldom been used in research concerning reading. This study may encourage future researchers to use remedial subjects who are severely disabled. Only when research can discover what is actually happening in the reading process when remedial students are reading can answers be found that can aid in the instruction of the reading disabled.

This study identified the reasoning strategies of 10 individual students. A better understanding of the reasoning strategies of remedial students has strong implications for teaching. For instance, several of the students used in this study need experiences which will help them to go beyond focusing on a single word that appears or does not appear in a passage. Although many of the students demonstrated an ability to use literal information and the ability to make an inference, much practice is needed in order for the subjects to determine when it is best to use a strategy.
**Recommendations for Further Research**

This study is a beginning step in attempting to understand the thought process of remedial readers when responding to prose discourse. However, as Harris (1981) maintains, educators need to be giving more attention to what the student is thinking when she or he is reading.

Further research is needed to determine if the use of the same materials with another group of remedial students would produce similar reasoning strategies. Would the use of other types of materials produce the same or different reasoning strategies?

Can a reasoning strategy be taught? If it can, are there methods that can be shown to be successful? If reasoning strategies cannot be taught then how does one acquire a reasoning strategy? Is there a correlation between acquisition of reasoning strategies and intelligence? Are experiences in problem solving transferrable to reading comprehension? These and similar questions require further research.

**Methodological Implications**

This study has demonstrated the value of the technique of protocol analysis in descriptive research. As Simon (1971) maintained, research in reading must be concerned with the process of reading comprehension and not merely the product. This process is the mental operations that go on
inside the reader's head while comprehension is taking place. These operations are not observable, so researchers have concentrated on the product of reading comprehension rather than the process. However, protocol analysis permits the researcher to listen to what the reader is thinking as he or she is problem solving. To date, protocol analysis appears to hold the most promise for researchers who want to understand the process of reading comprehension.

The technique of protocol analysis is a time-consuming procedure. The transcribing of the recorded protocols requires both time and patience in order to obtain verbatim transcripts. The sorting, labeling, and classifying of the protocols are all lengthy operations.

Protocol analysis requires that the researcher be willing to approach the protocols with an open mind toward the outcome of the classifications. At the same time, the researcher in reading must have a solid foundation in understanding what is known about information processing.

Each study which utilizes the technique of protocol analysis has the potential of leading researchers one step closer to a better conception of the process of reading comprehension. Only when educators fully understand the process of reading can the needs of remedial reading students be truly met.
APPENDICES
APPENDIX A

Examples of Selected Test Items

Sample 1 (narrative)

In one hand Roy carried his school books. In the other hand he had a big bag of cookies for the class party. Roy was glad that he didn't have to carry anything else. It was a long walk to school.

A. Where was Roy going?
   home
   to the store (inferential)
   to the bus stop
   to school

B. This story says that there will be a
   storm
   party (literal)
   ride
   sale

Passage 1 (narrative)

Rita sat quietly on the park bench watching a squirrel that hadn't even noticed her. She could hear children playing in the distance. Suddenly a car roared up the street, and the squirrel dashed away.

A. What was Rita doing before the squirrel ran away?
   standing
   walking (literal)
   watching
   playing

B. The squirrel was scared away by
   a car
   the children (inferential)
   the street
   Rita

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1All passages are from the Gates-MacGinitie Reading Tests, Level C, Form 1. Permission for use from the Riverside Publishing Company.
Passage 4  (narrative)

Maria brought a finger painting home from school. It was full of bright colors and nice shapes.
"I like that," said her father. "May I hang it here on the wall?"
Her mother said it made her think of sunshine on a spring day.

A. How did Maria's parents feel?

sad
sleepy (inferred)
upset
pleased

B. When Maria's mother saw the painting, she thought of

nice shapes
dirty hands (literal)
hanging it up
a sunny day

Passage 5  (narrative)

Mr. Winkel lived in a little house on a hillside in old Los Angeles. A flower path led to his house. Mr. Winkel loved flowers and dogs. When stray dogs came his way, he felt sorry for them and gave them a home.

A. What did Mr. Winkel love?

flowers
cats (literal)
hills
the city

B. Mr. Winkel's house was

old
sad (literal)
small
white
Passage 7  (narrative)

Children rode their bicycles on the sidewalk to avoid the buses and cars in the street. Some boys were playing catch in the lot, laughing and yelling at each other. As it grew later, one by one the children left for home, and the lot was quiet again.

A. Where were the boys playing catch?

   in the lot
   on the sidewalk (literal)
   in the street
   on the way home

B. They left for home when

   it got late
   the bus came
   school was over (literal)
   it got late

Passage 10  (expository)

In the early days of movies, Thomas Edison had a movie studio called the Black Maria. It was a building covered with black tar paper. The sun could shine through a hole in the ceiling. To allow the best use of this light, the whole floor could be turned.

A. What was the Black Maria?

   a movie
   a camera
   a horse (literal)
   a building

B. The light came from

   a black light
   the floor (literal)
   the sun
   a movie screen
Passage 11 (expository)

The fisher is a large member of the weasel family. It is one of the fastest and boldest hunters in the Canadian forest. It often hunts the prickly porcupine. It may also attack animals bigger than itself, such as beavers or even deer.

A. This wild animal is a kind of

- bear
- weasel
- beaver
- porcupine

B. The fisher eats mostly

- meat
- berries
- fish
- insects

Passage 12 (expository)

Pepper comes from the berries of the pepper plant. The green berries turn red as they ripen and are picked just as they begin to turn. Next, the berries are boiled, and they become dark brown or black. Then they are spread out on mats to dry in the hot sun. When they are dry, the berries are ready to be ground.

A. What color are ripe pepper berries?

- green
- black
- brown
- red

B. Pepper berries are ready for grinding as soon as they are

- dried
- picked
- boiled
- ripe
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These consist of pages:

92-93
A black-haired bandit robbed the United National Bank yesterday. Several witnesses saw him as he ran through the parking lot. Use the information from their stories to decide which of the men on page 29 is the robber. Put an X on that man.

He was a rather tall man.

I saw that he had a moustache.

I noticed that his ears stuck out.

He wasn't wearing a hat.

He had a big nose.

He had little eyes.

Just before he ran around the corner, he stopped to tie his shoe.

He could run quickly because he wasn't fat.

He was wearing a short-sleeved shirt.
CATCH THE CROOK

AL
CARLOS
HANK
JACK
TONY

TOM
HAL
JIM
MAX
BUD

© THE LEARNING WORKS
APPENDIX C

Permission Letter

October 1, 1980

Dear ____________________,

______________ is one of my reading students. As a part of the work on an advanced degree in reading, I am studying the way some of my students think while taking tests. From this study I hope to find new ways of helping students improve their reading skills. ________________ has been randomly selected to take part in this study, but I need you to sign the permission slip below.

If you have any questions, just let me know and I'll call you. Thank you for your support.

Sincerely,

Jane Seibert

I, ____________________, give permission for ________ to take part in this study. I understand that his or her participation will take place during the regular reading class time and that the study will not interfere with regular class work. I also understand that no names of the students will be used in the study.

_________________________ (signature)
APPENDIX D

Demonstration Tape

The following is a verbatim transcription of the first part of the demonstration tape.

This is a demonstration of how you are to think aloud while doing these exercises. You may follow along as I do the first one which is called Sample 1. The first thing you do is read the story out loud.

In one hand Roy carried his school books. In the other hand he had a big bag of cookies for the class party. Roy was glad that he didn't have to carry anything else. It was a long walk to school.

A. Where was Roy going?

home . . . well, he may have been going home but it doesn't say anything about going home in the story.

to the store . . . I don't think he's going to the store. He may have gone to the store to get the cookies, but it doesn't say anything about it.

to the bus stop . . . I don't think he's going to the bus stop because it says that it was such a long walk to school.

to school . . . yes, I think that he was going to school because it tells that they're having a class party and that it's a long walk to school, so I choose school.


Holmes, J. A. Basic assumptions underlying the substrata-factor theory. In H. Singer and R. B. Ruddell (Eds.), *Theoretical models and processes of reading*. Newark, Del.: International Reading Association, 1976.


