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THE EFFECTS OF SELF-INSTRUCTIONAL TRAINING ON THE READING PERFORMANCE OF LEARNING DISABLED CHILDREN

The University of North Carolina at Greensboro PH.D. 1981

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THE EFFECTS OF SELF-INSTRUCTIONAL TRAINING ON THE READING PERFORMANCE OF LEARNING DISABLED CHILDREN

by

Anthony J. Cellucci

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
1981

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March 3, 1981
Date of Acceptance by Committee

November 17, 1980
Date of Final Oral Examination

Cellucci, Anthony J. The Effects of Self-Instructional Training on the Reading Performance of Learning Disabled Children. (1981) Directed by: Dr. P. S. Lawrence. Pp. 312

Considerable interest has arisen recently over the effectiveness of self-instructional training (SIT). This cognitive-behavioral procedure may be appropriate particularly for learning disabled children for whom performance deficits are often attributed to attentional difficulties. Unfortunately, existing SIT studies employing academic measures have produced inconsistent results, and have failed generally to include a direct training control so as to evaluate the specific role of self-verbalizations. Examination of the theoretical literature relating to self-instructional training revealed, moreover, several conflicting conceptual formulations regarding the possible effect of self-verbalizing on performance. Specifically, the perspectives afforded by the regulatory-mediational and impulsivity models were judged to be largely facilitative in contrast to the opposing suggestion that verbalizing might create interference as a result of limited capacity and response competition. This literature also highlighted the possible importance of age and/or competence as well as task difficulty in understanding SIT effects.

In the present study, 36 learning disabled children attending a Summer Learning Program were assigned randomly to either direct training (DT), self-instructional training

(SIT), or a comparison (C) group. The 24 experimental subjects were provided with 45 minutes of daily instruction on an attentional-reading task for 12 days. Within a token reinforcement system, the children were asked to read aloud passages at three difficulty levels, underlining repeated sounds, words, and phrases. The only difference between the direct and self-instructional methods was the inclusion in the latter of systematic training in various task-related self-statements (e.g., "Remember, look closely," "Sound it out," or "I'm doing fine"). The comparison subjects only received reading instruction as part of their regular educational program. A pre-post measurement plan, with the students blocked by reading level (grade 1.6 vs 4.0), was used to evaluate the effects of these treatments. In addition to attentional reading scores, the Spache Diagnostic Reading Scales were administered to all subjects by blind assessors.

The results indicated that DT subjects in the lower reading level group improved more than corresponding SIT and C subjects on the earlier trials of the attentional-reading task. There was also an overall increase in correctly identified phonetic sounds across all students. Among the higher-level readers, SIT subjects improved more than the DT and C groups on both the Spache word recognition and instructional reading measures. This outcome favoring the SIT group occurred even though the DT subjects had practiced reading more passages. The improvements on the Spache were found to be associated more highly with reading competence, indexed by grade level, than chronological age. It was also noteworthy that overt self-verbalization measures obtained did not correlate with improved reading; there was actually a negative correlation between self-verbalizations and phonics gains at the lower reading level.

These findings are discussed as providing some support for both facilitative and detrimental perspectives regarding the effects of self-verbalizing, and as being interpretable within the framework of stage models of reading acquisition. SIT indeed may facilitate reading, given a moderate level of competence; however, for the beginning reader, SIT may be inferior to direct training, resulting in significant task interference. Some problems in training self-instructions as well as specific strengths and limitations of the study were noted. Finally, questions raised about the mechanism(s) through which SIT effects may be mediated, along with recent related literature, were reviewed, and some future research directions outlined.

My father was born into a large Italian-American family, grandfather having emigrated to the country as a boy of twelve. Lacking a formal education, he nevertheless became a very successful manager in the cost-estimating field, as well as a sought after business speaker.

Upon the occasion of my passing dissertation orals, Dad came to visit and celebrate. He was very proud of my degree, having always shared both the accomplishments and worries of his children. Several weeks later, after an unexpected myocardial infarction, he died.

Because I am equally proud of him, his accomplishments, and the compassionate life he led, this dissertation is dedicated affectionately to his memory.

ACKNOWLEDGMENTS

A project of this nature requires the assistance, cooperation, and generosity of a large number of people. First, I would like to thank the board of the Greensboro ACLD Chapter for granting me permission to conduct the investigation and the Summer Program's regular academic teachers who were very cooperative throughout. I am indebted also to the 36 children who served as subjects without whom, of course, the evaluation would not have been possible. Linda Achey, Frieda Beamer, Carolyn Gabriel, Cindy Pruett, Larry Schlesinger, and Naomi Zigmund all acted dependably and competently as reading instructors. In addition, the following individuals and friends generously consented to assist with the testing: Virginia Achey, Isis Badawi, Jan Barrett, Mike Bowdon, Hal Feinberg, Mike Rice, Kathy Smith, Dick Spong, and Bob Zettle.

I also wish to thank the members of my graduate committee. The quality of a student's education primarily depends upon his teachers, and my experience at UNC-G was a very good one. In that regard, I would like to express my appreciation to Drs. Roberts, Shull, Smith, Soderquist, and Watson for my contact with them, and for their willingness to serve on my committee. Dr. Lawrence deserves a special note of thanks for his advising, collaborative efforts, and personal friendship.

Appreciation is expressed also to Drs. Mark and Linda Sobell for providing computer access and funds to analyze the project's data. Mrs. Elizabeth Hunt provided the needed secretarial support. Her flexibility to take on typing material at short notice and her constant good humor were invaluable.

Finally, I would like to acknowledge the more subtle but nevertheless real contribution of my family. Words alone can not express my debt to Philomena, my wife, for her friendship, help, counsel, and love over the last eight years. Similarly, my parents also deserve a special acknowledgment. They taught me to value education, influenced me to seek a career helping others, and instilled in me enough achievement motivation to complete the requirements of the doctoral degree.

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CHAPTER I

INTRODUCTION

There is a growing interest in the psychological literature in teaching basic cognitive or information-processing skills via self-instructions. In the applied or clinical area, this trend is generally called cognitive-behavior modification and, more specifically, self-instructional training (SIT). SIT essentially involves teaching children the use of task-related self-guiding speech. An overview of the SIT treatment approach with hyperactive and learning disabled children[1] has been provided by a number of recent reviews (Abikoff, 1979; Craighead, Wilcoxon-Craighead, & Meyers, 1978; Kauffman & Hallahan, 1979; Lloyd, 1980). A special issue of a new journal, Exceptional Education Quarterly, has also been devoted to the area.

Two assumptions are actually involved in this movement. The first has been referred to as the process assumption, i.e., that learning and performance deficits may best be remediated by training in some basic psychological process or processes. Succinctly stated, the idea is that children labelled hyperactive or learning disabled fail to use adaptive cognitive processing skills (e.g., memory strategies such as rehearsal) or employ maladaptive cognitive styles (e.g., impulsive conceptual tempo). Training aimed at modifying these basic cognitive skills and strategies is predicted to result in increases in efficiency on a variety of tasks, including academic ones.

There is, of course, a long and controversial history of attempts to assess and remediate other psychological (i.e., perceptual-motor and psycholinguistic) processes in the education of learning disabled children. (See Egeland and Schrimpf (1978) for an excellent summary and overview of this literature.) From a historical vantage point, then, current enthusiasm with training cognitive or information-processing skills might be viewed as simply the latest process fad. Kauffman and Hallahan (1979) argue, however, that cognitive training should be taken more seriously, because the existence and nature of the proposed deficits are more strongly supported by basic experimental findings. Specifically, learning disabled and/or hyperactive children are known to exhibit deficiencies on reaction time and vigilance tasks, to be impulsive as measured by the matching familiar figures test, to be more susceptible to within-task distractors, and to demonstrate less selective attention on incidental learning tasks. As a result, many investigators and theorists (e.g., Douglas, 1972; Dykman, Ackerman, Clements, & Peters, 1971; Keogh & Margolis, 1976b; Ross, 1976) have concluded that the performance deficits of learning disabled children are attributable to attentional difficulties.

The second assumption involved in SIT concerns the use of self-verbalizations themselves. Extrapolating from both Soviet work by Vygotsky (1962) and Luria (1961) on the verbal regulation of behavior and also, rather paradoxically, from Western studies in experimental child psychology involving the use of verbal mediators, self-instructional training has been advanced by Meichenbaum (1975, 1977) and others (e.g., Camp, Blom, Hebert, & VanDoorninck, 1977; Douglas, Parry, Marton, & Garson, 1976) as a particularly powerful method of teaching generalizable process skills. In the now classic Meichenbaum and Goodman (1971) study, it was found that impulsive children could be taught self-verbalizations and that these self-statements apparently regulated behavior, resulting in associated increases on a number of intellectual and perceptual-motor measures. Despite these encouraging initial findings, however, the efficacy of SIT in improving academic performance remains unclear. While a number of studies (Bommarito & Meichenbaum, 1975; Douglas et al., 1976; Glenwick & Barocas, 1979; Parrish & Erickson, 1978; Watson & Hall, 1977; Wozniak & Egeland, 1978) have reported at least some increase in academic achievement, other researchers have failed to find SIT effects on academic measures (Burns, 1972; Camp et al., 1977; Friedling & O'Leary, 1979; Robin, Armel, & O'Leary, 1975; Wein & Nelson, 1978).

With this general background, the proposed study attempted to tie together the psychological literature suggesting attentional difficulties in learning disabled children with the current interest in evaluating SIT. It may well be that the presence of such difficulties provides a useful criterion for deciding whether self-verbalizations will have their proposed facilitative effect on performance. The starting point for the research was actually a unique study reported by Heiman, Fischer, and Ross (1973). In this experiment, a group of reading-disabled children participating in a university reading program also received a special seven-week program aimed at increasing their attention while reading. Thirty-minute training sessions were conducted once a week in which the students read aloud several times paragraphs designed to include repeated letters, words, and word clusters. The materials were flashed on a screen, the children's task being to identify particular reading targets by signaling on a castanet. Correct identifications were reinforced as part of a token system.

The results of this brief attentional-reading program were very impressive; the experimental subjects showed over a year greater gain than controls on the Spache standardized reading test. In that these results provided clear support for the idea that supplemental attentional training (i.e., teaching process) may lead to generalized improvement in reading performance, the study seemingly warranted replication.

Assessing the impact of SIT procedures on reading was, however, the primary interest. Since the initial work of

Meichenbaum and Goodman (1971), the SIT literature has grown rapidly. Although many investigators have been primarily concerned with the effect of self-verbalizations on impulsivity and behavior problems, others have included achievement measures, often reading, in their evaluations, or even focused on academic tasks (Kauffman & Hallahan, 1979). These investigators' findings are reviewed below. For now, suffice to say, a number of cognitive-behavior outcome studies now exist, such as those by Camp et al. (1977) and Douglas et al. (1976), and they are frequently cited as evidence for the value, both behavioral and pedagogic, of self-instructions. Unfortunately, other investigators, previously noted, have failed to find SIT effects, so that there are now a number of conflicting findings in the field.

As elaborated in a later section, the attentional-reading task employed by Heiman et al. (1973) and presumably sensitive to impulsive word recognition errors, appeared well suited for discovering any positive effects from such training. Moreover, the SIT literature additionally suggested the need for a direct-training comparison condition so as to validate the specific contribution of learning to self-verbalize. The overall objective of the research project, then, was to evaluate the effectiveness of attentional training, alone and in combination with self-instructions, in improving the reading performance of learning disabled children.

In planning the evaluation, an effort was also made to relate the possible findings to conflicting theoretical formulations regarding the effect of self-verbalizations on performance. A combined regulatory-mediational model, drawing on Soviet theorists (e.g., Luria, 1961; Vygotsky, 1962) and the experimental literature relating to verbal mediation in children's learning (Flavell, Beach, & Chinsky, 1966; Stevenson, 1972), were analyzed to underline the proposed facilitative effect of self-verbalizing. On account of their significance to this literature, it was decided to examine the effects of age and/or competence, as well as task difficulty, in relation to the effectiveness of SIT. In addition, the construct of impulsive conceptual tempo (Kagan, Rosman, Day, Albert, & Phillips, 1964), prominent in the SIT area, was also described, and found to offer a slightly different prediction in regard to task difficulty. Finally, these theoretical notions were contrasted with Bloor's (1977) recent formulation, termed a limited capacity model, in which the requirement to self-verbalize is actually predicted to have detrimental effects on performance, particularly as the difficulty of the task increases. It was hoped that the research findings might better determine the relevance of these varying conceptualizations for applied self-instructional programs.

The following chapter will review in some depth the related literature in the areas of attention and self-instructions. As indicated above, the union of these individual and seemingly extensive fields provided the background and support for conducting the current evaluation project. For completeness, the first two sections will present, respectively, an overview of the research evidence suggesting attentional problems in learning disabled students and a summary and explication of the direct attentional-training studies available. Readers familiar with this literature might focus on the third section, which reviews the SIT literature itself and particularly academic findings to date. Finally, theoretical formulations presumably underlining SIT procedures and/or specifically pertaining to the effects of self-verbalizing on performance are discussed.

CHAPTER II

REVIEW OF RELATED LITERATURE

Attentional Problems in Learning Disabled Children

An overview of the construct of attention in psychology (Mostofsky, 1970) suggests at least two important points. First, the word 'attention' may possess a number of conceptually separate meanings. Examples include 'alertness,' 'sustained attention,' 'selectivity,' and 'freedom from distractability.' As different connotations are emphasized by different research paradigms (e.g., reaction time-alertness, dichotic listening-selectivity, vigilance-sustained attention, etc.), the degree of interdependence of these separate meanings is unclear. Only rarely (e.g., Posner & Boies, 1971) are distinct measures of several different aspects of attention provided.

Moreover, attention, however construed, is always inferred from performance. Following Skinner (1965, 1968), it appears practically correct and heuristic to state that by definition an organism is attending to a stimulus when that stimulus changes his behavior in some way. Although somewhat circular, such attentional responding is generally acknowledged to be important in learning (Skinner, 1968; Zeaman & House, 1963).

With this background, one might further examine the previously mentioned proposition that attentional deficits are primarily responsible for the poor academic performance of learning disabled children. The data offered take on perhaps a more persuasive character given the seeming unanimity of investigators in the field (Douglas, 1976; Dykman et al., 1971; Kauffman & Hallahan, 1979; Keogh & Margolis, 1976b; Ross, 1976). Dykman et al. (1971) postulated that learning disabilities represent a specific attentional deficit syndrome on the basis of their laboratory investigations of reaction time and conditioning in these children. The performance of learning disabled and hyperactive children was deficient on both motor impulsivity and tone discrimination tasks. When these measures, along with data from motor, language, and intelligence tests, were subjected to factor analytic procedures, a primary factor, suggesting to the investigators the inability to focus attention, was revealed. From a somewhat different experimental tradition, Douglas (1972) summarized the results of her own extensive research program involving hyperkinetic children by stating that

> one closely related group of characteristics can pretty well account for all of the deficiencies we have found. These youngsters are apparently unable to keep their own impulses under control in order to cope with situations in which care, concentrated attention, or organized planning are required. . . . This appears to be the case whether the task requires that they work with visual or auditory stimuli and it also seems to be true in the visual-motor kinesthetic spheres. . . .
>
> I have come to think of these deficiencies as the inability to 'stop, look and listen' . . . . (p. 275)

As a final example, more recently Ross (1976) similarly concluded that the available evidence supported "the notion that delayed development in the capacity to sustain selective attention creates a handicap for children required to learn such academic subject matter as reading" (p. 53).

The laboratory evidence on which such conclusions have been based essentially extends over all the research paradigms that have been used to study attention. Learning disabled subjects in comparison to control children are generally more susceptible to distractors (e.g., Elkind, Larson, & VanDoorninck, 1965; Sabatino & Ysseldyke, 1971; Zentall, Zentall, & Barack, 1978) and are characteristically more impulsive (e.g., Campbell, Douglas, & Morgenstein, 1971; Epstein, Cullinan, & Sternberg, 1977); they have also been shown to exhibit poorer performance on reaction time (e.g., Cohen & Douglas, 1972; Rourke & Czudner, 1972; Spring, Greensberg, Scott, & Hopwood, 1973), vigilance (e.g., Keogh & Margolis, 1976a; Noland & Schuldt, 1971; Sykes, Douglas, & Morgenstein, 1973), incidental learning (e.g., Mondani & Tutko, 1969; Pelham & Ross, 1977; Tarver, Hallahan, Kauffman, & Ball, 1976), and dichotic listening tasks (e.g., Obrzut, 1979; Satz, Rardin, & Ross, 1971). A number of review papers emphasizing these selected areas are available (Douglas, 1972; Epstein, Hallahan, & Kauffman, 1975; Hallahan, 1975; Satz, 1976; Tarver & Hallahan, 1974). Presently, an inclusive review is beyond the intended scope of this summary; a brief overview of characteristic studies and outcomes will be given, however, to indicate the nature and limitations of the available research findings. It will be concluded that aside from brief dichotic listening paradigms and tasks involving extraneous distractors, the bulk of the evidence (i.e., results from comparative studies using sustained attention, incidental learning, and impulsivity-scanning tasks) indeed supports an attentional-deficit hypothesis. It will also be pointed out, though, that both direct observation studies, suggesting that the majority of ld/hyperactive children's behavior is goal directed, and research findings, indicating the modifiability of attentional errors by response consequences, highlight the possible importance of motivational differences. Finally, Staat's (1975) developmental framework, conceptualizing attention as a basic behavioral repertoire, is offered as one perspective from which to view current data in the area and as providing a rationale for why training aimed at increasing attentional skills might result in a generalized increase in performance.

Comparative studies. In overviewing attentional studies relating to learning disabled children, one might begin with research on the effects of distractors. Hallahan (1975) has reviewed this area; he concluded that

> when relevant and irrelevant stimuli are present in close proximity, learning disabled children are more distracted than normals to attend to the irrelevant distractors. Those experiments employing extraneous distractors (e.g., bright flashing lights, mirrors, (etc.) . . . have not found these distractors to decrease learning disabled children's performance. (p. 213)

Several representative studies might be mentioned. Both Elkind et al. (1965) and Keogh and Margolis (1976a) have found that in comparison to normal controls, learning disabled students were less able to differentiate embedded figures. In another study, Sabatino and Ysseldyke (1971) compared readers and nonreaders on both the standard Bender visual-motor test and similarly constructed tests in which the stimulus designs were presented on extraneous backgrounds. The scores of the nonreading group differed only on the distracting forms. It seems reasonably clear, then, that the performance of learning disabled children is inferior to controls in tasks involving irrelevant surrounding background stimulation.

Similarly, within-task color distractors may interfere with the performance of these children. In an early study, Silverman, Davids, and Andrews (1963) reported that underachievers scored lower on a Stroop Color Word Test. This measure involves reading color names with the words printed in inks of various colors. Although Alwitt (1966) failed to find differences on a nonreading variation of the same test, recent studies by Zentall et al. (1978) and Zentall, Zentall, and Booth (1978) have shown color distraction effects in visual-motor and spelling tasks.

In contrast to these findings involving backgrounds and color distraction, studies employing peripheral extraneous distractors have found, as Hallahan (1975) concluded, nonsignificant results. Browning (1967) reported that flashing lights failed to affect the discrimination performance of minimally brain-damaged children. Douglas (1972) also stated that white noise did not differentially affect the performance of hyperactive children on a vigilance test.

The outcomes of dichotic listening studies also present a mixed, if not a confusing, picture (Harris, 1979). In these studies different stimuli, typically digits or nonsense syllables, are presented simultaneously to both ears of a subject through stereophonic earphones. The instructions can be to recall one or both of the stimuli. Since adults have been found to show a right ear advantage (REA) for verbal material, the task has unfortunately been interpreted as providing a measure of cerebral dominance.

The study by Satz et al. (1971) is often cited as evidence that learning disabled children show less adequate selective attention as measured in this situation. While dyslexic and control groups did not differ in total recall, older dyslexic subjects were found to have significantly less of a REA than matched controls. In reviewing the literature, however, Satz (1976) cites a stream of conflicting studies highlighting the many methodological difficulties in the area. It is noteworthy, and perhaps a bit ironic, that early on Maccoby (1967), in her developmental work on auditory selectivity, reported that good and poor readers did not appear to differ on dichotic listening measures. More recently, Hiscock, Kinsbourne, Caplon, and Swanson (1979) stated that "most hyperactive children are not deficient in performance on this task (dichotic listening), at least when it is of brief duration" (p. 31). By implication, it may be that dichotic listening studies in which learning disabled subjects exhibit inferior recall (e.g., Mercure & Warren, 1978) have involved sustained attention to a greater extent. Moreover, Obrzut (1979) has provided some data indicating that only the performance of reading-disabled students lacking phonic skills is impaired.

More compelling evidence for attentional deficits in learning disabled children is provided by reaction time and vigilance research. There is a plethora of studies demonstrating that these children perform less adequately than controls on reaction time tasks. Dykman, Walls, Suzuki, Ackerman, and Peters (1970) employed a visual reaction time task in which subjects had to press a telegraph key when a red light came on and release it when an adjacent white light appeared. Learning disabled students took significantly longer to react. Using the more standard delayed reaction time paradigm, Czudner and Rourke (1972) and Rourke and Czudner (1972) examined, respectively, the visual and auditory reaction times of minimally brain-damaged children. In both studies, the performance of younger (6 to 9 years) clinical subjects was inferior to controls; the former had difficulty particularly under irregular preparatory interval conditions.

In still another study, Spring et al. (1971) investigated the reaction time performance of good and poor readers in a task requiring same-different judgements. Subjects had to press different hand microswitches depending upon whether letters flashed on a screen matched. Poor readers started off more slowly on the initial trials, and their performance deteriorated more rapidly.

In addition to similar latency differences on a delayed reaction time task, Cohen and Douglas (1972) also reported differential changes in orienting response (OR) measures between hyperactive and normal children. Of specific importance, the controls exhibited a decrease in heart rate, but the hyperactives were generally unresponsive. This is significant in that such heart rate deceleration has been interpreted as indicative of attention (Lacey, 1967; VanHover, 1974). Moreover, unlike other autonomic findings differentiating hyperactive children, the lack of a characteristic decline in heart rate during the preparatory reaction time interval has apparently been consistently replicated (Sroufe, Sonies, West, & Wright, 1973; Zahn, Abate, Little, & Wender, 1975).

It is of interest that the attentional difficulties revealed in these studies may be less evident in tasks involving the focusing of attention for brief periods. Sykes et al. (1973) reported that hyperactive children did not differ from normal controls on a choice reaction time task involving separate trials of three or four seconds each. Perhaps more importantly, however, on measures of prolonged attention their performance was severely impaired. The hyperactive subjects were found to make fewer correct responses and more impulsive errors on both visual and auditory forms of the continuous performance test. This instrument involves responding to the letter X presented in a string of letters if and only if it is preceded by the letter A. In further support of the attentional deficit hypothesis, moreover, other studies employing this or similar measures of vigilance have generally confirmed and extended these results.

For example, Noland and Schuldt (1971) compared the performance of normal and retarded readers on a 30-minute task involving responding to brief light flashes. Although both groups showed a decrease in correct responding over time, the poor readers made more detection errors. Kirchner and Knopf (1974) demonstrated a relationship between achievement and sustained attention in a rather creative vigilance task. Subjects were shown a movie of a jet plane, and had to respond to a change in a star on the fuselage. High achievers had a significantly greater number of correct detections and fewer false positive responses.

Two additional vigilance studies might also be cited. Recently, Kupietz (1976) reported that on an auditory version of the continuous performance test, minimally brain-damaged subjects made more errors and had a greater decrement in performance than controls over time. Finally, Keogh and Margolis (1976a) found that learning disabled children made significantly more errors of both omission and commission than a sample of normally achieving peers on a paper-and-pencil number-checking task.

In summarizing work in this area, it should be mentioned as well that many of the researchers cited above, who have been investigating the attentional deficits of clinic children on reaction time and vigilance tasks, have related that stimulant drugs improve the performance of these children (Cohen, Douglas, & Morganstein, 1971; Spring et al., 1973; Sykes, Douglas, Weiss, & Minde, 1971). It has been suggested, consequently, that the clinical effectiveness of such medication rests on its attention-normalizing properties (Whalen & Henker, 1976).

Still another paradigm that has been used to study attentional difficulties in learning disabled children is that of incidental learning. Mondani and Tutko (1969) were apparently the first investigators to study the incidental learning of underachievers. They gave a personality test to both academically successful and underachieving junior high students. Throughout the test booklet were a number of incidental stimuli (e.g., an erroneous date in the corner, a line of question marks, a doodled flower, an entire page which was a different color). As predicted, the underachievers recalled significantly more of this incidental information suggesting a lack of formal attention.

Although supporting these results, most of the other research in this area has employed Hagen's central-incidental recall task (Hagen & Hale, 1973). An array of picture cards each consisting of paired animal and household objects is presented to a subject, with instructions to recall the serial position of one type of stimulus. After testing central recall, subjects are unexpectedly requested to match the irrelevant and relevant pictures as a measure of incidental learning. The age-related increase in central recall and later decrease in incidental recall on this task has been interpreted to reflect a developmental increase in selective attention.

Employing this measure, Pelham and Ross (1977) compared the performance of poor readers in the first, third, and fifth grade with control children. At all grade levels, the poor readers obtained lower scores on the central task and higher scores on the incidental task. Not all studies have found significant group differences on incidental scores, but these results are consistent with a whole series of experiments (Hallahan, Kauffman, & Ball, 1973; Tarver et al., 1976; Tarver, Hallahan, Cohen, & Kauffman, 1977), indicating that the performance of learning disabled students on this task is generally two or three years behind their expected developmental level.

Finally, some research findings in the area of conceptual tempo, noted in the introduction as prominent in the SIT literature, can also be used to support the attentional deficit notion. The disposition to reflect over alternative selections available in an uncertain situation has been postulated to be an important individual difference variable in problem solving (Kagan et al., 1964). Although reflection-impulsivity is thus actually a cognitive style measure, research recording eye movements (Drake, 1970; Zelniker, Jeffery, Ault, & Parsons, 1972) and demonstrating that impulsive children have inferior scanning strategies and attend less to the stimuli, strongly suggests that it may be profitably construed as tapping attentional processes. Messer (1976) has reviewed the extensive literature in the area, and Epstein et al. (1975) have discussed the implications of the construct of impulsivity for special education.

The task most often employed to assess impulsivity is the Matching Familiar Figures Test (MFFT). Subjects are asked to select from six similar figures the one picture that exactly matches a simultaneously presented standard. Latency of the first response and total number of errors, which are generally inversely related in school age children, are recorded. Kagan (1965) originally reported impulsivity in first-grade children was associated with reading errors in a word recognition task. Denny (1974), however, found that MFFT scores generally failed to distinguish teacher-selected good and poor readers in the second through fifth grade. The data from this study, along with that from other available research (Lesiak, 1978) suggest that in relatively normal populations impulsivity may be related to reading skills only in the early grades.

More consistent findings and an explanation of Denny's (1974) results are provided by studies involving clinical groups. Specifically, Keogh and Donlon (1972) reported that although mildly learning disabled children performed about as well on the MFFT as normative groups, severely learning disabled students had significantly shorter latencies and more errors. This relationship between learning disabilities and impulsivity has been confirmed by Epstein et al. (1977). Similarly, Campbell et al. (1971) found that MFFT latency and error scores discriminated hyperactive students from matched controls.

In summary, the diverse evidence noted above, with the exception of that from tasks involving extraneous distal distractors and brief dichotic listening, is strongly suggestive of and consistent with the notion that learning disabled children have a basic difficulty in attention. Their performance is characterized by a lack of both sustained, focused attention and selective responding to relevant stimuli. Although their average reaction times are slower, they warrant the description "impulsive" by their greater number of commission errors and their ineffective scanning. Not surprisingly, many of the various attentional measures that have been discussed are moderately correlated with one another (Douglas, 1972; Hallahan, Kauffman, & Ball, 1973; Keogh & Margolis, 1976a). The evidence is seemingly mixed as to whether these children outgrow their attentional difficulties (Czudner & Rourke, 1972; Weiss, Minde, Douglas, Werry, & Nemeth, 1971).

The motivational caveat. As persuasive as the data appear, Koppell (1979) has rightfully pointed out, however, that the conclusion that a deficit in attention causes learning disabilities is unwarranted. The attentional deficit notion actually includes a family of hypotheses (i.e., intermittent attention, impulsivity, etc.), and its supporting findings do not rule out any number of other specific deficit theories. A viable, if simplistic, alternative candidate to explain the observed decrements in performance is a motivational deficiency. The few studies that have manipulated response consequences have found effects consistent with this idea. Firestone and Douglas (1975) reported that both reinforcing and punishing social comments improved the delayed reaction time of hyperactive children. Similarly, Kupietz, Camp, and Weissman (1976) related that candy reinforcement normalized the reaction times of aggressive and previously inattentive children on an irregular preparatory interval procedure. Using the MFFT paradigm, Nelson, Finch, and Hooke (1975) found that both reinforcement and response cost increased latencies and that the latter also decreased impulsive errors. Lastly, Hallahan, Tarver, Kauffman, and

Graybeal (1978) showed an increase in the selective attention of learning disabled children on Hagen and Hale's (1973) incidental learning task under a monetary reinforcement but not under a response-cost condition. The point is clear that "differences obtained between deviant and nondeviant children may be viewed as relative differences in their motivation to attend" (Kupietz et al., 1976, p. 129).

Direct observation studies of learning disabled children provide a second caveat to the attentional-deficit hypothesis. Hallahan (1975) reported that learning disabled children, observed while doing assigned seat work, attended approximately 75% of the time to the task at hand. He remarked that in comparison to other studies, this figure did not appear to be excessively low. Discussing her own research, Douglas (1976) stated that "classroom observations show that much of their (hyperactive children's) behavior is goal directed, although their goals often are not those of the teacher" (p. 418). Also, while Bryan's (1974) controlled study did find that learning disabled children spent less time engaged in attending behavior than matched peers, he also reported substantial increases in task-oriented behavior in a special education setting as opposed to the regular classroom environment. The purported character and modifiability of the learning disabled child's attending behavior, then, also suggest motivational and environmental influences. To return to the remarks made in the beginning of this section, an operant conditioning analysis of attention (Martin & Powers, 1967) specifies that attention refers to an instrumental response. This view, moreover, is in keeping with research findings that attention in children is situation specific (Moyer & Gilmer, 1955). In short, therefore, rather than interpreting the evidence that learning disabled children exhibit attentional difficulties on a variety of tasks as indicating a neurological deficit (Dykman et al., 1971) or a maturational lag (Ross, 1976), it is suggested that such children might be more profitably considered to have failed to learn appropriate attending responses.

Staat's (1975) formulation of attention as a basic behavioral repertoire. One perspective from which to conceptualize the attentional problems of learning disabled and hyperactive children is the framework provided by Staat's model of cumulative hierarchical learning (Staats, 1971, 1975; Staats, Brewer, & Gross, 1970). Within this formulation, attention is viewed as a basic behavioral repertoire of an individual on which future learning depends. Attentional behavior is learned even as an infant focuses his/her eyes to see better or tilts his/her head to hear better. Finer skills, such as those entailed in making scanning eye movements and comparing the details of objects, provide the foundation for learning complex discriminations. Such attentional learning has consequences. A child who has not been adequately conditioned to attend when a teacher provides verbal directions will undoubtedly be exposed to a different and less effective learning environment than a child for whom such verbal stimuli have come to control attention.

The power of Staat's (1975) analysis of learning is that through the interaction of classical and instrumental conditioning, stimuli take on emotional, reinforcing, and directive properties. Motivation is, therefore, included in the account of what it is to learn a particular skill. In learning to read, for example, the letters theoretically not only direct behavior but come to be secondary reinforcers and also elicit positive emotional responses. Such learning, of course, is expected to take thousands of trials. The present point, however, is that gaps in the development of an attentional repertoire may be expected to lead to poor performance in novel learning situations (e.g., delayed reaction time, incidental learning experiments) and in the classroom. A developmental-learning formulation of attention thus provides a possible explanation of why training attention in learning disabled children might improve their academic achievement. It is supported by considerable research indicating that mental age is perhaps the single most important factor in accounting for attentional differences (Alabiso, 1972). Moreover, that needed attentional skills can be taught to hyperactive and learning disabled children has been demonstrated by a number of behavior modification studies. This research is reviewed next.

Direct Training Studies

Interestingly, there is actually a paucity of studies aimed at directly training attention in children, and almost none of these investigations has systematically assessed the impact of such training on academic performance. In his review, Alabiso (1972) commented on the recency of research efforts to modify attentional responses. Moreover, for reasons suggested below, there appears to have been somewhat of a decline in interest in this area. This section will review the available evidence that attention can be increased through direct training procedures, reaffirm the possible need for such training in addition to applying contingencies directly on academic performance, and lastly, within this context, rediscuss the significance and limitations of the reading study (Heiman et al., 1973) around which the present evaluation project was centered.

Review of existing literature. The research reported by Patterson, Jones, Whittier, and Wright (1965) apparently represents the first attempt to increase attentional responding. Their study involved a 10-year-old brain-injured youth who was extremely hyperactive and inattentive. A small radio was strapped on his back and connected to an earphone. For every 10-second interval in which designated nonattentive responses did not occur, a signal was presented indicating an earned reward. These signals, paired with such items as candy and toy soldiers, maintained the child's attention on an academic task. Classroom conditioning trials were then gradually extended from 7 to 20 minutes, with a variable interval schedule being employed in the later sessions. Importantly, observational data indicated that the effects of this procedure generalized to a period when the subject was not wearing the earphone device. In contrast, a control subject's behavior did not change. The improvements in the experimental subject were maintained over a one-month follow-up.

Quay, Sprague, Werr, and McQueen (1967) employed a similar procedure with a group of five hyperactive children. Visual orientation toward the teacher was conditioned during a story-listening lesson by equipping each child's desk with a light box and rewarding 10-second periods of attentiveness. In an initial phase, the light flashes were paired with both M & Ms and social praise; the candy and the social reinforcements were subsequently withdrawn. The results indicated a clear increase in attention during the combined primary and social reinforcement condition. After an initial drop, social reinforcement alone also maintained the behavior. The extinction condition, however, was associated with a return to baseline levels of responding.

Social reinforcement has also been found to be effective in increasing the attention span of a preschool child with attentional difficulties (Allen, Henke, Baer, & Reynolds, 1967). In a reversal design, Allen et al. (1967) used teacher attention to reduce the number of activity changes. Reinforcement was contingent upon 1 (later 2) minutes of uninterrupted play. During the reward condition the average duration per activity was reported to be twice that in the baseline stage. Parental report also suggested some generalization of the improvement to the home.

One of the more interesting studies pertaining to the training of attention was reported by Kennedy and Thompson (1967). Counseling sessions were scheduled for a first-grade boy who was inattentive in class and failed to complete assignments. Percentage of time attending was recorded by means of a stopwatch, with data being collected both during the counseling sessions and the subject's arithmetic lessons. An initial counseling procedure of having the counselor discuss with the child why it is important to attend, complete assignments, etc., was ineffective. Thereafter, in these sessions, the boy was rewarded with candy and praise for each 1 minute of attention. The observational records documented not only an increase in attending during the reward period, but also generalization to the arithmetic class. In addition, there was a marked improvement in the number of assignments completed. While it is conceivable that this gain in arithmetic represented transfer from the visual attention span training (Alabiso, 1972), the case-study nature of the report, admitting a variety of influences, unfortunately precludes any clear interpretation.

Other efforts to modify attention have involved token economies. Walker and Buckley (1968) reported that the contingent delivery of points (later exchanged for a model) increased the attending behavior of an underachieving fourth-grade boy. It is of interest that although the subject's rate of academic behavior had already been increased by reinforcement, distractability and inattention remained a problem. During baseline, attention to programmed learning materials initially occupied only 33% of a 30-minute session. There was an immediate increase in attending, however, with the introduction of reinforcement. Through training, the point consequences were administered according to a graduated scale, ranging from 1 point every 30 seconds to 20 points after a 10-minute interval. During this period, attending increased to an average of 93% of the sessions. In addition, since attention was found to decrease in a withdrawal phase, Walker and Buckley (1968) set up a generalization program in the classroom. A variable interval 30-minute schedule successfully maintained task-oriented behavior.

A token economy study by Wagner and Guyer (1971) is also cited (e.g., Lahey, 1976) in the area of attention. Students in a special school for children with learning disabilities participated in a 12-week program in which they were rewarded for consistent attending. To evaluate the program, pre- and posttreatment observations from their token cards were compared. There was a significant increase in attention, which was also reflected in behavioral ratings. However, inasmuch as the reinforcement requirement specified 15 minutes of on-task behavior, one might question the severity of the subjects' attentional difficulties, and perhaps therefore the relevance of this study for teaching basic attentional skills. The investigators also reported that the students' performance on an oral reading test was not particularly influenced by their program.

More recently, Novy, Burnett, Powers, and Sulzer-Azaroff (1973) also reported using a token reinforcement system to increase attention in a 9-year-old boy described as hyperactive and distractible. A signaling device indicated receipt of a token, with reinforcement contingent upon an unmarred 5-minute interval. A reversal design indicated a 22% increase in attending during the reward condition, with behavior in the withdrawal phase stabilizing somewhat above baseline levels. The authors recommended a succession of reinforcement and withdrawal phases, as well as the use of social reinforcement, to better maintain the behavior.

Finally, two additional studies involving more laboratory-like measures of attention should be mentioned. Alabiso (1972) cites a dissertation study by Nelson (1969) that involved training hyperactive children in the selective aspects of attention. The training task involved discriminating the characteristics of a test stimulus and determining which matched those of several other subsequently presented stimuli. The subjects were reported

> to have made gains in observing responses, canvassing the array of attentives more equally, taking into account more information before making a decision, and increasing response time. (p. 276)

Lastly, Alabiso (1975) employed token and social reinforcement to increase measures of attention span, focus, and selectivity in eight hyperactive and mentally handicapped students. Span was defined as the length of time a subject could remain seated, focus was measured by a task involving the copying of digits and symbols in correct order, and selectivity was equated with performance on two-stage discrimination problems in which the relevant dimension and cue varied over trials. Training involved gradually thinning the amount of reinforcement by shifting to more intermittent schedules; for all tasks, the training period was followed by a brief extinction condition. All three of the attention measures were found to increase, with little immediate trend toward extinction. Moreover, the attentional behavior of the subjects generalized to similar measurements in the classroom. It was suggested that special additional training under distracting conditions might further assure the maintenance of these attentional skills.

Together, these studies provide reasonably adequate and convincing evidence that attentional behavior can be taught and enhanced through the systematic use of reinforcement procedures. The majority of these studies are characterized by the careful and relatively fine-grained measurement and modification of attending in children with severe attentional problems. A number of them show what is perhaps a surprising amount of generalization to nontreatment settings; the fact that attentional responding was found to reverse in some studies suggests, however, that in this area, as in all behavioral teaching programs, it is advisable to plan explicit procedures to assure maintenance and generalization (Marholin, Siegel, & Phillips, 1976; Stokes & Baer, 1977).

Academic contingencies versus training attention directly. With the possible exception of those of Kennedy and Thompson (1967) and Wagner and Guyer (1971), the behavior modification studies reviewed above have not examined the question of transfer of the attentional skills taught and their impact on academic measures. Such data, it will be recalled, are seemingly critical to the implicit assumption (the process argument) behind the recent SIT movement. There is perhaps an understandable reason for this seeming myopia on the part of researchers in the field, and also for the noted recent reduction in published studies of the effect of training on attention. Several classic studies in the behavior modification literature have shown that behavioral contingencies do not necessarily increase the rate of correct academic responding (Ferritor, Buckholdt, Hamblin, & Smith, 1972), while academic contingencies alone will often decrease inattention and behavioral problems (Ayllon & Roberts, 1974; Kirby & Shields, 1972). It is argued that the conclusions that seem to be supported by such work have influenced the direction of the applied literature, with confusion resulting from the probably unintended equating of attentional difficulties and disruptive behavior.

In the Ferritor et al. (1972) study, tokens given for working on academic assignments, looking at the teacher when she was speaking, etc., did not increase the average number of mathematics problems the children answered correctly in a 20-minute session. The need for designing specific contingencies for increasing particular, desired target responses was therefore highlighted. However reasonable this conclusion appears, generalization of these findings to children with attentional difficulties may not be warranted. The subjects were regular elementary school children, who, while perhaps disruptive, were already fairly attentive (Hallahan & Kauffman, 1975).

The outcome of the second group of studies has no doubt fostered the assumption that rewarding the terminal response of a student in a learning situation will in itself increase the requisite attentional behavior required. Contingencies applied to arithmetic and reading performance by Kirby and Shields (1972) and Ayllon and Roberts (1974), respectively, produced collateral behavioral changes. Again, however, subjects in the study by Ayllon and Roberts (1971) were normal students who were primarily disruptive. The single case described by Kirby and Shield (1972) did, however, apparently have some attentional difficulties.

Despite these objections, the idea that attention can be increased indirectly may often be correct. Ayllon, Layman, and Kendel (1975) recently replicated their results with three hyperactive students. As token reinforcement increased first arithmetic and then reading responses, changes in activity and inattention were documented. Hallahan and Kauffman (1975) concluded, however, that while it may be unnecessary to reward attention directly in many cases, this is clearly not always or necessarily so. They pointed out that even Skinner has commented on the need to sometimes reinforce attentional responses to assure learning. In the Technology of Teaching, he states:

> Some techniques of attending to a stimulus are learned only slowly, if at all, when reinforcement is confined to the second stage (responding to it). . . . Simply reinforcing a child when he reads a text correctly may be much less effective than special contingencies which induce him to read from left to right or to read a block of words at a glance. Another way to attend to stimuli so that one may respond to them more effectively is to construct supplemental stimuli. We do this when we point to words we are reading or follow a voice in a recorded fugue by singing or beating time with it or by moving our eyes along a score. Techniques of this sort are not likely to be learned simply because behavior which presupposes them is reinforced.
>
> In short, much of the elaborate act of looking and listening cannot be taught simply by reinforcing the student when he responds in ways which show that he has previously looked and listened carefully. Direct instruction is needed. (Skinner, 1968, p. 123)

Perhaps then, the need to teach attention directly is a function of the child's behavioral repertoire and the task itself. In summary, the argument has been made that although behavior modification studies clearly show that attentional skills can be trained in attention-deficient children, this research has failed, largely because of the extrapolation of assumptions from research involving normal, disruptive children, to generate much evidence regarding academic transfer.

The significance of the Heiman et al. (1973) study. In the context of the above discussion, the Heiman et al. (1973) reading study, summarized in the introduction, would seem to acquire particular significance. Recall that in this report, reading-disabled children receiving brief supplemental attentional training increased over a year more than matched controls on a standardized reading test.

The authors of the study were, however, rightfully cautious in interpreting their findings, pointing out several methodological weaknesses. The same form of the reading test was employed for both the initial and posttest assessments, and the testors were not "blind" to the experimental conditions of the subjects. Nevertheless, the implication of the research results was that such supplemental attentional training may lead to significant, generalized improvement in reading performance, presumably by decreasing impulsive and nonselective responding.

It should be clear from this interpretation that while future improvement in the rate of learning may be expected, the immediate effects of training in attentional process skills is thought to involve performance. Teaching a learning disabled child to attend may decrease his reading "these" for "those", and perhaps even increase his success at sound blending, but clearly it will not provide him with a year of phonic skills or a new vocabulary. Surely, however, a generalized decrease in impulsive word recognition errors, mistaken letters, etc., is an interesting phenomenon itself, with significance for the remedial teaching of children.

Since the Heiman et al. (1973) report appeared seemingly unique in providing clear support for the so-called process assumption, and given that this assumption also appears to be an implicit aspect of the rationale underlying current SIT programs, a stated objective of the present research project was to attempt a systematic replication of this experiment. Performance measures during the attentional-reading training task were obtained and a transfer test included. In addition, the aforementioned problems regarding measurement were avoided, and a somewhat larger sample of learning disabled subjects was employed.

The Efficacy of Self-Instructional Training

Early literature and overview. In the late 1960's and early 1970's, several studies appeared in the literature which suggested that self-instructional training could improve the performance of impulsive and hyperactive children on perceptual-motor and cognitive tasks (i.e., Meichenbaum & Goodman, 1971; Palkes et al., 1968; Palkes, Stewart, &

Freedman, 1972). This research apparently grew out of an interest in the Soviet developmental theory of the regulatory function of speech (Luria, 1961; Vygotsky, 1962), and in related experimental work investigating the effect of speech on laboratory tasks (e.g., Bem, 1967; Meichenbaum & Goodman, 1969).

Meichenbaum and Goodman (1971) actually reported two studies. In the first study, 15 second-grade students in a remedial class were assigned either to a cognitive self-guidance treatment group, an attentional-placebo condition in which the subjects were exposed to the training materials, or a control group. Cognitive training involved four half-hour sessions over two weeks. Because this article has furnished the primary model for designing SIT programs, it is important to describe the training procedures.

First, the experimenter modeled performing a task while verbalizing aloud to himself; then, the children were asked to carry out the same task while the experimenter instructed the child. Thirdly, the subjects performed the task verbalizing aloud for themselves. Finally, these verbalizations were faded to whispers leading to eventual covert performance. The verbalizations or self-statements trained included questions and answers regarding the nature and demands of the task, self-instructions in the form of self-guidance, and also self-reinforcement and error-coping statements. A variety of sensory-motor (e.g., reproducing designs) and problem-solving (e.g., completing pictorial series, Raven matrices, etc.) tasks were employed in the training. The pre-post dependent measures, which were not directly trained, consisted of the Porteus Maze Test, Kagan's MFFT, and the picture arrangement, block design, and coding subtests of the WISC. Classroom observations of attentiveness and on-task behavior were also obtained.

The results indicated that, relative to the attention condition and control, the cognitive treatment subjects showed significantly greater improvement on the combined performance IQ measures and on the MFFT latency score. Both the attention condition and the treatment group reduced the number of errors made on the Porteus Maze Test relative to the controls. There were no significant changes on the classroom measures. The above treatment effects, however, were discernible at a one-month followup.

In their second study, Meichenbaum and Goodman (1971) examined the specific contribution of the verbalization component of SIT in modifying impulsivity. Fifteen kindergarten and first-grade children selected on the basis of an impulsive response style on the MFFT were given either a modeling treatment, modeling plus self-verbalizations, or mere practice (as in the above attentional placebo condition). Modeling included demonstrating the active use of self-verbalization as well as a strategy to be used on a picture matching test. The illustration provided by the authors is informative.

> I have to remember to go slowly to get it right. Look carefully at this one (the standards), now look at these carefully (the variants). Is this one different? Yes, it has an extra leaf. . . . Good, I'm going slow and careful. . . . (after an error) It's okay, just be careful. I should have looked more carefully. (Meichenbaum & Goodman, 1971, p. 121)

The modeling plus self-verbalization group was exposed to this same treatment with the added requirement that in practicing the items, the children were trained to talk out loud as the experimenter had done. There was only one 20-minute treatment session, followed by a MFFT posttest. The results provided impressive evidence for the additive effect of self-verbalizing. Although both treatments reduced the subjects' latencies on the MFFT, subjects in the self-verbalization group had the longest decision times, and additionally were the only subjects to reduce their error scores.

Contemporaneously with this work, Palkes and her colleagues (Palkes et al., 1968; Palkes et al., 1972) carried out several experiments demonstrating that self-instructions improved the performance of hyperactive children on the Porteus Maze Test. The total score on this measure is purported to be an estimate of general intelligence; a secondary qualitative error score provides an index of impulsivity. In the initial study (Palkes et al., 1968), 10 hyperactive boys (mean age was 9.5 years) were given special training in verbalizing self-directing commands. Special cue cards instructing the child to "stop and listen" or "look and think before I answer" were constructed and placed on the child's desk. The subjects were taught through prompts to verbalize the sayings on the cards prior to beginning any task. The training materials consisted of the MFFT, an embedded figures test, and a trail-making task, with the actual training being conducted in two 30-minute sessions. Although no practice condition was included, the treatment subjects obtained significantly higher total scores and also made fewer impulsive errors than no-treatment controls. Subsequently, Palkes et al. (1972) also reported that overt verbalizing of the commands resulted in fewer impulsive errors than silent reading of the prompt cards.

These early studies, then, suggested the efficacy of self-instructional training. In discussing their work in the context of the known attentional difficulties of impulsive children, Meichenbaum and Goodman (1975) have stated that "one can use language to significantly alter attentional processes, thinking style, and also hyperactive behavior" (p. 24). Indeed, SIT programs based on this premise now appear to be flourishing (Abikoff, 1979; Craighead et al., 1978). Self-instructional teaching procedures have been employed to decrease impulsivity (Finch, Wilkinson, Nelson, & Montgomery, 1975; Kendall & Finch, 1978), to reduce hyperactivity (Bornstein & Quevillon, 1976; Douglas et al., 1976), to increase positive social behaviors (Camp et al., 1977), and to enhance academic performance on such tasks as letter writing (Robin, Armel, & O'Leary, 1975), spelling (Parrish &

Erickson, 1978; Robertson & Keeley, 1974), mathematics (Leon & Pope, 1977; Parrish & Erickson, 1978), and, particularly, reading (Bommarito & Meichenbaum, 1975; Glenwick & Barocas, 1979; Watson & Hull, 1977).

Much of the evidence remains positive, but a number of important questions regarding transfer, the nature of academic facilitation to be expected, and the effects of the self-verbalizing component per se have been raised. This section of the chapter will provide an overview of the recent SIT literature, discuss these issues briefly, and systematically review those studies which have included academic measures. It will be concluded that evidence for transfer of training in SIT studies is still limited; therefore, academic materials need to be included in training if academic performance is a desired target of intervention. Also related to transfer, it is argued that tasks in which performance deficiencies arise from impulsivity and attentional difficulties are most likely to be affected. In keeping with this idea, the academic findings reviewed are found to be conflicting in spelling and mathematics, but surprisingly positive in the area of reading, presumably because of the influence of impulsive word recognition and other attentional errors. Finally, in summarizing, it will be pointed out, however, that current studies demonstrating facilitative SIT effects on reading measures must be considered tentative in that existing studies have failed both to include a DT control and to record the subjects' use of self-verbalizations.

Review of current studies. To begin, a study by Bornstein and Quevillon (1976) was one of the first to demonstrate the functional utility of self-instructional training in an applied setting. In a multiple baseline design, three overactive preschool boys were provided with a massed two-hour SIT session. The training materials consisted of a variety of sensorimotor and conceptual-grouping tasks adapted from several intelligence scales. The self-instructional procedures were generally modelled after Meichenbaum and Goodman (1971), but additionally included a covert rehearsal component in which the children were asked to imagine tasks assigned by their classroom teacher. The introduction of this treatment was associated with substantial increases in ontask behavior. Moreover, the gains were maintained in a series of postchecks several months after treatment. The authors attributed the remarkable stability of the obtained behavioral changes to the functioning of the preschool environment as a behavioral trap (see Baer & Wolf, 1970).

A second group of investigators (Kendall & Finch, 1976, 1978; Kendall & Wilcox, 1980) have concentrated on developing a cognitive-behavioral treatment for impulsivity. In an initial case study, Kendall and Finch (1976) found that six training sessions consisting of self-instructions and response cost procedures produced positive changes on the

MFFT and successfully reduced frequent and inappropriate shifts in behavior in a 9-year-old impulsive boy. These changes were still evident at a six-month followup.

A more systematic evaluation of these treatment procedures was subsequently undertaken by Kendall and Finch (1978). As part of the treatment plan in a residential school, the investigators offered cognitive-behavior therapy to ten emotionally disturbed children, who were also identified as impulsive. There were six 20-minute sessions. During each of these meetings, the children worked on one of six sets of materials designed to foster conceptual thinking, attention to detail, recognition of identities, sequential recognition, visual closure, and visual-motor reproduction. The actual tasks consisted of matching pictures, arranging patterns in order, connecting dots, etc., and were described as psychoeducational. The training procedures involved both modeling and, of course, having the child self-verbalize, all in the context of a response-cost token system. A group of control subjects were exposed to the same training materials and given rewards at the end of the sessions noncontingently. Not unexpectedly, the results showed that treatment subjects had significantly increased their latencies and decreased their errors on the MFFT, relative to the controls; in addition, the experimental subjects were also reportedly rated as less impulsive by their teachers at a three-month followup.

These authors interpreted the significant difference in teacher ratings of impulsivity at followup as indicating successful generalization of treatment effects to the classroom. In a critique, however, Abikoff and Ramsey (1979) have pointed out that the data analysis employed was biased in favor of the SIT subjects because of preexisting differences between the groups. Their own reanalysis, using analysis of covariance, did not support the finding of significant classroom effects. In acknowledging the difficulty, Kendall and Finch (1979b) replied that evaluating the generality of SIT effects requires further outcome data; additional data (Kendall & Wilcox, 1980) are cited in which cognitive-behavior training using interpersonal as well as educational problems did result in improvements in self-control and hyperactivity ratings.

As indicated in the introduction, several general cognitive-behavioral outcome studies (Camp et al., 1977; Douglas et al., 1976) are also prominent in the SIT literature. These studies illustrate well both the promise and the problems in this area. Douglas et al. (1976) examined the effects of a comprehensive SIT program on 18 hyperactive children. There were 24 60-minute sessions over a three-month period. Included in training was a wide range of cognitive tasks as well as academic work assigned by each student's teacher. Treatment involved modeling, self-verbalizations, and training in general task strategies. In addition, the authors reported that sometimes contingency management procedures were also employed. Evaluation took place after training and at a three-month followup. The results, although mixed, were interpreted to be generally positive. The experimental subjects evidenced significant improvement, relative to controls, on both latency and error measures of the MFFT, a story completion test, and a time measure on the Bender Gestalt Test. The Detroit Memory Test, however, failed to distinguish the groups, and errors on the Bender and the total score on the Porteus Mazes showed little or no change. Lastly, moreover, the program had no effect on teacher's ratings of classroom behavior.

In another SIT research project, Camp et al. (1977) designed the "think aloud" self-control program for use with aggressive boys in the primary grades. Twelve such subjects were given daily 30-minute training sessions in small groups for six weeks. The children were seduced into self-verbalizing via a "copy cat" game, with the specific statements trained emphasizing the answers to the following questions: (a) What is my problem? (b) What is my plan? (c) Am I using my plan? and (d) How did I do? As in the previous research by Palkes et al. (1968), pictorial cue cards were also used to prompt self-verbalizations. The training materials were varied; they included perceptual measures, auditory verbal tasks, and interpersonal problem solving. An extensive battery of perceptual, cognitive, and achievement measures was used to evaluate the program. Compared to aggressive controls, the treated subjects showed a substantial increase in time spent on the MFF Test, and differed on a MFFT impulsivity score that considered errors and latency. With the exception of the WISC mazes, however, 16 other comparisons between treated subjects and aggressive controls were nonsignificant. These comparisons involved various cognitive and achievement tests and categories of recorded private speech. Data on teacher ratings were mixed. While the treated children did not differ from the controls on teacher ratings of aggressiveness, they did show a significant increase in presocial behavior.

Some data on academic measures were also collected in the Douglas et al. (1976) and Camp et al. (1977) investigations and will be discussed below. At this point, it is also important to review several significant studies (Friedling & O'Leary, 1979; Higa, 1973) in which the authors reported failure to obtain SIT effects. Higa (1973) compared the effectiveness of SIT in modifying the impulsive behavior of 15 impulsive kindergarten children to a direct training as well as to a control condition. The MFFT and Porteus Mazes were used to measure the effects of training. Two transfer measures, the Raven Matrices and a classification test, were included to assess generalization. Two 30-minute training sessions were conducted within the context of a token reinforcement system to maintain the subjects' attention. The training materials consisted of tasks that were exemplars of the MFFT and Porteus tests. Self-instructional training involved cognitive modeling and practice on a variety of different task-relevant verbalizations; the training progressed from simple to complex tasks, with prompts for self-verbalizations gradually being faded. The direct training subjects watched the instructor model the same tasks, and during practice, they were instructed and prompted to perform the tasks carefully. In the author's own words:

> the primary difference between the programs was the target of training: the SI program trained self-instructions while the DT program trained attentional behaviors. (Higa, undated technical report, abstract)

The analyses of the results of the study questioned the specific role of self-verbalizations in indicating that, while both treatment groups improved on the training measures (i.e., fewer errors on the MFFT and Porteus Maze Test), they did not differ from one another. There were also no generalization effects.

Finally, in an attempted replication of the findings reported by Bornstein and Quevillon (1976), Friedling and O'Leary (1979) similarly related that two consecutive 40-minute SIT sessions failed to increase the on-task behavior or work quality (e.g., not skipping items) of four second- and third-grade hyperactive children. These investigators additionally controlled for teacher attention. They suggested that Bornstein and Quevillon's (1976) earlier findings may have been due to reinforced compliance with teacher instructions interacting with the younger age of the students.

Conceptual and methodological issues. Presently, then, as indicated by the preceding review of current studies, there now exist a number of mixed and conflicting findings in the field. Nevertheless, several important observations or conclusions may be drawn from the SIT literature reviewed above. First, academic data temporarily aside, the evidence for generalization of SIT effects is hardly overwhelming. In contrast to Kendall and Wilcox (1980), and reminiscent of Meichenbaum and Goodman's (1971) original results, the majority of studies have failed to find transfer to classroom behavior or hyperactivity ratings (Douglas et al., 1976; Glenwick & Barocas, in press; Moore & Cole, 1978; Parrish & Erickson, 1978). Similarly, the cognitive-training rationale notwithstanding, the assorted perceptual-motor and cognitive measures that have been employed indicate a mixed if not confusing pattern. For example, sometimes the Porteus Maze Test and select performance IQ subtests show effects (Camp et al., 1977; Glenwick & Barocas, 1979; Palkes et al., 1968), but in many other instances they do not (Douglas et al., 1976; Glenwick & Barocas, 1979; Watson & Hall, 1977). Other measures, e.g., the Peabody Picture Vocabulary Test, are reported to be consistently insensitive (Glenwick & Barocas, 1979; Robertson & Keely, 1974).

Many of these differences between various SIT studies, in what are responsive measures, are no doubt a function of the materials employed in training. Measures resembling the training tasks are typically the most affected; it would be surprising if it were otherwise. Moreover, investigators in many SIT studies have shortsightedly failed to provide separate data on training measures. Without such information, of course, it is impossible to clarify the effects SIT has had on various behavioral tasks, let alone when and to what extent it shows transfer. Also, what is generally absent from research in this area is a rationale for including specific evaluation measures; SIT is a clear casualty of the current trend toward multivariate research.

Even self-instructional researchers themselves (Kendall, 1977; Meichenbaum & Asarnow, 1979) have now concluded that generalization is a continuing problem in SIT programs. Meichenbaum and Asarnow (1979) have summarized the field as suggesting that "the evidence for treatment efficacy is promising, but the evidence for treatment generalization, especially across response modes and settings is less convincing . . ." (pp. 10-11). Given research findings to date, it would seem critical to include academic tasks in training if improved performance on such measures is the treatment goal. As in behavior modification research in general, these results also highlight again the previously noted need to design specific generalization strategies (Marholin, Siegel, & Phillips, 1976; Stokes & Baer, 1977).

A related but separate issue in the SIT literature is the nature of the performance facilitation to be expected or the task's sensitivity to self-instructional effects. While speculative, it seems reasonable to agree with others (Bornstein & Quevillon, 1976; Glenwick & Barocas, 1979) that qualitative task errors (i.e., those determined by impulsivity and attention difficulties) are more readily influenced than measures of relatively stable ability factors. This idea is supported by the MFFT data, although unfortunately Watson and Hall (1977) found no SIT effects on another attentional measure, the continuous checking task. Nevertheless, the suggestion that SIT is likely to improve achievement only in situations where attentional difficulties contribute to poor task performance is an important one. It will be discussed again later in connection with the academic data.

Another important point regarding existing SIT studies is that, for the most part, they leave unclear whether there is any specific facilitative role for self-verbalizing in training attentional and performance skills. Most SIT outcome studies have involved treatment packages including modeling and contingency systems (e.g., Douglas et al., 1976; Kendall & Finch, 1978); by design, then, they have assumed rather than demonstrated the value of self-verbalizing. In fact, while the finding that SIT is effective in modifying impulsivity as measured by the MFFT has been repeatedly replicated (Camp et al., 1977; Douglas et al., 1976; Higa, 1973; Kendall & Finch, 1978; Moore & Cole, 1978; Parrish & Erickson, 1978), the contribution and necessity of self-verbalization to these results is quite equivocal.

Several studies are relevant to this point. Finch, Wilkinson, Nelson, and Montgomery (1975) assigned 15 impulsive, emotionally disturbed boys to either cognitive training, delay training, or a control group. The delay training group had the same number of sessions, practice with the materials, etc., as the cognitive-training group, but it did not receive training in self-instructions. The results showed that, while both treatment groups increased MFFT latencies, only cognitive training resulted in a reduction in errors. Similarly, Bender (1976) compared the effects of strategy training with and without self-verbalizations on visual discrimination tasks. There were four 10- to 25-minute sessions. A significant self-verbalization effect on both error and latency scores was reported.

In contrast to these results, however, stand the outcomes of a number of other studies. For example, Cullinan, Epstein, and Silver (1977) found that in a sample of impulsive, learning disabled boys, modeling was as effective as modeling plus self-verbalizations in reducing errors on the MFFT. Neither treatment decreased latency. Also, Parrish and Erickson (1978) recently reported that while both specific scanning and self-verbalizing training significantly reduced errors on the MFFT (and tended to decrease latencies), there was no incremental treatment effect in combining self-verbalization with scanning. In contrast to Bender (1976), this study involved six 30-minute sessions. Perhaps, then, the added value of self-verbalization is quickly lost as training time increases. In any event, it appears that impulsivity as measured by the MFFT can be modified by self-verbalization or scanning training (see Messer, 1976). If this is so, the added benefit of self-verbalizing in teaching attentional skills is far from clear.

In summarizing this issue, it would seem that part of the difficulty in evaluating the contribution of self-verbalization in SIT studies involves the difference between direct training methods (i.e., modeling, instructions, reinforcement, etc.) and so-called exposure control groups. While it may be a subtle distinction to make, it is also obvious that merely exposing subjects to training tasks is not the same as teaching. If self-verbalizing truly has facilitative effects on training or transfer performance, it must be demonstrated in comparison to direct and established teaching methods. Only the study by Higa (1973), reviewed above, included this important control; and, as may be recalled, the results were disappointing.

The Higa (1973) study is an important one because it was the first study to seriously question the SIT movement. In his discussion, Higa (1973) rejected the idea that self-instructions mediate improvements in SIT programs. He reported considerable difficulty getting the children to self-verbalize (e.g., during training they had to be physically restrained at times from continuing the task prior to verbalizing), and a number of the subjects did not verbalize during the posttest.

Also relevant to the role of self-verbalizations, then, is relatedly an apparent need for SIT studies to monitor the children's speech. A record of self-instructions is necessary to document the claim that the subjects actually employ the procedures (O'Leary & Dubey, 1979), and also to relate such use to any performance gains. Although this methodological point may seem obvious, unfortunately, very few investigators have collected these data. In Higa's (1973) study, recorded self-verbalizations were largely uncorrelated with successful task performance. In addition, Camp et al. (1977) reported that their experimental subjects did not have significantly more mature or relevant speech while performing the posttests. Lastly, in an academic study described below, Robin et al. (1975) failed to find a significant correlation between the number of self-directed comments and writing performance. The contribution of self-verbalizing in SIT studies is clearly still a crucial and unresolved issue.

Academic findings. A final question raised by the SIT literature, and one of particular importance to the present review, is the extent to which SIT might enhance academic performance (Craighead et al., 1978). Fourteen studies in the SIT literature which focused on or included an academic measure were identified. They are summarized in Table 1.

Table 1

Academic Findings in SIT Studies

Reference	Subjects	Design	Training	Measures	Results
Bower (1971)	Elementary school children	Control group design	Adapted SIT to reading & math worksheets	Academic worksheets, standardized tests	Significant improvement in reading worksheets, borderline math, no change standardized measures
Burns (1972)	Elementary school children	Control group design	Attentional SIT	Math performance measure	Nonsignificant improvement
Robertson & Keeley (1974)	5 1st & 2nd grade impulsive Ss	Multiple case study	SIT & token reinforcement with classroom materials, 15 sessions over 3 weeks	WRAT reading spelling & math	Some improvement in reading & spelling at posttest and/or 4-week followup, little change in math
Wozniak & Egeland (1975)	105 2nd graders with academic problems & poor visual information processing skills	Experimental exposure & control groups	Daily (25') sessions involving information processing & SIT	Metropolitan reading test	Experimental Ss showed greater improvement than exposure & control Ss at posttest & 1 year followup
Bommarito & Meichenbaum (1975)	7th & 8th grade 'difference' readers	Control group design	6 (45') SIT sessions focusing on improving reading comprehension	Nelson reading comprehension test (posttest) Gates-McGinnite (1 month follow-up)	Significant group differences, mean change SIT group was 11.5 months, gains maintained at followup
Robin et al. (1975)	30 kindergarten Ss with letter writing deficiencies	Self-instructional direct training & control groups	20 sessions involving 14 copying trials	Training & transfer letters	SIT>DT>C Ss, no generalization to untrained letters

Table 1 (continued)

Reference	Subjects	Design	Training	Measures	Results
Douglas et al.	29 hyperactive Ss mean age of experimental group 7.9	Control group design	24 (60) sessions SIT including some academic worksheets	WRAT math Durrell oral reading test	No improvement math, posttest improvement in oral & listening communication, gains in oral reading & oral communication at 3 month followup
Leon & Pepe (1977)	24 EMR & 13 LD elementary school children	1st 7-week phase compared SIT vs traditional teaching, 2nd 7-week compared length of exposure to SIT	Daily (15') sessions of SIT using math curriculum	Key Math test	Both groups showed significant improvements, initial SIT group made greater gains on content & operations sections at 14-week followup, LD students more gains than EMR
Wein & Nelson (1977)	35 impulsive 2nd grade children	Group design: SIT, behavioral modeling, verbal modeling, instructions, & control	3 (30') sessions using math sheets	Math placement test	No treatment effects
Camp et al. (1977)	22 6-8-year-old aggressive boys	Control group design	Daily (30') sessions for 6 weeks nonacademic materials	WRAT reading & math	No effect for math, trend for reading improvement
Watson & Hall (1977)	84 4th, 5th, & 6th grade hyperactive students, some in special classes	Group design: SIT, scanning, SIT & scanning, control	6 (30') sessions using academic worksheets	Classroom quizzes	Decreases in language arts & math at posttest but math not maintained at 5-week followup; additional decreases in spell- & reading at followup

Table 1 (continued)

Reference	Subjects	Design	Training	Measures	Results
Parrish & Erickson (1978)	24 impulsive 3rd grade children	Scanning, self-verbalization, scanning & self-verbalization & control groups	Designed academic materials 6 (30') sessions	Classroom quizzes	Decrease in errors on quizzes in language arts, spelling & reading (only at 5-week followup) & math (at posttest but not at followup)
Friedling & O'Leary (1979)	8 7-8-year-old hyperactive children	Control group design	1 (90') SIT session later followed by 2 consecutive (40') sessions	Informal tests in reading & math; varied difficulty	No treatment effect reported, SIT group increased in accuracy on easy math task but effect attributed to statistical regression
Glenwick & Barocas (1979)	40 impulsive 5th & 6th grade children	Group design: SIT performed by experimenter, teacher, parents, teacher & parents, & control	8 (50') sessions including some academic materials	WRAT reading spelling & math	No effect spelling, all experimental SIT groups > controls in reading, this effect maintained 5-week followup, teacher trained groups also showed some improvement in math

It should be pointed out that the quality of controls, statistical analyses, etc., varied tremendously. Moreover, many of the investigators were not primarily interested in academic performance. Nevertheless, perhaps some useful findings may be gleaned from the table.

One of the better controlled studies was that by Robin et al. (1975), which involved teaching children printing skills; this investigation is also one of the few SIT studies to have included a direct training control. Robin et al. (1975) assigned 30 kindergarten children evidencing writing deficiencies to either SIT, direct training, or control group. The self-instructional component was modeled after that used by Meichenbaum and Goodman (1971), and occurred in 20 relatively brief sessions. Direct training subjects practiced the copying task, receiving feedback and social reinforcement for completed letters. The results indicated a slight superiority of SIT subjects over direct training on trained letters, while neither treatment showed appreciable generalization to untrained letters.

Both of these findings have generated some interesting commentary. Higa (unpublished) has argued that the greater effectiveness of the SIT group was actually due, not to the self-verbalizing component, but to the fact that the subjects were additionally exposed to a model performing the task. The implication is that when the extent of such direct training is controlled, no special value of self-instructions will be evident.

Cognitive behavior therapists and proponents of SIT have struggled to explain the lack of a generalization effect. Two explanations have been forthcoming. Kauffman and Hallahan (1979) have suggested that the subjects used by Robin et al. (1975) were not impulsive and, therefore, did not need SIT. Craighead et al. (1978) and Meichenbaum (1977) himself have focused on the task. They argue that self-instructions are only predicted to increase performance on tasks in which the child already possesses the prerequisite elementary skills. As Robin et al. (1973) noted, basic skills such as discrimination or spatial-representational abilities may be required before the guiding function of speech can facilitate letter writing performance.

A number of studies have involved mathematics. Several have employed informal arithmetic worksheets in their assessments. Parrish and Erickson (1978) reported that self-instructions (as well as scanning) decreased arithmetic quiz errors immediately after training, but this effect was not maintained at a five-week followup. Secondly, in a dissertation study cited by Kauffman and Hallahan (1979), Bower (1971) reportedly found a trend for SIT to improve performance on arithmetic worksheets, with no effect evident on a standardized test. Most recently, Friedling and O'Leary (1979) assessed the impact of SIT on the quantity and accuracy of both easy and hard arithmetic tasks. The SIT group increased in accuracy on the easy math material, but the effect was attributed to statistical regression. A more general difficulty with the use of informal worksheets is that the reliability of such measures is unknown.

Four other studies have included standardized arithmetic achievement measures in their evaluation batteries. Robertson and Keeley (1974) treated five impulsive primary-school children with self-instructions in a multiple case design. They reported no effect on mathematics performance. Watson and Hall (1977) used the mathematics subtest of the PIAT in another large SIT outcome study. Elementary school children, many of whom were in special classes, were exposed in 12 30-minute sessions to a modified version of Camp's (1977) "think aloud" program. Unfortunately, these subjects were also given relaxation training and/or EMG biofeedback, completely clouding any specific interpretation. A group receiving physical education only served as a placebo control. In any event, the children's PIAT scores were unaffected.

Glenwick and Barocas (1979) did find some improvements in mathematics. Their study compared SIT provided by the subject's parents, teachers, both parents and teachers, or an experimenter, to a control group. Impulsive fifth and sixth graders received eight 50-minute SIT sessions on a wide range of training materials, including some academic tasks. Teacher-trained groups showed gains on the WRAT arithmetic subtest. In contradiction, however, Douglas et al.

(1976), in the study reviewed in the beginning of this section, reported no improvements on the WRAT arithmetic test; they employed similar training methods and also some academic materials.

Finally, three studies reported in Table 1 have focused entirely on the effects of self-instructions in teaching arithmetic. Wein and Nelson (1977) assigned 35 impulsive second graders to one of the following groups: SIT, behavioral modeling, verbal modeling, instructions, and control. There were three 30-minute sessions, using a basal arithmetic series. No significant group effects were found on an arithmetic placement test. Meichenbaum (1977) also related an earlier study by Burns (1972) in which attentional self-instructions did not improve arithmetic performance. Leon and Pope (1977), however, did find a significant effect for SIT in comparison to traditional teaching methods. Their subjects were learning disabled and educable mentally retarded elementary school children receiving daily 15-minute SIT sessions in connection with a specific mathematics curriculum. The experimental subjects obtained greater gains on the content and operations section of the KeyMath at a 14-week followup.

Conflicting results have also been found in regard to whether self-instructional training enhances spelling performance. Robertson and Keeley (1974) noted some improvement on the spelling section of the WRAT among their subjects.

Parrish and Erickson (1978) similarly related a decrease in spelling errors on classroom quizzes, not immediately after training but at a five-week followup. Unfortunately, however, both Douglas et al. (1976) and Glenwick and Barocas (1979) failed to document spelling effects.

Interestingly, SIT appears to have its greatest impact in the area of reading. Robertson and Keeley (1974) initially suggested that there were some gains in reading in their subjects. With the exception of Friedling and O'Leary's (1979), moreover, informal reading measures have reportedly also shown improvements (Bower, 1971; Parrish & Erickson, 1978). Most convincingly, the vast majority of SIT outcome studies including standardized reading measures have documented at least some reading effects (Bommarito & Meichenbaum, 1975; Camp et al., 1977; Douglas et al., 1976; Glenwick & Barocas, 1979; Watson & Hall, 1977).

Douglas et al. (1976) employed the Durrell reading test. Relative to control subjects, the SIT subjects showed greater improvements in oral and listening comprehension at post-testing, and significant differences in oral reading and oral comprehension at the three-month followup. Camp et al. (1977) reported a trend for reading improvement in the WRAT. In the study by Watson and Hall (1977), experimental subjects performed better on the PIAT reading subtest than physical education placebo or control subjects. Regardless of who instructed them, all of the subjects in the investigation by

Glenwick and Barocas (1979) outperformed controls on the reading section of the WRAT. Impressive evidence has also been provided by Bommarito and Meichenbaum (1975) and Wozniak and Egeland (1975).

Bommarito and Meichenbaum (1975) provided six 45-minute sessions of SIT to a group of seventh- and eighth-grade "difference" readers. These were poor readers whose difficulties were thought to stem from poor reading habits, as opposed to lack of vocabulary or knowledge. Relative to controls, the SIT subjects showed significant improvements in reading comprehension; the mean gain of the experimental group was 11.5 months. This significant group difference was also maintained at a one-month followup.

Finally, a process training program designed by Wozniak and Egeland (1975) may be cited as evidence that SIT increases reading performance. These authors have developed an elaborate assessment and training program in visual information-processing skills, e.g., scanning, picking out distinctive features, part-whole analysis, etc. Of present concern is the fact that one of the general theoretical orientations to the program is self-verbalization.

> Another thread running through every lesson is the importance of the child's learning to describe what it is that he/she is going to do. The idea is that these visual information-processing skills can be more easily learned and implemented by teaching the child to verbally direct his/her perceptual activities. (Egeland & Schrimpf, 1978, p. 241)

In a major evaluation study, 35 second graders with academic problems and poor visual information-processing skills were given the program; they were compared to both an exposure control and a no-treatment group. In addition to improvements on many of the visual information-processing measures, and in spite of the fact that reading was never taught, these experimental students showed significant gains on the Metropolitan Reading Test at posttest and again at a one-year followup.

In total, the evidence presented in Table 1 regarding academic findings, particularly the reading studies, appears, perhaps surprisingly, promising. While inconclusive, many of the research findings suggested that the current focus on SIT may indeed have positive implications for academic remediation. A number of these investigations included achievement tests as generalization measures. Moreover, this research is also in sharp contrast to the lack of positive academic findings in direct attentional training studies.

<u>Summary evaluation of academic SIT literature</u>. By way of summary, several comments might be made, paralleling the general conceptual and methodological issues discussed earlier. First, transfer to achievement measures does appear more likely given at least some training with academic materials (Douglas et al., 1976; Glenwick & Barocas, 1979; Parrish & Erickson, 1978; Robertson & Keeley, 1974). Significantly, there are a number of negative findings, e.g., in the mathematics area, that need to be explained. The most promising current explanation is the one previously discussed

in connection with the Robin et al. (1975) study--that SIT effects depend on the child's already having the necessary basic skills, with poor performance a function of coordination or attentional difficulties. In further discussion of this idea, Meichenbaum (1977) has stated that:

> teaching children to respond to such self-directed verbal commands as "stop and think" will not result in incremental improvement of performance on specific tasks unless the prerequisite performance skills are already in the repertoire. (p. 80)

If this argument is sound, SIT would be of most benefit to children who in fact have attentional problems and, specifically, on tasks in which attentional processes contribute significantly to the variance in performance.

In this light, it is interesting that reading measures appear to have been the most responsive. The sensitivity of reading to SIT is apparently the result of the frequent impulsive word recognition errors that children make when learning to read. Perhaps, moreover, hyperactive, learning disabled children often perform poorly in reading tasks, partially because of "avoidable" word recognition errors or "not attending" to what they are reading, in the same manner in which they perform poorly on other tasks requiring attention.

Lastly, while the reading data are generally positive, they need to be interpreted very cautiously. None of the studies cited employed a direct training control. Again, the SIT programs provided have been treatment packages including a range of components, e.g., contingency management (Douglas et al., 1976), relaxation (Watson & Hall, 1977), and visual information-processing training (Wozniak & Egeland, 1975); therefore, they can offer no conclusive evidence for the proposed specific effect of self-verbalizing. In fact, given that Parrish and Erickson (1978) and another study by Egeland (1974) found reading improvements after attentional strategy training without verbalizations, the available evidence can still be interpreted as supportive of only the attentional process assumption rather than both the process and self-verbalization assumptions involved in SIT.

In concluding this section, analysis of the academic SIT literature suggested that the attentional-reading task employed by Heiman et al. (1973) was well suited to discover any SIT effects. By comparing SIT with direct training on this reading task, and, additionally, recording self-verbalizations, it was reasoned that the present evaluation project might make a contribution to the growing literature in this area.

Some Theoretical Formulations Regarding the Effect of Self-Instructions

This final section of background material to the evaluation project will review and formulate more explicitly several different conceptual perspectives concerning the effect of self-verbalizing on performance. In so doing, it highlights the significance of two variables which may moderate SIT effects: (1) age and/or competence and (2) task difficulty. As a result, these factors were included in the design of the research. Conflicting theoretical formulations are also identified. The facilitative perspective afforded by both regulatory-mediational theory and the impulsivity concept is contrasted with a more recent suggestion that the requirement to self-verbalize might be irrelevant and quite possibly detrimental. As outlined in the introduction to this chapter, it was hoped that the evaluation results might better indicate the relevance of these perspectives for applied SIT programs.

Considering the evidence and argument presented in the preceding section that teaching self-instructional skills might be expected to increase performance on the attentional-reading task, it would seem profitable to inquire as to the theoretical rationale underlying such SIT effects. Unfortunately, as will become obvious, there is no clear account of the theoretical underpinnings of Meichenbaum's (1977) SI procedure. Instead, a loose collection of formulations, existing in a theoretical morass, appears to legitimize the expectation that verbalizing may facilitate educational performance.

Soviet regulatory theory. Soviet theory and research on the verbal regulation of behavior is apparently the primary historical antecedent to the development of the SIT procedure (Meichenbaum, 1975b; 1977). Meichenbaum (1977) has cited the Soviet psychologists Vygotsky (1962), Luria (1959, 1961) and Gal'perin (1969) in discussing self-instructional training.

The first of these authors, Vygotsky (1962), was an early Russian scientist of considerably broad interests (Brown, 1979). In the thirties, he proposed a highly influential programmatic theory on the development of the higher mental or psychological processes in man. To understand the theory itself, and no doubt its success in the Soviet Union, it must be viewed within the context of the Marxist socio-cultural and dialectical perspective (Cole & Scribner, 1978).

To begin with, Vygotsky (1962) felt that accounting for consciousness, thought, attention (i.e., the higher mental processes) was the critical problem in psychology. Word meaning was identified as the basic and complementary unit of both verbal thought and speech; unlike sensation, it consisted of a generalized reflection of reality. Vygotsky (1962) reasoned, therefore, that the problem presented by consciousness could be solved only by the genetic (i.e., developmental) study of the structure and function of language and its relation to thought. In suggesting that thought and language must be studied as processes in change, and that there was a qualitative jump, both phylogenetically and ontogenetically, from sensation to thought, Vygotsky

(1962) was already incorporating some significant aspects of a dialectic view. However, he went further. In essence, Vygotsky (1962, 1978) postulated that, just as the development of tools and technology are thought in Marxism to change man's nature, the internalization of a cultural sign system (i.e., language) brings about fundamental developmental changes in the nature of human consciousness. Language is an aid (or tool, if you will) that enables man, unlike Koehler's apes, to be free of the constraints of the immediate physical situation.

Vygotsky's (1962, 1978) theory, moreover, is sociocultural in nature because it specifies that prior to the internalization of language functions, they exist and are learned in social intercourse. This clear importance of socialization and social products to mental development is illustrated in several of Vygotsky's (1978) remarks.

> When children develop a method of behavior for guiding themselves that had previously been cued in relation to another person, when they organize their own activities according to a social form of behavior, they succeed in applying social attitude to themselves. The history, of the process of the <u>internalization of social speech</u> is also the history of the socialization of children's practical intellect . . . the path from object to child and from child to object passes through another person. This complex human structure (the combination of speech and action) is the product of a developmental process deeply rooted in the links between individual and social history. (pp. 27, 30)

With this background, and more related to the present interest, in outlining some of the specifics of his dialectical theory of higher mental development, Vygotsky (1962) proposed a number of stages in the relation between language and thought. Although they have different roots in their ontogenetic development and follow independent lines for a time, these behavioral processes are said gradually to exert greater reciprocal influence on one another. Speech becomes more rational and thought more verbal. In the beginning stage, words are learned via conditioning processes. They are said to function as substitutes for objects, and cannot be separated from them. Later, as the child increases his/her vocabulary, words take on a symbolic function; however, the child's use of language at this stage is impaired by a lack of understanding of grammar and the more abstract functions words can serve. It is in the third stage that external speech becomes an obvious tool of thought. So-called egocentric speech, present in the preschooler, is viewed as an aid in the solution of problems. It is thought to facilitate and improve the performance of children on intellectual tasks.

It should be stressed that the importance of such speech for Vygotsky (1962) is that it represents a transitional form; developing out of social speech, it is a precursor to verbal thought. Given the hypothesis that egocentric speech thus serves a guiding function, Vygotsky (1962) also proposed that it would increase with task difficulty. He and his students performed a number of informal experiments in which external speech was in fact found to increase--when, as instances, no pencil was provided for children instructed to draw or when they could no longer reach a piece of candy.

Additionally, in the early phases of its development, egocentric speech is said to accompany a child's behavior; later it precedes activity and takes on an important planning function. For example, in choice experiments, the young child's choice is described as a delayed selection among his own hesitating movements. The use of auxiliary signs, or presumably language in older children, restructures attention and perceptual processes, allowing for a single smoothly executed movement. By age 7, though, egocentric speech has finally "gone underground"; internalized, it has become verbal thought. In summarizing the effect of language learning on children, then, Vygotsky (1978) states that:

> the specifically human capacity for language enables children to provide for auxiliary tools in the solution of difficult tasks, to overcome impulsive action, to plan a solution to a problem prior to its execution, and to master their own behavior. (p. 28)

The laboratory research of Luria (1959, 1961), Vygotsky's student, is perhaps more widely known to Western psychologists. He investigated and extended Vygotsky's (1962) theory by studying, through a number of distinct paradigms, how verbalizations differentially affect the performance of children from age 1½ to the preschool years. Inasmuch as his reported findings have been repeatedly summarized (Bronckart, 1973; Stevenson, 1972; Wozniak, 1972), only a brief synopsis will be given here.

In the infant of $1\frac{1}{2}$ to $2\frac{1}{2}$ years, adult language, while it may initiate behavior, seems incapable of inhibiting action that has already started. A clear example of this effect is provided by the observation that asking the child to put rings on a peg, while he is in the midst of taking them off, seems merely to intensify his actions. Up until approximately age 3, he needs special help to coordinate a bulb-squeezing response to light. Once mastered, perseverate squeezing responses are made unless they are inhibited by external stimulus instructions (e.g., "Squeeze the bulb and then touch your knee").

The child of approximately 3 to $4\frac{1}{2}$ years of age no longer needs special training to respond to the directions, "When the light comes on squeeze the bulb"; but he too continues to make perseverate responses. It is at this stage that the facilitative effect of self-verbalization on performance is most clear. Success is obtained only if the child says "Go, go" in response to successive light flashes, or "Press" in response to a green light but nothing in the case of a red light. It is, moreover, the impulsive aspect of speech which appears to be regulating the child's behavior; the statement "I shall press twice" is ineffective, and saying "Don't press" to a negative stimulus may again increase responding.

Finally, in the last developmental stage that Luria (1961) describes, approximately age $4\frac{1}{2}$ to $5\frac{1}{2}$, the regulatory function of language is transferred from the impulsive side of speech to its semantic meaning. Behavior is regulated by a now internal verbal rule.

How is such increased verbal regulation to be explained? In addition to Vygotsky's influence, lurking within the cracks of Luria's (1961) description of these developmental changes, is the Pavlovian concept of the second signal system. (See Bloor, 1977; Bronckart, 1973.) In the process of social development, an intricate system of cortical interconnections corresponding to language and cultural-educational learning (semantic connections) is thought to become activated and instrumental in regulating the functioning of lower, reflexive brain centers. Such regulation is described as the operation of a "functional barrier" preventing the disorganization that would be caused by conflicting reflexes by channeling stimuli through the verbal system. "Speech" thus enters all behavior, and is at the center of human learning.

In Luria's (1961) experiments, saying "Go" improves the motor performance of the three-year-old because the excitation in the brain from the stimulation of the light and bulb is now checked by the more mature verbal system. As development proceeds, moreover, the nature of the "gates" in the functional barrier changes in the direction of increased semantic specificity. In short, although Luria (1961) also incorporated some cybernetic concepts in his writing, the development of verbal control over behavior in his version of the regulatory model is for the most part implicitly attributed to the maturation and social development of a hypothetical neurological system.

It is also of interest, although not as well disseminated, that Luria (1961) related both his research on verbal regulation and this sort of neurological theorizing to children who now could be termed "learning disabled." Hypothesized to be suffering from a cortical dysfunction labelled "the cerebro-asthenic syndrome," they are described as follows:

> fairly normal intellectually, they become easily exhausted and soon prove unfit for normal school life. They easily lose the ability to concentrate; any extraneous stimulus distracts them from their work. . . . If the pathological state of the cortical cells affects mainly the inhibitory processes, the excitatory weakness is manifested in an excessive impulsiveness. . . . The child becomes particularly unmanageable at school. If the pathological arrangement . . . is predominantly expressed in a decline of the excitatory processes . . . difficult questions are left unanswered, or the child falls into a state of passivity. (pp. 110-111)

In seemingly prophetic anticipation of the SIT movement, Luria (1961) questioned whether the system of verbal processes might be more neurodynamically mature in these children, and, if so, whether it would be possible to help them use this system to compensate for their deficits. Research in his laboratory purportedly demonstrated that while the cerebro-asthenic subjects studied, ranging in age from 9 to 11 years old, had considerable difficulty with a motor reaction time task, they were able to respond perfectly verbally. Moreover, it is noteworthy that their attentional difficulties on the motor task were said to increase with greater task demands. In addition, Luria (1961) claimed to have also found an affirmative answer to his second question. Having the children combine their motor and verbal behavior improved their performance; external speech had a "normalizing" influence on both excitable and inhibitable subjects. This effect was found not only under relatively simple stimulus conditions, but also when the children were asked to make a difficult sensory differentiation (i.e., a discrimination involving stimulus values that were just noticeably different). Thus, Luria (1961) concluded that the inclusion of speech "can substantially improve both the process of sensory analysis and the process of motor regulation" (p. 121).

Finally, Gal'perin (1969) has also contributed to Soviet theory on the role of language and verbalization in mental (i.e., intellectual) development. For Gal'perin (1969), conceptual learning in children involves not just remembering an act, but being able to repeat it in a new situation. He distinguished several levels in this learning process. Importantly, for the present thesis, he has argued that once an act has attained its highest level in the situation where materialized representations are used to carry it out, further development is contingent upon the child performing the act with the auxiliary aid of external speech. The use of the speech then changes from an accompaniment of the material action to an independent plan involving abstraction. The importance of the verbalization stage is clearly stressed. In children in whom it is missed

> solutions are characteristically only approximate ones, vacillations around the correct answer, and the operation is always insecure and unstable (the child may suddenly give a second answer, accidently substituting an incorrect answer for the correct one) . . . to correct this situation, we had to return to the stage of the objective act and, using it as a foundation, work out its verbal accompaniment. (Gal'perin, 1976, pp. 258-259)

To conclude, in Gal'perin's (1969) analysis, an act becomes mental when the external speech embodying its operations becomes internalized and, lastly, abbreviated in form. In regard to the latter process, he has written

> speech fragments which seem strange to the observer are nothing more than particles of external speech to oneself in the process of becoming internal speech . . . these fragments characteristically appear when it is necessary to arrest the automatic flow of thought. (Gal'perin, 1969, p. 264)

<u>Reservations to accepting Soviet theory as a basis for SIT</u>. In certain respects, particularly with regard to Luria's (1961) clinical work, the above overview of the Soviet perspective has suggested, then, that the regulatory tradition both provides evidence for the therapeutic effects of self-verbalization and perhaps also serves as a viable theoretical foundation for the SIT procedure. Unfortunately, more careful analysis quickly suggests a number of reservations concerning this proposition. First, although Luria's

(1961) theoretical account was broadly intended to include all "the higher psychological processes", the vast majority of the evidence he presented involved verbal control over motor behavior. In contrast to this primary use of motor tasks, however, the SIT literature has focused on measures of attentional-perceptual behavior like the MFFT. One might certainly question whether generalization is to be expected across these very different types of responses.

Secondly, research on the cerebro-asthenic syndrome aside, according to Luria's (1961) stages the self-verbalizations of school-age children should have already attained semantic control and become internalized. It is only by accepting the additional assumption of a neurological defect or by drawing on Gal'perin's (1969) account of children who fail to go through the audible speech stage, that one can retain the relevance and predicted effectiveness of self-instructions for these children. Moreover, from a pragmatic standpoint, still another compelling reason for questioning the idea that regulatory theory provides a cogent theoretical basis for the SIT procedure is that Luria's (1961) findings themselves have been notoriously difficult to replicate. (See Bronckart (1973) and Wozniak (1972) for a review and spirited discussion of this literature.) It is not surprising, then, that recently Meichenbaum (1975) has essentially stated that the Soviet research provides no more than an abstract model on which to base instructional training.

Lastly, it must be said that the SIT literature, to some extent, has misunderstood the Soviet theory. Early studies on the effects of self-verbalization (e.g., Bem, 1967; Palkes et al., 1968) were particularly guilty of interpreting Luria's (1961) findings out of context and largely within a S-r-s-R mediational framework. This criticism is clearly a large part of Wozniak's (1972) critique of attempted Western replications of Luria's work. More recently, Cole and Scribner (1978) apparently felt strongly that there was a need to insist that

> Vygotsky was _not_ a stimulus-response learning theorist and did not intend his idea of mediated behavior to be thought of in this context. What he did intend to convey by this notion was that in higher forms of human behavior, the individual actively modifies the stimulus situation as a part of the process of responding to it. (p. 14)

Mediational aspects to SIT. It is thus clear that regulatory theory does not include a cue-stimulus idea of verbalization; however, it is equally true, if confusing, that the rationale for SIT apparently does. In their original article, Meichenbaum and Goodman (1971) briefly discussed the related concepts of mediation and production deficiencies as providing support for self-instructional training. Moreover, they closed their discussion with the suggestive statements, "the goal has been to bring S's overt behavior under his own discriminative control" (Meichenbaum, 1971, p. 125).

In regard to this mediation hypothesis, Stevenson (1972) has provided a scholarly review of the experimental literature pertaining to the use and evidence for verbal mediators in children's learning. The term "mediational deficiency" refers to the developmental period in which words do not appear to serve as mediators in learning, e.g., in three-year-old children pointing and saying "Middle-sized" does not appear to affect performance on intermediate-size discrimination problems. The idea of a production deficiency (Flavell et al., 1966), although similar, is slightly different. Here, it is suggested that a young child's learning is impaired because he fails to produce verbal mediators spontaneously at the appropriate time. Flavell et al. (1966) demonstrated that this appeared to be the case with five-year-old children in a serial memory task. In addition to characteristically performing less successfully, these young subjects, in contrast to eight-year-olds, failed to verbalize as evidenced by a lack of lip movements. Further study by this research group also showed that the recall scores of somewhat older seven-year-old nonproducers could be improved by instructing them to verbalize (Keeney, Cannizzo, & Flavell, 1967).

To compress the argument into a sentence, numerous studies involving transposition, discrimination shifts, and paired-associate paradigms could be cited as generally supporting the idea that verbalizations improve learning in children. Although experimental in nature, this literature also suggests the clinical and educational potential of teaching self-instructions. Given their familiarity with experimental child psychology, it was perhaps natural for those interested in SIT to appeal to it.

At this juncture, then, it is apparent that, despite a lack of conceptual rigor in the literature, a loosely stated regulatory-mediational model generally predicting positive or facilitative SIT effects may be said to exist. It might be briefly outlined as follows. As a central proposition, self-verbalizations are thought to enhance performance. This is particularly true developmentally as children are observed to use speech increasingly to regulate behavior and internalize (i.e., conceptually understand) their actions (Gal'perin, 1969; Luria, 1961). Verbalizations may increase performance by providing cues upon which to guide subsequent behavior (Bem, 1967). Finally, at certain developmental stages and/or for specific tasks, self-instructions might serve as verbal mediators improving discrimination or facilitating memory (Stevenson, 1972). According to Meichenbaum's (1977) own account, such a general model, drawing on various sources, as well as his own anecdotal evidence, does indeed appear to underlie the SI procedure.

<u>The relevance of age/competence and task difficulty</u>. Particularly salient within the formulation elucidated above is the significance of age or relatedly competence as a possible moderator of verbal regulatory or mediational effects. With increasing age, the guiding function of speech

is hypothesized to become abbreviated and increasingly internalized. Moreover, absent production deficiencies, older children might be expected to employ verbal mediators spontaneously. Keogh and Glover (1980) have even cited some data by Kendler, Kendler, and Carrick (1966) suggesting that requiring overt self-statements, once such private speech has become covert, may cause task interference. For all these reasons, then, SIT might be expected to selectively improve the performance of younger children.

The importance of cognitive maturity or competence in connection with chronological age is suggested by the reported finding by Kohlberg, Yaeger, and Hjertholm (1968) that mental age actually best predicts developmental trends in private speech. Fuson (1979) has provided the most comprehensive review of developmental and naturalistic studies. She summarizes the developmental data pertaining to private speech as suggesting:

> an initial high level of production of such speech by 2-year-olds, a drop in production when such speech becomes differentiated from other motor activity, a rise to a high around age 4 and 5, some irregularities in production around age 5 to 6, with continued use during school tasks about 40% of the time for 7-, 8-, and 9-year-olds and 30% for 10-year-olds. (p. 161)

In addition to confirming the presumed significance of age-related changes, by documenting that many early elementary school-age children apparently continue to employ private speech, such research also suggests that SIT may indeed still be relevant for this population. In fact, older children are more likely to have acquired the basic elementary task skills upon which the facilitative effects of self-instructions apparently depend (Craighead et al., 1978; Meichenbaum, 1977; Robin et al., 1975). The present point, then, is that age may be an important moderating factor in SIT programs. In discussing cognitive training effects, Keogh and Glover (1980) have similarly proposed that "the chronological age of pupils, and more importantly perhaps, the adequacy and maturity of their cognitive and language skills, may interact with program techniques" (p. 80).

A second variable also highlighted in the literature on verbal regulation, moreover, is task difficulty. It may be recalled that Vygotsky (1962) suggested that the amount of self-guiding speech increased with the difficulty of the task. Subsequent naturalistic studies of private speech have provided at least partial support for this idea (Fuson, 1979; Meichenbaum & Goodman, 1979). For example, Goodman (1975) related an increase in task-relevant and description of activity statements among preschoolers after failure to solve jigsaw puzzles. Beaudichon (1973) also reported that more difficult seriation and classification tasks were associated with increased self-guiding utterances for children approximately six years old, although no such increase was observed with slightly older subjects. As Roberts (1979) has indicated, such private speech might serve as a useful reference point linking skills acquired in similar, already mastered situations with the present difficult one. Relating this to applied efforts, the greater spontaneous use of regulatory speech among younger children when confronted with difficult tasks would also seem to suggest that self-instructions might be helpful particularly in connection with harder or more challenging assignments.

Given their significance to the theoretical literature and the possible implications for applied programs, it was decided, then, to additionally include in the present research an evaluation of the moderating effects of age and task difficulty on the self-instructional training provided. O'Leary and Dubey (1979) have also recently suggested that the effects of self-instructions might interact with these factors. Currently, reported SIT effects on reading seem to cover a wide range of school-age children (Bommarito & Meichenbaum, 1975; Glenwick & Barocas, 1979; Watson & Hall, 1977; Wozniak & Egeland, 1975). The only study to examine the effects of SIT on reading selections varying in difficulty level was Friedling and O'Leary (1979). The performance of their second- and third-grade hyperactive students was assessed on both easy (defined as six months below grade level) and hard (at grade level) reading selections. Although unexplained, SIT was predicted to have more impact at the easier reading level. Unfortunately, in this study, there were no SIT treatment effects found.

In summary to this point, a combined regulatory-mediational perspective has been analyzed to underlie SIT procedures. Based on the literature and within the context of the Heiman et al. (1973) reading task, this formulation would seemingly predict that training learning disabled children to engage in task-related self-verbalizations will have positive effects on their control of attention, and therefore should facilitate or improve their reading. Moreover, younger children might be more likely to benefit from the procedures, with the effect more probable or greater at higher levels of task difficulty.[2] It is interesting that other theoretical formulations offer alternative hypotheses regarding how SIT might interact with age and/or difficulty level, and even about the proposed overall effectiveness of self-instructions themselves.

<u>Impulsivity as a conceptual model for SIT</u>. In the preceding reviews of both attentional difficulties in learning disabled children and SIT studies, the construct of conceptual tempo developed by Kagan et al. (1964) was found to figure prominently in the literature. This formulation is especially significant in that it provides a somewhat distinct conceptual perspective from which to construe the effects of self-instructions. Several pertinent facts should be reviewed. First, learning disabled and hyperactive children have been found to be generally more impulsive than controls as measured by the MFFT (Campbell et al., 1971; Epstein et al., 1977). Secondly, a number of studies have demonstrated that training, including teaching self-verbalizations, can successfully reduce impulsive responding

(Douglas et al., 1976; Egeland, 1974; Kendall & Finch, 1978). In his own review, Messer (1976) summarized this literature by stating that

> the reflective child, as compared with the impulsive is better able to sustain attention. . . . Impulsive children succeed less well in school than do reflectives and appear to have deficient reading skills. They are found in higher proportion than are reflectives among children diagnosed as hyperactive, brain damaged. . . . the most potent way to make impulsives more reflective seems to be to teach them improved scanning strategies while having them verbalize what they are doing. . . . (p. 1047)

Clearly, then, an impulsivity model, like the regulatory-mediational formulation, also predicts a positive SIT effect on performance.

Unfortunately, the proposed mechanism behind this reduction in impulsivity is obscure. A number of different possibilities appear to exist. In addition to constitutional differences, Kagan et al. (1964) discussed degree of involvement in the task, and anxiety over task competence as antecedents to a reflective style. Instructions could conceivably be in the service of these determining variables. Recently, Block, Block, and Harrington (1974) have proposed that self-instructions might be reducing task ambiguity in children viewed as less resourceful, more anxious, and structure-seeking. Lastly, considering the general lack of effects shown by delay-only controls in training studies, it may be suggested that self-verbalizations not only delay but guide performance, again, by supplying mediational cues.

However this issue of mechanism is resolved, it is at present noteworthy that the idea that self-instructions improve performance by decreasing impulsive errors generates a different prediction regarding task difficulty than the regulatory-mediational perspective. Recall that conceptual tempo is defined as "the degree to which the subject reflects on the validity of his solution hypotheses <u>in problems that contain response uncertainty</u>" (Kagan & Kogan, 1970, p. 1309, present author's emphasis). In brief, as a consequence of the fact that impulsivity is manifested only in an uncertain situation, this viewpoint would expect the difference between impulsive and reflective responding, and therefore the effect of self-instructions, to be greatest at intermediate task difficulty levels.

This very logic was used by Kagan (1965) to clarify the results of his correlational study of the MFFT with various reading measures. The association between reflection and letter errors was generally lower than between reflection and word errors for all the children studied except for a group of verbally deficient boys. Kagan (1965) interpreted this finding as support for the idea that

> the influence of reflective delay is maximal when the subject has already learned the rudiments of the skill necessary to perform the task but has not overlearned the skill to a point where delayed responding does not facilitate an initially accurate solution. [For the low verbal boys] the task of recognizing letters contained some response uncertainty, and an impulsive disposition should have led to higher error scores. (p. 617)

Elsewhere, in explaining the differential size of the correlations in subgroups, he stated that

> the low-verbal Ss had acquired minimal reading skills, and lack of basic ability to read rather than a preferred conceptual strategy was the primary determinant of (their) reading errors. (Kagan, 1965, p. 616)

In regard to the present study, then, this conceptual tempo or impulsivity model would also seem to predict a positive effect of self-instructions, but only at low to intermediate reading difficulty levels where uncertainty exists. In addition, this perspective again highlights the possible significance of age or competence. SIT may be of more assistance to younger children if the greater impulsivity of students in the learning disabled population, paralleling developmental trends, decreases as the children get older. Alternatively, perhaps only the older and/or more competent students will have acquired sufficient reading skills for impulsivity to have significant influence on performance. Within age groups, the MFFT measure of conceptual tempo would be expected to correlate with any observed improvements in reading performance.

<u>The notion of limited capacity and response competition</u>. Finally, it is possible to discern still another general theoretical model pertaining to the effect of self-verbalizations on performance. Moreover, this third perspective makes startlingly different predictions regarding the probable effectiveness of SIT in increasing a child's

attention and performance during reading. Termed the limited capacity model, it was recently formulated by Bloor (1977) as an alternative account of verbal interference effects (e.g., Meichenbaum & Goodman, 1969) which have been used by Wozniak (1972) as indirect support for the Soviet regulatory position. To clarify, as part of their early work, Meichenbaum and Goodman (1969) found, for example, that kindergarten children could tap their fingers more quickly while whispering the verbal response "Faster" than they could while making this response overtly. In addition to internalization, this interference effect was offered as evidence for the sort of verbal inhibition of responding hypothesized to lie at the heart of the regulatory theory. Bloor (1977) suggested what is perhaps a more straightforward interpretation of such inference findings. The verbal task interferes with the motor task by competing for the limited resources of the nervous system; it is simply another thing to do.

From this perspective, true verbal regulation of other responses simply does not exist. Response systems are viewed as independent, unless the task demands involve competition for the limited response capabilities of the organism. It was reported that instructing a child to say "Faster" does not increase his rate of tapping if he has already been told to tap quickly; rather, it decreases it. To further test his position, Bloor (1977) performed a rather well designed study. Seven-year-old children were asked to perform both a motor and a verbal response under several conditions in which the response modalities could be compatible or incompatible with the stimulus situation and with each other. He reasoned that according to regulatory theory, when the motor and verbal systems were incompatible, the children's errors should show the dominance of the verbal system. The results of the experiment, however, clearly supported a capacity model in that greater interference effects could be obtained in either the motor or verbal systems depending upon which task was made more difficult.

Higa, Tharp, and Calkins (1978) recently offered a similar interpretation of the performance data of kindergarten and first-grade children on a Luria-type task. Although verbalizing had no effect on omission errors in second graders, it apparently increased the error rates of these younger children. These authors too concluded that "the requirement to verbalize constitutes an additional task for the child, instead of serving a mediating or facilitating function" (Higa et al., 1978, p. 495). Although it could be argued that these results are limited to laboratory experiments, the tendency, reported in a number of SIT studies (e.g., Higa, 1973; Robin et al., 1975), for verbalizations to drop out in spite of instructions and training is also interpretable in terms of such response competition.

In short, the extension of a capacity model to SIT predicts that self-verbalizations might actually interfere with performance on the attentional-reading task, with the probability of interference expected to increase at higher levels of task difficulty. The findings of Higa et al. (1978) also suggest that such interference may be more detrimental to younger children. As these predictions are clearly at odds with those that arise from the regulatory-mediational and impulsivity views, it was thought that the findings of the present evaluation project might test the relative generality and applicability of these three differing perspectives to applied SIT programs. At this point, the necessary, if rather lengthy, review and discussion of the literature related to the present project is at an end. Prior to discussing methodology, however, a brief summary of the questions that have been raised, and the dissertation study's objectives may be helpful.

Summary of the Present Project's Objectives

The present research project is concerned with the recent SIT movement as applied to learning disabled children. Self-instructional training was analyzed to include assumptions regarding the effects of both attentional training and self-verbalizing. It appears that this cognitive-behavioral procedure may be particularly appropriate for learning disabled children for whom performance deficits are often attributed to attentional difficulties. As background support, the evidence for attentional problems in this population was briefly reviewed, and the data tentatively interpreted in the context of Staat's (1975) cumulative hierarchical developmental model in which attention is viewed as a basic behavioral repertoire of an individual. Moreover, some behavior modification studies of attention in hyperactive and learning disabled students indicated that attentional difficulties may be ameliorated via explicit teaching procedures. It was pointed out, however, that this research has failed to provide evidence for academic transfer, presumably because of the questionable extrapolation of assumptions from studies with disruptive normal children. In this context, the significance of the study by Heiman et al. (1973), providing impressive evidence for attentional training on a reading task, was noted. As this article provided the starting point for the current investigation, the first objective of the study was to provide a systematic and controlled replication of their findings. Simply stated, at issue was the question of whether training in attentional-reading skills might in fact result in a generalized improvement in reading performance in this population.

The second and major objective of the project was to examine the additional effects of providing SIT in teaching these attentional skills. Academic findings in current SIT studies were reviewed, and found to be surprisingly positive in the area of reading. It was argued that this sensitivity was related to the influence of impulsive and attentional errors; consequently, the Heiman et al. (1973) reading task was seen as well suited for manifesting any possible facilitative effects of self-verbalizing. A methodological critique of the existing SIT literature further suggested both the need for a direct training control and the necessity of recording the subject's self-verbalizations. It was reasoned that by comparing the effects of SIT and direct training methods in the Heiman et al. (1973) attentional-reading paradigm, a significant contribution might be made to the growing literature in this area.

A third objective of the research was to clarify the relevance of several conflicting theoretical formulations for applied SIT programs. Unfortunately, there is no clear account of the theoretical underpinnings of the SIT procedure; however, it was possible to discern in the literature several distinct conceptual perspectives. One such view, lending credence to the prediction that self-verbalizations might improve attentional responding and therefore reading performance, was termed the regulatory-mediational model. It is regulatory in that it borrows some of the conceptual ideas of Soviet writers like Vygotsky (1962) and Luria (1961) regarding how language may be intimately related to the development of thought, behavior regulation, and problem solving in the young child. From a distinctly different point of view, though, the stated rationale behind SIT is mediational in that it is acknowledged that verbalizations may also serve as mediators in various learning situations (e.g., transposition, discrimination shifts, etc.). A second perspective predicting facilitative SIT effects was suggested by Kagan's (1965) formulation of conceptual tempo. This impulsivity view predicts that SIT might help learning disabled children, known to be relatively impulsive, develop a more reflective task style. Both of these viewpoints were contrasted with a third opposing perspective, the limited capacity model. The significance of verbal interference effects in the controversy surrounding replication of Luria's (1961) work, prompted Bloor (1977) to suggest that the requirement to self-verbalize may actually interfere with performance through response competition, essentially overloading a child's attentional-response capacity. Within this framework, self-verbalizing may be viewed as possibly detrimental to a child's performance.

Finally, a related objective was to evaluate the possible moderating influence of age/competence and task difficulty. It was noted that throughout the theoretical literature, these variables were highlighted. Regulatory speech, impulsivity, and the facilitative effect of verbal mediators all have been associated with the age of children and more directly to their competence in the observational situation. Significantly, the use of regulatory speech is predicted to increase with task difficulty, although the construct of cognitive tempo was formulated as involving tasks of intermediate difficulty or uncertainty. Albeit lacking in direct evidence, it seemed probable that these variables might also be found to moderate SIT effects in applied programs.

CHAPTER III

METHOD

Subjects and Setting

Thirty-six learning disabled children enrolled in a summer educational program sponsored by Greensboro's Association for Children with Learning Disabilities served as subjects. All of the students had been labelled "learning disabled" by their regular school systems or by the area's developmental evaluation clinic. Approximately 25% of the children were receiving medication for hyperactivity or minor seizures.

In its fifth year of operation, the program itself was housed in the Sunday School building of a local church. Through criterion-referenced testing, specific behavioral objectives were established for each child. Sessions were held weekday mornings for five weeks. During this period individualized academic instruction as well as some structured recreational activities (e.g., arts and crafts, physical education) were provided (Cellucci & Cellucci, 1979).

Subjects were selected to participate in the attentional-reading project on the basis of age, extent of reading difficulties, and scheduling considerations. Twenty-five males and eleven females, the students ranged in age from seven to twelve years old. The experimental subjects received attentional-reading training as part of their educational program. Otherwise, there was no change and little disruption of either established program procedures or the subjects' participation in nonacademic activities.

Design

The students were arranged into groups of three, matched as closely as possible by age and word recognition grade level on the Brigance criterion-referenced test. Also, all the children were administered the MFFT, with assessed impulsivity being a secondary consideration in matching. Subjects within each group were then randomly assigned to one of three treatment conditions: direct training (DT), self-instructional (SIT), or control (C).

In addition to assuring roughly compatible treatment groups, the original intent of the design was to create two age blocks (i.e., subjects aged 7 through 9 vs 10 through 12), crossed with the treatment conditions. After a week of training, however, it became apparent through observations that reading grade level was probably the more appropriate blocking factor. Although these two variables are generally related, there were several older students reading at a particularly low level. Fortunately, this change to reading grade level could easily be made by switching the blocking level of four groups of matched students. It was thus decided to make reading grade level (i.e., mean grade of

1.6 vs 4.0) the primary blocking factor but to analyze the data blocked by age as well. Within both the lower and higher reading levels, there were six subjects assigned to each of the treatments.

As detailed below, the DT group received training similar to that of Heiman et al. (1973), aimed at increasing attention and skills in oral reading. The SIT group also received direct instruction on the same task, but was additionally given training in various self-statements in conjunction with it. For both groups, the training program was relatively brief, being conducted in individual 45-minute reading sessions for 12 days. The third treatment group served as a comparison condition. These subjects participated in testing, having received some reading instruction as part of the regular educational program but were given no specific training on the attentional-reading task.

Instructors

Six employed program aides served as reading instructors in the study. They were primarily undergraduates studying to be special education teachers. Each had had previous experience working with special students in various practica or as tutors. In response to unavoidable absences and scheduling difficulties, the program director and author assisted by conducting some sessions.

The instructors were initially trained in the teaching procedures in several preliminary meetings (see Appendix A).

They also were observed periodically with additional meetings held several times weekly to assure as much as possible uniform and consistent implementation of the procedures.

All six instructors conducted both direct and self-instructional training; each was assigned one younger and older child in each of the two training conditions so as to balance possible teacher effects. Analyses and a discussion of such effects are provided later in the paper.

Procedure

Direct training procedures. Within the context of an individualized token reinforcement system, the task and instructional sequence used by Heiman et al. (1973) was adapted for use in the present study. In the initial session, the children were told that they could improve their reading by more carefully attending to the printed letters that stand for different sounds and words. It also was explained that by doing this during the sessions, they could earn points to be exchanged for various prizes (e.g., yoyo, model car) at the end of the program.

The training materials consisted of reading passages specially constructed from selections extracted from the Merrill Linguistic and Scott Foresman Basal Reader series. Essentially, in each passage a particular phonetic sound was built into the prose in repeated words and phrases. For example, one story at the sixth grade reading level repeated the sound, "shun," the word, "nation," and the phrase, "in this nation." Generally, the phonetic sound, the key word, and the phrase were incorporated 12, 8, and 5 times respectively. An effort was also made to associate the more elementary letter combinations with passages at the lower grade levels. Different selections were provided for each day. Some sample attentional-reading passages are contained in Appendix B.

Following the procedure of Heimen et al. (1973), the attentional-reading itself involved reading the training passages aloud five times. On the first trial, the passage was simply read and the instructor assisted the student with any unknown words. On the second through fourth trials, the subjects' task was to pick out and underline the target sound, then word, and then phrase. Correct identifications were rewarded. During the final trial, the child was instructed to read the passage over a little more quickly and also to remember the main idea for restatement in his or her own words.

The children repeated this sequence with passages at varying difficulty levels within each of the training sessions. The grade level of the passages presented was roughly determined by the pretest grade equivalents at which the students performed at 95, 90, and 75% correct on the oral reading portion of the Spache Diagnostic Reading Scales (Spache, 1963). In teaching reading, 95% correct is often recommended as being the child's instructional level. A grade equivalent corresponding to 95% was identified for each student, and then higher grade levels, at which the child read approximately 90 and 75% of the words, were defined as the student's difficult and very difficult levels. If a child did not attain 95% correct, he or she was assigned reading passages from the beginning preprimer, the late preprimer, and the primer levels. The grade levels of the training passages used are listed by group in Appendix C. The order of presentation of the difficulty level was balanced across the 12 training days. Within each session, the students went through the attentional-reading procedure with one training passage from each difficulty level or for a total of 45 minutes of training.

For direct training subjects, the instructors mainly provided reading assistance and administered the reinforcement system. Their copies of the training passages were marked so they could identify the reading targets easily. Correctly underlining the target phonetic sound, word, or phrase while reading aloud resulted in the immediate receipt of a poker chip, as did stating the main idea of the passage. Missed targets were ignored. At the end of the session, the student and teacher counted the number of chips earned and recorded the figure on a daily record card (Appendix D).

The large majority of children worked fairly diligently within the above reinforcement system; however, a few notable students in both the DT and SIT conditions required additional arrangements or special contingencies. In addition to their points, one young SIT child was given fruit loops and a young DT student a star at the end of the session to help them keep on task. An older DT student continually complained about having to read, so it was arranged that he would lose several chips every time he engaged in that verbal behavior. These modifications were, of course, discussed with the author before implementation, but were considered the legitimate purview of what the instructor needed to do to work well with the student.

To equate the two training conditions in terms of modeling, the instructors also demonstrated the attentional-reading task to DT subjects for the first week using a short demonstration paragraph at the subject's instructional level. Sample demonstration passages at the preprimer, third, and sixth grade reading levels are provided in Appendix E. Finally, it should be clear that the instructors also used verbal prompts and consequences in direct training. For example, they might implore the student to "Look at that word again" or "Sound it out," as well as respond to the child's efforts by saying "Good" or "That's okay." As elaborated below, the crucial difference in this regard was that for DT subjects, the instructors directed such statements to the students, whereas SIT subjects were specifically trained to also "think" such statements for themselves. A further outline of the DT procedures given to the instructors is provided in Appendix F.

<u>Self-instructional procedures</u>. For the children in this experimental condition, systematic self-instructional training, generally designed after Meichenbaum (1977), was coordinated with the attentional-reading task. Table 2 lists the six types of self-instructions that were presented. The training sequence involved three main phases: cognitive modeling, prompted practice in overt self-statements, and continued training while fading prompts. Because of some difficulty encountered in teaching self-instructions and the perceived need for additional practice in overt self-verbalizations, it was decided not to implement a fourth phase involving the rehearsed reduction of overt statements to whispered thoughts.

In the initial session, in addition to explaining the goal of increased attention, the task itself, and the reward system, the instructors also explained to the children that they could do even better and earn more points by thinking aloud about what they were doing. After the instruction, "Watch what I'm doing, and listen to what I say so you can repeat it," the process of thinking aloud was modeled using the demonstration paragraph. Both preparatory and then task analysis statements were presented in the first lesson. The former were simply general remarks such as "Good reading means reading carefully," and the latter involved answering the question, "What do I have to do?", in terms of the attentional-reading task.

Table 2

Types of Self-Instructions

(1)	Preparatory	"Good reading means careful attention."
(2)	Task Analysis	"What do I have to do? I have to read carefully and watch for ________."
(3)	Focusing	"Remember, look at the letters closely."
(4)	Sound It Out	"If I don't know a word, I'll just try to sound it out."
(5)	Self-Reinforcement	"I'm doing fine."
(6)	Coping	"I don't expect to get every word, I'm reading better all the time."

With the addition of the self-statements, the instructors modeled performing the reading task as in direct training, i.e., before the first trial of the first passage and similarly prior to the second and fifth trials of the second passage. For example, before beginning to read the demonstration passage, the instructor might have verbalized:

> If I want to read well, I have to pay close attention. What do I have to do now? Read carefully and underline the 'shun' sound. Here I go.

Along with modeling, pictorial cue cards, corresponding to each type of self-instruction (see Appendix G), were individually introduced during self-instructional training to prompt the children to state the "helpful thoughts" out loud on succeeding trials. Although sample statements were also printed on these cards, the teachers were instructed both to introduce natural variations in self-verbalizing and to have the students state them as much as possible in their own words.

Preparatory and task analysis statements occurred prior to reading the passages. On the second training day, in addition to reviewing these self-statements, self-verbalizing during the reading task was introduced. Using the demonstration passage and after a natural pause in reading provided by punctuation, the instructor would model reminding himself as an aside, "I need to look closely at the words." Subsequently, the child was instructed to make one or two such focusing statements to himself when carrying out the attentional-reading task. Prior to the fifth trial, the fourth type of self-instruction was also demonstrated. On the occasion of hesitating before a word, the students were taught to reflect aloud, "If I don't know a word, I'll just sound it out."

Training to self-verbalize just the first four types of self-instructions was continued for one or two more sessions. In addition to modeling and carrying out the standard direct training procedures, the instructors also were asked to keep a record of their SIT students' self-statements during training (Appendix H). If a student failed to self-verbalize, he or she was prompted by either pointing to a cue card or asking, "What are you going to remind yourself of?" More spontaneous and especially natural-sounding (i.e., reflective, in the child's language) self-instructions were noted and judiciously praised. The instructor might say, "That's great, you're thinking aloud about what you have to do" or "You're really remembering to remind yourself to sound out the difficult words." For many of the self-instructional subjects, however, it was also necessary to make the reinforcement chips contingent on their self-verbalizing, as well as correctly underlining the reading targets.

By the fifth training session, the last two types of self-instructions, self-reinforcement and coping statements, were presented. The students were instructed to say, for example, "I'm doing fine," or, if they made an error, "That's okay, I can't expect to get every word." Although learning to self-verbalize the various statements was a cumulative process, it should be clear that the instructors did not insist that all statements be made on every trial. Rather, their goal was to have the SIT students actively incorporate these or similar statements into their approach to the attentional-reading task. In this context, the following illustration depicts how a student might appropriately self-verbalize:

> (Okay, before saying any word, I need to look carefully at all the letters. My job is to read this over again and underline the word 'nation'.)
>
> In this nation, dinosaurs are usually pictured even in motion as being muddy brown or icky green. (Boy, I am doing better than the first time I read this.)
>
> What if there were purple (I'll just try to sound it out) str-i-ped dinosaurs? (Good.) The fact is we don't know what color dinosaurs in this nation really were. . . .

For the remaining sessions, the students were asked to continue practicing overt self-instructions while reading, although the cognitive modeling component of training was discontinued after the first week. The final phase of training involved gradually fading the pictorial prompts over the last several days. Verbally encouraging the children to think aloud, however, was continued through the last session. The instructors' outline of the SIT procedures is provided in Appendix I.

Measurement Plan

A pre-post experimental design was used to evaluate the effects of the treatments. Both a specifically designed measure of training and a standardized reading test were administered before and after the 12-day treatment period.

The training measure, an attentional-reading test, was constructed so as to be similar to the training materials and procedure. The test instructions and passages employed are provided in Appendix J. Essentially an informal reading inventory, two roughly equivalent stories selected from the special passages (i.e., including repeated sounds, words, and phrases) that had been composed at each grade level were used. As in training, the children were presented with three stories at their predetermined instructional, difficult, and very difficult reading levels, with the task being to select out and underline the different reading targets while orally reading the passages. The order of presentation of the passages remained the same from pre- to post-testing for each individual child, but varied between children, being counterbalanced across the experimental groups (Appendix K).

The reading instructors and, in a few cases, the author administered the test to all subjects. The task was demonstrated within the instructions along with a minimal prompt to self-verbalize and a brief example:

> I would like to find out how children like yourself go about this task, so please think out loud for me. For example, you might say to yourself, "I have to look for ______" or "Darn, I missed one." Whatever comes to your mind. Okay?

To maximize the probability of increased attention and self-verbalizations on the posttest, the instructors tested their own students. No reinforcement chips, however, were given.

As the children read, the examiner marked the subject's reading errors according to the Spache scoring system. Although, in the fifth trial, the subjects were also asked to state the main idea of the passage, this variable was not used as an outcome measure as these responses were all generally considered appropriate. Two dependent measures were obtained. For each reading trial, the percentage of words correctly read was calculated. Secondarily, the percentage of correctly underlined reading targets was also noted. All the attentional-reading test sessions were audiotaped. This practice allowed examination of the reliability of the examiners' scoring of oral reading errors. More significantly, it also provided a naturalistic record of the subjects' speech.

Analysis of the subjects' verbalizations was considered important in that it both permitted a check as to whether subjects receiving self-instructional training continued to self-verbalize on the training test and also allowed computation of correlations between such self-instructions and performance measures. A categorical system was thus developed to quantify the children's verbal behavior, and the posttest tapes of all subjects were coded. The students' verbalizations during testing were classified as reading, social speech, task-related self-guiding speech, or other private speech, with the task-related speech being further subdivided into preparatory/task analysis, focusing/sound it out, self-reinforcement, and coping categories.

Specifically, a second tape recorder was arranged so as to provide a signal every 15 seconds, and the presence and/or absence during that time period of each of the verbalization categories was indicated on an interval recording form (Appendix L). Under self-guiding or self-instructional speech, preparatory/task analysis and also focusing/sound it out statements were combined. On a number of occasions, the combined types of self-instructions were said together, and additionally, it was sometimes difficult to sharply define the content boundary of each of these self-instructions. Social speech consisted of asking for help or other conversation, and the least frequently used category, other private speech, was reserved for seemingly self-stimulatory speech, e.g., "Whatever" or yawning, "Oh."

The reliability of classifying the subjects' verbalizations into the general categories of reading, social, self-guiding, and other private speech was examined by having two raters independently code the tapes of six randomly selected subjects (i.e., one from each experimental group). Reliability was expressed as percentage agreement, which was defined as the number of agreements divided by the total number of 15-second intervals multipled by 100. The posttest tapes of all SIT subjects similarly were coded independently to assess the reliability of classifying task-related self-instructions. Given their lower expected frequency, reliability for these categories was assessed appropriately as percentage agreement occurrence. The latter was defined as the number of agreements regarding a category's occurrence divided by the total number of occurrence intervals by either rater multipled by 100. If a tape was unclear, the raters relistened to that portion and agreed as to what was said before scoring the child's verbalizations.

Pre-post administration of the Spache Diagnostic Reading Scales (Spache, 1963) was planned as a second method to assess the effects of the treatments. This standardized reading inventory provides separate measures of word recognition and phonics, as well as two equivalent forms to determine instructional oral reading grade level. As mentioned above, the oral reading portion of the pretest was used to establish the three levels of task difficulty employed throughout training for each subject. It was thought then that the Spache posttest would provide both a measure of transfer and a comprehensive evaluation of reading improvement.

First, it was hoped that the transfer of attentional-reading skills to standard prose would be reflected in better oral reading performance on the students' three selected reading passages. To assess the performance of students reading below the Spache primer level, however, it was necessary to add beginning and later preprimer passages to the lower portion of the test. These were taken from informal reading inventories constructed from the Betts (Betts, 1954) and Ginn Reading series (Russell & Ousley, 1961). Each story also was followed by several associated comprehension questions. Both changes in the percentage correct oral reading and the percentage of comprehension questions answered correctly were examined as a function of reading difficulty level.

The more standard Spache reading measures also were obtained. Instructional oral reading grade level is determined from the combined use of reading error and comprehension norms. Acceptable evidence of both alternative forms and 10-week test-retest reliability for this measure is provided in the Spache examiner manual (Spache, 1963). In addition, word recognition grade level and the total number of correct responses on the phonics section were recorded.

These data were analyzed together to ascertain the overall effects of the respective treatment conditions.

Finally, although both the Spache Scales and the attentional-reading test were administered in the same three-day period following training, no student received both tests on the same day. The Spache testing was conducted by volunteer examiners who were blind to the subject's experimental condition. No self-instructional prompts were given. However, on the Spache posttest, the examiners were asked to record any spontaneous comments or self-verbalizations the children made immediately prior to or while reading (Appendix M).

CHAPTER IV

RESULTS

Subject Characteristics

The characteristics of the subjects grouped by reading level and treatment condition are presented in Table 3. (All data tables are provided in Appendix N.) Fortuitously, the groups were largely equated in terms of sex. As described above, the subjects had been roughly matched on age and years behind in reading, and were later blocked by reading grade level. To check the outcome of this procedure, analyses of variance were conducted on these subject characteristics. These analyses are summarized in Table 4.

All between-group differences were nonsignificant as expected. Reading-level-two subjects were both generally older, $\underline{F}$ (1, 30) = 13.95, $\underline{p} < .01$, and reading at a significantly higher grade level, $\underline{F}$ (1, 30) = 80.15, $\underline{p} < .01$, as measured by the Brigance. Because there was considerable variability, there were no mean differences with respect to years behind in grade level. Associated with the blocking procedure, however, two subjects in each of the lower-level reading groups were severely deficient readers. Overall, the students were an average of 1.6 years behind. The subject analyses largely confirmed, then, that the treatment groups were successfully equated on these variables, and that the expected difference was obtained between reading levels.

Extent of Training Provided

Training on the attentional-reading task was conducted over a 12-day period. Several students in the experimental groups were absent for one or more days, however, so that the exact number of training days varied somewhat between students. Moreover, since the children performed the reading task at their own rate, the number of passages completed in the 45-minute sessions could also vary. Analyses were conducted, therefore, to determine if there were any systematic differences between groups on these training measures.

ANOVA summary tables for attendance and number of passages completed are provided in Table 5. There were no significant effects for number of days attending. However, there were significant differences both between reading levels, F (1, 20) = 8.22, $p < .01$, and treatment groups, F (1, 20) = 10.32, $p < .01$, in regard to the number of attentional-reading passages (trials) read over the training period. Specifically, level-two subjects completed more reading trials (M = 128) than subjects in level one (M = 102), and perhaps more significantly, subjects in the DT groups also read more passages (M = 130) than their counterparts in the SIT conditions (M = 100). The meaning and import of this difference will be discussed in the next chapter in conjunction with the testing results.

Interrater Reliability

Indices of interrater reliability were computed for both the percentage correct measure on the attentional-reading test and the various verbalization categories. As previously mentioned, evidence for the reliability of the Spache Diagnostic Scales has been provided already and is reviewed in the examiner's manual (Spache, 1963).

To assess the reliability of scoring reading errors on the attentional-reading passages, the pre- and posttapes of six randomly selected subjects, one from each group, were independently rescored for errors. The reliability of percentage correct oral reading was then calculated by computing Pearson correlations between the instructor's and independent assessor's measures (Johnson & Bolstad, 1972). Table 6 presents these correlations by difficulty level and time of testing. All the correlations were acceptably high (i.e., .92 or greater), indicating substantial interrater agreement.

As detailed in the method section, the consistency with which raters categorized the children's verbalizations on the posttest also was assessed. Table 7 provides the reliability of scoring the major speech categories as indexed by percentage agreement for a random sample of six subjects (i.e., again, one from each group). For each of the self-verbalization categories, percentage agreement occurrence was additionally calculated where possible for the SIT

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<u>Self-Verbalization Data</u>

A record of the subjects' speech was potentially available during both the attentional-reading and Spache posttests, as well as the training sessions. These will be discussed briefly in turn.

Table 9 depicts for each group the mean percentage of 15-second time intervals the various speech categories were scored based on the audiotapes of the attentional-reading posttest. The data were averaged across difficulty level since there did not appear to be any consistent trends involving this variable. The most noticeable result was clearly that reading occurred in the majority of intervals for all subjects.

Between-group analyses were performed on each of the category measures, and are listed in Table 10. There was a slight trend for level-two subjects to spend more time reading than those in the lower-reading-level group,

$\underline{F}$ (1, 30) = 3.17, $\underline{p} < .10$. More substantively, there was a significant group effect involving the self-guiding speech category, $\underline{F}$ (2, 30) = 5.95, $\underline{p} < .01$. A Scheffé multiple comparison test indicated that as expected SIT students engaged in more self-guiding speech ($\underline{M}$ = 8.79) than both DT ($\underline{M}$ = .18) and control subjects ($\underline{M}$ = .17). No significant differences were found in social speech or other private speech.

The self-guiding speech category is, of course, of particular interest. There were only two instances of self-guiding speech involving non-self-instructional training subjects. A level-one control subject repeated the example used in explaining thinking aloud in the instructions; in addition, a direct training student exclaimed, "I got that one," upon underlining a target word. Although statistical analysis indicated then that the SIT group on the average engaged in more task-relevant self-verbalizations than the other groups, it must be pointed out that not all SIT subjects self-verbalized during the attentional-reading posttest. Table 11 provides the number and type of self-instructions emitted by each of the SIT students. Only half of the subjects continued to self-verbalize with few coping statements being included. Interestingly, none of the subjects was observed to engage in task-related self-verbalizations on the Spache posttest. The self-verbalization training data become even more important, therefore, in establishing essentially that the independent variable was successfully manipulated.

During the actual training sessions, which were typically not audiotaped, the reading instructors had been asked to record via a form all self-verbalizations, both prompted and spontaneous. On account of problems encountered in teaching self-instructions, however, the instructors did not continue to prompt every self-statement on all trials, often concentrating on only one or two. Unfortunately, they also sometimes failed to mark their prompts, resulting in an unknown amount of missing data on the recording sheets. It was possible, however, to quantify from the daily training record, the percentage of the training days once introduced, that each of the particular self-statements occurred at least once spontaneously, i.e., without an immediate prompt by the instructor beforehand. It is argued that this is an appropriate process measure of the success of training.

Table 12 provides these figures. Again, there was some noticeable variability between subjects as well as statements, with the data being further analyzed in Table 13. The results of the analysis indicated that there was a tendency, $\underline{F}$ (1, 10) = 3.34, $\underline{p} < .10$, for the higher-reading-level subjects ($\underline{M}$ = 85) to have spontaneously self-verbalized more than those in the lower-reading group ($\underline{M}$ = 64). There was a significant effect for the type of self-verbalization, $\underline{F}$ (5, 50) = 11.54, $\underline{p} < .01$. Specifically, Scheffé post hoc comparisons indicated that preparatory, task analysis, and look closely statements all occurred more frequently than coping ones, with preparatory self-verbalizations also occurring more frequently than sound it out statements. These differences, as well as the apparent lack of generalization on the posttests, will be further explored in the discussion section. At this point, however, it is noted that the preceding data do suggest that the training was at least moderately successful in teaching the SIT students self-verbalization skills. It is appropriate to ask, then, what effect this learning might have had on the test data.

Test Data

In analyzing the testing data, a number of separate analyses were conducted with the dependent variables grouped conceptually in the following categories: the attentional-reading test, selected transfer passages, and overall reading performance on the Spache. Where indicated, multivariate analysis of variance (MANOVA) was performed with significance assessed using Wilks's lambda. Significant MANOVA results are discussed in conjunction with the corresponding univariate analyses and in light of the specific dependent variables which showed significance.

A systematic approach to data analysis and interpretation was undertaken. For each group of variables, pretest scores were analyzed first to determine if there were any significant pre-existing differences between the groups.

Gain score analyses were then performed to determine significant treatment effects as recommended by Huck and McLean (1975). If there were no differential treatment effects, a repeated measures analysis was employed to uncover any overall pre-post changes. Univariate results were further analyzed using the Scheffé multiple comparison post hoc test; if no significant Scheffé was found, the significant _F_ ratio was discussed in terms of the largest difference between cell means. Finally, in providing an overview of the results obtained, an effort was made to describe the extent and amount of individual subject change so that the reader might assess the potential clinical significance of the findings.

Attentional-reading test. The two dependent measures on the attentional-reading test, percentage correct oral reading and percentage of reading targets correctly underlined, were analyzed separately, inasmuch as they differed in number of data trials. Table 14 presents the analysis of the subjects' pretest oral reading scores. Although there were no significant between-group differences, there were significant effects for reading level, $F\ (1, 30) = 5.48$, $p < .05$; difficulty of passage, $F\ (2, 60) = 7.36$, $p < .01$; and difficulty x level, $F\ (2, 60) = 3.59$, $p < .05$. Even though an effort had been made to gear the passages to different student levels, reading-level-two subjects read somewhat more proficiently ($M = 94$) than those in the lower-reading-level group ($M = 88$). The Scheffé post hoc additionally revealed that for the lower-reading-level subjects, the average percentage of words read correctly at the highest difficulty level ($\underline{M}$ = 82) was significantly lower than at the instructional level ($\underline{M}$ = 97), with the percentage of words read correctly at the intermediate level ($\underline{M}$ = 85) falling between. For level-two subjects, however, there was little difference in the percentage of words read correctly at the three difficulty levels ($\underline{M}$ = 95, 95, and 93, respectively). Lastly, given the attentional-reading procedure, it is noted that there was also a trend for trials, $\underline{F}$ (4, 120)= 2.22, $\underline{p} < .10$, with reading performance during trial 2 ($\underline{M}$ = 97) tending to be greater than during trial 1 ($\underline{M}$ = 84).

The gain score analysis of the percentage correct oral reading scores is presented in Table 15, where a number of differential treatment effects are revealed. Of primary importance, there was a significant group x level x trial interaction, $\underline{F}$ (8, 120) = 2.14, $\underline{p} < .05$. This effect is plotted in Figure 1. Although the cell means failed to reach the critical Scheffé value, it can be seen that among level-one readers, DT subjects consistently improved more than SIT and control subjects with the amount of differential gain depending on the trial. In contrast, there were no differential group trends at reading level-two.

The group x trial x difficulty, $\underline{F}$ (16, 240) = 1.98, $\underline{p} < .05$, and the difficulty x level, $\underline{F}$ (2, 60) = 12.26, $\underline{p} < .01$, effects were also significant. The greatest mean

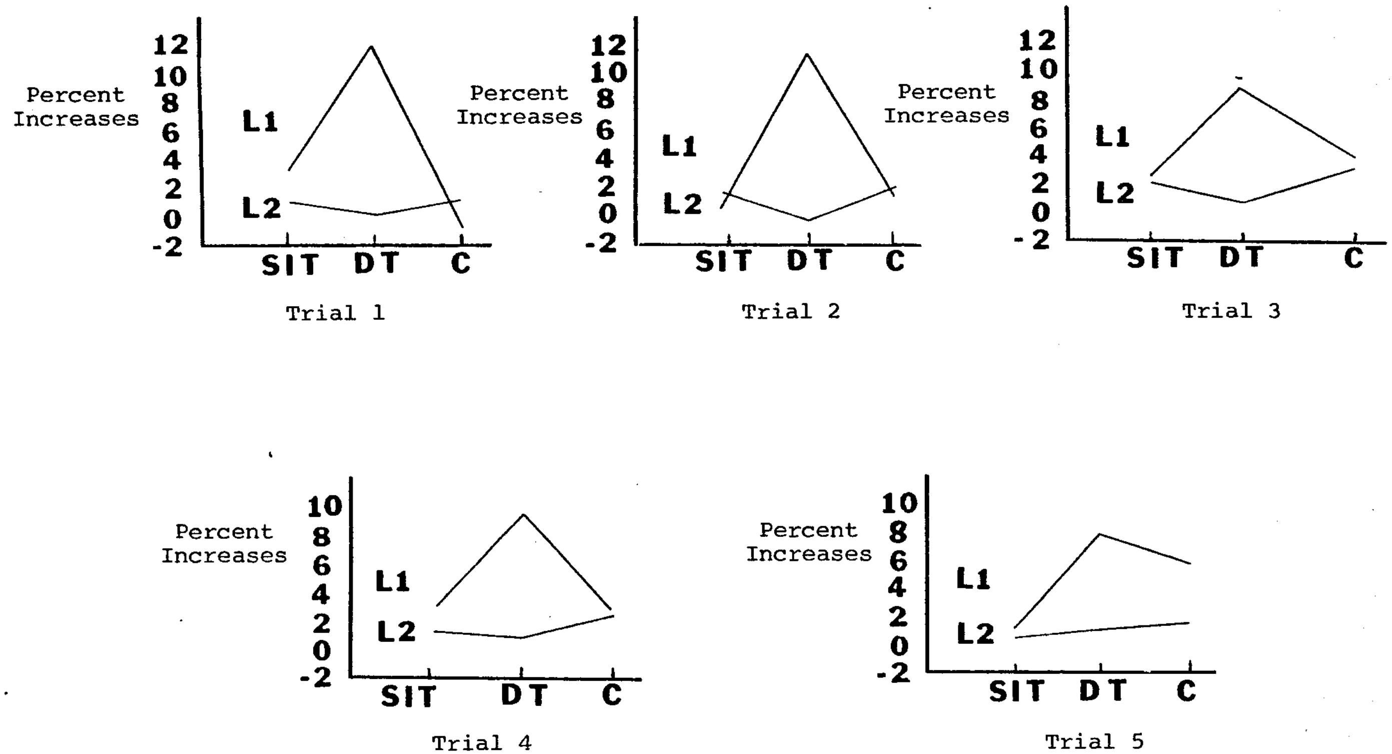

Figure 1. Group x level x trial differences in percentage correct oral reading gains on the attentional-reading task.

difference relating to the former effect indicated that on trial one, at the highest difficulty level, DT subjects ($\underline{M}$ = 7.7) again increased more than control ($\underline{M}$ = -3.5) and SIT subjects ($\underline{M}$ = -2.5). The Scheffé multiple comparison test of the difficulty x level interaction indicated that subjects in the lower-reading level increased significantly more at the intermediate ($\underline{M}$ = 9.6) as opposed to the instructional ($\underline{M}$ = 3.7) and very difficult levels ($\underline{M}$ = 1.0); there was little differential increase across difficulty levels ($\underline{M}$ = 1.1, 1.1, and 1.4) for the higher-level readers.

Table 14 also provides the pretest score analysis of correctly underlined reading targets. There was a significant level x trial effect, $\underline{F}$ (2, 120) = 5.79, $\underline{p}$ <.01, with the multiple comparison test indicating that relative to reading-level-one subjects, level-two subjects correctly identified more phonetic sounds ($\underline{M}$ = 80 vs $\underline{M}$ = 57) and target words ($\underline{M}$ = 93 vs $\underline{M}$ = 81) but not word phrases ($\underline{M}$ = 91 vs $\underline{M}$ = 87). There were no group differences nor was there any effect of passage difficulty.

Inspection of the data suggested that, although some children did poorly on the phonics trial, generally subjects either performed this aspect of the task well or haphazardly, omitting underlining whole sections of a passage. The underlining, it seems, was a novel but perhaps not very difficult requirement; the gain score analysis (Table 15) indicated, moreover, that there were no group treatment effects on this measure. Considering the erratic variability in individual data, it is not surprising that the percentage of correctly underlined reading targets also did not correlate with oral reading performance (Table 16). Although it is unclear whether the task of underlining enhanced attention during reading, it apparently could be omitted without affecting reading processes.

Finally, however, a repeated measures analysis (Table 17) did reveal some significant overall pre-post changes in correctly identified targets, interacting again with the trials factor, $\underline{F}$ (2, 60) = 5.90, $\underline{p} < .01$. This interaction is plotted in Figure 2. The Scheffé post hoc test indicated that across groups, the students identified more phonetic sounds at the posttest with the increases in target words and phrases not reaching significance.

In summary, there were only a few modest changes on the attentional-reading test. Across groups, students increased the number of phonetic sounds they were able to identify correctly while reading. The only treatment change relating to difficulty level suggested that, on the initial trial, direct training subjects performed better than both SIT and control students at the most difficult reading level. In addition, direct training subjects at the lower-reading level significantly improved their oral reading performance more relative to the other groups on the earlier trials. Perhaps a useful alternative perspective for evaluating the superior if

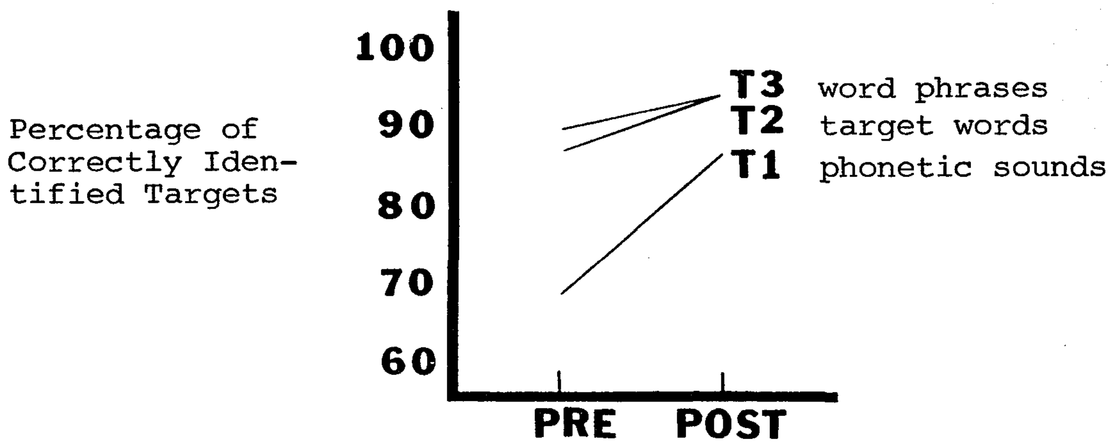

Figure 2. Pre-post changes in the percentage of correctly underlined targets.

moderate gains of this group is to describe the number of subjects per condition that clearly increased their overall oral reading performance. Paralleling the statistical results, four direct training students at the lower-reading level improved their reading an average increase of 8%, although only one subject each in the corresponding SIT and control groups met this individual improvement criterion.

Selected transfer passages. A MANOVA was employed to conjointly analyze the percentage-correct oral reading and comprehension measures on the selected transfer passages, with subsequent univariate analysis also being performed. These analyses of the subjects' pretest scores are provided in Table 18. The multivariate results indicated a significant level, approximate F (2, 59) = 34.35, $p < .01$); difficulty, approximate F (4, 118) = 19.20, $p < .01$; and difficulty level interaction, approximate F (4, 118) = 5.38, $p < .01$. Examination of the univariate findings, however, suggested that the two dependent variables contributed somewhat differentially to these effects.

The percentage-correct oral reading results matched those of the multivariate analysis. Post hoc testing of the significant difficulty x level effect, F (2, 60) = 9.69, $p < .01$, indicated that the three difficulty levels (M = 91, 84, and 71) differed from one another at reading level-one but not at level-two (M = 95, 92, and 88). Only the difficulty effect reached significance on the comprehension measure, $\underline{F}$ (2, 60) = 6.69, $\underline{p} < .01$. As confirmed by the multiple comparison test, the students clearly answered more comprehension questions correctly on the instructional reading passage ($\underline{M}$ = 80) than on the difficult ($\underline{M}$ = 68) or very difficult ($\underline{M}$ = 64) levels. There were no pre-existing group differences on either dependent variable.

Gain score analyses (Table 19) of the selected transfer passage measures were then examined to identify any differential treatment effects. Disappointingly, however, there were no significant effects on the MANOVA or on either of the two univariate analyses. Repeated measures analyses, therefore, were undertaken again to identify any overall pre-post changes (Table 20). The repeated measures MANOVA did reveal a significant pre-post effect, approximate $\underline{F}$ (2, 59) = 15.20, $\underline{p} < .01$. To identify how the two dependent variables may have contributed to this result, the univariate analyses were examined. Only the comprehension measure showed a significant overall change, $\underline{F}$ (1, 30) = 19.45, $\underline{p} < .01$. Across groups, the students increased the percentage of comprehension questions answered correctly from a mean of 70 to 81%.

<u>Spache reading scales</u>. The standard Spache scores (i.e., word recognition grade level, instructional reading grade level, and total phonic skills) provided an index of overall reading performance and were analyzed together. Table 21 lists the multivariate and subsequent univariate pretest analyses of these scales. The MANOVA indicated the

expected significant effect for reading level, approximate $\underline{F}$ (3, 28) = 18.93, $\underline{p} <.01$. This result, moreover, was replicated for all three dependent measures. Reading-level-two subjects relative to those in the lower-reading group achieved higher word recognition scores ($\underline{M}$ = 4.8 vs 2.0) obtained a generally higher reading grade level ($\underline{M}$ = 4.9 vs 1.6), and had more phonetic skills ($\underline{M}$ = 104 vs 68) in their reading repertories. There were again no pre-existing signigifcant differences between the groups on any of these measures.

Table 22 presents the multivariate and univariate gain score analyses of the Spache scales. The MANOVA indicated significant effects for level, approximate $\underline{F}$ (3, 28) = 5.90, $\underline{p} <.01$; group, approximate $\underline{F}$ (6, 56) = 2.42, $\underline{p} <.05$; and level x group, approximate $\underline{F}$ (6, 56) = 2.29, $\underline{p} <.05$. Examination of the following univariate analyses suggested that the three dependent measures had contributed cumulatively as well as differentially toward these significant results.

On the reading grade level variable, there was an effect for reading level, $\underline{F}$ (1, 30) = 9.05, $\underline{p} <.01$, with higher-level reading subjects having gained significantly more ($\underline{M}$ = .48) than those at the lower-reading level ($\underline{M}$ = -.07). There were, moreover, clear trends for the level x group effect on both word recognition, $\underline{F}$ (2, 30) = 2.88, $\underline{p} <.10$, and reading grade level, $\underline{F}$ (2, 30) = 2.53, $\underline{p} <.10$, measures. These interactions are depicted in Figure 3. Additively,

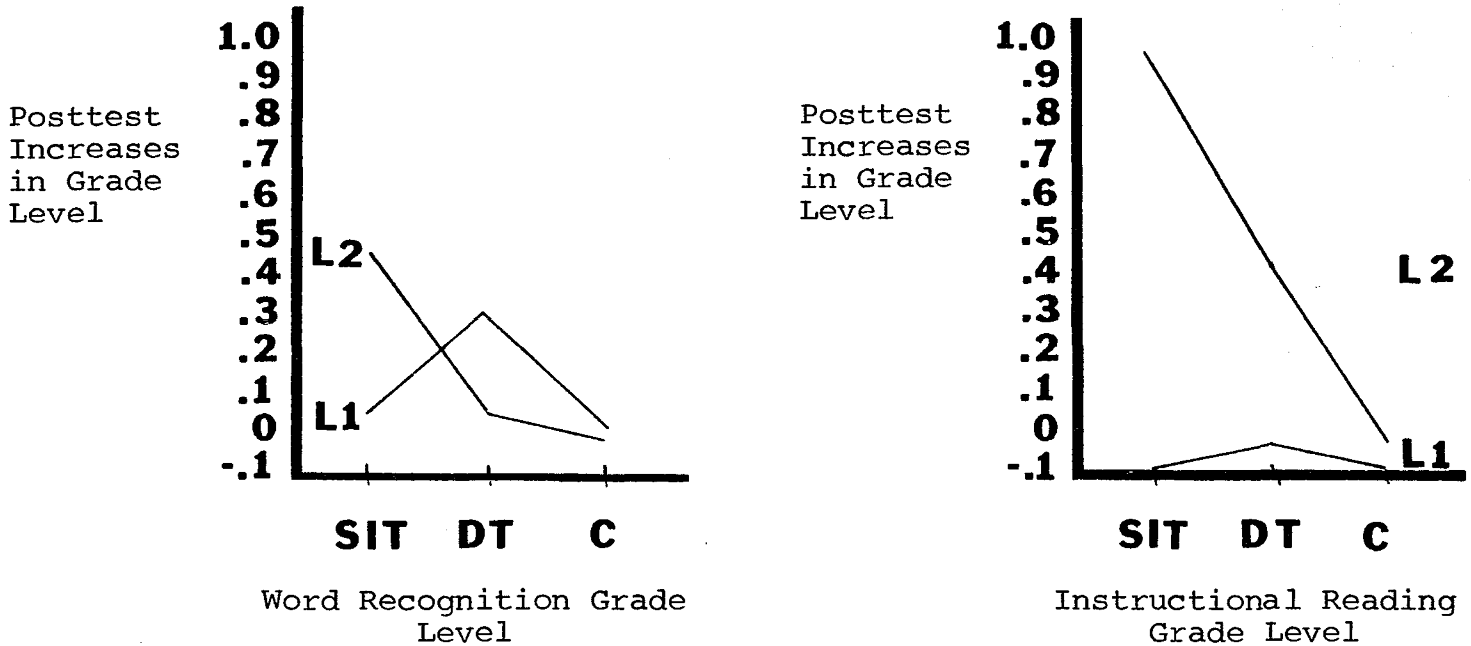

Figure 3. Group x level differences in grade level gains on the Spache Diagnostic Reading Scales.

they apparently produced the significant MANOVA result. For both variables, the greatest mean difference occurred at reading level-two where SIT subjects gained appreciably more than controls; there were no treatment effects at reading level-one.

A different pattern of results was obtained on the phonics measure. There was a significant effect again for level, $\underline{F}$ (1, 30) = 7.15, $\underline{p} < .05$, but on this section of the test, reading-level-one subjects gained more ($\underline{M}$ = 15) than those at the higher-reading level ($\underline{M}$ = 5). There was also a trend for group, $\underline{F}$ (2, 30) = 2.66, $\underline{p} < .10$. This effect is plotted in Figure 4, showing that on the average the DT and control subjects increased considerably more in phonetic skills than students in the SIT condition.

Unlike the attentional-reading test and selected transfer passage measure, the analysis of the Spache scales suggested a SIT effect. Among the higher-level readers, all the SIT students gained five months or more on the reading grade level and/or word recognition scales. Inspection of the individual data for these subjects showed that compared to the DT group, more SIT subjects increased in word recognition while their increases on the reading grade level measure were greater, thus accounting for the graphically presented mean differences.

These superior gains of the SIT group, however, did not hold for the phonics measure. The individual data indicated

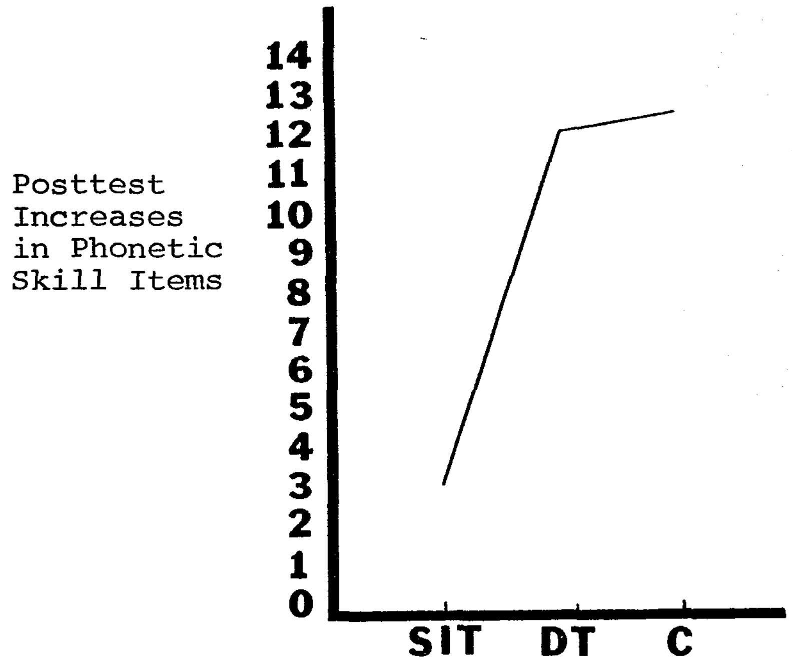

Figure 4. Skill increases on the phonics section of the Spache Diagnostic Reading Scales.

that in this area, interestingly, the SIT subjects did not improve. This was particularly true in contrast to the other groups among the lower-reading-level students for whom phonics perhaps were more relevant. Specifically, no lower-level SIT subject gained more than ten phonics items, although five out of six subjects in both the comparison DT and control groups did so.

Age Analyses

The matched groupings of subjects also were rearranged for analysis so that the students were blocked by age. Gain score analyses then were conducted again for both the attentional-reading test and the Spache Diagnostic Reading Scales. Table 23 provides the age analyses for the attentional-reading measures. On the percentage-correct oral reading measure, only the group x trial x difficulty interaction remained significant, F (16, 240) = 1.85, $p < .05$. Paralleling the earlier analysis, DT subjects(M = 7.7) increased more than SIT (M = -2.5) and control subjects (M = -3.5) on the first trial of the most difficult passage. A significant age x group effect also appeared, F (2, 30) = 4.05, $p < .05$, for the percentage of correctly underlined targets. The greatest mean difference was between younger control students who improved their performance more from pre to post (M = 24) than similarly aged SIT subjects (M = 6). There were no significant differences among the older children.

The gain score analyses by age of the Spache scales are presented in Table 24. As before, both multivariate and univariate analyses were employed. The results again indicated that with age as the blocking factor, there were no significant effects. Although the cell means for the word recognition and instructional reading grade level measures were in the same direction as before, the differences were smaller in magnitude. Finally, the greater association of reading grade level versus age with improvements on the Spache also was demonstrated correlationally. Among SIT subjects, the combined increases in word recognition and reading grade level correlated highly (r_{xy} = .79) with reading level on the Brigance but only moderately (r_{xy} = .36) with age.

<u>Teacher Effects</u>

The test data also were examined for possible teacher effects, with experimental subjects nested in an instructor factor. Analyses of teacher differences in gains on the attentional-reading test are listed in Table 25. On the percentage-correct oral reading measure, both the instructor x difficulty, $\underline{F}$ (10, 36) = 2.14, $\underline{p} < .05$, and the instructor x trials, $\underline{F}$ (20, 72) = 2.05, $\underline{p} < .05$, interactions were significant. Although the multiple comparison test failed to reach significance, a consistent picture emerged. Instructor Four's students improved more than those of Instructor

Three, but the size of the difference varied with the difficulty level of the passage and the trial. The two greatest mean differences among the significant interactions both occurred between these two teachers at the intermediate difficulty level ($\underline{M}$ = 18.75 vs $\underline{M}$ = .25) and the first trial ($\underline{M}$ = 15.67 vs $\underline{M}$ = -2.50). In contrast, there were no teacher differences involving the percentage of underlined reading targets.

Table 26 provides the corresponding analyses of possible teacher differences on the Spache. Although no major differences were revealed, there was a trend, $\underline{F}$ (5, 18) = 2.19, $\underline{p}$ <.10, for Instructor Six's students to have increased more ($\underline{M}$ = .98) than Instructor Four's ($\underline{M}$ = -.30) on instructional grade level. Considering the small sample size, these analyses appear suggestive of the importance of instructor effects.

Correlational Findings

A final area of data analysis involved correlating gains on the attentional-reading test and Spache scales with suggested predictors of improvement. Most importantly, Pearson correlations were computed between the self-instructional measures obtained and increases in test performance. These correlations are presented in Table 27. There was no clear relationship between self-verbalizing, either on the attentional-reading posttest or spontaneously through training, with improvements on any of the test measures. In fact, for level-one SIT subjects, a negative association ($r_{xy} = -.80$, $p < .05$) was found between self-verbalizing during the attentional-reading posttest and phonetic gains on the Spache. The two self-verbalization measures were related at the lower-reading level ($r_{xy} = .81$) but independent at level-two ($r_{xy} = .27$).

Given the suggestion that impulsive children might benefit the most from attentional training, correlations also were calculated between the test gains and a measure of impulsivity. For each subject, an impulsivity score on the MFFT was derived by dividing the child's total number of errors by the sum of his latencies. Correlations involving this measure are listed on Table 28. The only finding was a trend ($r_{xy} = .68$, $p < .10$) among SIT subjects for impulsivity to be associated with increases on the Spache word recognition scale.

Summary of Major Results

At this point, the major findings of the study will be reviewed. On the attentional-reading test, the DT subjects in the lower-reading-level group improved more in percentage correct oral reading than corresponding SIT and control subjects, with the extent of differential gain depending upon the trials factor; the greatest differences occurred on the earlier trials. Similarly, subjects in the DT group increased relatively more at trial one on the most difficult reading passages. In terms of underlining reading targets, there was an overall increase across students in correctly identifying phonetic sounds, but no differential treatment effects on this measure, which did not correlate with oral reading performance.

Oral reading and comprehension on selected passages also were examined as a measure of transfer. The only significant result, however, was that, across groups, students increased the percentage of comprehension questions answered correctly.

The most noteworthy finding involved the Spache Diagnostic Scales which were used to measure the overall effects of the treatments. Among the higher-reading-level students, SIT subjects gained more than those in the DT and control groups on both the word recognition and reading grade level measures, cumulatively resulting in a significant multivariate level x group effect. In contrast, subjects in the lower-reading-level group gained more on the phonics section of the test, with a clear tendency for the SIT group to have increased the least in this area.

Blocking the subjects by age as opposed to reading grade level substantially affected the pattern of group differences obtained. Presumably because of increased variability, a clear pattern of differential improvement across trials for young DT students was not evident on the attentional-reading test. The correlation between age and improvements on the

Spache was additionally found to be considerably smaller than that involving reading grade level. Consequently, the Spache results, while in the same direction, also failed to reach significance. There was some indication of instructor effects on both tests.

Finally, the correlational data largely indicated that there was no relationship between the self-instructional measures obtained and improvements on the attentional-reading and Spache tests. Among the lower-reading-level SIT subjects, self-verbalizing was actually negatively correlated with phonics gains.

CHAPTER V

DISCUSSION

The present study provided a controlled evaluation of the effectiveness of attentional-reading training in increasing the reading performance of learning disabled children. Although the findings are probably best described as mixed, some evidence for a facilitative effect of self-instructional training was found, at least among moderately competent readers. This chapter will discuss and further interpret various aspects of the study, and is divided into four sections: (1) the process of self-instructional training and related self-verbalization data, (2) the specific test findings, (3) conceptual and pragmatic implications of the evaluation, and (4) future directions in the self-instructional area.

In the first section, the difficulties and time investment in teaching learning disabled children to self-instruct particularly are stressed, along with the absence of transfer. The data are interpreted, however, as showing that the self-instructional training provided was moderately successful, and it is pointed out that the fact that SIT subjects actually read fewer passages makes the positive effect for higher-level readers all the more intriguing. The second section reviews the pattern of specific test findings in more detail. Although the level-one DT subjects showed some modest gains on the earlier trials of the attentional-reading test, the percentage-correct measure proved insensitive to treatment effects among the higher-level readers, presumably because of ceiling effects and excessive variability. Similarly, the Spache phonics score was most affected at the lower-reading level with DT subjects again showing the greatest degree of improvement. Failure to replicate the impressive results of Heiman et al. (1973) was attributed to setting differences and particularly, the present use of massed training sessions. It is argued further that the appreciable increases shown by level-two SIT subjects on both Spache word recognition and reading grade level measures may be considered verdical due to the use of matching, random assignment and blind assessors. In summarizing the suggestion will be made that the above pattern of results is best interpreted within the context of a stage model of reading acquisition.

The remaining sections strive to assess further the present project in terms of existing findings and directions in the current SIT literature. Conceptual and pragmatic implications of the study are reviewed in a third section. These include (a) evidence for theoretical perspectives suggesting both detrimental and facilitative SIT effects with competence seen as an important moderator of outcome; (b) correlational data in keeping with other studies finding no relationship between overt self-guiding speech and performance, and together, questioning a regulatory-mediational perspective; and (c) limitations of the present investigation, especially the small cell sample size, lack of follow-up, and inability to address the question of how positive SIT effects are mediated. In regard to the latter issue, existing literature is reviewed as hinting that self-instructions might "work" through a variety of conceptually inter-related means; they may decrease impulsivity, increase structure and positive task orientation, provide the child with a planful approach, help him/her remember the goals/desired outcomes of actions, and prompt or teach ways of coping with failure and rewarding success. Finally, the last section suggests some important future research directions. Prominent among these are basic research efforts to increase our understanding of the psychological processes involved in academic tasks, applied research directed at improving treatment procedures and tailoring them to achieve and document replicated clinical improvements in controlled single cases, and lastly, developmental research on how children naturalistically use private speech and approach various learning tasks.

Self-Instructional Training and Self-Verbalization Data

Self-instructional training has been advanced as a method to enhance the effectiveness of direct training and also to increase generalization. As documented in the literature reviewed above, however, evidence for these effects is still limited; moreover, until very recently, what has not been emphasized enough by proponents of self-instructional training is how extremely difficult it is to teach learning disabled and/or hyperactive children to employ self-guiding speech. Although investigators have commented on the difficulty of training self-verbalizations (Higa, 1973; Robin et al., 1975), the present writer came to appreciate the problems involved only by directly observing and working with the children. It may be helpful to briefly discuss some of the difficulties encountered.

To begin, the attentional deficits of these children apply as well to learning self-instructions as they do to academic material. The child must attend to the model, to where he or she is in the task, to cues to self-instruct, etc. For this reason, some children needed special structuring and environmental contingencies. The subjects also raised many--what might be termed--"affective" objections to the training. They felt shy or embarrassed to self-verbalize out loud; for example, one child instructed to say, "I'm doing well," replied, "I can't say that." Another told his instructor, who was demonstrating the use of a coping statement, "You don't have to make an error; I know you can read it."

Other problems had to do with the process of self-instructing itself. The self-statements of several children remained rather mechanical. It was particularly difficult to enter the conceptual-language system of the younger children; for instance, it was probable that some of the subjects had an incomplete or different understanding of the concept of "attention," so the instructors had to try to use as many synonyms as possible. Occasionally, self-instructions were observed that were not under appropriate stimulus control, i.e., they occurred in the wrong context. A blatant example might be stating, "I'm doing fine," after a missed word.

Finally, just verbalizing even appropriate task-related guiding speech does not assure the corresponding behavior. One instructor succinctly captured this possibility in his observation that John would sometimes state, "I need to look closely," and then proceed to read carelessly. For these children, verbal behavior not only is, but can remain, an independent behavioral stream. In this regard, O'Leary and Dubey (1979) have correctly pointed out the importance of considering the subject's reinforcement history as it relates to the relationship between saying and doing; a small but interesting literature on this question already exists (Israel, 1978; Israel & O'Leary, 1973; Risley & Hart, 1968).

Given the extent and seriousness of the difficulties involved in teaching self-instructions, it is reasonable to question whether teaching effort is best expended in this manner. Ultimately, accumulated outcome data on the effectiveness of SIT programs will decide this issue. Currently, a balanced discussion requires pointing out that there also are some very positive moments in training. In the present study, a child who came across an unknown word was observed on a particular occasion to "light up," saying very meaningfully, "Sound it out"; it was as if he had acquired a new insight. Upon observing a student stating, "I'm doing better," and smiling, one can not help but think that there are positive implications for the child's self-concept and subsequent performance. Such reinforcing moments no doubt serve to support the assumption that efforts at self-instructional training are worthwhile. The challenge is to develop more effective training procedures that complement the development and needs of the children involved (Kendall, 1977).

Robin et al. (1975) have made the related argument that self-instructing decreases the amount of time available for academic work. In their study, the amount of practice actually was controlled by yoking subjects in the experimental groups. The current findings regarding the extent of reading training, however, support this argument. Throughout training, SIT subjects read fewer passages than their DT counterparts. Among the higher-level reading group, for example, the SIT students completed an average of only 114 reading trials as compared to 142 trials for the DT group. Rather than providing still another difficulty with self-instructional training, however, this differential effect on reading practice makes the obtained positive SIT effect for reading level-two subjects all the more intriguing. There is apparently something about learning self-instructions that is more powerful than "more of the same."

With this background, the self-verbalization data collected in the present study may be examined for their possible import. It should be recalled that the subjects' verbalizations during the attentional-reading test were recorded and reliably classified by intervals into distinct speech categories; moreover, teacher recording sheets on unprompted or spontaneous self-verbalizations during training also were available. The following specific points regarding these data appear to be conceptually important: self-verbalization as taught was certainly not an ecological component of the reading task; among SIT subjects, self-verbalizing often failed to generalize to the test situation; in the context of the present task, there was no clear difficulty effect on private speech; and lastly, the process data on spontaneous self-verbalizations indicated that the self-instructional training provided at least was moderately successful.

First, inspection of the findings for the DT and C students revealed little or no naturally occurring, overt, self-guiding speech. The fact that reading itself occurred in the majority of intervals is reminiscent of Roberts' (1979) naturalistic study. General self-regulatory statements of the type trained appear conspicuous in reading by their absence. While these findings are clearly a function of the academic nature of the task (Fuson, 1979), to dismiss them as merely such is to misunderstand reading's significance to applied instructional programming. Such naturalistic data question the ecological validity of models purporting to underlie self-instructional programming in the classroom (Roberts & Dick, in press). On the other hand, some overt self-instructions may be beneficial, to particular children with attentional problems, precisely because such self-administered cues are not part of the student's usual strategic approach to reading.

In keeping with the evidence offered by other investigators (Camp et al., 1977; Robin et al., 1975), the present verbalization data for the most part showed a lack of generalization of self-instructional skills. Only half of the SIT subjects continued to emit self-instructions on the attentional-reading task; none of the students was observed to self-verbalize during the Spache test. The fact that more subjects did not self-verbalize on the attentional-reading posttest was surprising, given its designed similarity to the training materials and considering that the teachers themselves administered this test. Although theoretically this finding may be interpreted from the perspective that private speech would be expected to go underground as the task became overlearned, it seems more likely that the minimal prompts contained in the instructions were insufficient cues to "hook" self-verbalizing. A major difference between training and test conditions was also the absence of reinforcement chips in the latter. To the extent that the instructor created (or the student perceived) a relationship between self-verbalizing and the token reinforcement, transfer might have been impeded. There was no obvious relationship between self-verbalization and age, reading level, or instructor.

In addition, the data showed no consistent effect of increasing passage difficulty on the various speech categories. A few selected subjects in the different treatment groups did seem to show an increase in social speech, likely indicating increased requests for assistance. Of the six SIT students who continued to self-verbalize, four showed a decrease, one an increase, and another no change in self-guiding speech at the very difficult level. The greater reading difficulty of these passages, if anything, interfered with using self-instructions. Interestingly, Roberts (1979) also found no effect of difficulty on task-relevant speech, although he was able to describe differential patterns of strategy and evaluative statements depending on the competence of the child. In this connection, it also might be pointed out that by requiring oral reading, the present study did not allow for a differential effect of difficulty on the one particular type of task-related speech (i.e., reading aloud) for which Roberts' (1979) naturalistic study found an elevation effect. Additionally, some problems with the difficulty manipulation in the current study are discussed below.

Finally, however, the training data regarding "spontaneous" self-statements did indicate that the self-instructional training provided was at least moderately successful. Overall, SIT students were verbalizing at least some self-statements unprompted, on an average of 75% of the training days. At the completion of training, a successful self-verbalizer was emitting probably five or six self-statements (albeit two before beginning) per reading trial, and still receiving one or two occasional prompts. There was some indication in the data that the reading-level-two subjects were somewhat more proficient at self-verbalizing. As these students were generally older, having more cognitive maturity as well as fewer reading difficulties, such an effect appears very understandable. Perhaps more in need of explication, there were additional differences in the relative frequency of days the various self-statements were verbalized spontaneously. Coping statements occurred the least frequently, with preparatory self-instructions occurring more often than sound it out statements. Although all the statements were introduced by the fifth day, it is true that the students had less practice with the latter self-instructions, a fact which may account for the lower use of coping statements.

It may be, moreover, that the lower frequency of both coping and sound-it-out statements is actually an artifact of the requirement that the appropriate use of both these self-instructions presupposes error and/or difficulty. There may have been less opportunity, then, for the subjects to learn and emit such verbalizations unprompted.

Specific Test Findings

The pattern of mixed results on the test measures suggested that they were differentially sensitive to program effects depending on the reading level of the students. The attentional-reading test was seemingly most responsive to changes among the lower-reading-level subjects. The DT students at this level improved more in percentage-correct oral reading on the earlier reading trials than those in both SIT and control conditions; the attenuating influence of trials presumably is due to the trend on the attentional-reading task for students to make the most errors on trial one. The changes were modest; but, given that the only difference between DT and SIT conditions was the inclusion of training in self-instructions, the failure of SIT subjects to evidence similar gains suggests that at this reading level, self-verbalizations may interfere somewhat with learning reading skills.

Unfortunately, the relative improvements in percentage-correct oral reading that the DT subjects showed on the attentional-reading test were not found, or did not generalize, to the selected transfer passages. The transfer measure may have been less responsive for several reasons. A trials factor was not included in the analysis; moreover, the reading selections consisted of regular prose and, therefore, may have been more difficult. In fact, the only significant finding on the selected transfer passages was an overall increase in the percentage of comprehension questions the students answered correctly. This was presumably an effect of testing, or perhaps of nonspecific factors associated with overall program involvement.

Among reading-level-two subjects, the percentage correct oral reading measure on both test and transfer passages showed little change, seemingly insensitive to other evidence of reading gains. There was considerable variability among these data, and the result probably reflects the fact that many of the higher-level readers were penalized by a partial ceiling effect. For example, it turned out that, on the attentional-reading test, the reading-level-two subjects averaged 95% correct on the instructional and intermediate passages. A more general problem with the percentage-correct measure itself may have been low to moderate test-retest reliability. In the present study, interrater reliability for the attentional-reading test scores was calculated with grade level passage equivalency assumed based on the widespread practice of designing oral reading inventories (Betts, 1957). The variability obtained suggests that the reliability of such inventories should be investigated further.

The difficulty manipulation was only moderately successful. Pretest analyses showed that on both the attentional-reading test and the transfer passages there was a significant interaction such that a difference in average percentage of words read correctly on the selections occurred only at the lower-reading level; albeit there was an overall effect for comprehension on the transfer passages. Several problems became apparent in attempting to uniformly adjust reading difficulty. Some of the lower-level children were essentially nonreaders, and therefore showed little performance change from preprimer to primer passages. On the other hand, some of the more proficient readers consistently maintained 90% correct through the eighth grade reading level; their comprehension, of course, decreased dramatically. As alluded to above, there did not always appear to be a correlation between supposed grade level of the passage and the percentage-correct measure. Finally, it was interesting that even children reading at roughly the same grade level showed markedly different patterns of change in oral reading performance when confronted with increasingly difficult selections. A number of students demonstrated a gradual decline in percentage correct, while for other children it was as if their reading suddenly fell apart at a given level, with a dramatic drop in performance. This observation itself would seem worthy of further study to better understand both reading acquisition and the task-approach strategies of learning disabled children.

In regard to the current study, however, although the difficulty level of academic tasks conceptually would still seem to be an important factor in considering the possible effectiveness of self-instructional training (O'Leary, 1980), the results unfortunately offered little additional information regarding this issue. No SIT effect was found on the percentage-correct measures, with the only significant effect involving difficulty--again suggesting some interference, in that DT subjects improved more than both SIT subjects and controls on the initial trial of the most difficult reading passage.

It was disappointing that the percentage of correctly underlined reading targets failed to be a heuristic measure of either training effects or attentional processes. Generally, students either underlined accurately or not at all, with the percentage of correctly underlined targets unrelated to their oral reading performance.[3] At posttesting, however, there was a significant increase in correctly identified phonetic sounds averaged across all groups. The gains no doubt resulted from increased familiarity with a novel task. The initial higher level and therefore smaller increase in both identified target words and phrases would appear to have been a function of their increased salience.

The lack of change among reading-level-one subjects in Spache word recognition and oral reading grade level suggests that these standardized measures were insensitive to any minor gains that the low DT group may have made. Conversely, the increases in phonics reaffirm this area's relevance to reading acquisition for beginning readers. The lower average gain on the phonics measure for the more advanced readers may be interpreted again as the result of a ceiling effect operating at this level.

Upon reflection, the fact that both level-one DT and control subjects increased in the phonics area is also not too surprising. The control students were actually a comparison group; as participants in the Summer Learning Program, they received some academic tutoring directed at specific behavioral objectives. Given their reading skill level, it is likely that phonics was a targeted teaching area. What is perhaps more noteworthy regarding this measure is that, once again at this reading level, teaching self-instructions apparently had an interference effect. There was a clear trend for SIT subjects to have improved less in this area.

Clearly, the most exciting result of the present evaluation was the finding of a SIT effect for the more advanced readers on overall reading performance as measured by the Spache. The pattern of gains on the three Spache scales interacted markedly with reading grade level. SIT students at the higher reading level increased appreciably more than controls and DT subjects on both word recognition and reading grade level measures, additively producing a significant multivariate effect.

The superiority of the SIT group among the higher-level readers provides some evidence for a specific facilitative effect of self-instructions. More reading-level-two SIT subjects increased in word recognition and additionally showed greater gains in oral reading grade level when compared to their DT counterparts. On the Spache, reading grade level is determined by both reading error and comprehension norms. Examination of the individual subject data revealed, however, that the increases shown by the SIT subjects were related to making fewer oral reading errors.

There were relatively less reading gains among level-two DT subjects, with the present evaluation generally failing to replicate the impressive results of Heiman et al. (1973). Because the current study was a systematic replication, any number of factors might account for the differences obtained. Heiman et al. (1973) employed traditionally nonacademic components (i.e., slide presentation of passages, castanets); also, in their study the same reading materials, almost tongue twisters, were used repeatedly in the attentional-training sessions. Perhaps the most crucial difference was that the supplementary training of Heiman et al. (1973) was spaced out through a school semester as opposed to occurring in a massed, twelve-day period. The present findings, however, do suggest caution in extrapolating from their results; certainly, the value of such attentional training needs to be demonstrated more convincingly with replication. The direct training literature reviewed earlier also indicated a definite need for additional evidence that direct training in attentional skills can enhance academic performance.

The current study's finding that training learning disabled students in self-instruction can improve the reading performance of moderately competent readers also probably should be taken tentatively, due to the small number of subjects involved. A number of arguments might be raised, however, as to why this finding may be considered a veridical result. The experimental subjects were well matched, with no pre-existing differences between groups. Blind assessors carried out the Spache posttesting. In addition, given that the SIT students actually read fewer training passages than those in the DT group, the instruction and requirement to self-verbalize apparently contributed something beyond sheer reading practice.

In the present study, an effort also was made to control for possible teacher effects; analyses of such effects were suggestive of the importance of teacher influence.[4] Possible explanations of the SIT gains in terms of nonspecific factors such as teacher enthusiasm would not seem likely. The teachers were instructed to follow the procedural protocols as carefully as possible, not favoring or expecting differential gains in either treatment group. The obtained results, moreover, would necessitate that any such explanation include the tenuous assumption that the teachers differentially applied this enthusiasm, e.g., for a new teaching method, depending on student reading level.

Finally, Lloyd and Kneedler (1979) also recently reported that having students verbalize a strategy for attacking words somewhat increased their accuracy in reading words presented on flashcards. This finding would seem to add additional support to the present word recognition results. In short, there are now at least eight studies in the literature suggesting that self-instructional training improves reading performance. Although various methodological problems might be cited with particular investigations, together these studies indicate that the phenomenon is probably a real one.

In summary, the specific test findings of the present evaluation perhaps are best interpreted in the context of contemporary stage models of learning how to read. The initial stage no doubt primarily is concerned with phonics learning and decoding. In support, the reading literature does seem to bear out that teaching phonic skills may be initially superior to various "whole word" teaching approaches (Chall, 1967). Self-instructional training, at least as operationalized in the current investigation, would seem to have little pedagogic value at this stage in the reading acquisition process. Later, however, other skills besides word decoding presumably ascend in importance and self-instructional training apparently does affect positively the processes involved here. At different levels, various sub-components of the reading process necessarily may become automatized with respect to the conscious deployment of attention (LaBerge & Samuels, 1974). This analysis and the absence of a SIT effect for the lower-level readers should not be interpreted as implying attention is unimportant to the beginning reader, only that attention must be deployed differently.

Relatedly, it sometimes is asserted that since the ultimate objective of reading is comprehension, one need not be concerned with phonics, or (more related to the present study) word recognition and other oral reading errors. This perspective, however, does not consider that the important processes in initially acquiring reading skills may differ from those significant in a mature reader. In the present study, no effects on comprehension were found even though some self-instructions involving the extraction of the semantic information from the reading passages were included on the fifth reading trial. This aspect of self-verbalizing the important points, however, was not emphasized, given the centrality of the attentional-reading task adopted from Heiman et al. (1973). Other workers, particularly Bommarito and Meichenbaum (1975), have tailored self-instructional training more toward comprehension skills with positive results. It would seem that the effect of self-instructions would depend on the specific reading task and type of self-statements trained.

Conceptual and Pragmatic Implications

The specific test findings reviewed above provided some support for theoretical formulations suggesting both facilitative and detrimental effects of self-verbalizations on performance. Reading competence proved to be an important moderator variable of outcome. The initial pretest analyses had confirmed, as expected, that relative to reading-level-one subjects, level-two students were reading at a significantly higher grade level on all the Spache scales, as well as more proficiently on the attentional-reading passages. Among these learning disabled but moderately proficient readers, training in self-instructions was clearly beneficial. The level-two SIT subjects showed the greatest gains on both the word recognition and reading grade level scales; given the aforementioned difficulties with the percentage correct measure, these variables were the most sensitive to reading improvement at this level.

In contrast, self-instructional training interfered with reading performance at the lower-reading level. Such interference was suggested by the level-one SIT subjects' failure to show an increase in percentage-correct oral reading on the earlier trials of the attentional-reading task, comparable to the lower-level DT subjects, and also by the general absence of phonic gains among SIT students. In regard to the latter area, the correlational findings revealed that those subjects who continued to self-verbalize on the attentional-reading posttest, and presumably had learned to self-verbalize the best, actually showed the smallest phonic gains and, therefore, apparently the most interference.

Other investigators (e.g., Higa, 1973; O'Leary & Dubey, 1979) have suggested the possibility that self-verbalizing might produce such interference, but heretofore, there was no clear evidence of this detrimental effect on an academic task. The exact nature of the interference remains unclear. Although the results certainly are interpretable within the framework of Bloor's (1977) limited capacity model, the specific response systems and/or processes involved (e.g., less attention to critical features, interference with memory storage) remain to be identified. The differential results among the lower-level students alternatively might just reflect the fact that the SIT subjects had less actual reading practice, perhaps more critical at this stage of learning to read.

That task competence rather than age best moderated the facilitative effect of SIT among the higher-level readers also was shown. Age analyses of the Spache gain scores obscured the differential effectiveness of the treatments; moreover, the combined increases in word recognition and reading grade level scores on the Spache were correlated much more highly with initial Brigance reading level than age.

The improvements found for the higher-level SIT subjects also can be considered clinically significant. Four of the six subjects in this group increased a year's grade level on either the Spache word recognition or the oral reading measure, with all the subjects gaining this amount when considering the scores combined. By including a DT control group, the present evaluation was able to highlight the previously presumed significance of self-instructions themselves. Along with several other SIT studies (Bommarito & Meichenbaum, 1975; Douglas et al., 1976; Glenwick & Barocos, 1979), these evaluation findings indicate that understanding the effects of SIT on reading indeed may be worthwhile.

Several limitations of the evaluation, however, should be mentioned. The small sample size and restrictiveness of the particular training task employed were pointed out previously. Unfortunately, it also was not possible logistically to obtain followup measures, as the children came from five different school systems. A review of the academic findings in Table 1 does provide some support for the maintenance of SIT effects. Bommarito and Meichenbaum (1975) and Glenwick and Barocas (1979) found continued significant differences at one-month and five-week followups respectively. One could argue, moreover, that SIT subjects actually might improve more with increasing time as several studies have uncovered a SIT effect on reading only at followup (Douglas et al., 1976; Parrish & Erickson, 1978).

The relative contribution that the various self-statements made also is, of course, unknown. Nelson and Birkimer (1978) have reported some data suggesting that self-reinforcement statements, in addition to self-guiding verbalizations, are important in the modification of impulsivity. In addition, in evaluating their cognitive-behavioral treatment for non-self-controlled children, Kendall and Wilcox (1980) found general or conceptual self-statements, as opposed to more task- or situation-bound concrete statements, to result in greater change and maintenance on teacher ratings of impulsivity and hyperactivity. Given the greater need for training specific strategies on academic tasks (Lloyd, 1980), it will be interesting to evaluate to what degree this result may be generalized to the academic area.

Lastly, the present study was not able to address the question of the mechanism by which self-instructions might have improved the reading performance of the more competent readers. Teaching children to self-verbalize appropriately is extremely difficult, and it is clear that the overt use of self-statements shows little transfer, dropping out quickly in the absence of considerable prompting and reinforcement. In related literature, Kendall and Finch (1979a) did report an increase in on-task verbal behavior accompanying self-instructional training for impulsivity; however, unlike the improvements shown on the MFFT, this change was not maintained at followup. In seeming opposition to the combined regulatory-mediational view, SIT investigators repeatedly have reported finding no relationship between overt self-guiding speech and performance (Camp et al., 1977; Robin et al., 1975), suggesting that overt verbalizations are neither necessary for, nor related to, test gains.

Research findings in naturalistic studies have been more mixed on this issue. In her review, Fuson (1979) concluded that the available data supported a generally positive relationship between performance and regulatory speech. For example, in the most relevant field study, Pechman (1978) observed 40 6½- to 10½-year-old children in their classroom settings. Thirty to forty percent of their speech was classified as self-guiding and reportedly involved the saying of words or numbers in various academic tasks. For students in the Piagetian transitional-operational period (roughly, first and second grade), the amount of self-guiding speech in the classroom was correlated positively with reading and mathematics achievement. These children would have been younger, although not learning disabled, and still reading at a lower grade than the level-two subjects in the present study. More recently, however, Roberts (in press), in his more highly controlled observational study, reported that verbalizations other than reading were unrelated to sentence completion performance when the choice words were difficult and actually negatively correlated when more familiar words were used. Setting, task, and code differences may account for the disparate results. Nevertheless, the absence of the expected relationship between self-verbalizing and performance in many studies demands reevaluating the proposed regulatory-mediational process as being responsible for positive SIT findings.

It is conceivable that the higher-level SIT students continued to self-verbalize task-relevant statements covertly. Even if one accepts this premise, however, knowing that a child has learned and continues to use the specific strategy taught remains a clinical and research problem. It was disappointing that the percentage of days unprompted self-verbalizations occurred did not correlate with reading improvement. Validating measures of the success of training appears critical. Process studies employing single subject designs and replicating findings across small groups of subjects might better elucidate the mechanism behind SIT effects. Along with the idea that the overtness of self-instructions may not be significant for the typical population of students in applied SIT programs, one might speculate that SIT, like new information or detailed instructions themselves, produces an essentially nonreversible impact. This assumption would obviate the use of reversal designs and highlight the need to develop creative research strategies for studying how exposure to SIT comes to affect a child's performance.

The suggestion that SIT affects primarily attentional skills remains only a good hypothesis. Some limited support for the impulsivity model was found here in that there was a trend for the MFFT impulsivity measure to be correlated with improvements in word recognition among SIT students. The most impulsive subjects tended to improve the most on this measure. Word recognition performance might better reflect a modified attentional style than overall reading grade level in that it would seem to involve fewer reading processes.

Finch and Spirito (1980) recently provided an excellent overview of the impulsivity concept, relating it to the classroom and presenting the rationale and evidence for applied SIT efforts to modify this stylistic aspect of behavior. Following Messer (1976), these authors interpret the available evidence as supporting the assumption that conceptual tempo is moderately stable and generalizable across tasks. Alternatively, however, impulsivity may be more situation specific. It is not clear empirically that those children who score the most impulsively on a test like the MFFT necessarily always rush through their classwork or make more attentional errors in reading. The possible specificity of impulsive or nonselective responding adds considerable complexity to studying this issue.

The major difficulty in the applied SIT literature, however, is that generally investigators lack a sophisticated psychological understanding of the academic tasks they most want to teach. It is easy to agree with Belmont and Butterfield (1977), that cognitive training is at its best when an independent and converging measure of the inferred, affected process (e.g., the serial position effect indicating rehearsal in the memory literature) can be provided directly. Unfortunately, there are as yet no such readily available indices of attentional processes in applied self-instructional programming; moreover, there are not likely to be such indices without greater knowledge regarding the tasks themselves.

Theoretical formulations pertaining to the effect of self-instructions on performance arose out of the Soviet tradition regarding the verbal regulation of behavior (Luria, 1961; Vygotsky, 1962) and reactions to it (Bloor, 1977). Experimentally, they have been concerned primarily with verbal-motor interactions. Attempts to explain the success of contemporary SIT programs have expanded conceptualizations about the possible effects of self-verbalizing. Fuson (1979) has suggested that the performance facilitation found in applied training studies is due to three kinds of effects: inhibition of impulsive responding, substitution of a strategically selected response, and the tying of verbalizations to subsequent behavior. The response inhibition might be due to the act and sound of vocalizing, but in the school-age child it probably relates more to semantic content. Inhibition alone, however, does not help the child select correct responses, attesting to the importance of teaching specific strategies as a mechanism of change. The last effect is based on observations that the typical children with whom SIT has been tried need help in coordinating their verbal and nonverbal actions.

Meacham (1979) also recently formulated a novel but interesting conceptualization of the effectiveness of self-instructional statements. He was concerned with accounting for the guiding function of private speech when the verbal activity often followed motor behavior. He hypothesized that such verbal activity assists in describing and remembering the anticipated goals and outcomes of actions. Actual outcomes can then be compared to those anticipated, and corrective behavior, if necessary, can be undertaken. Although the self-statements taught in applied instructional programs are meant to precede and cue nonverbal behavior, such an additional function as assisting memory and self-evaluative processes also might be considered.

Finally, in a thought-provoking paper, Meichenbaum and Asarnow (1979) have enumerated a number of specific effects self-verbalizations may have on cognitive tasks. Most directly, they may aid in organizing information in the task and assist the student in formulating alternative responses. Such statements may serve as verbal mediators and help in distinguishing relevant and irrelevant dimensions. Rehearsal also should increase memory storage and maintain a positive task-orientation. Lastly, self-statements might be expected to increase task-relevant behaviors in general and to present ways of coping with failure and reinforcing success.

These latter authors additionally have pointed out the possible significance of the metacognitive developmental literature for cognitive-behavior modification research with children. Metacognitive development may be described as the acquisition of knowledge about one's own cognitive processes, how they operate, and what constitutes their limitations. For example, in the area of metamemory, where most of this research has been focused, metacognitive development is knowing that a memory task becomes more difficult if one has to memorize two sets of similar words, having awareness of one's own recall potential, or appreciating that categorical rehearsal facilitates remembering.

Metacognitive development has to do with the executive processes or cognitive strategies by which a learner selects and guides his own thinking or more routine cognitive processes, in attempting to solve problems. In effect, it includes the development of such strategies as sizing up the task, planning, asking questions, and monitoring efforts, which are obviously central self-statements in current SIT programs. In fact, self-instructions may work partially by increasing a student's understanding of this need for a planful approach and by directing him or her to attend to what successful performance would require.

Relating specifically to the present study, Meichenbaum (1980) has cited some metacognitive reading research suggesting that children who manifest an academic deficit in reading fail to understand or employ the means, goals, and parameters of efficient reading. Children's understanding of attentional processes also has begun to be investigated (Miller & Bibi, 1976).

Although the parallel interests within these literatures may be very heuristic, there is a problem with this comparison. In the memory literature, for example, it is known that difficulty in recall increases with the number of items or that rehearsal helps, but generally such statements can not yet be made with the same certainty regarding self-instructions. This disparity demands again that along with studying children's understanding of tasks and the strategies taught, attention be paid to validating what are effective approaches and self-statements. Such research will lead, hopefully, to more effective programs as well as help elucidate the mechanisms behind their effectiveness.

In concluding this section, it should be mentioned that Meichenbaum and Asarnow (1979) have noted some implications for the future of self-instructional training. They argue that instructors might profitably develop more of a metacognitive perspective in their teaching and interactions with students, and that the educational curriculum itself be more concerned with the constructive processes involved in learning. When presenting academic material, for example, the teacher might have the students focus in detail on how they are going to approach the assignment. Experiences designed explicitly to teach metacognitive skills might be provided, along with playful reminders to use self-statements and specific strategies.

In keeping with the findings of the present evaluation, however, the current evidence for a legitimate pedagogic role for self-instructions, perhaps especially significant for exceptional children, remains still at the promissory stage. One can only agree with O'Leary's (1980) balanced evaluation of the field as needing "reasoned enthusiasm, comparative research, and creative application" (p. 94).

Future Research Directions

Concern over private speech and the verbal regulation of behavior has had a long history, considering Soviet theoretical writings. The scientific study of this area and the applied paradigm it generated, however, is merely beginning (Ziven, 1979). The literature reviewed above, as well as the experience of conducting the present evaluation, indicated foremostly the continuing need for more related basic, applied, and naturalistic research.

Laboratory studies might be directed at better understanding the psychological processes involved in task performance, especially academic ones. In order to teach successfully effective cognitive strategies and self-statements to exceptional children, there must be an increased emphasis on task analysis. As suggested above, the effects of self-instructions on reading might be better integrated with current theories and models of the reading acquisition process (Gibson & Levin, 1975; LaBerge & Samuels, 1974). This appears to be an area in which cognitive behavior therapists might collaborate effectively with the research psychologists working within an information-processing framework. A sample research problem, uncovered in the present project, might be that of investigating the different patterns of oral reading performance the students showed when confronted with increasingly difficult reading material. The distinct sudden drop versus gradual deterioration of performance certainly is suggestive of differing strategies or reading processes. The subjects who maintained their reading performance may have been more phonetic readers; however, personal or motivational variables relating to persistence also may have been involved. Whatever the eventual explanation, the question would seem to be an important one.

Some needed objectives of continued applied research are to improve the effectiveness of current training methods and the overall precision with which SIT programs are now employed. Failure to obtain generalizable SIT effects may be considered at some level to be due to 'experimenter deficiencies'

(Meichenbaum & Asarnow, 1979), but SIT researchers need to take the lead in designing successful and replicable training procedures. Videotapes of students self-verbalizing appropriately while working on their academic assignments might be developed. This technique would allow greater standardization of the cognitive modeling component, and could be followed by an overt rehearsal phase in which particular strategies and self-statements geared to specific academic lessons could be practiced.

Studies examining how self-instructions can best be combined with other teaching procedures also would be desirable. It was clear in the current project that effectively working with some children necessitated structuring and contingencies. Nelson (1976) and Kendall and Finch (1978) have provided some evidence for employing response cost in conjunction with self-instructions in the modification of impulsivity. Meichenbaum (1977) has suggested that structured play and imagery procedures be investigated. In designing such treatment packages, however, it is important to remember that more does not necessarily equal better. Recall, for example, that Parrish and Erickson (1978) found that providing instruction in scanning, as well as a typical SIT program, offered no advantage over either treatment alone.

Research aimed at better determining when teaching self-instructions might be beneficial and the type of training needed would increase the precision of current SIT programs.

The present evaluation project highlighted the importance of task competence as a general moderating variable. As indicated in the literature, the type of task itself also would seem to be critical. Future research needs to assess the significance of the extensiveness of attentional processes in the task's performance as well as task difficulty.

Given the accumulated research findings regarding the narrow generalization of self-instructional training and the selectivity of treatment effects (Keogh & Glover, 1980), increased emphasis additionally should be given to the type of training one needs to provide in order to produce a particular outcome. For instance, if one is interested primarily in affecting classroom personal-social behavior, it would seem imperative to include interpersonal problem situations in training; research experience and data suggest that this is in fact true (Kendall & Wilcox, 1980). Similarly, influencing reading comprehension optimally will require no doubt different training experiences than those designed to reduce word recognition errors. There is, in short, a need for better assessment and classification of the cognitive behaviors and strategies psycholoigsts and educators wish to teach (O'Leary, 1980).

Still another area in which applied studies could increase the effectiveness of self-instructional training is by identifying children most likely to benefit (O'Leary & Dubey, 1979). Perhaps expectedly, Leon and Pepe (1978) have reported that their learning disabled subjects profited more from the self-instructional training provided than did educable mentally retarded students. Much of the current literature has involved heterogeneous groupings of children labelled aggressive, learning disabled, or impulsive. Such students vary in the degree to which they exhibit social-behavioral, hyperactive, attentional, and/or academic difficulties. Relating presenting problems and empirical descriptors to outcome might assist in future subject selection. What is particularly needed is more research along the lines of Bugental, Whalen, and Henker (1977), in which, for example, the children's attributional style interacted with the success of the treatment procedures investigated.

Finally, more naturalistic and developmental studies are required in this area. Two broad directions for research may be discerned. One, there is a need to study more broadly the development of cognitive strategies and skills. Investigators might compare how children varying in age or task competence approach distinct academic or interpersonal problems; moreover, such studies must go beyond simple group comparisons to include a cognitive-functional assessment, i.e., a psychological analysis of the subjects' thinking or strategy while responding to the demands or requirements of the task (see Meichenbaum, 1975a).

The second research direction involves determining the extent and functions of naturally occurring private speech.

Self-regulatory speech undoubtedly occurs in the ecologically important settings of the preschool and even young elementary school-aged child (Fuson, 1979). Contemporary researchers, e.g., Rubin (1979), have illustrated the complexity of this topic, however, in emphasizing that there are a number of different kinds of speech for self, that such speech is dependent on setting, and significantly, that private speech no doubt serves a variety of intrapersonal or psychological functions. Within this intriguing research area, it is noteworthy that Copeland (1979) recently found significantly more and less mature private speech among hyperactive boys. In encouraging further naturalistic research on how children utilize private speech as well as learn successfully to approach developmental tasks, including academic ones, the SIT literature may yet make its greatest contribution.

CHAPTER VI

SUMMARY

An evaluation project concerned with the recent SIT movement as applied to learning disabled children was undertaken. There is considerable evidence suggesting that the performance deficits of such children may be attributable to attentional difficulties. SIT programs may be particularly appropriate, therefore, for this population. The starting point for the investigation was actually a unique study by Heiman et al. (1973), in which reading-deficient children receiving brief supplemental attentional training were reported to have gained over a year more than controls on a standardized reading test. In that these results provided clear support for the attentional process assumption underlining self-instructional training, the study seemingly warranted replication.

A review of the SIT literature itself revealed a number of conflicting findings; however, the evidence for positive SIT effects on academic measures was surprisingly promising in the area of reading. This sensitivity to SIT presumably is due to the influence of impulsive word recognition and other attentional errors on reading performance. Consequently, it was suggested that the Heiman et al. (1973) reading task was well suited to discovering the possible facilitative effects of self-verbalizing. In addition, methodological weaknesses in the existing SIT literature indicated that there was a need to record self-verbalizations and to include in the evaluation a direct training control so as to evaluate the specific contribution of the self-verbalizing component in treatment programs.

Lastly, the study sought to clarify the relevance for applied programs of several conflicting conceptual formulations that underlie the application of self-instructional procedures and/or are concerned with the effects of self-verbalizing on performance. The largely facilitative perspective afforded by the regulatory-mediational and impulsivity models was contrasted with the predicted detrimental effects suggested by limited capacity and response competition notions. It also was decided to examine the factors of age and/or competence, as well as task difficulty, given their significance within this literature as possible moderators of SIT effects.

Thirty-six learning disabled children attending a Summer Learning Program were matched in groups of three by age and word recognition grade level, and then randomly assigned to either a direct training (DT), a self-instructional training (SIT), or a comparison (C) group. The subjects were blocked primarily by reading grade level, although the outcome data were additionally examined by age. Six program aides, balanced among treatment conditions, served as reading instructors in the study. The experimental subjects received 12 days of 45-minute instructional sessions on an attentional-reading task adapted from Heiman et al. (1973). Within a token reinforcement system, the children were asked to read aloud passages at three difficulty levels, underlining repeated phonetic sounds, words, and phrases. Reading assistance and encouragement also were provided.

Students in the SIT condition differed from DT subjects in that they additionally received systematic training in self-instructions coordinated with the attentional-reading task. The training sequence involved cognitive modeling, prompted practice in overt self-statements, and continued training with fading prompts. The types of self-statements included were: preparatory (e.g., "Good reading requires that I have to pay attention"), task analysis (e.g., "I have to look for the 'tion' sound"), focusing (e.g., "Look closely"), sound it out (e.g., "If I don't know a word, I'll try to sound it out"), self-reinforcement (e.g., "I'm doing better"), and, lastly, coping (e.g., "I don't expect to get every word") statements. The goal of SIT was to guide these students to incorporate such statements actively into their approach to reading. As a control condition, the comparison subjects received no exposure to self-instructions nor specific training on the attentional-reading task; however, these students were provided some academic instruction as part of the regular educational program.

A pre-post measurement plan was used to evaluate the effects of the treatments. An attentional-reading test, similar to the training materials and procedure, was administered before and after the treatment period. The children's speech during these sessions was audiotaped, and the resultant verbalizations reliably categorized. In addition, "blind" assessors evaluated the transfer of attentional-reading skills and overall reading improvement via the Spache Diagnostic Scales. Only about half of the SIT subjects continued to self-verbalize overtly on the attentional-reading posttest. Data regarding spontaneous or unprompted self-statements during training nevertheless indicated that the SIT provided could be considered at least moderately successful; on the average, the SIT students were spontaneously verbalizing some self-statements on 75% of the training days.

The test findings were mixed but presented an informative pattern. On the attentional-reading test, the DT subjects in the lower reading level group improved more in percentage-correct oral reading on the earlier reading trials than corresponding SIT and control subjects. There was also an overall increase in correctly identified phonetic sounds across all students, but no differential treatment effects on this measure. A different pattern emerged on the Spache. Among the higher level reading students, SIT subjects gained more than those in the DT and control groups on both the word recognition and reading grade level measures, cumulatively resulting in a significant multivariate level x group effect. This outcome favoring the SIT group occurred even though the DT group had practiced reading more passages. The improvements on the Spache were found to be correlated more highly with reading competence, indicated by grade level, than chronological age. Finally, it was significant that the self-verbalization measures obtained were not associated with increases on the test measures. Among the lower reading level SIT subjects, there was actually a negative correlation between self-verbalizations and phonics gains.

The evaluation results are discussed as providing some support for both facilitative and detrimental perspectives regarding the effects of self-verbalizing. Tentative evidence for a positive effect of SIT on reading performance was found, given a moderate level of reading competence; however, for the beginning reader, self-verbalizing, at least as operationalized in the present study, may result in significant task interference. It was suggested that these effects might be best interpreted within the context of stage models of reading acquisition, and perhaps related to research on the basic reading processes involved. Problems in training self-instructions also were noted along with a number of conceptual and pragmatic implications of the evaluation. These included the failure to replicate the impressive results of Heiman et al. (1973), the clinical significance of the Spache findings, specific strengths and limitations of the study, and particularly questions raised about the mechanism(s) through which SIT effects may be mediated. Some recent related literature pertaining to hypothesized SIT effects and the possible relevance of metacognitive development was reviewed, and some needed future directions in the area were outlined.

FOOTNOTES

[1]The term "learning disabled" refers to a child who, while average or above in intelligence, is nevertheless significantly behind academically. These children have acquired a potpourri of labels in the psychological literature including "dyslexic," "minimally brain damaged," "reading disabled," and "educationally handicapped." Although it is clear that not all such children are "hyperactive" as defined by activity levels, many of them also receive this designation. Following Kauffman and Hallahan (1979), the present writer prefers the term "learning disabled" in that it is generic and does not imply etiology. From the subject descriptions within research studies in the literature referring to brain-damaged or hyperactive children, it usually is apparent that learning deficits also are entailed; therefore, for the most part, no attempt was made to distinguish these groups in the present review. The original labels have been reported in citing particular studies, and the present writer has generally employed "hyperactive" and "learning disabled" to indicate a broad view of these problems.

[2]The present writer is somewhat sympathetic to those who would argue that this formulation obfuscates the meaning and intent of the Soviet theories. In defense, however, several points can be made. One is that the major prediction does appear to be in line with Luria's (1961) work on the

cerebro-asthenic syndrome. Second and more importantly, the source of any such obfuscation clearly lies not in the present analysis but in the SIT literature itself. If the predictions are unsupported, it at least suggests that SIT enthusiasts should not cite the Soviet research as support for what they do.

[3]While the present investigation was being conducted, Heiman interestingly also related that a surprising aspect of her own study was that the children missed very few of the reading targets; however, the exact number was not recorded (Personal communication, June, 1979).

[4]The change to blocking subjects by reading grade level as opposed to age actually produced some minimal confounding of the teacher factor with reading levels, since all instructors originally were assigned a younger and older student in each experimental group. It is unlikely, however, that this slight shift could be responsible for the interaction effect found, given that no teacher was represented more than twice in any cell.

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Appendix A:

Protocol Followed in Training the Reading Instructors

Training in the attentional-reading and self-instructional procedures largely occurred in four preparatory sessions of approximately an hour each. However, the six reading instructors and the experimenter continued to meet several times weekly both to solve problems that arose and to allow the experimenter to give feedback from his own observations of the training sessions.

In the first session, the nature of the reading project including the evaluation of the role of SIT was explained and discussed. The instructors were given a copy of the Heiman, Fisher, and Ross (1973) article and Meichenbaum's (1977) chapter on SIT for background reading. In addition to generally explaining the study, this session explicitly outlined what the reading aides would be doing as instructors. Questions were answered, and the meeting ended with an assignment to review and practice the Spache system of reading errors.

The second training session involved describing the attentional-reading task and demonstrating direct training. The instructors were asked to pair off and practice carrying out the procedures using copies of the reading passages, the token rewards, and point cards. Specifically, the teachers rehearsed (1) explaining the task and reward system to children, (2) the rewarding of correct identifications, and (3) concurrent marking of Spache reading errors.

SIT was introduced in the third instructor training session. As with direct training, each component was discussed, modeled, and practiced. The helpfulness of "thinking aloud" was explained to the children in first introducing the task. The initial phase of SIT also involved the cognitive modeling procedure and the use of pictorial prompts to teach the various types of self-instructional statements. Directions were given regarding prompting and the instructional sequence was roleplayed using all the materials including the SIT record form.

Prior to both of these training sessions, the instructors were provided with explicit written descriptions of the two treatment procedures. The fourth and last training session was mostly devoted to review and continued practice. The instructions regarding the pretest procedures for the attentional-reading test also were reviewed at this time.

After training began, the instructors were observed working with students and individual feedback and suggestions were given. Fortunately, it was also possible to videotape several training sessions and playback some exemplars of students correctly self-verbalizing. Finally, the group discussed common problems encountered in teaching self-verbalizations and their possible solutions.

Appendix B

Sample Attentional-Reading Passages

Jim

This is Jim. He is big.

The boy is big Jim.

Big Jim is a good boy.

It is hard to be big.

Big Jim needs a tall barn.

Big Jim needs big toys.

We like big Jim.

Level: Preprimer I
Sound: b
Word: big
Phrase: Big Jim

Pam

Pam can pat a cat.

Pam sits with the cat.

The cat can sit with Pam.

Pam can pat Rags.

She can sit with Rags and Nat.

Pam can get a pan for Nat.

Pam can get one for Rags.

Pam pats Rags and Nat.

Level: Preprimer I
Sound: p
Word: Pam
Phrase: Pam can

Friends

Jack has a friend. Pat is Jack's friend. Jack and Pat went for a walk. Jack and Pat are friends. Jack has some jam. Jack and Pat eat the jam. Jack and Pat jump and jump. Jack and Pat are good friends.

Level: Preprimer II
Sound: j
Word: Jack
Phrase: Jack and Pat

I Like You

Mike hugs Mom.

I like you, Mom.

I like to hug you.

Mike is with Dad.

I like you, Dad.

I like to be with you.

Mike pats Nat.

I like you, Nat.

I like to play with you.

Mike and Bill walk.

I like you, Bill.

Level: Preprimer II
Sound: ike
Word: like
Phrase: like you

Oh, No.

Mrs. Cane's hat fell in the lake.

It rolled down a hill.

It went right into the lake.

What fate!

A lake mouse was in the lake.

This lake mouse climbed into the hat.

The hat came near the shore of the lake.

The mouse got out.

The hat went to the bottom of the lake.

Too late. This lake got the hat!

Level: Primer
Sound: ā
Word: lake
Phrase: the lake

What Is It?

Ruth got a box.

This is a big box.

The box is on the ground.

The box is in the yard.

You can not move this box. The box is too big.

What do you think is in the box?

Is it a bug? Is it a cat?

What is in the box?

LeveL Primer
Sound: ŏ
Word: box
Phrase: the box

A Talk

Mother had to talk to Dan.

Dan thought he should wink at all the girls.

Mother said, "It is not good to wink at girls. Why do you wink? Girls get pink when you wink. You must not be so bad."

Dan said, "But I do not wink at all girls."

"Dan, which girls do you think you can wink at?" said Mother.

"I wink when they wink at me," said Dan. Mother will have to think some more as she was pink.

Level: One
Sound: ink
Word: wink
Phrase: wink at

Dinner

Days later the animals came out again to the bird's house for dinner. This time they brought the food.

The cat brought the milk.

The dog brought the meat.

The pig brought the corn.

The sheep brought the grass.

Each animal brought his food. The bird brought out a seed.

This brought a smile to the bird.

He bounced as he was happy.

Level: One
Sound: ou
Word: brought
Phrase: brought the

Debbie Duck

Debbie Duck went to the pond to go in the water with her mother.

Debbie put her foot in the water and said, "The water is cold."

Mom said, "Yes, it is but when a duck gets bigger it swims in the water. You must go in the water."

"I do not want to be a water swimmer. I like warmer water. I will go in the water, when it is warm."

Level: Two
Sound: er
Word: water
Phrase: in the water

Mother's Birthday

When is mother's birthday? Which day is it?

I need to get Mother a present. What does she like?

Which present to get? Which store to go in?

I looked at flowers.

I could not tell which one to get.

I looked at animals.

I could not tell which one to get.

What does Mother like?

I looked at balls.

I could not tell which one to get.

I looked at cakes.

I could not tell which one to get.

Dad can help me tell which one to get.

Dad can tell me what Mother likes.

Level: Two
Sound: wh
Word: which
Phrase: which one to get

The Show

We went to a stage show last night. There were trained circus animals in the stage show. The reason we went to the stage show was to see the different animals perform. They were not in a cage. The monkeys rode elephants on stage. The tiger looked like he was in a rage on stage. We had to page Pam when we thought she was lost. She went up on stage. The stage show was really a nice trip for children our age. I wonder when the next stage show will be.

Level: Three
Sound: age
Word: stage
Phrase: stage show

Dad's Camp

Ted was going to spend the summer in a Boy Scout Camp. Ted was excited to know all about the camp. He said, "Dad, tell me what you know about the camp. Let me know." His father knew a lot as he had gone there a long time ago. He said, "If you tell me what you want to know, I will explain it." Ted said, "I want to know what will we be doing there." Dad said, "You will be happy to know that they have many special things planned. You will know how to tie knots, to go on knapsack trips, to do knee crawls, and to know how to last in the forest."

Level: Three
Sound: kn
Word: know
Phrase: to know

Getting Started

A young lawyer was anxious to get his law practice started. He was invited to an important lawn party. This lawyer saw a pretty girl sitting on the porch with a knit shawl over her shoulders. The young lawyer knew she was the daughter of a famous lawyer that he'd like to meet.

It is difficult for a young lawyer to start out on his own. A young lawyer almost always has to work for a while with an established lawyer. This young lawyer decided to try to talk with the girl and ask to meet her father.

Level: Four
Sound: aw
Word: lawyer
Phrase: young lawyer

Magic or Not

Sam and Sue tried to discover the secrets behind the magic act. In order to discover these secrets, they would have to really watch the acts and discuss what they discover with others. It would be necessary to discover why some acts are disliked and discontinued. Also, it might be necessary to discover how the acts are learned.

I wonder if it will be possible for them to discover these secrets and discard the magic behind them. I would like to know what they discover as soon as it is discovered.

Level: Four
Sound: dis
Word: discover
Phrase: to discover

The Future

Sam was sure to save his allowance. His mother taught him the importance of saving allowance. Sam got an allowance for doing chores around the house and even for his attendance in school. Once he got an advancement of his allowance because Dad wanted to only go to the bank once.

Sam was trying hard to decide what he was saving his allowance to get. Saving his allowance required a lot of endurance. Sam felt that he might be able to spend just a little of his allowance as there was a dance coming up which he really wanted to go to. He would bank the rest of the allowance.

Level: Five
Sound: ance
Word: allowance
Phrase: his allowance

The Earth's Continents

For a long time scientists did not know what caused big earthquakes in the earth's continents. They believe that the earth's continents are drifting apart. The cause of earthquakes might be dependent upon the movement of the continents.

The earth's continents have been moving for millions of years. The land masses were broken into smaller pieces forming more continents many centuries ago. The continents have not stopped moving. This fact is pertinent to this persistent thought concerning the causes of quakes on the earth's continents.

Level: Five
Sound: ent
Word: continents
Phrase: earth's continents

The Unsolved Mystery

Mark pushed open the door of the attic and peered inside. His eyes had to get accustomed to the darkness of the attic. Then he saw that the attic consisted of a tremendous room.

Karen yelled in a frantic voice, "Where are you?"

Mark said, "Be realistic, I'm okay. I'm in the attic. Come up the metallic steps of the attic and join me. Be careful as it is dark here, the electric light is off in the attic."

Karen climbed carefully up the ladder of the attic. "Are you searching for clues to the solution of the mystery of the attic? I doubt that we will discover anything."

Level: Six
Sound: ic
Word: attic
Phrase: of the attic

Within the Sea

A meek little puffer fish swims slowly near the bottom of the ocean. Suddenly a small hungry shark speeds toward the little puffer. The shark might try to make the little puffer suffer but the clever puffer can change its shape. The stuffer shark may find it hard to swallow the puffer when it is no longer in the shape of a little puffer. This is a buffer state for this fish. When the danger is gone the puffer changes back to his little puffer shape. The shark is the one that will suffer as it will be necessary to look elsewhere for supper.

Level: Six
Sound: uffer
Word: puffer
Phrase: little puffer

Ichabod Crane

Ichabod Crane was a scholar and a conscientious man. He was a scholar who taught many young scholars in a formidable schoolhouse. This scholar's schedule was very rigid. Ichabod was a scholar who said scholars are taught in a strict environment. In the days when Ichabod was a scholar, costs of schooling were considered a grievous burden and schoolmasters were seen as mere drones. Still, Ichabod was a scholar who was outstanding and even continued to instruct under these circumstances.

Level: Seven
Sound: sch
Word: scholar
Phrase: was a scholar

King: Peace Creator

Martin Luther King was a creator. He was a creator of the belief that nonviolence is the answer to the crucial political and racial questions. He was a creator of peace in a troubled time. As a peace creator, King spoke at every engagement relating how he did abhor violence. Also, as a peace creator, King led many non-violent demonstrations. King was a creator of peace in every aspect of his life.

Since King was a creator of peace, he received the highest type of recognition possible. On December 10, 1964, King received the Nobel Peace Prize in Norway. Upon his return to this country, he was welcomed by the governor and other dignitaries. Glamor and splendor seemed to follow King even though he was a very humble man.

Level: Seven
Sound: or
Word: creator
Phrase: was a creator

The Professionals' Article

The journalist was asked to compose an article about the various professionals. The journalist was very excited about the prospect of doing such an article. This would mean that the journalist would have to decide which professions to include. The journalist thought for quite awhile and decided to write about a psychologist, a chemist, a humorist, and a hairstylist. Next, the journalist was going to interview several members of each profession. The journalist was going to try to combine their stories to compose a single representative of each field. The journalist was then very involved in the feature story.

He was trying hard to complete this story prior to the deadline. A journalist is always anxious to turn an article over to his editor.

Level: Eight
Sound: ist
Word: journalist
Phrase: the journalist was

The Precise Gift

A man with a certain mystique came into the antique shop. He was the great uncle of the former owner of the antique shop. He had a technique for examining any antique in the antique shop. He was looking in the antique shop for a gift for the lady who owned the boutique. He started to ask the clerk about an antique vase that seemed to be a new arrival in the antique shop. He was sure that it really was an antique and thought the boutique lady would adore it.

Level: Eight
Sound: que
Word: antique
Phrase: antique shop

Appendix C

Grade Levels of Training Passages

Grade Levels of Training Passages

		SIT			DT			C		
		I	D	VD	I	D	VD	I	D	VD
lower reading level	S1	PP1	PP2	P	PP1	PP2	P	PP1	PP2	P
	S2	1	2	3	PP2	1	2	PP2	1	2
	S3	PP1	PP2	P	PP1	P	2	PP1	PP2	P
	S4	PP1	PP2	P	PP1	P	1	PP1	PP2	P
	S5	PP1	PP2	P	PP1	PP2	P	PP1	PP2	P
	S6	1	2	3	PP2	P	1	PP2	P	2
higher reading level	S1	5	7	8	6	7	8	5	6	8
	S2	3	5	7	4	5	7	3	4	6
	S3	2	3	4	5	6	8	5	6	8
	S4	3	4	5	2	3	4	PP2	1	2
	S5	2	3	5	2	3	4	3	4	5
	S6	2	3	4	2	3	4	2	3	4

Appendix D

Reinforcement Card and Exchanges

Daily Point Card

Name: ______________________

	Points Earned	Cumulative Record		Points Earned	Cumulative Record
Day 1			7		
2			8		
3			9		
4			10		
5			11		
6			12		

Prize Card

movie pass--700 points
nerf basketball--700
model car--700
necklace--700
yoyo--700
45 record--650
hair combs--650
McDonald's gift certificate--650
plant--600
matchbox car--600
cards--550
writing paper--550
ball--500
coloring book--500
comic book--450
crayons--400
brush--350
candy--250

Appendix E

Sample Demonstration Passages

Bill plays with me.

He likes me.

This is Mike.

He plays with me.

He likes me.

Level: Preprimer II; Demonstration
Sound: m-
Word: me
Phrase: with me

You will find rocks interesting. There are all kinds of rocks. Rocks are in all sizes from small to large. They can be found in all kinds of places--under tall trees, in ball parks, or just about anywhere.

Level: Three; Demonstration
Sound: ll
Word: all
Phrase: all kinds

Some trees are so thick that it's hard to nick them. Some trees are thick enough to put a thick sign on them. Some other trees are so thin that they look like sticks.

Level: Six; Demonstration
Sound: ick
Word: thick
Phrase: are thick

Appendix F

Outline of Direct Training Procedures

Initial Session

SAY TO THE CHILD: Remember the other day when you were reading and were asked to underline certain sounds and words? Well, every day for the next few weeks, I'm going to help you with your reading some more like that. The reason I ask you to underline is to make sure you read carefully. You can improve your reading by looking closely at (attending to) all the printed letters that stand for the different sounds and words. Would you like to learn how to read better? Good.

It will be fun. What's more, you can earn some prizes. Every time you underline the correct letter or words I tell you while you're reading, I will put a chip in this cup. At the end of our reading time, we will count how many chips you have earned and put the number on this card. This is like your bank. You save up your chips and at the end of the program (a little over two weeks) you can buy prizes with the chips you've earned. Here are some of the prizes (GO OVER THE CARD). Which ones would you like to work for? That sounds good; let's get started.

USING DEMO PARAGRAPH, SAY: First you watch me. I'm going to read the passage over once and underline the sound ______ POINT, THEN READ AND UNDERLINE, SAY: I underline it no matter where it appears in the word. If my job was to underline the word _____, then I'd read . . . , underline ______ and keep reading, paying close attention so

I won't miss any _____ words. WHEN MODELING HERE AND BELOW, YOU EXPLAIN WHAT YOU ARE OR WILL BE DOING TO THE CHILD, BUT YOU DO NOT SELF-VERBALIZE.

Now you try it. Read this page and I'll help you with any words you don't know. CORRECT CHILD AS HE/SHE READS. (1st TRIAL) Good.

Now this time, underline the sound ______ POINT when you read, GIVE CHILD PENCIL (2nd TRIAL). Remember underline _____ wherever it appears. I'll give you one chip every time you underline it, but you keep on reading. REWARD AS INDICATED; CORRECT AS NEEDED; ALWAYS IGNORE "MISSES".

This time, read the passage and underline the word _____ (3rd TRIAL). Begin. AGAIN, REWARD CORRECT IDENTIFICATIONS AND CONTINUE TO CORRECT, TEACHING THE CHILD ANY WORDS HE/SHE STILL HAS TROUBLE WITH.

Now read it and underline the words _____ when they come together (4th TRIAL).

Finally, I want you to read it one more time a little more quickly and tell me the main idea (5th TRIAL). ON THIS TRIAL GIVE THE CHILD A CHIP FOR ANYTHING APPROXIMATING THE JIST OF THE STORY, I.E., WHEN YOU FIRST START TRAINING, BE LENIENT BUT ASK QUESTIONS LIKE TELL ME A LITTLE MORE ABOUT IT, ETC. Yes, that's right; what else happened in the story . . . AS THE CHILD BECOMES MORE PROFICIENT REQUIRE A MORE ELABORATE/EXACT RESTATEMENT. CORRECT AS NEEDED.

SAY: Let's do another one. Read this story out loud and I'll help you (1st TRIAL). BEFORE BEGINNING 2nd TRIAL, RETURN TO DEMO AND MODEL AS BEFORE. Say: Okay, watch me again. I'm going to read the story and underline the words _______ READ DEMO, UNDERLINE THE SELECTED WORDS; THEN SAY: Read your story carefully and underline the sound ______ POINT (2nd TRIAL). REWARD CORRECT IDENTIFICATIONS AND CORRECT.

CONTINUE BY GIVING TRIALS 3 AND 4. REWARD AS INDICATED AND CORRECT AS NEEDED. ON TRIAL 5, HAVE THE CHILD READ THE PASSAGE AND STATE THE MAIN IDEA. FIRST, HOWEVER, MODEL THIS POINT AGAIN. Look I am going to read my story and try to remember the main idea. READ DEMO ALOUD AND SAY THE MAIN POINT WAS ______. THEN SAY: You read your story and tell me the main idea. SHAPE RESTATEMENTS AND CORRECT AS NEEDED.

SAY: We'll do one more today. FIRST READ THIRD PASSAGE ASSISTING CHILD (TRIAL 1). CONTINUE WITH TRIALS 2-4. REWARD CORRECT IDENTIFICATIONS AND TEACH WORDS AS NEEDED. FINALLY, HAVE THE CHILD READ THE STORY FOR THE MAIN IDEA (5th TRIAL).

AT THE END OF THE SESSION, SAY SOMETHING LIKE: Boy, you really did well today. You paid very careful attention when you read. COUNT CHIPS AND HAVE THE CHILD RECORD THE NUMBER ON HIS CARD. REMIND THE CHILD OF THE PRIZES AND SAY YOU WILL WORK WITH HIM/HER TOMORROW.

General Remarks:

FOR THE MOST PART, THE SAME PROCEDURE IS REPEATED THROUGHOUT TRAINING. THERE'S ONE EXCEPTION. AFTER THE

FIRST WEEK, YOU WILL NO LONGER MODEL WITH THE DEMO PASSAGE. JUST PRESENT THE CHILD HIS OWN STORIES. AS IS ALWAYS THE CASE, WHILE THIS TEACHING TASK IS VERY STRUCTURED (I.E., 5 TRIALS, REWARD, ETC.), IT DEPENDS UPON YOUR FLEXIBLE AND GOOD TEACHING SENSE. PRAISE THE CHILD OFTEN FOR READING THE DIFFICULT MATERIAL. SET A POSITIVE YET GET DOWN TO BUSINESS PACE, I.E., TALK TO HIM ABOUT SNACKS, WHAT ELSE IS HAPPENING, ETC., BUT DON'T LET "RELATING TO THE CHILD" PREVENT YOU FROM TEACHING. TO LEARN SOUNDS AND WORDS (LET ALONE INCREASING ATTENTION SPAN) SIMPLY REQUIRES MANY TRIALS OF REPEATED REINFORCED PRACTICE. MAKE SURE THE CHILD KNOWS THAT YOU THINK HE IS DOING BETTER AND THAT YOU APPRECIATE HIS HARD WORK. IN GIVING CHIPS, SMILE; YOU MIGHT SAY, Good job, OR you're really good at this. ONE CAUTION, HOWEVER, IS NOT TO DISTRACT THE CHILD BY EXCESS REMARKS. ALSO, TRY TO PREVENT PROBLEMS BY CONSIDERING THE CHILD'S MOOD. IF YOU HAVE A BAD DAY OR DON'T GET FINISHED, DON'T PANIC; YOU ACCOMPLISHED WHAT YOU COULD AND THAT'S GREAT. FINALLY, ALWAYS END YOUR MEETING WITH THE CHILD ON A POSITIVE NOTE.

Appendix H

SI Training Record Form

Instructor____________________ Name____________________

Date____________________

1. Circle Difficulty Level of Passage I D VD
2. Circle trial number: 1 2 3 4 5
3. Keep tally for SI: e.g., ~~1111~~ - 1

	Prompted	Spontaneous
Preparatory		
Task analysis		
Look closely		
Sound it out		
Self-reinforcement		
Coping		

4. Give examples:

1. Circle Difficulty Level of Passage: I D VD
2. Circle trial number: 1 2 3 4 5
3. Keep SI tally: e.g., ~~1111~~ - 1

	Prompted	Spontaneous
Preparatory		
Task analysis		
Look closely		
Sound it out		
Self-reinforcement		
Coping		

4. Give examples:

1. Circle Difficulty Level of Passage: I D VD
2. Circle trial number: 1 2 3 4 5
3. Keep SI tally: e.g., ~~1111~~ - 1

	Prompted	Spontaneous
Preparatory		
Task analysis		
Look closely		
Sound it out		
Self-reinforcement		
Coping		

4. Give examples:

Appendix I

Outline of Self-Instructional Training Procedures

YOU SHOULD TREAT YOUR SELF-INSTRUCTIONAL TRAINING STUDENTS IN ALL WAYS IDENTICAL TO YOUR DIRECT TRAINING CHILDREN WITH THE SINGLE EXCEPTION BEING THE EXPLICIT TRAINING IN TASK RELEVANT SELF-VERBALIZATIONS DESCRIBED BELOW.

IN THE INITIAL SESSION, IN ADDITION TO EXPLAINING THE GOAL OF INCREASED ATTENTION IN READING AND THE REWARD SYSTEM, EXPLAIN TO THESE CHILDREN THAT THEY CAN DO EVEN BETTER AND EARN MORE POINTS BY THINKING ALOUD ABOUT WHAT THEY ARE DOING. FOR EXAMPLE, YOU MIGHT SAY: I know a trick or a special method that will help you read better and earn more points--think out loud and remind yourself of certain "helpful thoughts". (FOR AN OLDER CHILD, YOU COULD EVEN SAY, some research has shown that one good way to increase your attention and improve your reading is to think out loud and remind yourself of some helpful thoughts.) We all sort of give ourselves directions when we face a new and/or difficult task (AVOID THE PHRASE "TALK TO YOURSELF" BECAUSE IT CONNOTES BEING CRAZY IN OUR CULTURE.) Let me show you what I mean. <u>Watch what I'm doing and listen to what I say so you can repeat it</u>. PLACE DEMO IN FRONT OF YOU AND CHILD AND SAY ALOUD TO YOURSELF: Being a good reader means carefully looking at every word. Now what do I have to do? I'm going to read this story carefully and underline the ____ sound. POINT IT OUT TO YOURSELF. I'm supposed to underline it no matter where it appears in the word. BEGIN READING AND UNDERLINE ALL THE ____ SOUNDS. WHEN THROUGH WITH THE DEMO SAY: If my job was to underline the word ____, then before I started I'd say (PAUSE), I can improve my reading by looking carefully at every word. Now what do I have to do this time? I'm going to read the story, looking closely, (or paying close attention) and underline all the _____ words. Here I go. READ FIRST FEW LINES OF DEMO UNDERLINING THE WORD _______. Do you understand? Good. Now you try it. Just say the first part now. INTRODUCE FIRST PICTURE PROMPT, POSITIONING IT ON CHILD'S DESK. This card will remind you of what to think out loud before beginning. The soldier is at attention, so remember good reading means paying careful attention to all the letters. First say that aloud and then read this page carefully. I'll help you with any words you don't know. CORRECT CHILD AS HE READS. (1st TRIAL)

HERE, AS THROUGHOUT SELF-INSTRUCTIONAL TRAINING, IF THE CHILD DOES NOT SELF-VERBALIZE THE TYPE OF STATEMENT BEING TAUGHT, STOP HIM AND INSTRUCT HIM TO DO SO BEFORE CONTINUING, E.G., what are you going to say to help yourself? YOU HAVE JUST TAUGHT THE FIRST TYPE OF SELF-INSTRUCTION--A PREPARATORY STATEMENT. (SEE ATTACHED TABLE FOR AN OVERVIEW AND EXAMPLE OF THE SIT STATEMENTS THAT WILL BE TRAINED.) ON TRIALS 2-5 OF THE FIRST PASSAGE, THE STUDENT MUST SAY THIS TYPE OF STATEMENT BEFORE BEGINNING TO READ. IF NOT, PROMPT HIM OR HER. OTHERWISE THE PROCEDURE FOR TRIALS 2-5 IS THE SAME AS

IN DIRECT TRAINING--I.E., PICK OUT SOUND, WORD, PHRASE, ETC. YOU ASSIST AND REWARD CORRECT UNDERLININGS. IN ADDITION, HOWEVER, DURING ALL SIT SESSIONS TRY TO KEEP A TALLY COUNT OF SELF-VERBALIZATIONS MADE ON THE SIT TRAINING RECORD FORM. FOR EXAMPLE, ON TRIALS 1-5, YOU WOULD PUT A SLASH IN EITHER THE PROMPTED OR SPONTANEOUS COLUMN NEXT TO PREPARATORY/TASK ANALYSIS.

IN INTRODUCING THE SECOND PASSAGE SAY: Let's do another one. Read this story out loud and I'll help you. THE STUDENT SHOULD ALSO SAY THE PREPARATORY SELF-INSTRUCTION HERE AND FROM NOW ON. BEFORE BEGINNING THE 2nd TRIAL RETURN TO DEMO AND MODEL AGAIN. Okay, now I want you to state what you're going to do as well as reminding yourself to look closely. Watch me again and <u>listen to what I say so you can repeat it</u>. PLACE DEMO IN FRONT OF YOU AND CHILD AND SAY ALOUD TO YOURSELF: Good reading means careful attention. Now what do I have to do? I have to read this and look closely for when the words ______ are together. Okay, that's easy enough. READ DEMO UNDERLINING THE SELECTED WORDS. This picture will help you remember to pause and think about what you are going to do. GIVE CHILD 2nd TRIAL OF SECOND PASSAGE. Try it. Underline the sound _____ (POINT). MAKE SURE HE/SHE VERBALIZES SIMILARLY TO YOUR EXAMPLE. THIS MAY SEEM REDUNDANT TO THE CHILD BUT IT IS IMPORTANT BECAUSE IT IS EXACTLY WHAT YOU ARE TRAINING HIM TO DO--REFLECT ON THE TASK DEMANDS. MARK SELF-INSTRUCTIONS ON RECORD FORM. CONTINUE BY GIVING TRIALS 3 AND 4. PRIOR TO EACH, THE CHILD SHOULD GIVE THE APPROPRIATE VERBALIZATIONS.

AS IN DIRECT TRAINING, PRIOR TO THE 5th TRIAL ON THE SECOND PASSAGE, YOU MODEL FOR THE LAST TIME. SAY: Watch and listen to me one more time. (TO YOURSELF) I can improve my reading by looking closely at all the words. Now what do I have to do? Read this passage carefully and try to remember the main idea. No problem. READ DEMO, WHEN AT A CRITICAL PART, SAY: That sounds important. MAKE A BRIEF RESTATEMENT OF THE IDEA. I'll keep reading to make sure. WHEN FINISHED SAY: The main point was ___________. THEN TURN TO CHILD AND SAY: Okay, now it's your turn. Read your story and tell me the main point. (5th TRIAL) MAKE SURE CHILD SELF-VERBALIZES BEFORE REGINNING. IF NECESSARY, POINT TO THE PICTURES. CORRECT READING AS NEEDED, AND SHAPE CHILD'S RESTATEMENT OF MAIN POINT AT END. FINALLY, GUIDE THE CHILD THROUGH ALL FIVE TRIALS OF THE THIRD PASSAGE. PROMPT SELF-VERBALIZATIONS IF NECESSARY AND REWARD CORRECT IDENTIFICATIONS WITH CHIPS.

AT THE END OF THE SESSION, SAY: You did very well, we'll practice again tomorrow. COUNT CHIPS AND HAVE THE CHILD RECORD THE NUMBER ON HIS CARD.

<u>General Remarks</u>

AS IN DT, PRAISE THE CHILD OFTEN. MODEL THE SI WITH A REFLECTIVE INTONATION. MAKE SURE THE CHILD IS WATCHING. CAPTURE HIS/HER ATTENTION WITH YOUR ENTHUSIASM. WHEN WITH A SEVEN YEAR OLD, BE ONE. ON THE OTHER SIDE OF THE COIN, DON'T TALK DOWN OR BABYISHLY TO A TWELVE YEAR OLD--USE THEIR

LANGUAGE. CHIPS SHOULD BE GIVEN FOR CORRECT UNDERLINING, BUT WHEN YOU GIVE A CHIP YOU MIGHT ALSO VERBALLY REWARD SELF-INSTRUCTIONS, TOO. FOR EXAMPLE, SAY: You really got the idea of directing yourself to pay close attention. That's great, I don't even have to remind you. IF THE CHILD STARTS TO NOT VERBALIZE, AWARD NO TOKENS FOR UNDERLINING UNLESS THE UNDERLINING IS ACCOMPANIED BY SELF-INSTRUCTIONS IN THE PRECEDING LINE OR SO.

<u>Second Session</u>

IN THE FIRST SESSION, YOU HAVE EXPLAINED ATTENTIONAL-READING TRAINING TO THE CHILD AND TAUGHT HIM TO SELF-VERBALIZE PREPARATORY AND TASK ANALYSIS STATEMENTS BEFORE BEGINNING. START THE SECOND SESSION BY ASKING THE CHILD IF HE/SHE REMEMBERS WHAT YOU DID LAST TIME. PUT THE FIRST TWO PICTURE PROMPTS IN FRONT OF THE CHILD AND USING THE DEMO PASSAGE, MODEL SELF-INSTRUCTIONS AND THE TASK AS YOU DID AT THE BEGINNING OF THE INITIAL SESSION. BEFORE STARTING, SAY: <u>Watch and listen so that you remember how to do it today</u>. REPEAT FIRST EXAMPLE OF MODELING IN THIS HANDOUT.

HAVE THE CHILD PERFORM THE TASK INCLUDING THE INTRODUCTORY SELF-STATEMENTS ON TRIALS 1-5 ON THE FIRST PASSAGE. PRIOR TO BEGINNING THE 2nd TRIAL OF STORY TWO, SAY: Today I also want you to remind yourself of some important things <u>while</u> you read. <u>Watch me and listen so that you can do it</u>. USING DEMO, INCORPORATE A FOCUSING STATEMENT, I.E., I NEED

TO LOOK AT ALL THE LETTERS OR REMEMBER, LOOK CLOSELY INTO YOUR EXAMPLE: To read well I have to pay close attention to all the letters. Now what do I have to do? Read carefully and underline the words ______ when they are together. BEGIN READING AND UNDERLINE; AFTER A PUNCTUATION PAUSE AND SAY, I need to look closely for _____ (OR keep my attention on what I'm reading). THEN SAY: Did you hear how I instructed myself to look closely <u>while I was reading</u>? Good. You try it. This card will remind you to look closely. Say it several times when you read this page. GIVE 1st TRIAL OF SECOND PASSAGE. PROMPT SELF-INSTRUCTIONS BY POINTING TO THE CARDS AND/OR STOPPING THE CHILD AND ASKING, What are you going to remind yourself of first? VERBALLY PRAISE SELF-VERBALIZATIONS, E.G., You remembered to ask what you had to do OR Super, you used the "look closely" statement twice. CONTINUE WITH TRIALS 3 AND 4. AS INSTRUCTOR, YOU SHOULD BE: 1. PROMPTING SELF-VERBALIZATIONS AS NECESSARY, 2. HELPING THE CHILD READ THE PASSAGE, 3. REWARDING HIM/HER WITH CHIPS FOR ALL CORRECTLY UNDERLINED READING TARGETS, AND 4. PRAISING THE CHILD FOR STAYING ON TASK, WORKING HARD, AND SPONTANEOUSLY STATING THE RELEVANT SELF-INSTRUCTIONS. YOU SHOULD ALSO KEEP THE TALLY OF SELF-INSTRUCTIONS. PRIOR TO THE 5th TRIAL, MODEL SELF-INSTRUCTIONS AND THE TASK AGAIN. THIS TIME ADD THE "SOUND IT OUT" SELF-INSTRUCTION. THAT IS AFTER PREPARATORY/TASK ANALYSIS STATEMENTS AND IN ADDITION TO FOCUSING, I.E., LOOK CLOSELY. INSTRUCTIONS WHILE READING THE DEMO

ARE TO HESITATE BEFORE A LONGER WORD AND SAY: If I don't know the word at first, I'll just try to sound it out. PROCEED TO DO SO AND CONTINUE READING. SUBSEQUENTLY, ASK THE CHILD TO USE THIS SELF-INSTRUCTION FROM NOW ON WHENEVER HE HAS TROUBLE WITH A WORD. PLACE PICTORIAL PROMPT ON DESK. CONDUCT THE 5th TRIAL AND ALL TRIALS WITH THE LAST STORY. CONTINUING TO PROMPT THIS AND REVIEW OTHER SELF-VERBALIZATIONS. FOR EXAMPLE, SAY: You really are reminding yourself to sound things out now, don't forget to say, "look closely at all the letters" sometimes. SELF-VERBALIZATIONS NEED NOT OCCUR AFTER EVERY LINE, BUT IT SHOULD BE CLEAR THAT THE CHILD IS ACTIVELY INCORPORATING THEM IN HIS/HER RESPONSE STYLE.

Remaining Sessions

IN THE BEGINNING OF THE THIRD SESSION, MODEL ALL FOUR SELF-INSTRUCTIONS, I.E., PREPARATORY, TASK ANALYSIS, FOCUSING, SOUNDING OUT WITH THE DEMO. IF FOR THE MOST PART, THE CHILD SPONTANEOUSLY SELF-INSTRUCTS ON THE FIVE TRIALS OF THE FIRST PASSAGE, TEACH THE REMAINING TWO SELF-INSTRUCTIONS: REINFORCEMENT AND COPING. (SEE TABLE.) IF NOT, PRACTICE THE FIRST FOUR SOME MORE IN THE THIRD SESSION, MODELING ALL OF THEM AGAIN PRIOR TO THE 2nd TRIAL AND BEFORE THE LAST TRIAL ON THE SAME STORY. EVEN IF THE CHILD STILL NEEDS PROMPTING, HOWEVER, THE LAST TWO SI SHOULD BE INTRODUCED ON THE FIFTH SESSION. TEACH SELF-REINFORCEMENT FIRST PRIOR TO

THE 2nd PASSAGE AND THEN COPING BEFORE THE 5th TRIAL; LIKE THE OTHER SELF-INSTRUCTIONS, THEY SHOULD BE INTRODUCED BY COGNITIVE MODELING, AND THEN PLACING A PICTORIAL PROMPT IN FRONT OF THE CHILD. IN MODELING THE COPING STATEMENT, THE INSTRUCTOR SHOULD MAKE AN ERROR, CORRECT HIMSELF AND SELF-VERBALIZE, E.G., "That's okay, I can't expect to get them all the first time. I'm doing better." HAVE THE STUDENT PRACTICE EACH NEW STATEMENT INCORPORATING IT ALONG WITH THE OTHERS AS HE/SHE PERFORMS THE ATTENTIONAL-READING TASK. CONTINUE TRAINING THROUGHOUT THE WEEK WITH ALL THE PICTORIAL PROMPTS IN FRONT OF THE CHILD.

AS IN DIRECT TRAINING, THOUGH, DISCONTINUE THE THREE MODELING EXPOSURES AFTER A WEEK. IT IS IMPORTANT, HOWEVER, TO CONTINUE TO PROMPT AND PRAISE THE SELF-INSTRUCTIONS ALONG WITH REWARDING THE CHILD'S GENERAL PERSEVERANCE AND CORRECTLY UNDERLINED TARGETS. BY THE END OF THIS WEEK, A STUDENT MIGHT VERBALIZE: OKAY, BEFORE SAYING ANY WORD, I NEED TO LOOK CAREFULLY AT ALL THE LETTERS. MY JOB IS TO READ THIS OVER AGAIN AND GET THE MAIN IDEA. HERE I GO. IN THIS NATION DINOSAURS ARE USUALLY PICTURED EVEN IN MOTION AS BEING MUDDY BROWN OR ICKY GREEN. (BOY, I AM DOING BETTER THAN THE FIRST TIME I READ THIS.) WHAT IF THERE WERE PURPLE (I'LL JUST TRY TO SOUND IT OUT) STR-I-PED DINOSAURS? (GOOD.) THE FACT IS WE DON'T KNOW WHAT COLOR DINOSAURS IN THIS NATION REALLY WERE. (THAT SOUNDS IMPORTANT--DINOSAURS COULD HAVE BEEN ANY COLOR. I'LL KEEP GOING) . . . .

LASTLY, IN THE FINAL PHASE OF TRAINING, THE PICTORIAL PROMPTS SHOULD BE FADED. TELL THE CHILD, I want to see if you can remember to think these helpful thoughts without the pictures. TAKE THE FIRST TWO CARDS AWAY. PROMPT IF NECESSARY. IN THE NEXT TWO SESSIONS, FADE THE MIDDLE TWO AND LAST TWO PICTURES RESPECTIVELY. AT THIS POINT, THE CHILD SHOULD BE PERFORMING THE ATTENTIONAL-READING TASK WHILE VERBALIZING ALOUD. TELL THE STUDENT TO REMIND HIMSELF OF THESE THINGS WHENEVER HE/SHE READS.

Types of Self-Instructions

(1) Preparatory	"Good reading means careful attention."
(2) Task Analysis	"What do I have to do? I have to read carefully and watch for ______________."
(3) Focusing	"Remember, look at the letters closely."
(4) Sound It Out	"If I don't know a word, I'll just try to sound it out."
(5) Self-Reinforcement	"I'm doing fine."
(6) Coping	"I don't expect to get every word, I'm reading better all the time."

Appendix J

Attentional-Reading Test Instructions and Passages

Attentional-Reading Test

Instructions

SAY TO THE CHILD: We are going to be working on a reading task. Before we begin, I want you to read this passage with me so that I can help you with any words you might not know. Some of the passages will be more difficult than others so just do your best. (READ ENTIRE FIRST PASSAGE; SCORE READING ERRORS ON EXAMINER'S COPY; CORRECT ALL ERRORS: MARK PASSAGE TRIAL 1.)

Good! Now I'm going to ask you to read aloud the same passage four more times. Read it carefully. Your job will be to pick out and underline certain letters or words. For instance, I might ask you to pick out the sound ______ (POINT TO THE LETTERS REPRESENTING THE SOUND.) So you would read . . . , underline ______ and keep reading. Underline the sound no matter where it appears in the word. Do you understand? One more thing, I would like to find out how children like yourself go about this task, so please think out loud for me. For example, you might say to yourself, "I have to look for _____" or "darn, I missed one," whatever comes to your mind. Okay?

The first target I want you to underline is _______ (POINT TO THE LETTERS REPRESENTING THE SOUND.) Begin reading. (READ PASSAGE SECOND TIME; SCORE READING ERRORS ON EXAMINER'S COPY; MARK PASSAGE TRIAL 2.)

This time I would like you to underline the word _____. (IT IS NOT NECESSARY TO POINT TO WORDS OR PHRASES.) Read carefully and remember to think aloud. (READ PASSAGE THIRD TIME, SCORING READING ERRORS ON EXAMINER'S COPY; MARK PASSAGE TRIAL 3.)

Now, still thinking aloud, read the passage again and this time underline the phrase _______. (READ PASSAGE FOURTH TIME, SCORING READING ERRORS ON EXAMINER'S COPY; MARK PASSAGE TRIAL 4.)

Okay, for the last time, read the passage over quickly and try to remember the main idea. (READ PASSAGE FIFTH TIME, SCORING READING ERRORS ON EXAMINER'S COPY; MARK PASSAGE TRIAL 5.) WHEN THE CHILD IS THROUGH, ASK HIM/HER ABOUT THE STORY.

REPEAT THE ENTIRE PROCEDURE (I.E., TRIALS 1 THROUGH 5) WITH THE TWO REMAINING PARAGRAPHS. PRIOR TO THE SECOND TRIAL, SAY: Okay, now you are going to underline certain letters and words just like last time. As you work at this, say any thoughts you have (e.g., "I'm getting better at this") out loud. The first target I want you to underline is ________. (POINT TO THE LETTER(S) REPRESENTING THE SOUND.) Begin.

General Directions

ENCOURAGE THE CHILD TO CONTINUE AS NEEDED. IT IS PARTICULARLY A GOOD IDEA TO STATE, "That was really good" OR SOMETHING SIMILAR BETWEEN PASSAGES. SCORE READING ERRORS ON ALL TRIALS; ON TRIALS 2 THROUGH 5 CORRECT SUBSTITUTIONS OR OTHER ERRORS ONLY IF THE CHILD LOOKS TO YOU FOR REASSURANCE OR IF THE MEANING OF THE SENTENCE IS COMPLETELY LOST.

Cat! Cat!

Nat is a cat, a fat cat.

Pat a cat.

Is Dan a cat?

Dan is not a cat.

Pat a cat.

Level: Preprimer I; Pretest
Sound: at
Word: cat
Phrase: a cat

Do You See?

Dan goes in.

Sue goes in and out.

The dog goes in and out.

In and out of the house.

The rain does not go in.

The moon looks in.

The sun goes in and out.

In and out of the sky.

Level: Preprimer II; Pretest
Sound: -n
Word: in
Phrase: in and out

A Dog

Rags ran to some mud.

Rags, don't get in the mud.

Rags did not hear.

Did you get in the mud, Rags, said Dan.

Now you get in a tub.

You get in a hot tub.

Let him get in a tub. Rags must get wet.

He must get clean.

Rags must get a bath.

Level: Primer; Pretest
Sound: ĕ
Word: get
Phrase: get in

The Present

Mike had a new bike. It was his first big bike. It was such a big bike that it was hard to ride. "I will try to ride this big bike. Mom wants to keep the bike until I am bigger."

Mike tried to ride the big bike. He got up on the bike and rode it! Mike ran to Mom.

"I like my big bike. I can ride it and not fall," he yelled.

Level: One; Pretest
Sound: ike
Word: bike
Phrase: big bike

Mr. Skipper, The Grasshopper

By the sea there lives a special grasshopper named Mr. Skipper who is a great big grasshopper. He is a special grasshopper who can skip. There has never been such a special grasshopper before. Mr. Skipper lifts himself up on two legs in the green grass and skips right by his other grasshopper friends. Mr. Skipper has a friend who is also a special grasshopper. This special grasshopper has learned to jump on one foot. They always grin as they jump and skip.

Level: Two; Pretest
Sound: gr
Word: grasshopper
Phrase: special grasshopper

Bridge Work

Mr. Sands parked along Ridge Street. They went back to the edge of the river to look at the painters working on the bridge.

"It doesn't seem to be safe working on the bridge," said Ted.

"No," said Dad, "working on the bridge is safe if the men are trained. Look by the edge of the bridge. See the ledge under the bridge?"

"Yes, but it still doesn't seem safe to be working on the bridge. I am glad you are here and not working on the bridge," said Ted.

Level: Three; Pretest
Sound: idge
Word: bridge
Phrase: on the bridge

Tale of a Capable Sailor

Robin Lee Graham, a capable sailor, set out to circle the globe in a sailboat. He had gone to school for years before this trip to learn to be a capable sailor. These schools had the most capable teachers available and these capable teachers taught him all the skills a capable sailor would need. He learned all the noticeable signs of danger as well as how to have an enjoyable cruise.

Robin Lee Graham is a capable sailor. He is capable of completing a very remarkable trip.

Level: Four; Pretest
Sound: able
Word: capable
Phrase: capable sailor

Game Invitations

The President of the student council stood at the meeting to take suggestions for handling the invitations to the student basketball games. He asked, "Whom do you intend to send invitations to?"

Bruce rose and stated, "The invitations to the game should be sent to everyone."

Indignantly, the President asked, "But whom does everyone include? Who should receive invitations to the game?"

Susan stood, raising her hand and said, "I feel that's incomplete. All students should receive invitations and all teachers should receive invitations to the game."

Ann rose and added. "I agree but think each student should have two extra invitations to the game to bring their friends."

Level: Five; Pretest
Sound: in-
Word: invitations
Phrase: invitations to the

What If Dinosaurs Were Purple?

In this nation dinosaurs are usually pictured even in motion as being muddy brown or icky green. The fact is we don't know what color dinosaurs in this nation really were.

Most fossils that are found throughout this nation are bones and teeth. The soft parts of the animals decayed and became a portion of the soil of this nation. The animal's skin pressing motionless against the mud was the condition under which these fossils were made. Scientists in this nation call these fossils casts. Color is not shown in these fossils of our nation.

There were thousands of different kinds of dinosaurs in this nation. In this nation, we can paint dinosaur pictures as we wish.

Level: Six; Pretest
Sound: tion
Word: nation
Phrase: in this nation

The Twine Will Tell

Shaw said that she saw packers who carried their loads tied with twine. Becky told her that she could tell what was in the tied with twine packages by the way the twine was tied and by the way they handled them.

If they handled twelve of these tied with twine packages, the load was not precious. However, if the twine was tied twice around the package, then the tied with twine package had gold in it. If twin packages were tied with twine twisted together, then you knew that there will be wheat inside.

Level: Seven; Pretest
Sound: tw
Word: twine
Phrase: tied with twine

A Scientist

A time explorer is one type of explorer who gets to experience many things. Some may think a time explorer exaggerates a lot, but any explorer will tell you how exciting it is to be a time explorer and use a time machine.

While traveling into the future you expect to see the unknown. While traveling into the past, a time explorer can relive the bygone days. Every explorer would want to be a time explorer for at least a day.

Level: Eight; Pretest
Sound: ex-
Word: explorer
Phrase: a time explorer

Can

Can a man tag a bag?

Sam can tag a bag.

He can tag.

Can Dan tag a bag?

He can tag it.

Dan can tag a bag.

Can a cat tag a bag?

He can not tag it.

Level: Preprimer I; posttest
Sound: ag
Word: tag
Phrase: tag a bag

The Jig

A pig can jig.

Can I jig?

I can jig with a wig.

A pig and I can jig.

Can you jig?

You can jig.

You can jig with the pig and me.

Level: Preprimer II; Posttest
Sound: ig
Word: jig
Phrase: can jig

The Woods

Jack was going into the woods with his sack.

It is a red sack.

He will pack a snack to bring with his sack.

Mom said, "He will bring a match with his sack."

He will have light and food with his sack.

Mom said, "You need to put a cap in your sack, too."

Jack left with his sack.

Mom said, "Bring back some wood in your sack."

Level: Primer; Posttest
Sound: ack
Word: sack
Phrase: with his sack

A Fun Day

Jim's kite has a long tail. He will write his name on it. Ann's kite has a longer tail. No kite has a short tail.

There is a white kite up in the air. Let's fly our own kite. Bite the string to break it.

Jim's kite has gone up. Ann's kite has gone up higher than the white one! It is fun to fly a kite.

Level: One; Posttest
Sound: ite
Word: kite
Phrase: kite has

The Zoo

Ed started out to find the elephants. He stopped at some signs. He was stuck; where were the elephants? He walked straight ahead but stopped at the road crossing. When he stopped he knew he had to ask for help. He began to walk until he stopped a man. Ed said, "Where are the elephants? I have stopped at each cage and I have stopped at each road I came to."

The man said, "Have you stopped at the bears? That is where they stopped the elephants as they were going out of the zoo. I will stay with you and take you there."

Level: Two; Posttest
Sound: st
Word: stopped
Phrase: stopped at

An Old Maple Tree

There once was an old maple tree in Bugle Park. It was so high that its top reached the steeple. Children liked to come to this old maple tree to play and eat maple candy. Their mothers and fathers came to the old maple tree to have a cookout. Men liked the maple tree because they could sit idle under the large maple leaves and read. This old maple tree was a fun place to go to when you went to Bugle Park.

Level: Three; Posttest
Sound: le
Word: maple
Phrase: old maple tree

The Village Visit

Robin Lee's voyage brought him to a tiny exciting village. This tiny exciting village had an open water passage through the entire village. Robin Lee decided to explore this tiny exciting village by including a trip through the passage. He sent a message ahead to get permission from the chief of the village.

When Robin came within view of the tiny exciting village, he saw all the people waiting at the beach to greet him. Through his adventures, he learned that this really was a tiny exciting village.

Level: Four; Posttest
Sound: age
Word: village
Phrase: tiny exciting village

A Gift from Earth

Every year a gift was delivered from Earth. This small planet was completely independent of Earth but its people did look forward to this gift from Earth. This year the gift was to be swiftly delivered. It would be lifted into space by a swift spaceship; then the gift was to be sifted through space and delivered. The gift was quite a large one this year and there was no telling what the gift could be. The individuals at the receiving end could hardly work until the gift was delivered.

Level: Five; Posttest
Sound: ift
Word: gift
Phrase: gift was

Just In Case

The threat of an explosion would make it necessary to have the area cleared. Provision was made so that the mere threat of an explosion would make an alarm go off. This explosion alarm would be heard for miles warning everyone about the possible explosion and telling them to take the proper provisions. Hopefully, then the area threatened by an explosion would be left in seclusion with little confusion.

Such a threat of an explosion would make it necessary to move clearly and with caution. Any materials that could add to the explosion would also have to be removed.

Level: Six; Posttest
Sound: sion
Word: explosion
Phrase: threat of an explosion

The Iceberg Experts

A meeting of iceberg experts was held in Iowa. The experts' convention drew more than 200 iceberg experts. The results of the studies done by the iceberg experts suggest that exciting things are happening in the world of iceberg science. The experts' experience shows that a "captive" berg could serve an extra duty of preserving perishable foods. The experts also have found that icebergs could be used as platforms for probing deep undersea oil. One such platform was made by a few iceberg experts and now they expect oil soon.

Level: Seven; Posttest
Sound: ex
Word: experts
Phrase: iceberg experts

Job Finding

When you get a personal interview with an employer it usually means that you are seriously being considered for a job. One of the best ways to obtain a personal interview is to complete a job application in a careful manner. Once you are granted a personal interview, it is very important to prepare prior to the interview. It is important to research the organization which you will interview with so that the interaction during the interview can be positive. A personal interview should be an interchange between the two participating individuals. It is important that you seem interested. During the personal interview, nothing should interfere with the goal of job attainment.

Level: Eight; Posttest
Sound: inter
Word: interview
Phrase: personal interview

Appendix K

Presentation Schedule of Passages on Pre-Post Attentional-Reading Test

	SIT			DT			C		
younger									
S1	I	D	VD	I	D	VD	I	D	VD
S2	D	I	VD	D	I	VD	D	I	VD
S3	VD	I	D	VD	I	D	VD	I	D
S4	D	VD	I	D	VD	I	D	VD	I
S5	VD	D	I	VD	D	I	VD	D	I
S6	I	VD	D	I	VD	D	I	VD	D
older									
S1	I	D	VD	I	D	VD	I	D	VD
S2	D	I	VD	D	I	VD	D	I	VD
S3	VD	I	D	VD	I	D	VD	I	D
S4	D	VD	I	D	VD	I	D	VD	I
S5	VD	D	I	VD	D	I	VD	D	I
S6	I	VD	D	I	VD	D	I	VD	D

Appendix L

Interval Recording of Self-Verbalizations Emitted During Attentional-Reading Task

Tape#______________

Story___________________________

Difficulty Level______ Trial___________

Coder__________________

x = present

0 = absent

	1				2				3				4				5				6				7			
	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60	0-15	16-30	31-45	46-60
Reading																												
Social Speech																												
Task Related Self-Guiding Speech																												
Prepara-tory/Task Analysis																												
Focusing/ Sound It Out																												
Self-SR																												
Coping																												
Other Private Speech																												

Appendix M

Spache Posttest Form for Recording Self-Verbalizations

Name of child:_______________________

Examiner:_____________________________

Passage #___ Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Passage #____Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Passage #____Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Passage #____Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Passage #____Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Passage #____Self-verbalizations: Yes No (Circle one)
If yes, record specific self-statements:

Appendix N

Data Tables

Table 3

Subject Characteristics by Group

		Sex	Age	Reading Grade Level (Brigance)	Years Behind in Reading Grade Level
Reading Level-One	Self-instructional training	4M 2F	8.0	1.7	1.2
	Direct training	5M 1F	8.6	1.6	2.0
	Control	4M 2F	8.6	1.6	2.1
Reading Level-Two	Self-instructional training	4M 2F	11.0	4.1	1.8
	Direct training	4M 2F	10.6	4.1	1.6
	Control	4M 2F	10.2	3.9	1.3

Note. All between group differences are nonsignificant.

Table 4

Analysis of Variance Summary Tables for Subject Characteristics

Age				
Source of Variance	df	SS	MS	F
Level	1	42.25	42.25	13.95**
Group	2	.39	.19	.06
Level x Group	2	3.50	1.75	.58
Subjects (LG)	30	90.83	3.03	
Reading Grade Level				
Source of Variance	df	SS	MS	F
Level	1	53.29	53.29	80.15**
Group	2	.20	.10	.15
Level x Group	2	.03	.02	.02
Subjects (LG)	30	19.95	.66	
Months Behind in Reading Grade Level				
Source of Variance	df	SS	MS	F
Level	1	.40	.40	.15
Group	2	.52	.26	.10
Level x Group	2	3.94	1.97	.73
Subjects (LG)	30	81.01	2.70	

**$p < .01$

Table 5

Analysis of Variance Summary Tables for
Extent of Training Provided

Attendance

Source of Variance	df	SS	MS	F
Level	1	.17	.17	.11
Group	1	4.17	4.17	2.75
Level x Group	1	2.67	2.67	1.76
Subjects (LG)	20	30.33	1.52	

Number of Attentional-Reading Passages Completed

Source of Variance	df	SS	MS	F
Level	1	4161.	4161.	8.22**
Group	1	5222.	5222.	10.32**
Level x Group	1	13.50	13.50	.03
Subjects (LG)	20	10122.	506.	

**$p < .01$

Table 6

Interrater Reliability of Attentional-Reading Test Scores

	Instructional	Difficult	Very Difficult
Pretest	.95	.99	.98
Posttest	.92	.98	.97

Note. Pearson correlations were computed on six randomly selected subjects.

Table 7

Reliability of Scoring Verbalizations on Attentional-Reading Posttest as Indexed by Percentage Agreement

Subject	Reading	Social Speech	Task-Related Speech	Other Private Speech
1	100	99	100	100
2	100	98	98	99
3	100	99	100	100
4	100	100	100	100
5	100	97	100	100
6	100	99	100	100

Note. The numbers indicate the mean percentage agreement averaged across stories.

Table 8

Reliability of Scoring Self-Verbalization Categories on Attentional-Reading Posttest as Calculated by Percentage Agreement Occurrence

	Preparatory/ Task Analysis	Focusing	Self-Reinforcement	Coping
Level-One				
S1	100	-	-	-
S2	100	100	100	-
S3	-	-	-	-
S4	-	-	-	-
S5	100	100	100	100
S6	100	-	100	-
Level-Two				
S1	-	-	-	-
S2	100	92	90	100
S3	100	100	100	100
S4	100	100	100	-
S5	-	-	-	-
S6	-	-	-	-

Table 9

Verbalizations Emitted During the Attentional-Reading Posttest

	Reading	Social Speech	Task Related Self-Guiding Speech	Other Private Speech
Level-One				
SIT Group	95.8	10.3	10.4	0
DT Group	99.3	17.9	0	1.2
C Group	98.4	12.7	.3	.6
Level-Two				
SIT Group	99.0	7.0	7.2	.8
DT Group	99.6	7.2	.4	.7
C Group	99.9	9.4	0	.3

Note. The numbers indicate the mean percentage of 15-second intervals scored per reading averaged across subjects.

Table 10

Analyses of Verbalizations Scored During Attentional-Reading Posttest

<u>Reading</u>

Source of Variance	df	SS	MS	F
Level	1	25.67	25.67	3.17
Group	2	28.10	14.05	1.73
Level x Group	2	12.10	6.05	.75
Subjects (LG)	30	243.04	8.10	

<u>Social Speech</u>

Source of Variance	df	SS	MS	F
Level	1	298.14	298.14	2.70
Group	2	90.26	45.13	.41
Level x Group	2	110.02	55.01	.50
Subjects (LG)	30	3313.27	110.44	

<u>Self-Guiding Speech</u>

Source of Variance	df	SS	MS	F
Level	1	10.13	10.13	.20
Group	2	593.98	296.98	5.95**
Level x Group	2	21.64	10.82	.22
Subjects (LG)	30	1197.11	49.90	

<u>Other Private Speech</u>

Source of Variance	df	SS	MS	F
Level	1	.01	.00	.00
Group	2	2.03	1.02	.07
Level x Group	2	3.07	1.54	1.06
Subjects (LG)	30	43.61	1.45	

$^{**}p < .01$

Table 11

Number and Type of Self-Verbalizations Emitted by the SIT Group on the Attentional-Reading Posttest

	Number of Self-Verbalizations	Percentage of Self-Verbalizations per Category			
		Preparatory/ Task Analysis	Focusing/ Sound It Out	Self-Reinforcement	Coping
Level-One					
S1	1	100	-	-	-
S2	19	74	16	10	-
S3	0	-	-	-	-
S4	0	-	-	-	-
S5	50	52	26	20	2
S6	15	73	-	27	-
Level-Two					
S1	0	-	-	-	-
S2	25	12	44	40	4
S3	22	55	32	9	4
S4	7	57	29	14	-
S5	0	-	-	-	-
S6	0	-	-	-	-

Table 12

Percentage of Training Days Self-Instructions Occurred without Immediate Prompt

		Pre-paratory	Task Analysis	Look Closely	Sound It Out	Self-SR	Coping
Level-One	S1	73	91	50	30	75	0
	S2	100	100	100	83	100	50
	S3	78	44	50	13	17	17
	S4	91	82	80	70	25	13
	S5	100	100	100	100	88	75
	S6	100	90	33	33	57	0
Mean Percentage		90	85	69	55	60	26
Level-Two	S1	100	91	100	90	100	100
	S2	100	100	89	89	100	100
	S3	100	100	100	50	100	50
	S4	100	90	100	100	100	67
	S5	100	92	82	82	100	89
	S6	100	64	70	50	25	0
Mean Percentage		100	90	90	77	88	68

Table 13

Analysis of Self-Verbalizations
Occurring during Training

Source of Variance	df	SS	MS	F
Level	1	8064	8064	3.34
Subjects (Level)	10	24140	2414	
Type of Self-Verbalization	5	17444	3489	11.54**
VL	5	2572	514	1.70
VS (L)	50	15124	302	

**$p < .01$

Table 14

Pretest Analyses of the Attentional Reading Test

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Level	1	5109	5109	5.48*
Group	2	1169	584	.63
Level x Group	2	4430	2215	2.37
Subjects (LG)	30	27986	933	
Difficulty	2	8264	4312	7.36**
D x L	2	4208	2104	3.59*
D x G	4	2718	679	1.16
DLG	4	1561	390	.67
DS (LG)	60	35168	586	
Trials	4	9977	2494	2.22
T x L	4	5929	1482	1.32
T x G	8	9829	1229	1.09
TLG	8	10532	1317	1.17
TS (LG)	120	134927	1124	
DT	8	9801	1225	1.06
DTL	8	9074	1134	.98
DTG	16	17629	1102	.95
DTLG	16	17672	1104	.96
DTS (LG)	240	277165	1155	

Percentage Correct Underlined Targets

Source of Variance	df	SS	MS	F
Level	1	13741	13741	9.77**
Group	2	2660	1330	.95
Level x Group	2	2854	1427	1.01
Subjects (LG)	30	42199	1407	
Difficulty	2	1335	668	.08
D x L	2	312	156	.21
D x G	4	3814	954	1.26
DLG	4	2361	590	.78
DS (LG)	60	45611	760	
Trials	2	28444	14222	32.37**
T x L	2	5088	2544	5.79**
T x G	4	960	240	.55
TLG	4	1841	460	1.05
TS (LG)	60	26342	439	
DT	4	5224	1306	2.34
DTL	4	3401	850	1.52
DTG	8	6940	867	1.55
DTLG	8	2561	320	.57
DTS (LG)	120	67033	559	

*$p < .05$ **$p < .01$

Table 15

Analysis of Variance Summary Tables for Gain Score Analyses of Attentional-Reading Test

Percentage-Correct Oral Reading

Source of Variance	df	SS	MS	F
Level	1	1682	1682	4.17*
Group	2	1101	550	1.36
Level x Group	2	2357	1179	2.93
Subjects (LG)	30	12101	403	
Difficulty	2	1576	788	10.79**
DL	2	1791	895	12.26**
DG	4	239	60	.82
DLG	4	419	105	1.44
DS (LG)	60	4397	73	
Trials	4	56	14	.67
TL	4	16	4	.19
TG	8	507	63	3.00*
TLG	8	360	45	2.14*
TS (LG)	120	2563	21	
DT	8	175	22	1.00
DTL	8	297	37	1.67
DTG	16	703	44	1.98*
DTLG	16	493	31	1.39
DTS (LG)	240	5324	22	

Percentage-Correct Underlined Targets

Source of Variance	df	SS	MS	F
Level	1	1504	1504	1.63
Group	2	4177	2089	2.27
Level x Group	2	4577	2288	2.48
Subjects (LG)	30	29923	997	
Difficulty	2	227	113	.10
DL	2	2228	1114	1.21
DG	4	6552	1638	1.78
DLG	4	5270	1318	1.17
DS (LG)	60	67377	1123	
Trials	2	12330	6165	8.25**
TL	2	3987	1994	2.66
TG	4	615	154	.21
TLG	4	915	229	.31
TS (LG)	60	44820	747	
DT	4	7584	1896	2.06
DTL	4	7421	1855	2.01
DTG	8	13924	1741	1.89
DTLG	8	5318	665	.72
DTS (LG)	120	110641	922	

*$p < .05$ **$p < .01$

Table 16

Correlations of the Percentage of Correctly Identified Reading Targets with Oral Reading Performance

	Instructional			Difficult			Very Difficult		
	Phonetic Sound	Word	Phrase	Phonetic Sound	Word	Phrase	Phonetic Sound	Word	Phrase
Reading-Level-One	-.12	.01	.18	.50	.09	-.13	.16	.50	.34
Reading-Level-Two	.42	.14	-.24	-.08	-.19	-.02	.12	.10	.29

Note. Pearson correlations were computed on 18 subjects.

Table 17

Analysis of Variance Summary Table for Repeated Measures Analysis of the Percentage of Correctly Underlined Targets

Source of Variance	df	SS	MS	F
Source				
Level	1	18187	18187	13.23**
Group	2	749	375	.27
Level x Group	2	1290	645	.47
Subjects (LG)	30	41255	1375	
Pre-Post	1	16673	16673	33.15**
PL	1	956	956	1.90
PG	2	2287	1144	2.27
PLG	2	2181	1090	2.17
PS (LG)	30	15098	503	
Difficulty	2	3855	1928	4.28*
DL	2	2101	1050	2.33
DG	4	1647	412	.92
DLG	4	882	220	.49
DS (LG)	60	26979	450	
Trials	2	27579	13789	38.09**
TL	2	3178	1589	4.39*
TG	4	966	242	.67
TLG	4	2057	514	1.42
TS (LG)	60	21738	362	
PD	2	145	73	.13
PDL	2	916	458	.81
PDG	4	3648	912	1.62
PDLG	4	2311	578	1.02
PDS (LG)	60	33863	564	
PT	2	5285	2643	5.90**
PTL	2	2394	1197	2.67
PTG	4	380	95	.21
PTLG	4	428	107	.24
PTS (LG)	60	26880	448	
DT	4	2132	533	1.61
DTL	4	924	231	.70
DTG	8	3146	393	1.18
DTLG	8	1290	161	.48
DTS (LG)	120	39828	332	
PDT	4	3849	962	2.10
PDTL	4	3630	908	1.98
PDTG	8	6858	857	1.87
PDTLG	8	2672	334	.73
PDTS (LG)	120	54935	458	

*$p < .05$
**$p < .01$

Table 18

Pretest Multivariate and Univariate Analyses of the Selected Transfer Passages

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Level	2	59	34.35**
Group	4	118	1.50
Level x Group	4	118	.61
Difficulty	4	118	19.20**
DL	4	118	5.38**
DG	8	118	1.68
DLG	8	118	.77

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Level	1	2720	2720	23.45**
Group	2	99	49	.42
Level x Group	2	88	44	.38
Subjects (LG)	30	3482	116	
Difficulty	2	3399	1700	41.92**
DL	2	786	393	9.69**
DG	4	308	77	1.90
DLG	4	230	57	1.42
DLGS (LG)	60	2433	41	

Percentage Correct Comprehension

Source of Variance	df	SS	MS	F
Level	1	602	602	.48
Group	2	1323	661	.53
Level x Group	2	136	68	.05
Subjects (LG)	30	37615	1254	
Difficulty	2	4927	2464	6.69**
DL	2	2004	1002	2.72
DG	4	2215	554	1.50
DLG	4	260	65	.18
DLGS (LG)	60	2433	41	

$^{**}p < .01$

Table 19

Multivariate and Univariate Gain Score Analyses of Selected Transfer Passages

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Level	2	59	1.54
Group	4	118	.39
Level x Group	4	118	1.94
Difficulty	4	118	.17
DL	4	118	2.17
DG	8	118	.55
DLG	8	118	.37

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Level	1	.14	.14	.00
Group	2	49	24	.25
Level x Group	2	257	128	1.32
Subjects (LG)	30	2902	97	
Difficulty	2	28	14	.21
DL	2	134	67	.98
DG	4	190	47	.69
DLG	4	170	42	.62
DS (LG)	60	4098	68	

Percentage Correct Comprehension

Source of Variance	df	SS	MS	F
Level	1	2011	2011	3.04
Group	2	907	453	.68
Level x Group	2	1833	916	1.38
Subjects (LG)	30	19860	662	
Difficulty	2	56	28	.04
DL	2	3028	1514	2.13
DG	4	594	148	.21
DLG	4	478	120	.17
DS (LG)	60	42778	713	

Table 20

Multivariate and Univariate Repeated Measures Analyses of the Selected Transfer Passages

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Level	2	59	89.94**
Group	4	118	2.99*
Level x Group	4	118	1.73
Pre-Post	2	59	15.20**
PL	2	59	1.53
PG	4	118	.39
PLG	4	118	1.94
Difficulty	4	118	44.81**
DL	4	118	13.65**
DG	8	118	3.05**
DLG	8	118	1.91
PD	4	118	.17
PDL	4	118	2.18
PDG	8	118	.55
PDLG	8	118	.37

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Level	1	5480	5480	27.26**
Group	2	240	120	.60
Level x Group	2	123	61	.30
Subjects (LG)	30	6222	201	
Pre-Post	1	128	128	2.67
PL	1	.07	.07	.00
PG	2	123	61	1.27
PLG	2	129	64	1.33
PS (LG)	30	1451	48	
Difficulty	2	6792	3396	59.58**
DL	2	2246	1123	19.70**
DG	4	311	78	1.37
DLG	4	439	110	1.93
DS (LG)	60	3433	57	
PD	2	14	7	.21
PDL	2	67	33	.98
PDG	4	129	32	.94
PDLG	4	85	21	.62
PDS (LG)	60	2049	34	

Table 20 (continued)

Percentage Correct Comprehension

Source of Variance	df	SS	MS	F
Level	1	9.38	9.38	.00
Group	2	966	483	.28
Level x Group	2	1324	662	.38
Subjects (LG)	30	52195	1740	
Pre-Post	1	6457	6457	19.45**
PL	1	1001	1001	3.02
PG	2	459	228	.69
PLG	2	921	461	1.39
PS (LG)	30	9960	332	
Difficulty	2	9299	4650	11.95**
DL	2	611	306	.79
DG	4	3446	861	2.21
DLG	4	398	100	.26
DS (LG)	60	23353	389	
PD	2	28	14	.04
PDL	2	1521	761	2.13
PDG	4	297	74	.21
PDLG	4	242	60	.17
PDS (LG)	60	21449	357	

*$p < .05$
**$p < .01$

Table 21

Pretest Multivariate and Univariate Analyses of the Spache Diagnostic Reading Scales

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Level	3	28	18.96**
Group	6	56	.34
Level x Group	6	56	.20

Word Recognition Grade Level

Source of Variance	df	SS	MS	F
Level	1	68	68	53.84**
Group	2	.07	.03	.03
Level x Group	2	.40	.20	.16
Subjects (LG)	30	37.93	1.26	

Instructional Reading Grade Level

Source of Variance	df	SS	MS	F
Level	1	98	98	41.89**
Group	2	.98	.49	.21
Level x Group	2	.71	.36	.15
Subjects (LG)	30	70.19	2.34	

Phonics Skills

Source of Variance	df	SS	MS	F
Level	1	11449	11449	34.17**
Group	2	239	119	.36
Level x Group	2	55	28	.08
Subjects (LG)	30	10051	335	

**$p < .01$

Table 22

Multivariate and Univariate Gain Score Analyses of Spache Diagnostic Reading Scales

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Level	3	28	5.90**
Group	6	56	2.42*
Level x Group	6	56	2.29*

Word Recognition Grade Level

Source of Variance	df	SS	MS	F
Level	1	.02	.02	.16
Group	2	.49	.24	2.15
Level x Group	2	.65	.33	2.88
Subjects (LG)	30	3.39	.11	

Instructional Reading Grade Level

Source of Variance	df	SS	MS	F
Level	1	2.72	2.72	9.05**
Group	2	1.40	.70	2.33
Level x Group	2	1.52	.76	2.53
Subjects (LG)	30	9.03	.30	

Phonics Skills

Source of Variance	df	SS	MS	F
Level	1	920	920	7.15*
Group	2	686	343	2.66
Level x Group	2	572	286	2.22
Subjects (LG)	30	3862	129	

*$p < .05$
**$p < .01$

Table 23

Gain Score Analysis by Age of Attentional-Reading Test

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Age	1	436	436	.86
Group	2	1100	550	1.08
Age x Group	2	487	244	.48
Subjects (AG)	30	15217	507	
Difficulty	2	1576	788	7.73**
DA	2	12	6	.06
DG	4	239	60	.59
DAG	4	456	114	1.12
DS (AG)	60	6139	102	
Trials	4	56	14	.64
TA	4	101	25	1.14
TG	8	507	63	2.86**
TAG	8	178	22	1.00
TS (AG)	120	2661	22	
DT	8	175	22	.92
DTA	8	66	8	.35
DTG	16	703	44	1.85*
DTAG	16	350	22	.92
DTS (AG)	240	5697	24	

Percentage Correct Underlined Targets

Source of Variance	df	SS	MS	F
Age	1	1248	1248	1.37
Group	2	4177	2089	2.29
Age x Group	2	7382	3691	4.05*
Subjects (AG)	30	27373	912	
Difficulty	2	227	113	.10
DA	2	47	24	.02
DG	4	6552	1638	1.42
DAG	4	5825	1456	1.27
DS (AG)	60	69003	1150	
Trials	2	12330	6165	10.97**
TA	2	1353	676	1.20
TG	4	615	154	.27
TAG	4	2396	599	1.07
TS (AG)	60	33743	562	
DT	4	7584	1896	1.99
DTA	4	5012	1253	1.31
DTG	8	13924	1741	1.82
DTAG	8	3826	478	.50
DTS (AG)	120	114542	955	

*$p < .05$
**$p < .01$

Table 24

Multivariate and Univariate Gain Score Analyses by Age of Spache Diagnostic Reading Scales

MANOVA--Test of Significance using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Age	3	28	1.68
Group	6	56	1.75
Age x Group	6	56	.36

Word Recognition Grade Level

Source of Variance	df	SS	MS	F
Age	1	.03	.03	.22
Group	2	.49	.24	1.89
Age x Group	2	.17	.09	.68
Subjects (AG)	30	3.85	.13	

Instructional Reading Grade Level

Source of Variance	df	SS	MS	F
Age	1	1.48	1.48	3.89
Group	2	1.40	.70	1.84
Age x Group	2	.38	.19	.49
Subjects (AG)	30	11.41	.38	

Phonics Skills

Source of Variance	df	SS	MS	F
Age	1	169	169	.98
Group	2	686	343	1.98
Age x Group	2	.01	.00	.00
Subjects (AG)	30	5184	172	

Table 25

Gain Score Analysis of Teacher Effects on the Attentional-Reading Test

Percentage Correct Oral Reading

Source of Variance	df	SS	MS	F
Instructor	5	6071	1214	2.52
Subjects (Instructor)	18	8654	481	
Difficulty	2	631	316	4.94*
DI	10	1367	137	2.14*
DS (I)	36	2316	64	
Trials	4	92	23	1.10
TI	20	859	43	2.05*
TS (I)	72	1515	21	
DT	8	82	10	.42
DTI	40	865	22	.88
DTS (I)	144	3525	24	

Percentage Correct Underlined Targets

Source of Variance	df	SS	MS	F
Instructor	5	5806	1161	1.76
Subjects (Instructor)	18	11868	659	
Difficulty	2	2468	1234	1.10
DI	10	11563	1156	1.03
DS (I)	36	40296	1119	
Trials	2	8985	4492	10.14**
TI	10	4692	469	1.06
TS (I)	36	15947	443	
DT	4	1246	311	.34
DTI	20	23461	1173	1.27
DTS (I)	72	66411	922	

*$p < .05$
**$p < .01$

Table 26

Multivariate and Univariate Gain Score Analyses of Teacher Effects on the Spache Diagnostic Reading Scales

MANOVA--Test of Significance Using Wilks Lambda Criterion.

Source of Variance	df_{HYP}	df_{ERR}	Approximate F-Statistic
Instructor	15	44.57	.92

Word Recognition Grade Level

Source of Variance	df	SS	MS	F
Instructor	5	.45	.09	.64
Subjects (I)	18	2.50	.14	

Instructional Reading Grade Level

Source of Variance	df	SS	MS	F
Instructor	5	4.01	.80	2.19
Subjects (I)	18	6.60	.37	

Phonics Skills

Source of Variance	df	SS	MS	F
Instructor	5	309	62	.33
Subjects (I)	18	3357	186	

Table 27

Correlations of Self-Instructional Measures with Gains on the Attentional-Reading Test and the Spache Diagnostic Reading Scales

	Attentional-Reading Percentage Correct Oral Reading	Spache Scales Word Recognition	Spache Scales Instructional	Spache Scales Phonics
Number of Self-Instructions on Attentional-Reading Posttest				
Low SIT Group	.66	.08	-.50	-.80*
High SIT Group	.26	-.24	.20	.25
Percentage of Training Days Unprompted Self-Instructions Occurred				
Low SIT Group	.36	.50	-.54	-.35
High SIT Group	.65	-.21	.52	-.40

*$p < .05$

Table 28

Correlations of Impulsivity Scores with Gains on the Attentional-Reading Test and the Spache Diagnostic Reading Scales

		Attentional-Reading Test Percentage Correct Oral Reading	Spache Scales		
			Word Recognition	Instructional Level	Phonics
Level-one	SIT Group	-.30	.68	.14	.59
	DT Group	.28	-.37	-.08	-.05
Level-two	SIT Group	.36	.68	-.26	.09
	DT Group	.32	-.03	-.59	-.25