THE EFFECT OF VERBAL SELF-INSTRUCTION TRAINING ON THE COGNITIVE STYLES OF IMPULSIVE ELEMENTARY SCHOOL STUDENTS

By

VIRGINIA LOCK HOOVER

Bachelor of Science
University of Denver
Denver, Colorado
1947

Master of Education
Memphis State University
Memphis, Tennessee
1968

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Thesis Approved:

Paul Ellard
Thesis Adviser

Michael E. Kane

Judith E. Dobson

J. Barbara Wilkinson

David Yellin

Norman N. Durham
Dean of the Graduate College

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

Children bring their own learning styles with them when they enter school. Most children flourish from the start, are well behaved, achieve academically and socially, and have learning styles that assure attainment in school. On the other hand, some students fail to thrive in school. Whether it is from their cultural background or cognitive styles that are not conducive to effective learning, the result is difficulty with academic and social skills. This type of student is becoming all too prevalent in our schools. Teachers report that these students do not settle down to task, ignore instructions, and proceed to act or respond without knowing what is expected of them. They rush through their work paying no attention to signs in arithmetic problems, making wild guesses at words while reading, and having only the slightest idea how to approach and solve a problem.

This is a classic description of impulsive children who are unable to control their impulses, who act and react without thought, who lack the attention needed to begin the learning process, and who can not become involved in the

instruction. In addition, impulsive children are poorly organized, generally lack self-control, are incapable of response inhibition (e.g., behavior appears automatic), and show deficiencies in cognitive problem solving capacities (Kendall and Finch, 1979b).

One of the major problems in finding a solution to deficient academic and social performance is the continued perception of cognition as a global process. The very subtle differences in children's cognitive styles have been overlooked by researchers in their quest for a global explanation of the cognitive process. As posited by Epstein, Hallahan, and Kaufman (1975), investigators have relied too long on standardized global intelligence tests for their research. Individual differences in cognition must be observed and broken down into smaller units. The child's cognitive styles offer an opportunity for investigation.

Cognitive style, sometimes referred to as cognitive tempo or cognitive disposition, has been conceptualized as an individual's characteristic approach to processing information (Goldstein and Blackman, 1978). Individuals process stimuli so that the environment takes on meaning for them and affects their behavior. Individuals must sort out the stimuli which require attention and response. When more complex stimuli are to be selected and organized, the channeling of information is done according to the particular cognitive style of the individual.

The new field of cognitive psychology provides a theoretical basis for the study of cognitive style. One of the important premises is the assumption that human beings are "active information-seeking and information-using organisms, not, as prior views held, passive receivers of stimulation" (Reynolds and Flagg, 1983, p. 15). In addition, researchers in cognitive psychology have been more concerned with the structure of thought or how people think rather than the content or what people think. There are several theoretical approaches to the study of cognitive style. Three divergent cognitive styles are investigated in this study: field dependence, reflection-impulsivity, and simultaneous and successive cognitive processing.

The most thoroughly researched cognitive style is field dependence. The field articulation construct postulated by Witkin, Dyk, Faterson, Goodenough, and Karp (1962) differentiates individuals who can attend to relevant cues and discard the irrelevant from those that cannot. Children who are successful at this are said to be field independent, while those who are unsuccessful and can not discriminate between the relevant and the irrelevant are field dependent.

The Children's Embedded Figures Test (CEFT) (Karp and Konstadt, 1971) is used frequently to measure field dependence. The subject locates a simple figure embedded in a complex pattern of designs. If children are not distracted by the complex patterns and can locate the figure rapidly, they are classified as field independent. Children who are

field independent are found to be more successful in school since selective attention plays a vital part in information processing. This better school performance has been demonstrated in the literature (Kagan and Zahn 1975; Witkin, Moore, Goodenough, and Cox, 1977).

As with field dependence, research on reflectivity has indicated that impulsivity creates barriers to good school performance. Reflectivity-impulsivity plays a vital part in the successful evaluation of the alternatives. Kagan (1971) used the Matching Familiar Figures Test (MFFT), (Kagan, Rosman, Day, Albert, and Phillips, 1964) to identify impulsive and reflective children. The MFFT is composed of a series of familiar figures and six variations of the figure. Only one of the variations is exactly like the stimulus figure. Children select the figure believed to match the stimulus figure and are timed from the stimulus presentation to their decision. If their answer is incorrect, they then proceed to choose from the remaining five figures until the correct one is selected. The child who is below the median in errors and above the median in reaction time is classified as reflective. The child who is above the median in errors and below the median in reaction time is classified as impulsive. Reflective children, on the other hand, display no impulsive behavior and are self-controlled. They stop, look, and listen, evaluating their responses alternately and are able to either engage or inhibit their responses. The child who pauses and thinks prior to

responding usually makes fewer errors than the one who makes hasty responses. This has been reflected in research reviewed by Kendall and Wilcox (1979).

There has been a consistent series of findings that fewer reflective children than impulsive children failed first grade (Messer, 1970). Reflective children showed greater reading skill (Kagan, 1965), and generally were more proficient in arithmetic (Cathcart & Liedtke, 1969). Reflective children have higher standards for all types of tasks (Kagan, 1965), use more systematic and efficient scanning strategies (Ault, Crawford, and Jeffery, 1972), and score higher on sustained attention scales (Zelniker and Wendall, 1976).

One of the current research approaches to cognitive style based on the work of the Russian scientist, Luria (1966), provides the third area of investigation. Luria postulates that information received either from direct perception or from memory, must be processed in one of three ways; sequentially (in temporal order), simultaneously (in spacial order), or depending upon the task, utilizing both sequentially and simultaneously processed information. The choice of processing may depend upon the individual's habitual mode for solving problems or the preferred style (Das, Kirby, and Jarman, 1975).

Simultaneous processing is measured by tests such as the Raven's Progressive Matrices Test (RPMT), (Raven, 1956). The RPMT consists of a series of designs with a section

missing. The subjects are required to choose a design from six possibilities pictured below the stimulus design that would complete the total format. The designs increase in difficulty as the test progresses. Successive processing is measured by a serial ordered test such as the Visual Aural Digit Span test (VADS), (Koppitz, 1977). The VADS presents a series of digits verbally and visually. The subjects respond verbally or write the numbers down.

Research has linked simultaneous processing to reading comprehension and mathematics while word recognition and spelling are associated with successive processing (Cummins and Das, 1977). Successive processing correlated significantly with the Wide Range Achievement Test (WRAT), (Jastak and Jastak, 1946) oral reading while simultaneous processing is significantly related to the WRAT arithmetic subtest (Das and Cummins, 1978).

These three cognitive styles provide an area for investigation of information processing differences in impulsive children. The possibility of better controlling impulsive behavior through modifying the inefficient use of a particular cognitive style poses a challenge for investigators.

The voluntary control of behavior involves a complex relationship between language, thought, and behavior. Soviet scientists, Vygotsky (1962) and Luria (1961), researched the voluntary control of behavior in children. Both describe three stages by which voluntary motor behaviors come under verbal control. First, the adult controls

children by speech and directs the children's behavior. Second, the children's own overt speech controls their behavior. Third, children's inner speech self-direct their behavior and overt speech becomes covert speech. This inner speech emerges as overt speech in adults when tasks become too complicated and they resort to talking aloud to themselves.

Meichenbaum (1977), building on the theories of Luria (1961), examined the use of language to control behavior by impulsive children and found that they do not analyze their experiences in cognitively mediated terms. They do not formulate or internalize any rules that might be helpful in new learning situations. Deficiencies in these processes of comprehension, production, and mediation produce inferior performance. As a result of these observations, Meichenbaum and Goodman (1971) developed a therapeutic intervention program designed to train impulsive children to comprehend the task, to spontaneously produce mediators and strategies, and to use such mediators to guide, monitor, and control their behavior. This procedure teaches the child specific verbalizations that follow a step-by-step sequence modeled by the therapist and rehearsed by the child.

There is ample research that an impulsive cognitive style can be modified through verbal self-instruction (Abikoff, 1979; Douglas, Parry, Marton, and Garson, 1976; Kendall and Finch, 1978, 1979a; Leon and Pepe, 1983; Meichenbaum, 1977; Messer, 1976; Zelniker, Jeffery, Ault, and

Parsons, 1973). The basis for this research rests on two hypotheses. Since reflective children are more accurate and slower to respond, impulsive students should be trained to respond more slowly and accurately. Secondly, drawing impulsive children's attention to small details could increase their accuracy (Kagan, Pearson & Welch, 1966b).

Statement of the Problem

Research has indicated that impulsive children display academic and behavior problems resulting from the inefficient use of cognitive styles or cognitive strategies. The literature also suggests that impulsive cognitive style may be modified through verbal self-instruction. Little research has been done to determine if verbal self-instruction can be implemented effectively with impulsive children on a large scale in a normal school situation, utilizing the child's teacher as the trainer. Nor has it been determined if verbal self-instruction based on daily school work will generalize to the various cognitive styles of these children.

The questions to be answered in this study are:

1. Will verbal self-instruction training increase self-control in impulsive students?

2. Will verbal self-instruction training increase field independence?

3. Will verbal self-instruction training increase reflectivity?

4. Will verbal self-instruction training improve successive processing skills?

5. Will verbal self-instruction training improve simultaneous processing skills?

The Purpose of the Study

The purpose of this study is (1) to investigate the modifying of three aspects of cognitive style: reflective-impulsive, field independence-dependence, and simultaneous and successive styles of elementary school children rated as impulsive and (2) to determine the effectiveness of self-instruction training administered by their teachers based upon their daily classroom work. Generally this study explores the effect such training has on the student's cognitive style and the degree of generalization. Specifically, this study examines the effects of verbal self-instruction training on impulsive children's cognitive styles. Impulsive classroom behaviors are defined as those measured by the Self-Control Rating Scale (Kendall and Wilcox, 1979). Reflectivity-impulsivity is defined as performance on the Matching Familiar Figures Test (Kagan et al., 1964). Field dependence-independence is defined as performance on the Children's Embedded Figures Test (Karp and Konstadt, 1971). Simultaneous and successive processing are defined as performance on the Raven's Cloured Progressive Matrices Test (Raven, Court, and Raven, 1976) and the Visual Aural Digit Span Test (Koppitz, 1977), respectively.

Background Value of the Study

Since it is estimated that between 5% to 10% of

students are impulsive (O'Malley and Eisenberg, 1973), the problems associated with impulsivity pose a challenge to any educator. A model is needed for remediation. Educators need to be more concerned with the process of learning, rather than the product of learning, if the impulsive child is to be taught more effectively.

With this problem evident, Meichenbaum and Goodman (1971) developed a verbal self-instruction training procedure based on Luria's (1961) theories. While the procedure has proven effective, little or no research has been carried on in the natural setting of the classroom, with the teacher acting as the trainer, using regular classroom work as the basis for self-instruction training.

Limitations to the Present Study

1. The study involves only elementary school children classified as impulsive, and consequently generalization could only apply to similar groups of children.

2. The study is of eight weeks duration and will not reflect change that could occur over longer periods of time.

Summary

Impulsive students pose a problem in the classroom both to themselves and their teachers. This impulsive cognitive style creates difficulties for students in both academic and social situations. The perception of cognition as a global process has failed to produce solutions to these problems.

Cognitive psychology, with its emphasis on the active information-seeking and information-using organism, provides a theoretical basis for the creation of techniques to modify cognitive styles.

From the field of cognitive psychology, a method of cognitive behavior modification has been developed utilizing verbal self-instruction training to increase relfective behaviors of children. While clinical and laboratory investigations have produced positive results, little or no research on the effect of this training on cognitive styles has been carried out with impulsive children in the classroom. Two important questions remain unanswered; (1) Can the cognitive styles of impulsive students be modified by verbal self-instruction training and (2) can this modification procedure be carried out successfully in the regular classroom by the child's teacher?

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The purpose of this study is to investigate the modification of the cognitive styles of impulsive children through verbal self-instruction. Cognitive styles will be addressed, and the concept of impulsivity will be reviewed and examined. Three cognitive styles, defined: impulsivity-reflectivity, field dependence-independence, and simultaneous and successive processing, will be discussed. The history and background of the development of verbal self-instruction will be presented. Research presenting the effects of verbal-self instruction will conclude the review.

Conceptualizations of Cognitive Style

Cognitive styles are usually accepted as being part of the general family of personality traits (Guilford, 1980). These traits are frequently envisioned as the variables which distinguish individuals from others in their population. There are many variations of cognitive styles, and researchers have conceived and labeled these various dimensions as cognitive controls (Santostefano, 1969), cognitive attitudes (Gardiner, 1953), cognitive systems principles

(Holtzman and Gardiner, 1959), cognitive strategies (Messick, 1976), and intellectual executive functions (Guilford, 1980). The most widely accepted term has come to be cognitive styles (Guilford, 1980).

Several authors have expanded the concept of cognitive style as an individual's characteristic approach to processing information (Goldstein and Blackman, 1978). The real world takes on psychological meaning by developing cognitive representations that serve as mediators of what individuals receive and the response that they give. Cognitive style was developed as a hypothetical construct to explain the relationship between stimuli and responses (Blackman and Goldstein, 1982).

The processing of information involves the perception of the stimuli which is first processed in the unit of the brain that activates and regulates the individual. The information then goes to the second unit that analyzes and stores the information. The information progresses into the third unit that programs, regulates, and verifies it (Luria, 1963). This last level accounts for the individual cognitive styles where complex stimuli are selected, stored, and organized according to each person's cognitive processing style.

The consistency of the individual's cognitive styles throughout the perceptual and intellectual domains as well as the other characteristics that comprise the personality of the individual has been noted by Whitkin, Moore,

Goodenough, and Cox (1977). They delineate four essential elements of cognitive styles.

First, cognitive styles are involved with the structure of thought rather than the content. The way individuals think is the basis of study rather than the product or information produced: the how rather than the what. As these processes are delineated more specifically, the possibility of teaching children to use their most effective strategies to solve problems emerges.

Second, cognitive styles are pervasive, reflecting those individual differences we call personality. Cognitive style can be measured by verbal as well as nonverbal methods. Perception can be used to assess cognitive style also. Minucci and Connors (1964) observed this in a study of ten trained adults participating in a psychophysical study of light intensity. Viewing light intensities close to threshold under three different conditions, a consistent pattern of individual decision times resulted. Like children, some adults make decision rapidly and other slowly, no matter what the conditions.

Third, cognitive styles are stable over time. Individual differences in children in impulsivity are noted as early as two years of age (Kagan, 1965), and this impulsive dimension continues into adulthood with a high degree of consistency. Over the years individuals operate with the same basic characteristics. Impulsive children carry this style with them into adulthood. This does not mean that

cognitive styles are unchangeable; circumstances as well as maturity may alter a style.

Fourth, cognitive styles are bipolar. Unlike intelligence where more of it is better, either simultaneous or successive processing, when applied to appropriate tasks, can produce solutions more effectively. When used inappropriately, then, either style can produce poor performance (Kaufman and Kaufman, 1983).

Cognitive styles can be relatively pervasive and stable; involved in the structure rather than the content of thought; and bipolar, where opposite dimensions can be found such as impulsive and reflective cognitive styles.

Impulsivity

There are observable differences in the rapidity with which children process information. Some children act upon the first thought which comes to their minds without the slightest consideration of whether it is true or false or even appropriate or what the consequences might be. At the other end of the continuum, one finds other children who pause and reflect on each act, testing the validity and appropriateness of their responses prior to their acting upon them.

The most frequent cause for referral for psychological services is impulsivity--behavior lacking in self-control (O'Malley and Eisenberg, 1973). Impulsive behavior ranges from a short attention span to aggressive acting out. On

the whole, impulsive children are less inhibited, lack attention control, act out more, are more aggressive, and have greater problems in interpersonal relationships and academic performance (Kendal and Finch, 1979b).

Historical Perspective

For over two decades, Jerome Kagan (1965) has studied individual differences from the problem-solving perspective. As a result of these investigations, he has identified individual differences in cognitive style or tempo. His construct of the reflectivity-impulsivity dimension provides researchers with an approach to the study of this cognitive process.

Reflection-impulsivity is defined by the amount of time and reflection expended in the solution of a problem where there is response uncertainty. The degree of this reflection affects the entire cognitive process. The quality of initial decoding, recall, and hypothesis generating is dependent upon the degree of reflectivity (Kagan, 1965).

The differences in problem-solving approaches in children was further explored by Kagan (1966). He found that, when presented with a number of response alternatives, and when uncertainty is high as to the correct response, impulsive children respond quickly without carefully weighing all the possibilities, and make many errors. Reflective children show self-control by delaying their answers while

carefully considering the various response alternatives with the greater probability of making the correct response.

The Matching Familiar Figures Test created by Kagan et al. (1964) is used most frequently to measure this dimension. The child is asked to select the one figure, from a series of six variants, which is identical to the standard. The errors and the response time are recorded. Children who respond too quickly and make many errors are considered impulsive and those with longer response time and few errors are considered reflective.

The correlation between response time on first and second administrations across a 10 week period was .70. There is also a long term continuity with a .62 correlation after a one-year period. Messer (1976) found that among elementary school age children, reflectivity and impulsivity are moderately stable. In addition, these attributes generalize across similar tasks.

With situations involving response uncertainty, Kagan, Pearson, and Welch (1966a) found children in the first three grades had a correlation of .64 between response time in the MMFT and the Haptic Visual Matching task. Kagan (1966) also found a very slight relation between language skills with the correlation between response time and the Weschler Verbal scale usually under .20.

Research in attention consistently indicates reflective children are superior in this respect. Selective attention was assessed in second, fourth, and sixth grade with an

incidental learning task. By the sixth grade, reflective children displayed less incidental learning and greater central learning, but impulsive children did not appear to attend selectively (Kaufman and Kaufman, 1979).

Messer (1970) found that reflective children seem to be more concerned than impulsive children about the quality of their work. Reflective children show superiority in sustained attention, in personal and social skills, in making better moral judgements, in being less aggressive, and in being less pessimistic.

Factors Underlying Reflection-Impulsivity

There has been a number of investigations of reflective or impulsive nature. Three possible explanations of this dimension were postulated by Kagan (1966): concern for competency, anxiety about performance, and a constitutional predisposition.

The concern for competency in our culture is evidenced by the fact that children who give a quick answer are considered intelligent. Therefore, children wanting to be so considered will respond quickly, and children who have little confidence in their abilities will respond quickly also to compensate for their presumed deficit.

A child who is anxious will be more reflective and have a greater response latency. Messer (1970) had children experience failure in a test situation. Results indicated that the anxiety-provoked group made fewer errors than the

non-anxious control group. The data show that anxiety may be one factor that decreases impulsivity.

The constitutional factor was investigated by Kagan and Kogan (1970) in a longitudinal study of infants from 4 months to 27 months. The activity level of a 4 month old child could predict the level of his behavior at 27 months. In theorizing as to the basis of impulsive behavior, Kagan and Kogan (1970) state:

> The early display of these behaviors could be completely the product of differential experience or it could be the partial products of biological differences among the infants. There is some reason to suspect that the differences in tempo and inhibition may have a genetic basis (Kagan and Kogan, 1970, p. 139).

Reflectivity-Impulsivity and Academic Achievement

The effect of cognitive tempo on achievement and performance in school has been documented. Zelniker and Wendall (1976) found that reflective children perform better on tasks requiring detail analysis than those requiring global analysis. Impulsive children were the opposite, with better global analysis than detail analysis. When a task could be solved by either method, impulsive children performed on an equal basis with reflective children. It was concluded from this research that impulsive children are not inferior in potential or problem-solving ability, but rather poor performance is due to the incompatibility of their preferred global style to the detail analysis that is required for most types of school work.

Ault (1973) found that impulsive children asked less mature questions than the reflective children and concluded that reflective children differ from impulsive children, of the same grade, by the fully thought-out strategies used to solve problems. Barrett (1977) investigated academic achievement finding that children identified as reflective scored significantly higher on the Comprehensive Tests of Basic Skills than those classified as impulsive.

Reading skills were compared by Kagan (1965) between impulsive and reflective children. Based on performance on the MMFT, 130 first graders were assigned to reflective or impulsive groups. The examiner read one word aloud and asked the children to point to one of five words on a card that matched the one read. With verbal skill statistically removed, reflective children make fewer errors in reading than impulsive children.

Margolis, Brannigan, Gould, Heaverly, Molteni, Potter, and Samuels (1982) found conceptual tempo an important predictor of achievement of impulsive and reflective first grade children. In an investigation of high risk (those most prone to failure) kindergarten children, it was found that high risk children were more impulsive than low risk children and were also less able to alter tempo and follow instructions. Underachieving children tend to be impulsive as compared to normal groups (Hollon and Kendall, 1979). Becker (1976) supported the importance of the regulation of cognitive tempo in successful school achievement. To be

reflective requires careful attention to details and a slow pace that produces few errors.

This review of the research establishes the differences between reflective and impulsive children and the effects of impulsive cognitive style on behavior. The concept of an impulsive cognitive style has been well documented.

Field Dependence

The concept of field dependence began with the Witkin, Dyk, Faterson, Goodenough, and Karp (1962) study of individual differences in the perception of a vertical rod known as the upright. Witkin et al. (1962) noticed how consistent individuals were in the perception of the upright despite individual difference in the magnitude of errors. The instrument developed to measure this dimension was the Rod and Frame Test (RFT) consisting of a luminous adjustable rod and frame. The subject is seated in the darkness and asked to bring the rod into a vertical position independent of the orientation of the frame. Those who performed well on the test were classified as field independent and those who performed poorly were classified as field dependent. The field independent subjects were able to adjust the rod to the upright and were not affected by the position of the frame.

From these experiments developed a more simple procedure, the Embedded Figures Test (Witkin, Oltman, Raskin, and Karp, 1971) and the Children's Embedded Figures Test (Karp and Konstadt, 1971). These tests require the subject to

find a figure embedded in a complex series of distracting backgrounds. The field independent subject is one who can find the embedded figure quickly and accurately.

Factors Underlying Field Dependence-Independence

People tend to be consistent either in reliance on the field or on themselves in performance of a variety of tasks. Field independent people possess the internal referents to restructure the field on their own. They are able to take the information available from the environment, restructure it, and formulate additional hypotheses. The field dependent person has fewer internal referents available and must thus rely on the most evident elements in the stimulus field. Goodenough (1976) found that field independent people restructure the elements in the environment more frequently than field dependent individuals.

In a longitudinal study of college students, Witkin et al. (1977) found that field independent students preferred the sciences where less emphasis is on interpersonal skills and where more cognitive restructuring skills are required. The field dependent students chose to work with people in areas such as elementary education where restructuring skills are not as vital. When career choice was incongruent with their preferred cognitive style, students tended to switch majors to areas more in keeping with their styles.

Field Independence-Dependence and Academic Achievement

Field independent students usually perform better in school since selective attention is an important criteria to school success. Witkin et al. (1977) has demonstrated the relationship between lower achievement and field dependence. Other studies confirm this; Kagan and Zahn (1975) have linked underachievement to field dependence. Mexican-American students have lower achievement levels than do their Anglo counterparts. Mexican-American students tend to be field dependent and reflect the lack of ability to restructure mathematic, scientific, and abstract thought that is necessary for high achievement. Kagan and Zahn (1975) also found that when a teacher does not clearly organize instruction and material in the classroom, the field dependent student is doubly handicapped. Keough and Donolon (1972) found that perceptual difficulties associated with field dependence contribute to emotional instability, distractibility, and impulsivity.

Simultaneous and Successive Cognitive Processing

Historical Perspective

The contribution of Soviet neuropsychology is evident in two areas of this research, (1) simultaneous and successive cognitive processing and (2) verbal self-instruction to be reviewed later. The concept of simultaneous and successive processing was first discussed in 1878 by Sechenov

(cited in Zivin, 1979), the father of Russian psychology. Current Soviet research on the localization of brain functions builds upon the nineteenth-century physiological psychology of Sechenov (Harris, 1979).

Sechenov conceived of "all stimuli as being decomposed and then synthesized into spatial or temporal form" (Das, Kirby, and Jarman, 1979, p. 46). Later Soviet scientists built upon his theories to provide a basis for the theory of simultaneous and successive processing. However, Sechenov was more concerned with the spacial or simultaneous processing since little was known about auditory perception in his time. He stated that sequential learning, since it was so closely related to language, was a prerequisite to symbolic representations (Harris, 1979).

Neurological Foundations

Luria (1973), building upon previous Soviet work, proposed a controversial model of brain function. Luria (1973), basing his model on his observations that the cortex engages in two type of integrative activities, formulated his theory of simultaneous and successive processing. Luria's (1973) clinical experience with patients with lesions in the left hemisphere of the cortex led him to the discovery that disturbances of the simultaneous organization of the stimuli are attributed to lesions in the occipital-parietal area. Disturbances in successive processing could be attributed to injuries to the frontal-temporal areas

(Luria, 1966). Based upon Luria's (1966) neuropsychology, the pinpointing of brain lesions provides a foundation for understanding the resultant behavior. In addition, the model provides for a statistical factor analysis of the functions of the various parts of the brain with the use of psychological tests.

Luria (1973) outlined three functions of the brain: (1) the first activates the individual, regulates tone, waking, and the various mental states; (2) the second receives the information, analyses it and stores it for future use; (3) the third programs incoming stimuli, regulates activity, and verifies the messages. The first unit, referred to as the reticular activating system, that controls and maintains arousal is found in the subcortex and brainstem. This system can be activated from both within and outside the individual and can also originate in the cortex to provide conceptually driven behavior. The frontal lobes also play a part in the inhibition or activation of arousal systems of the brain. The posterior, convex surface of the cortex houses the second unit which receives, analyzes, and stores information in the occipital, temporal, and parietal lobes. The area is further broken down into three sub-areas called the primary, secondary, and tertiary levels.

The primary level processes the five senses: sight, sound, taste, smell, and touch. The secondary level receives, analyzes, and stores information. It also organizes information from one mode to the other. The tertiary

level organizes and codes information from the different sensory modes, and converts from one process to the other.

The last and third principal function of the brain consists of the frontal lobes which connect with all the other parts of the brain and can stimulate or inhibit information processing, arousal, and activation. Its main function is to program, regulate, and verify all stimuli. This process is illustrated in Figure 1.

Luria sees all information processed through the brain, whether it comes from the physical environment, internally within the organism, or from the autonomic nervous system, as being synthesized into two forms: simultaneous and successive cognitive processing (Das et al., 1975.) These two basic processes account for the intellectual activity of the individual.

Simultaneous synthesis refers to the processing of information in composites in order that elements are surveyable such as some logical-grammatical structures, spacial tasks, and certain forms of imagery. Any portion of the result is surveyable at once without dependence on its position in the whole and refers to any system of relationships (Das, Kirby, and Jarman, 1975). Simultaneous processing is essential to advanced levels of comprehension.

There are three aspects of simultaneous processing. The first is direct perception. The organism is selectively attentive to the stimulus field and the formation is primarily spatial; the second, mnestic process, refers to the

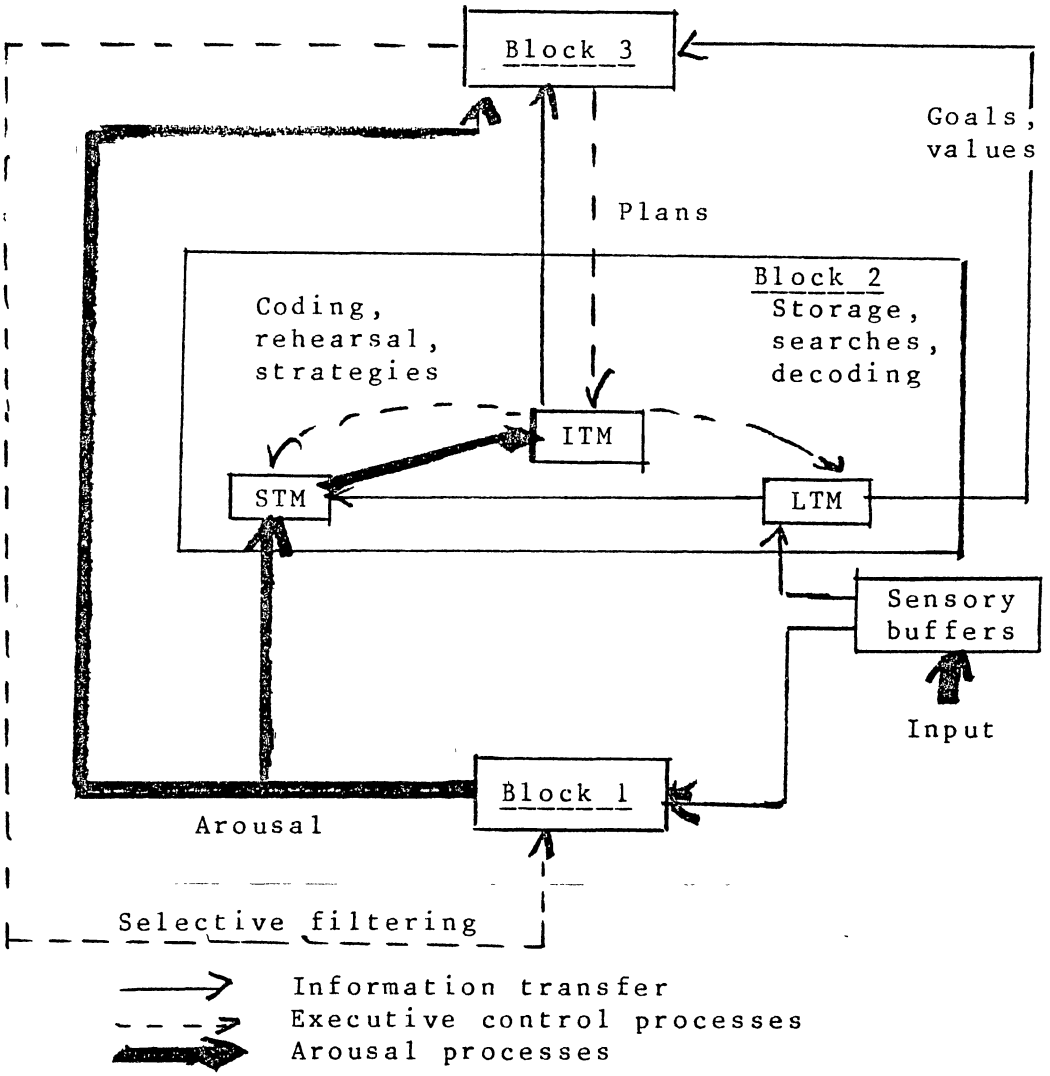

Figure 1. Integration of Luria's neuropsychological model and Western information processing theory, (STM = short-term memory; LTM = long-term memory; ITM = intermediate-term memory.) (From J. R. Kirby & J. B. Biggs. Cognition, Development, and Instruction, 1983, p 135.)

organization of stimulus traces from earlier experience. The third, synthesis, is found in complex intellectual processes. In order for the individual to comprehend the systems of relationships, the components must be represented simultaneously. When a unitary representation of components is formed, the system is readily surveyable.

Successive information processing refers to processing information in a serial order. This information need not be totally surveyable at once. A series of cues activates the components such as the processing of human speech. The English grammatical system is constructed so that the proccessing of syntactical components is dependent upon their sequential relationships in the sentence. Successive coding is temporally organized and accessible only in a linear fashion. The best illustration of successive processing is human speech. Successive processing also contains the same three varieties of synthesis: perceptual, mnestic, and complex intellectual (Das, Kirby, and Jarman, 1975).

Luria's (1966) theory remains uniquely his. Little research had been done outside the Soviet Union in these areas until investigations in Canada were begun by Das (1973) and his associates in the past decade.

Expansion of Simultaneous and Successive Processing

As a result of the shift from the study of abilities to a study of the processes, Das, Kirby, and Jarman (1975) propose a new model of the intellect based on Luria's

findings. Their model contains four basic units for processing and integrating information: (1) the input, (2) the sensory register, (3) the central processing, and (4) the output unit. The model is illustrated on Figure 2.

All incoming stimuli from outside the organism or from within, can be either simultaneous or successive. The information enters the sensory register and then is passed on immediately to the central processing unit. The sensory register serves as a buffer and the central register questions it concerning incoming information. In turn, the buffer forces the central register to accept information since it cannot be delayed.

The central processing unit is divided into three units: (1) that which processes information simultaneously; (2) that which processes information successively; and (3) that which makes the decision and plans. Information can be processed both ways from any type of sensory input. Three factors in selecting the mode of processing depend on the individual--his genetic and his socio-cultural background--and the task. The third unit, planning, brings all the coded information into a meaningful frame of reference (Das, Kirby, and Jarman, 1979).

Development of the Theory

While Luria's concept of information processing appears to limit itself to the functions of the different brain areas and their interrelationships, Das et al. (1979) expand

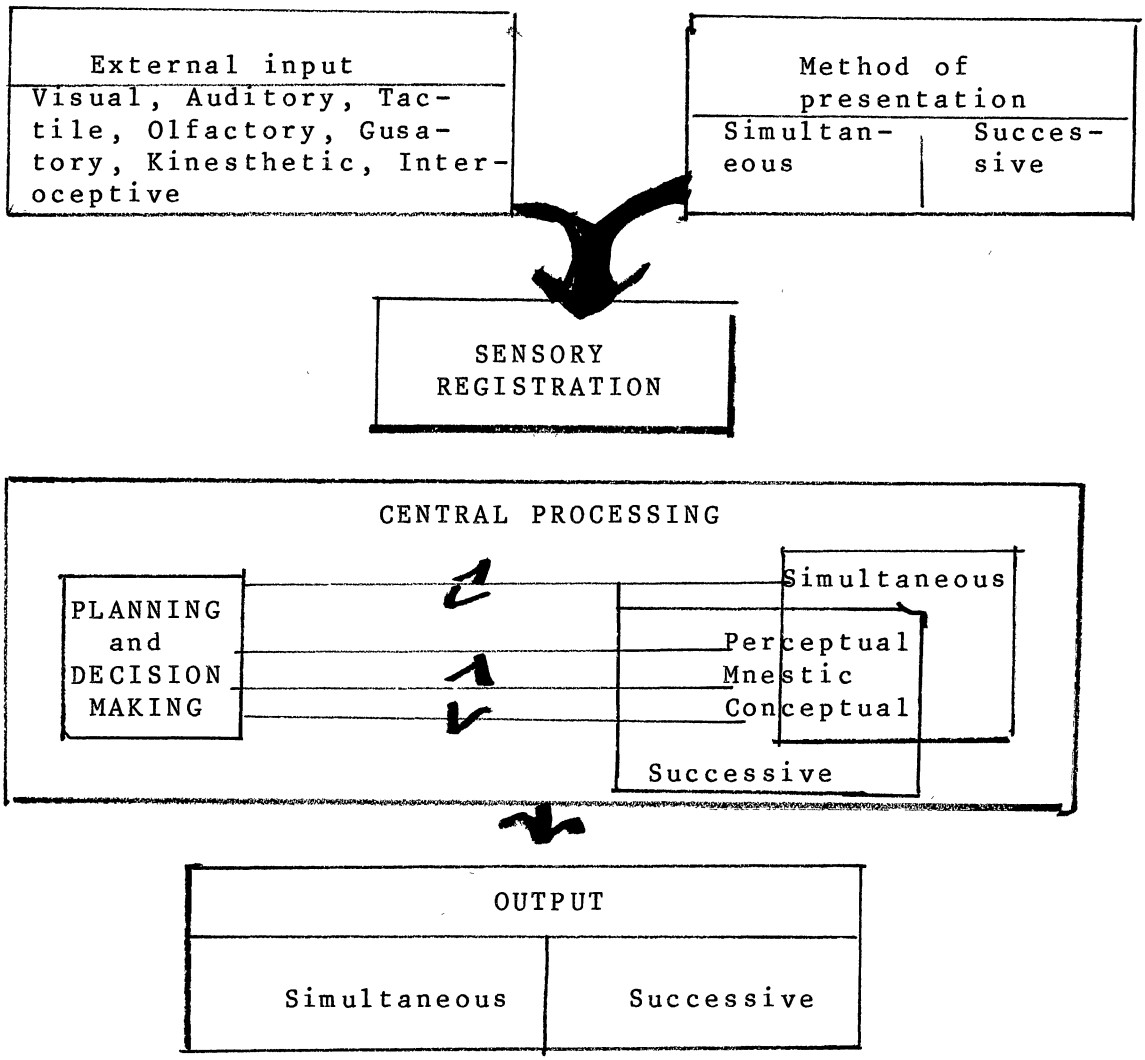

Figure 2. Diagram of the components of information processing (From J. P. Das, J. Kirby, & R. F. Jarman. Simultaneous and successive synthesis: An alternative model for cognitive abilities. Psychological Buletlin, 1975, p. 82.)

this theory to include the processing of the input received, the further coding, storage, and retrieval of the input, and the output produced by the individual. Das et al. (1979) attempted to examine these processes through the use of factor analysis of psychological tests and overt behavior rather than the brain localizations through physiological means. Both theories take into consideration these factors: (1) the input or stimulus; (2) the processes of coding, storage, and retrieval of information: and (3) the output of observable, measurable behaviors. The greatest difficulty of investigation is in the second component. Since it is not observable except from the manipulation of the other two components, the internal processes must be inferred.

Information may enter the first component through any one of the senses, be it sight, hearing, touch, taste, or smell; it is then defined by the specific tasks required from this information. The incoming information progresses to the processing components where it relies on prior stored information, previous successful mediation of this type of information, or a combination of both of these processing strategies. The model presumes that the child possesses both simultaneous and successive processing abilities. The demands of the task and the cultural and genetic background of the individual influence the selection of one or both of the modes. The final component consists of the processed information taking the form of overt or covert behavior: that is, actions or reasoning.

The educational implications of this theory provide a fruitful approach to instruction. If teaching methods are modified to capitalize on the simultaneous factor, children showing a preference for this mode of thought would learn more effectively. Conversely, children favoring a successive mode might profit more from a sequential approach to teaching the task (Das and Malloy, 1975).

Confirmatory Studies

Investigations among school children using factor analysis have shown that there are stable individual differences in relation to many variables. The stability of these processing modes is evident among several diverse groups including: Canadian native Indian groups from both urban and rural settings; Indian high-cast and village children (Das, 1973a, 1973b; Das, Manos, and Kanungo, 1975); learning disabled students (Das, Lelong, and Williams, 1978); students of various intelligence levels (Jarman, 1978; Jarman and Das, 1977); and groups from differing socioeconomic status (Das, 1973a).

In a study of patterns of cognitive ability of grade one and grade four children, a battery of tests, including those indicative of simultaneous and successive processing, was administered to sixty boys in each grade. The results supported the hypothesis that the process of simultaneous and successive processing provides an appropriate description of individual differences in a number of problem

solving situations. Das et al. (1979) also confirmed the earlier findings that simultaneous-successive processing offers a better theoretical model than reasoning and memory for observing the processes underlying cognitive tasks.

The results augment earlier findings pointing to internal consistency of the two process distinctions made by Luria (1973). Further, the process distinction has been generalized beyond the original sample of grade four to describe the processes used by grade one children. The recurrence of these factors over age may offer an alternative to current models of hierarchical cognitive development.

Simultaneous and Successive Processing and Academic Achievement

Numerous studies have been conducted on the relation of academic success to simultaneous and sequential processing. Different types of school work involve the use of one or a combination of the cognitive processing abilities. Task demands and previous experience activate the specific cortical areas (Das et al., 1979). Identical tasks could demand various processing skills. For example, in reading, word recognition involves simultaneous processing in the sight word approach, while phonetic decoding requires a sequential approach. While neither processing mode is necessary for or dependent on the other, learning may involve either. If

higher level learning is to take place, both simultaneous and successive processing must be adequate (Das, 1972).

Research in reading by Kirby and Das (1977), in addition to Cummins and Das (1977) and Das, Lelong, and Williams (1978), shows that children with the highest proficiency in reading also exhibit well developed skills in both simultaneous and successive processing. Low level readers were low in both processing skills. Average readers were also average processors. The mentally retarded and learning disabled students were generally inefficient in simultaneous and successive processing skills (Das, 1972).

Kaufman and Kaufman (1983) examined the cognitive processing in reading-disabled children in comparison to normal readers. Using the Kaufman Assessment Battery for Children (K-ABC), Kaufman and Kaufman (1983) found a clear sequential processing deficit for the reading-disabled group. As compared with the normal reading group, the disabled readers scored significantly lower in the Mental Processing Composite (combined simultaneous and successive processing) and reading achievement subtests thus indicating a processing pattern in disabled readers. A fruitful educational approach would be to select and adapt variables such as simultaneous or successive integration and design treatments that would interact with these variables. Simultaneous integration may assist the child in mastering learning calling for spatial transformation of data. If teaching methods are modified to capitalize on the simultaneous

factor, children showing a preference for this mode of thought would learn more effectively. Children favoring a successive mode might profit more from a sequential approach.

Verbal Self-Instruction

The three authors associated with regulatory speech have been Piaget (1965), Vygotsky (1962), and Luria (1961). While both Piaget (1965) and Vygotsky (1962) used the term egocentric speech and engaged in spirited but polite debate over it, they were referring to two very different phenomena. Piaget's (1965) theory is structurally defined and Vygotsky's (1962) functionally defined. Piaget (1965) is concerned with the child's progress toward consensual thought and speech, and Vygotsky (1962) is concerned with how children use their speech to regulate behavior (Zivin, 1979).

Luria (1961) differs from Vygotsky (1962) in that he creates a function for nonsemantic, impulsive speech in self-regulation. While Vygotsky was interested in spontaneous speech, Luria only induced speech in his young subjects. There are major similarities in each theory. Both agree that self-speech is regulatory and is not intended to be effective communication (Zivin, 1979).

Luria (1966) has acted as Vygotsky's interpreter and has since fostered Soviet study of the regulatory role of language. Luria (1961, 1966) developed a model of self-

regulation through the process of internalization of verbal control. Through this internalization, the transformation of control from impulsive, motoric forms to increasingly abstract ones becomes possible. More importantly, Luria (1961) has conceived of a role of speech in rehabilitation. Since the speech system is interrelated with other behavioral systems, language can be used to stimulate behavior in immature, injured, or impaired individuals.

The social relationships with adults condition the mental activities of the child. The child is tied to the mother emotionally and develops new modes of behavior through her speech and that of other adults. Mothers shape children's behavior by interacting with them, by naming objects, giving orders, and instructions. When children follow their mother's instructions, the mother has a long term effect on the child. Children are constantly monitoring their environment, and when speech develops, children name the objects organized in their perceptual field and actions. They can create their own wishes and intention by themselves. These complex mental activities are internalized in speech and later in inner speech. This is how children create the higher forms of mental activity. What children once needed help to accomplish can now be done on their own. This is Luria's basic law of development (Luria, 1961).

Luria's bulb-pressing (1963) studies demonstrate the steps involved in children establishing voluntary regulation

of their movements. In the experiment, children press a rubber bulb at the instruction of the experimenter, "push" or "don't push" at the flashing of a light, or with their own words. Small children (1 1/2 to 2 1/2 years of age), when instructed to start or stop pressing the bulb or coordinate pressing with a flashing light could not initiate the activity on their own. Children could initiate pressing at the command of another. Children could not initiate or inhibit action by their own speech at this level of maturity. When the 3 and 4 year olds are told by the experimenter to initiate and inhibit pressing of the bulb, they can perform both functions. Children could initiate the pressing by their own speech. This may indicate that children may not be expected to have the full regulating function of their speech until they are 4 1/2 years of age. Until that time, control is generalized in the motor effector system and has not as yet been transferred to the semantic aspect of the child's speech. At 4 1/2 to 5 1/2 control is firmly established and has been transferred to the full language system (Luria, 1966).

Meichenbaum and Goodman (1969) attempted to verify the relationship between cognitive impulsivity as measured by the Matching Familiar Figures Test and Luria's verbal control task. On the "push"-"don't push" task, impulsive children would tend to say out loud, "don't push," then actually push despite their own instructions. Only 40% of the impulsives met the criteria while 85% of the reflective

children succeeded, indicating less verbal control over impulsive children than over reflective children.

Children's private speech, as investigated in a natural setting with a group of impulsive and reflective preschool children, was researched by Meichenbaum (1977). The groups were controlled for intelligence, age, and socioeconomic status. The use of speech by impulsive children differs from reflective children both in content and purpose.

Impulsive preschoolers use more immature speech, made more animal noises, did more rhymes, sang more songs, and produced more inaudible muttering. The reflective children's speech was directed toward others in the group and was more self-regulatory. When called upon to solve problems, these reflective children increased their self-directing speech from 11% to 25%; at the same time there was no change in the impulsive students. Ault (1973), using other problem solving tasks, found the same efficiency in strategies used by reflective children. Younger reflective children achieved scores equal to older impulsive children, producing an equivalence of the 20 Question Game. Impulsive children's performance indicates a different level of cognitive development. Younger reflectives are more reflective on MFFT than the older impulsive children.

The conclusions from this research on impulsive children reveals that reflective behavior would be much more desirable. The pattern of behavior of impulsive children provides adverse implications for them. Their performance

in the classroom, their social relationships with peers and adults, and their prospects for their future success, all reflect the detrimental attributes of impulsivity. One of the most promising methods of modifying impulsive behavior is verbal self-instruction training.

Verbal Self-Instruction Training

Building upon a combination of social learning theory, mediational deficits, task analysis, and the work of Vygotsky (1962) and Luria (1961), Meichenbaum and Goodman (1971) developed a self-instructional training program. The procedure is as follows:

> 1. An adult model performed a task while talking to himself out loud (cognitive modeling);
>
> 2. The child performed the same task under the direction of the model's instructions (overt, external guidance);
>
> 3. The child performed the task while instructing himself aloud (overt self-guidance);
>
> 4. The child whispered the instructions to himself as he went through the task (faded, overt self-guidance) and finally;
>
> 5. The child performed the task while guiding his performance via private speech (covert self-instruction) (Meichenbaum and Goodman, 1971, p 117).

After repeated trials of the self-statements modeled by the trainer, the child's bank of statements is increased by means of response chaining and successive approximation procedures. An example of a child at a modeling task is illustrated:

> "Okay, what is it I have to do? You want me to copy the picture with the different lines. I have to go slowly and carefully. Okay draw the line down, down, good; and then to the right, that's it; now down some more and to the left. Good, I'm doing fine so far. Remember to go carefully...Good. Even if I make an error I can go on slowly and carefully. I have to go down now. Finished, I did it!" (Meichenbaum and Goodman, 1971, p. 117).

Meichenbaum and Goodman (1971) defined several performance-relevant skills: (1) problem definition: (2) focusing attention and response guidance; (3) self-reinforcement; (4) self-evaluative coping skills, and (5) error-correction options. These skills can be used with a variety of tasks both verbal and nonverbal. The training evolved from initially simple tasks to more complex cognitive operations. The instructor modeled the tasks, and the child followed the prescribed procedure of self-instruction.

Confirmatory Studies

In an initial study by Meichenbaum and Goodman (1969a), kindergarten students were designated as either reflective or impulsive on the Matching Familiar Figures Test. A foot pressing task was devised requiring a child to press the pedal when a colored light appeared and to keep the pedal depressed until the light was extinguished. When a different color light appeared, the children were told not to press the pedal. The children performed the task first without any verbalization then were taught to self-instruct themselves out loud with "Push," or "Don't push," depending on the color of the light. The performance of impulsive

children did not differ from reflective children when they used self-instruction. When no self-instruction was used, reflective children outperformed impulsive children.

A two-part initial study by Meichenbaum and Goodman (1971) opened a new area for investigation. The first part investigated the effectiveness of verbal self-instruction on fifteen second-graders who were in a remedial class because of behavior problems or low IQ. Five students were assigned to a control group, five to an attention control group, and five to cognitive modeling plus verbal self-instruction group. The training tasks were given during thirty minute daily sessions over a two week period. Each child was assessed on the Porteus Maze Test, the Matching Familiar Figure Test, and the Wechsler Intelligence Scale for Children (WISC) subtests of Picture Arrangement, Coding, and Block Design. Teacher and observer ratings were also included in the battery. Tests were administered before, after, and one month after treatment. Of the three groups, only the verbal self-instruction showed significant improvment on the Wechsler Picture Arrangement and the Matching Familiar Figures Test latency scores. The verbal self-instruction group and the attention control group improved on the Porteus Maze Test. No significant improvement was found on the WISC subtests, the Matching Familiar Figures Test, nor in the classroom behavioral measures.

The second part of the study compared the effects of modeling contrasted against modeling with self-instruction.

Kindergarten and first-grade impulsive students were assigned to three groups--five to a modeling group, five to a modeling plus self-instruction, and five to a control group. Eight 20 minute sessions were conducted. This study found that modeling alone was not sufficient. The child had to rehearse the modeling procedures to himself. The child's performance of the training procedure was essential for its effectiveness. In the treatment condition of modeling alone, the errors on the MFF were not reduced but the modeling alone treatment group did increase the time of reflecting on the initial answer. When both modeling and self-instruction rehearsal were used, both fewer errors and slower time resulted.

Another confirmatory work by Douglas, Parry, Marton, and Garson (1976) studied the effects of Meichenbaum's procedure with hyperactive boys. The children were trained over a three month period for a total of 24 one-hour training sessions. This training was further reinforced by six sessions with the teachers and 12 sessions with the parents. As compared with a control group, children who received training improved on a number of tasks, both cognitive and motor, including listening, spelling, and oral comprehension tests; however, there was no improvement on the Connor's Teacher Rating Scale.

The Generalization of Self-Instruction Training

A limited number of studies have been done on the

effects of verbal self-instruction with academic materials. Most studies used matching-to-sample training tasks and the results suggest that effects due to self-verbalization training do not generalize (R. Kagan, 1977; Meichenbaum and Goodman, 1971).

Results with academic related training materials have been equivocal. Glenwich and Barocas (1979) report success with older children. Impulsive fifth and sixth graders were trained with Meichenbaum's five step procedure to become more reflective problem solvers. The children's teachers and parents were trained also with the hypothesis that this would increase the effectiveness of the training. The training lasted four weeks with two sessions per week. The children were measured on cognitive and intellectual performance, academic achievement, classroom behavior, and home behavior. Compared with the control group, the experimental group made consistent gains in academic achievement on the Wide Range Achievement Test. This improvement was especially noted in reading. Parents reported gains in behavior but teachers did not (Glenwich and Barocas, 1979).

A study of effects of verbal self-instruction on basic arithmetic skills of 48 reflective and 48 impulsive second graders was done by Scott (1981). The reflective and impulsive students were distributed into one of three groups: verbal self-instruction, tutoring, and no-treatment control. There was no significant difference between the groups. Students receiving verbal self-instruction were resistant to

modifying their problem solving approach to incorporate verbal self-instruction.

A practical academically oriented study was done in the classroom by Korzeniowski (1981) with children classified as having learning and behavior disorders. The investigator designed two arithmetic training programs, verbal self-instruction and cognitive strategies. The three groups were formed: verbal self-instruction, cognitive strategies, and control. They were pre-tested on the Matching Familiar Figures Test and the Fundamental Arithmetic Story Problem Inventory. After nine half-hour lessons they were post-tested. The two training groups did not differ from each other, but they did improve significantly over the no-training group. Greater improvement in arithmetic occurred in the less impulsive students in both training group. On the post-test the verbal self-instruction group became more impulsive on the MFFT and the strategy groups less impulsive. No change was noted in the control group.

Research in verbal self-instruction training of impulsive students has stimulated enough interest to produce a number of review articles (Abikoff, 1979; Craighead, 1982; Kazdin, 1982; Kendall and Hollon, 1979; Schleser and Thackwray, 1982). With few exceptions, most of the research has been conducted in a laboratory setting and has been of a short duration. Most lack the ecological validity of conditions in a regular classroom with the classroom teacher providing the training.

Results from various investigations have been equivocal and there appears to be no research on the effect of verbal self-instruction on cognitive styles. This area remains unexplored and a fruitful one for research. Verbal self-instruction is only in its second decade of development. Much of the research is quite promising, but many questions remain to be answered.

Summary

A review of the literature brings forth several key issues in the modification of the cognitive styles of impulsive elementary school children. First, the new field of cognitive psychology provides a vehicle for the study of individual differences in children. Cognitive styles are most easily understood as those variables that distinguish one individual from another. Literature on three cognitive styles was reviewed: reflectivity, field dependence, and simultaneous and successive cognitive processing. Second, a review of the literature on impulsivity suggests that this cognitive style contributes to poor academic and social performance. Third, cognitive behavior theory provides a basis to investigate modification of impulsivity. Verbal self-instruction training has met with some success enabling impulsive children to become more reflective. However, research as to the possibility of providing this training in the classroom with the teacher as the trainer remains to be investigated.

CHAPTER III

METHODS AND PROCEDURES

Selection of a Sample

All subjects in this study were from an elementary school in a southwest town of 40,000. Because this was a new school, all students and teachers could be and were randomly assigned to classes for this research. Teachers rated all the students in the school on the Self-Control Rating Scale (SCRS), (Kendall and Wilcox, 1979). A cutoff criterion of three or more items on the scale (scores of six or seven) indicating extreme impulsivity was used for the selection of the impulsive students for this study. Impulsive students were found in all of the classes from grade one through six. There was a minimum of two students in a class to a maximum of eleven in one class. Six classes containing impulsive students, one class from each level, first through the sixth grade, were selected randomly to serve as the treatment group. Students classified as impulsive in the other classes not selected for the treatment group were considered the control group. These students met the same criterion as the Treatment Group but received no verbal self-instruction training and were taught in the usual manner by their teachers.

A total of 70 children remained in the study from the time of the pre-test to the completion of the research. There were 36 students in the treatment group, 14 females and 22 males; and 34 students in the control group, 16 females and 18 males. The mean age was 96 months (the range was from 75 to 140), 102 months for the treatment group and 90 months for the control group. There was a significant ($F_{1,60} = 9.14$, $p < .01$) difference in age. The mean score on the SCRS was 157.64 for the treatment group and 149.49 for the control and the groups were not significantly different ($F_{1,60} = 1.89$, $p > .05$). The scores for the median group, the third grade, were .8 standard deviation above the normative mean for boys and .6 standard deviation for girls above the normative means established by Kendall and Wilcox (1979). The mean IQ for the treatment group was 86.44 and the control group was 84.06 on the Otis-Lennon Mental Ability Test (OL MAT), (Otis and Lennon, 1969) and there was no significant difference between the groups.

The school is in a low socioeconomic area with 62% of the students on the free lunch program. The enrollment of 374 is composed of 44% black students, 32% white students and 24% Indian students. The racial composition for the system as a whole is 20% black students, 74% white students, and 6% Indian students. All teachers in the school volunteered for this teaching assignment.

The policy of the system is to have heterogeneous classes with each child working in a variety of small groups

in reading, math, and special needs. Title I and Indian students are also provided additional assistance with small group work. Permission was granted by the administration to conduct this study on the condition that any treatment administered to the children be considered a constructive contribution. In view of the policy and the highly varied small group activity a placebo group was not formed.

Instrumentation

Grades one through six were included in this study, and two criteria for selection of the tests were used. First, all tests were constructed for elementary children. Secondly, the tests were currently published and easily available to other researchers to replicate the study.

Dependent Measures

The Self-Control Rating Scale (SCRS)

Kendall and Wilcox (1979), observing a need for an instrument to measure the changes caused by the application of behavior modification procedures in the management of children's disruptive classroom behavior, developed the Self-Control Rating Scale (SCRS), as a teacher administered instrument.

The scale was developed with 110 children in grades 3 to 6 at a predominantly white, middle-class elementary school. The school selected has been designated by a national test development firm as a school containing a

representative student population for this country. The sample contained 59 boys and 51 girls ranging in age from 96 month to 150 months with a mean age of 126 months. The mean IQ score of the sample was 106 on the Peabody Picture Vocabulary Test.

The Self-Control Rating Scale contains 33 items to be rated by the teacher on a 7-point continuum. One word descriptive anchors at each end of the continuum provide the parameters. Three major areas are defined with 10 items describing self-control, 13 items describing impulsive behavior and 10 items including descriptions of both behaviors. A score of 1 indicates maximum self control at one end of the continuum with scores in increments of one reaching 7 which indicates maximum impulsivity. Rating scores on all 33 items are totaled. The SCRS is designed to be used as a basis to determine the amount of change resulting from cognitive behavior modifying techniques. Simple instructions are given to the raters as follows;

> Please rate this child according to the descriptions below by circling the appropriate number. The underlined 4 in the center of each row represents where the average child would fall on this item. Please do not hesitate to use the entire range of possible ratings (Kendall and Wilcox, p. 102, 1979).

Internal consistency of .98 on the Cronbach's alpha test was reported indicating a high degree of internal consistency among the items. Test-retest reliability over a three to four week period was .84. According to the authors, Kendall and Wilcox (1979), the SCRS correlated

significantly, $p < .005$, with classroom behavioral observations (lack of behavior control), ($r = .24$), Porteus Maze Test scores (behavioral self-control), ($r = .31$), and latency ($r = -.22$) and errors ($r = .25$) from the Matching Familiar Figures Test (MFFT) (a measure of cognitive impulsivity) prior to and after the effects of IQ and chronological age were statistically removed. These high scores would indicate a homogeneous and reliable scale.

An orthogonal factor analysis of the SCRS indicated 72% of the variance could be accounted for by one major factor, cognitive-behavioral self-control. In the norming group, the mean scores of impulsive students as compared with a normal sample, was 1.53 standard deviations above the mean. Children in different grades did not differ significantly on the SCRS, ($F_{3,106} = 1.24$, $p > .05$). In general, the SCRS scores were meaningfully related to classroom behavior.

The Visual Aural Digit Span Test (VADS)

The Visual Aural Digit Span test (VADS) developed by Koppitz (1977) was used to measure changes in successive cognitive processing. The test was designed for children 5 1/2 to 12. It consists of four subtests composed of a series of digits that are presented aurally or visually and are repeated by the examinee either orally or written. The first subtest presents digits spoken to the subjects and repeated back by them orally. The second subtest presents the digits visually and they are repeated orally by the

subject. The third subtest presents the digits orally and the subject writes them down from memory. In the fourth subtest, digits are presented visually and are then written down by the subject.

Koppitz (1977) chose digits to examine sequential processing to eliminate the confounding variables of words used in previous tests. Both tasks for the auditory and visual modality are equal, and both verbal and written responses are used.

The test was normed on 810 public school children ranging from 5 years, 6 months to 12 years, 11 months who represented a cross section of socioeconomic groups. No significant difference was found between the scores of males and females. The test-retest method was used to determine the reliability with a mean interval of 6 1/2 weeks. The correlations for 6 to 12 year-old ranged from .80 to .92.

Validity was established with a correlation between the WISC Digit Span-Forward (Torgensen, Bowen, and Ivey, 1978). The VADS scores of 272 second-grade students were correlated with their WISC Digit Span-Forward. Torgensen, et al. (1978) found that the WISC correlated with all the subtests significantly at the .01 level (Aural-Oral: r = .55; Visual-Oral: r = .30; Aural-Written: r = .52; Visual- Written: r = . 37). There were significant differences found between the Digit Span-Backward (a simultaneous cognitive process) and all of the VADS Subtest scores (sequential processing).

The VADS is administered with a set of 26 VADS stimulus

cards and pencil and paper. The four main subtests are Aural-Oral, Visual-Oral, Aural-Written, and Visual-Written. The examiner reads the first series of numbers aloud and asks the child to repeat them orally; the examiner continues until the child misses two trials. The digits begin with three numbers and increase one digit each trial until seven digits are reached. The process is repeated with the examiner presenting the numbers visually and the child responding orally on the second series. The third series has the examiner say the numbers and the child write them on the paper. In the last series, the examiner presents the numbers on cards, and the child writes the numbers down.

The score on the VADS consists of the longest sequence of numbers the child is able to recall without errors on each of the four subtests. The total score of the four subtest measures the sequential processing of the child.

The Matching Familiar Figures Test (MFFT)

The Matching Familiar Figures Test (MFFT) developed by Kagan et al. (1964) was used to measure reflectivity. The test requires the presentation of a 12-item match-to-sample task. Children are shown a familiar figure (standard) along with six variations, only one of which is identical to the standard. The children are asked to select the one that is exactly like the standard. Children make their first choice (response latency), and the response is timed from the exposure to the choice with no time limit set. If children

are incorrect on their first choice, the subjects are asked to make another choice and to continue until correct. The time it takes to make this first choice is recorded for all 12 items. The average response time and the number of errors on each presentation of the task are recorded and tallied.

When the MFFT is used for classification, children with errors below the median and with response latency above the median are classified as reflective. Children with errors above the median and with response latency below the median are classified as impulsive. While some authors question the classification issue (Egeland and Weinberg, 1976) from a psychometric point of view, the test is used in this research only to measure change in the students and not for classification purposes.

Kagan (1965) found the instrument to be fairly reliable with a correlation over a one-year span to be .62. A negative correlation -.60 was found with the number or errors and response latency. Messer (1976) reports a test re-test, equivalent and internal consistency reliability, coefficients ranging from .62 to .98. Cairns (1977) showed a .96 and .97 reliability coefficient on the Spearman-Brown with 9 and 11 year olds. The error scores produced coefficients of .63 and .68. The validity of the MFFT is reflected in the correlation .61 to .87 with the Haptic Visual Matching task with samples of children in the first three grades. While

there are no national norms available, the MFFT has been accepted as a sound procedure for assessing reflectivity.

The Children's Embedded Figures Test (CEFT)

The Children's Embedded Figures Test (CEFT) is based on the Embedded Figures Test (EFT), (Whitkin, Dyk, Faterson, Goodenough and Karp, 1962). The EFT assesses the ability to segment an organized visual field and the ability to differentiate a particular segmented portion from the total field. It is a pencil and paper test and the subject is required to locate a simple figure within a complex and distracting series of designs. The field independent person is one who can locate the embedded figures quickly and accurately and not be distracted by the complex design. The EFT proved too complicated for the five to ten year old group and necessitated a less complex version. Karp and Konstadt (1971) developed the Children's Embedded Figures Test (CEFT) incorporating many of the features from the EFT while eliminating the disadvantages. This test was used to rate field dependence in order to investigate individual differences, their stability, and changes.

A pool of 72 complex forms, all representing recognizable objects, many of which were from EFT, were given to 100 children. The sample was equally divided between boys and girls age 5 to 9 from two schools in Brooklyn, New York, and was representative of all diverse groups. Two criterion

groups were formed comprising the top 27% and the lowest 27%. An analysis of Chi-square comparing success on each total performance discriminated items significantly from each criterion group to form a 25 item test.

The test consists of two cut-out models of a tent and house which are used to identify a similar figure embedded on a series of complex figures. The examiner demonstrates how to find the tent embedded in the figure, and children attempt to find the figure. Children then continue on their own, finding embedded figures through a series of design cards. The testing continues until there have been five consecutive failures. No time limit is set and subjects receive a one point score only when the first choice is correct.

The CEFT was normed on 160 children, evenly divided in age groups from 5 to 12 years. The effect of age was significant with performance becoming more independent with age. Neither sex nor interaction with age was significant. Reliability correlations on test-retest ranged from .83 to .90 and compared with those on the EFT. Validity was higher with older children, .90 for 11 year olds and .75 for 9 year olds on the EFT. The CEFT correlated significantly .49 with the composite scores of the WISC Block Design, Object Assembly, and Picture Completion and showed no relation to WISC composite verbal-comprehension scores. However, validation data are incomplete and the authors suggest that the CEFT be used for research purposes only.

The Coloured Progressive Matrices (CPM)

Simultaneous processing is measured by the Coloured Progressive Matrices (CPM), (Raven, Court, and Raven, 1976). This test evolved from the Raven's Progressive Matrices which was developed as a general intelligence test for non-English speaking people. The Coloured Progressive Matrices is designed for use with young children, old people, those who cannot speak English, the deaf, physically handicapped, and intellectually subnormal.

While the CPM is considered a culture-free measure of general intelligence, it fulfills all the requirements for a test of simultaneous processing (Das, Kirby, and Jarman, 1979). The solution to the Raven's requires a construction of a spatial pattern or scheme. The scheme must be reconstructed before the option can correctly be selected. Das, et al. (1979) found the Raven's to be more related to spatial ability than to reasoning and clearly involves simultaneous processing.

The test is in the form of a booklet with a series of designs and drawings printed in bright colors. On the top of each page of the book, a large pattern is shown with a section missing. Below are six figures, one of which will correctly complete the large pattern. The test administrator demonstrates the first problem and explains why it is part of the pattern. The children are assisted for the first 5 problems and then continue on their own. Students mark their choice on the answer sheet, and the correct

answers are tallied. Patterns are simple to match in the beginning and progress to complicated choices.

The test was standardized on approximately one hundred children of each age level from 5 years to 11 1/2 years with a total sample of 627. The test re-test reliability with 6 1/2 and with 9 1/2 year old youngsters was .60 and .80 respectively. Validity was established by a correlation of .66 with the Terman-Merrill scale.

The Otis-Lennon Mental Ability Test (O-L MAT)

The Otis-Lennon Mental Ability Test (O-L MAT) (Otis and Lennon, 1969), was developed to provide a comprehensive assessment of the general mental ability or scholastic aptitude of school children. The O-L MAT was designed to yield a dependable measurement of the "g" or general intelligence factor. The O-L MAT measures broad reasoning abilities which are important in academic success and reflects both experience and ability of the subjects performance. The O-L MAT assumes that all students had the same opportunity to learn the types of things included in the test and that all students were equally motivated in taking the test. In response to arguments about cultural bias, Otis and Lennon (1969) state that the tests do not measure native endowment but are designed to predict the likelihood of success in academic work.

Elementary Level I (grades 1 through 3) and II (grades 4 through 6) tests provide a measure for elementary school

students. The eighty items in each test cover: following directions, quantitative reasoning, comprehension of verbal concepts, and reasoning by analogy. The O-L MAT is a pencil and paper test and requires approximately 55 to 60 minutes to complete. The O-L MAT was normed on 200,000 pupils, from grades 1 through 12, in 117 school systems in 50 states. The controls used in the selection of school systems was designed to provide the most representative norming groups. A deviation IQ is obtained with a mean of 100 and a standard deviation of 16 points.

Reliability was determined by corrected split-half correlations and the Kuder-Richardson. Reliability coefficients range from .88 to .92. Alternate forms of the test correlated .85 for Level I and .90 for Level II. Construct validity was determined by Proger, Bayuk, McGown, and Mann (1971). The second (N=322) and fourth (N=316) grade students of a large suburban public school district served as subjects for the validation study. All students were given the Otis-Lennon, The Metropolitan Readiness Test (MRT), the Stanford Achievement Test (SAT) and the Lorge-Thorndike Intelligence Test (L-T IT). The Otis-Lennon correlated .55 with MRT, .44 to .68 with the subtests of the SAT, and .83 with the L-T IT.

The O-L MAT appears to be at least as effective a predictor of verbal and numerical achievement as the SAT and MRT, as is the L-T IT (Proger et al., 1971).

Research Hypotheses

This research study will test five hypotheses related to between-group difference: impulsive behavior, measured on the Self-Control Rating Scale; field independence-dependence cognitive style, measured by the Children's Embedded Figures Test; impulsivity-reflectivity, measured by the Matching Familiar Figures Test; simultaneous processing measured by the Coloured Progressive Matrices Test; and successive processing, measured by the Visual Aural Digit Span Test.

Research Hypothesis No. 1

There is a significant between-group difference on impulsive classroom behavior. Students with verbal self-instruction training will exhibit greater control of impulsive classroom behavior.

Research Hypothesis No. 2:

There is a significant between-group difference on field independence-field dependence. Students with verbal self-instruction will exhibit greater field independence.

Research Hypothesis No. 3:

There is a significant between-group difference on impulsivity-reflectivity. Students with verbal self-instruction training will exhibit greater reflectivity.

Research Hypothesis No. 4:

There is a significant between-group difference on simultaneous processing. Students with verbal self-instruction training will exhibit greater skill in simultaneous processing.

Research Hypothesis No. 5

There is a significant between-group difference on successive processing. Students with verbal self-instruction training will exhibit greater skill in successive processing.

Research Treatment Procedures

Pre- and Post-Testing

All students in the school were rated on the Self-Control Rating Scale (Kendall and Wilcox, 1979) by their teachers. Students with three scores of six or seven (highly impulsive) were classified as impulsive. These students were then tested individually on the RPM, FFT, VADS, and CEFT. A group intelligence test O-L MAT was given to all subjects. All testing was done in a quiet room. Tests were given in random order by certified psychometrists who had no knowledge of either group nor of the purpose. Post-testing was done following the eight weeks of self-instruction training with both the tests and psychometrists again assigned randomly.

Selection of Teaching Strategies

A one day workshop on verbal self-instruction was conducted by two faculty members from a university teacher training program for all teachers assigned to the experimental groups. All teachers agreed voluntarily to participate in the study and devoted one Saturday to the training.

The group included the six teachers, the counselor, principal, and director of Elementary Education. The morning session covered the background and theory of verbal-self instruction. Teachers were instructed in techniques to increase reflectivity and to develop verbal self-instruction procedures (see handouts of program in Appendix B).

During the afternoon session, teachers were shown how to use their subject areas and the child's daily classroom work as the basis for training of students. The teachers wrote the sequential steps using arithmetic, language, and reading subjects in the practice session which followed. Teachers formed groups of two and alternated roles of teacher and student, practicing verbal self-instruction areas for use in the first eight weeks of the second semester. A handout sheet (Wilkinson and Grissom, 1981) with written instructions for training students in verbal self-instruction was provided teachers for future reference.

Just prior to the beginning of the treatment, another workshop was conducted to review and assist teachers with any problems or difficulties in verbal self-instruction

training. Teachers brought samples of their verbal self-instruction training procedures they had developed based on the handout. These were demonstrated to another teacher from the treatment group. All questions were answered and all teachers were reasonably confident of their ability to provide adequate training. All teachers agreed (1) to conduct the treatment for eight consecutive weeks, (2) to form a small group with the impulsive students, (3) to train each student individually in verbal self-instruction procedures using daily classroom assignments as training materials for 10 minutes a day while in the small group with the other students observing, and (4) to keep a daily log of time spent on each student individually.

The verbal self-instruction strategies were adopted from Meichenbaum & Goodman (1971) using the curriculum materials for their particular class and modifying them to follow self-instructional strategies. This procedure was to be as natural as possible with the daily curriculum. Teachers were asked to conduct training in the morning. The teachers requested that they be allowed to train in one subject, arithmetic, for the first two weeks to assure that the training procedures were mastered by the student. After the trial period, to obtain better generalization, all subjects were included in the training for the remaining six weeks.

Training Strategies

The training strategies were adopted from Meichenbaum,

by Kendall, Padawar, and Zupan, (1980). Verbal self-instruction serves to break down the process of problem solving into steps for the child. Each self-instruction represents one step of solving the problem. Verbal self-instructions are taught to the student in the following way:

Problem Definition

The teacher models the task performance and talks out loud while the students observe.

Problem Approach

Students perform the task, instructing themselves aloud.

Focusing of Attention

The teacher models the task performance while whispering the self-instructions.

Students perform the task, whispering to themselves.

Choosing an Answer

The teacher performs the task using covert self-instructions with pauses and behavioral signs of thinking (e.g., stroking beard or chin).

Students perform the task using covert self-instructions.

Self-Reinforcement of Coping Statement

The content of self-instructions includes five types of statements. The self-reward is used only with correct responses. Coping statements are designed to facilitate reflectivity and inhibit a disturbing outburst when errors are made and to avoid overly negative self-statements such as "I am dumb" or "That was stupid of me." Neutral statements, such as "I made a mistake" are encouraged.

General Instructions

The problem-solving self-instructions are constructed to enable children (1) to recognize that there is a problem and to be able to identify its features, (2) to develop a strategy that will help them solve the problem, (3) to consider the options, and (4) to enable them to act on their plan. This, plus the self-reinforcement coping statements, strengthens children's thinking habits.

It is important that the self-instruction procedures use language appropriate for the individual child. Saying the self-instructions the way teachers would is not as crucial as having the children say them in their own words. Both teacher and child work together to create specific self-statements in the working vocabulary of the child so that the statements are meaningful to the child. Individualizing the self-directed statements based on the child's own verbalizations of of the problem is far superior to the

wording of the statements by the teacher. Self-instruction training should reflect the desire of the teacher to break down the process into discrete steps so that each self-instruction represents one step of solving a problem. One of the main goals of training is to enable impulsive children to internalize the self-instructions and use them to think slowly through potential solutions to problems that occur in their daily lives.

CHAPTER IV

RESULTS

Introduction

The purpose of this chapter is to present the results of the statistical analyses of the five research hypotheses which were formulated for this study. The focus of this study was to determine if there were differential effects of the verbal self-instruction training on the five dependent variables. The independent variables were Treatment (verbal self-instruction training or control) and Time (pre and post). The dependent variables were classroom impulsive behavior, field dependence, impulsivity, simultaneous processing, and successive processing. A one-factor multivariate analysis of variance with repeated measures was performed on the five dependent variables.

SPSS MANOVA (Nie, 1983) was used for the analyses. Multivariate analysis of variance was performed for the global differences and the F-statistic was computed from Wilks' lambda (SPSS MANOVA), (Nie, 1983). The strength of the effect was estimated by the generalized Eta squared. A series of univariate F tests was run on each individual dependent variable to further define the results.

Group Comparability

The two groups were compared prior to treatment in terms of IQ, age, and pre-treatment levels on the independent variables.

A one-way analysis of variance showed that the groups differed significantly ($F_{1,60} = 62.29$, $p = .001$) in age. The chronological age for the Treatment Group was 103.2 months and 91.2 months for the Control. A t test of IQ scores (means of 86.45 for the Treatment Group and 84.07 for the Control Group) yielded a t of .27, and was not significant.

A univariate analysis of variance was used as a pre-planned comparison (SPSS MANOVA), (Nie, 1983), there was a significant difference ($F_{1,49} = 8.12$, $p = .006$) between the groups on the VADS with the Treatment Group having a mean 2.5 points higher (22.5 Treatment, 20.0 Control). There was also a significant difference ($F_{1,49} = 5.00$, $p = .03$) on the MFFT error scores with the Control Group exceeding the Treatment Group by 2.91 points (15.52 Control, 12.61 Treatment). All other differences between groups on the dependent variables: the SCRS, the MFFT Latency, the CEFT, and the CPM were not significant.

The intercorrelation of pre-test scores indicated that ten of the 21 correlation coefficients were greater than .26 which is significant at the .05 level. No correlation was greater than .68. The matrix is presented in Table I.

TABLE I

PRE-TEST CORRELATION MATRIX
OF THE DEPENDENT
VARIABLES

Variable	Age	SCRS	VADS	MFFT	M-LAT	CEFT	CPM
Age		.173	.683*	.534*	.205	.512*	.493*
SCRS			.083	-.187	.027	.067	-.242
VADS				-.226	.281*	.498*	.395*
MFFT					-.117	-.303*	-.269*
MFFT Latency						.026	.194
CEFT							.425*
CPM							

*p < .05
n = 61

Tests of the Research Hypotheses

Multivariate Results

Multivariate analysis of variance with repeated measures (SPSS MAOVA), (Nie, 1983), using the Wilks' lambda, revealed a significant Treatment effect ($F_{6,54} = 2.72$, $p = .022$) and a significant Periods of Time effect ($F_{6,54} = 7.11$, $p = .00$); there was no significant Treatment by Time interaction ($F_{6,54} = 1.90$, $p = .10$). All scores are presented in Table II. Means and standard deviations for each of the dependent variables at the two assessment periods are presented in Tables III to VIII.

Univariate Results

Univariate F-Tests were obtained on each of the effects to further define the independent variables. It should be noted that univariate F tests do not take into consideration possible correlations among the dependent variables and may result in a higher probability of a type I error than that which was stated at .05. Because of the insights provided, the univariate analyses are included. These scores are given also in Table II. Each research hypothesis is discussed individually in terms of the statistical results of the univariate data.

Research Hypothesis No. 1

There is a significant between-group difference in

TABLE II

MULTIVARIATE ANALYSIS OF
VARIANCE SUMMARY TABLE

Source	Multivariate F (df 6,54)	Univariate F (df 1,59)	Eta2
Treatment	2.72*		
SCRS		.37	
VADS		7.57**	.10
MFFT		5.14*	.05
MFFT Latency		1.65	
CEFT		.02	
CPM		.08	
Time	7.11**		
SCRS		.56	
VADS		.09	
MFFT		10.24**	.05
MFFT Latency		.04	
CEFT		22.75**	.10
CPM		15.15**	.04
Treatment X Time	1.90		
SCRS		10.69**	.55
VADS		.27	
MFFT		.23	
MFFT Latency		.07	
CEFT		.13	
CPM		.21	

*p <.05
**p <.01

TABLE III

MEANS AND STANDARD DEVIATIONS OF THE SCRS AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	157.64	18.75	141.75	26.97	28
Control	149.49	26.23	157.85	39.15	33
Entire Sample	153.23	23.28	150.46	34.79	61

TABLE IV

MEANS AND STANDARD DEVIATIONS OF THE VADS AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	22.50	2.29	22.79	3.63	28
Control	20.03	4.45	19.97	4.61	33
Entire Sample	21.16	3.89	21.26	4.39	61

TABLE V

MEANS AND STANDARD DEVIATIONS OF THE MFFT ERROR SCORES AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	12.61	4.51	10.57	4.39	28
Control	15.52	5.72	12.76	6.06	33
Entire Sample	14.18	5.36	11.75	5.43	61

TABLE VI

MEANS AND STANDARD DEVIATIONS OF THE MFFT LATENCY AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	12.54	5.69	12.61	6.40	28
Control	11.39	4.78	11.00	5.01	33
Entire Sample	11.92	5.20	11.74	5.70	61

TABLE VII

MEANS AND STANDARD DEVIATIONS OF THE CEFT AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	16.75	4.23	19.85	4.68	28
Control	16.84	4.64	19.52	4.38	33
Entire Sample	16.80	4.42	19.67	4.86	61

TABLE VIII

MEANS AND STANDARD DEVIATIONS OF THE CPM AT THE ASSESSMENT PERIODS FOR THE TWO GROUPS

	Pre-Test		Post-Test		
Groups	Mean	SD	Mean	SD	N
Treatment	18.28	6.70	21.00	5.24	28
Control	18.18	5.71	20.33	5.90	33
Entire Sample	18.23	6.13	20.64	5.57	61

impulsive classroom behavior. Students with verbal self-instruction training will exhibit greater control of impulsive classroom behavior.

In the univariate analysis of variance, scores on the Self-Control Rating Scale reveal no significant Treatment effect ($F_{1,59} = .37$, $p > .05$) or Periods of Time effect ($F_{1,59} = .56$, $p > .05$). However, the SCRS, on the Treatment by Time effect, was significant ($F_{1,59} = 10.69$, $p .002$). Eta squared accounted for 55% of the variance.

As noted in Table I, the SCRS did not correlate with age nor with any of the other dependent variable. This is in keeping with the authors (Kendall and Wilcox, 1979) findings of no age factor. Table IX illustrates no pattern of age with the SCRS and implies that age of students is of little consequence. Since change in impulsive behavior, as a result of verbal self-instruction training, is a well established effect (Abikoff, 1979; Douglas et al., 1976; Kendall and Finch, 1977, 1979a, 1979b; Leon and Pepe, 1983; Meichenbaum, 1977; Messer, 1976), there was no reason to assume any difference between the groups for reaction to the treatment.

When MANOVA and repeated-measures ANOVA produce different results, some questions are raised. No other dependent variable was significant on the Treatment by Time effect and the statistical power lost in the number of cells could have prevented a significant effect on the MANOVA. There was a strong significant difference ($p .002$) on the SCRS

TABLE IX

MEANS AND STANDARD DEVIATIONS OF THE SCRS
BY AGE AT THE FIRST ASSESSMENT
FOR THE TWO GROUPS

	Treatment Group			Control Group		
Age, Months	Mean	SD	N	Mean	SD	N
78	165.50	13.44	2	147.00	23.92	11
90	145.00	.00	1	150.00	18.23	5
102	154.78	18.36	9	140.56	25.94	9
114	154.91	20.76	11	197.67	8.14	3
126	169.80	17.50	5	118.56	18.56	5

Treatment by Time effect indicating the chance of making a type one error is small. After treatment was administered, the Treatment Group showed greater control of behavior and less impulsive actions according to scores on the Self-Control Rating Scale with a decrease of 15.69 points. The Control Group increased 8.36 points from pre- to post-testing, exhibiting less self-control and greater impulsivity. The interaction is illustrated in Figure 3. Because of the significance of the univariate Treatment by Time effect, Research Hypothesis No. 1 is accepted.

Hypothesis No. 2

There is a significant between-group difference in field dependence. Students with verbal self-instruction training will exhibit greater field independence.

As indicated in Table I no significant univariate differences were obtained on the Children's Embedded Figures Test Treatment or Treatment by Time. This is illustrated in figure 4. There is a significant difference in Time ($F_{1,59} = 22.75$, $p < .001$), with Eta squared accounting for 10% of the variance. Scores on the CEFT were approximately the same for both groups on each evaluation (17 for the first evaluation and 20 for the second). The increase in scores for both groups could have resulted from practice. The lack of a significant interaction of the CEFT Treatment by Time effect does not permit acceptance of Research Hypothesis No. 2.

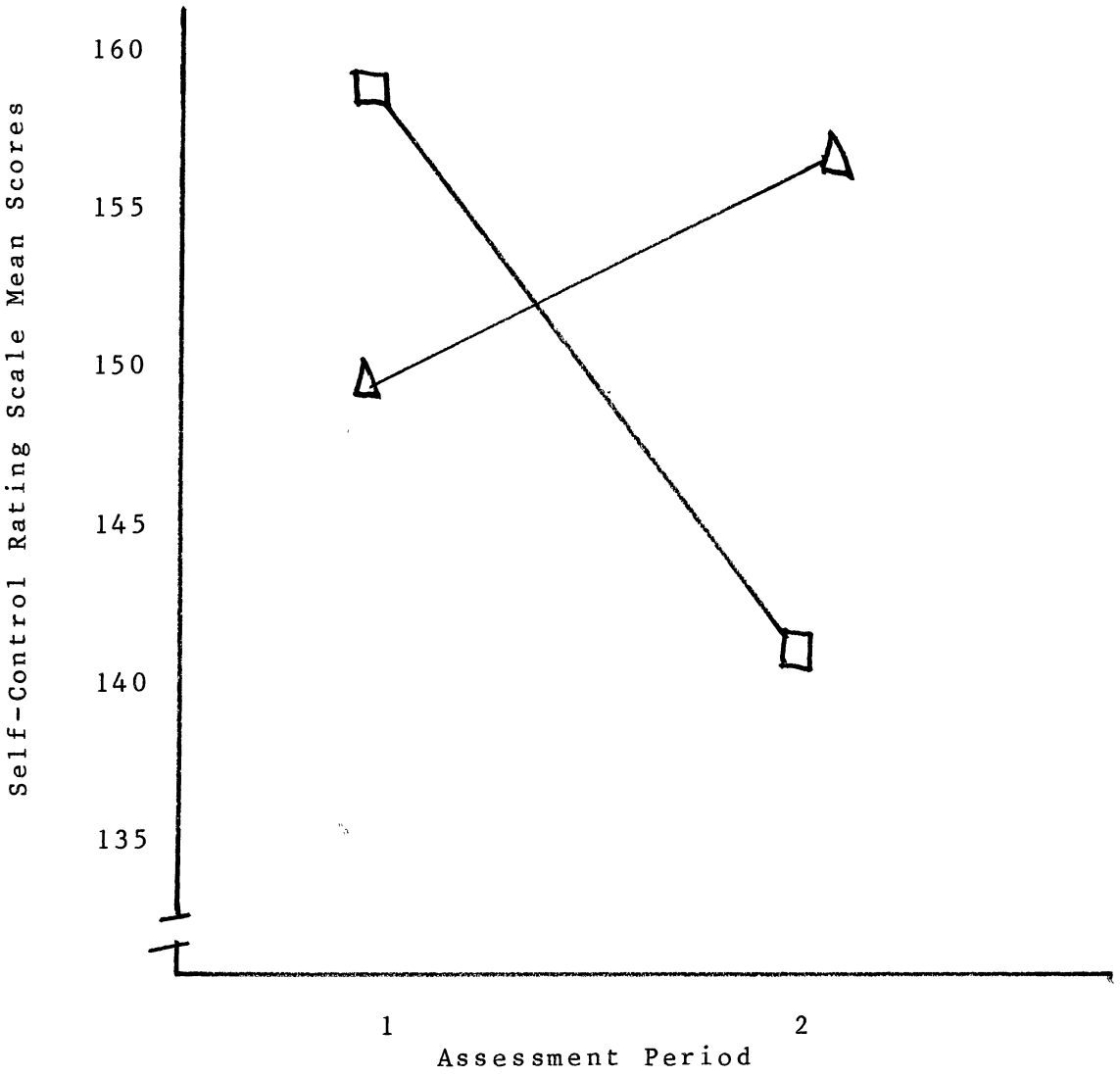

Figure 3. Groups by Assessment Periods Interaction: Self-Control Rating Scale

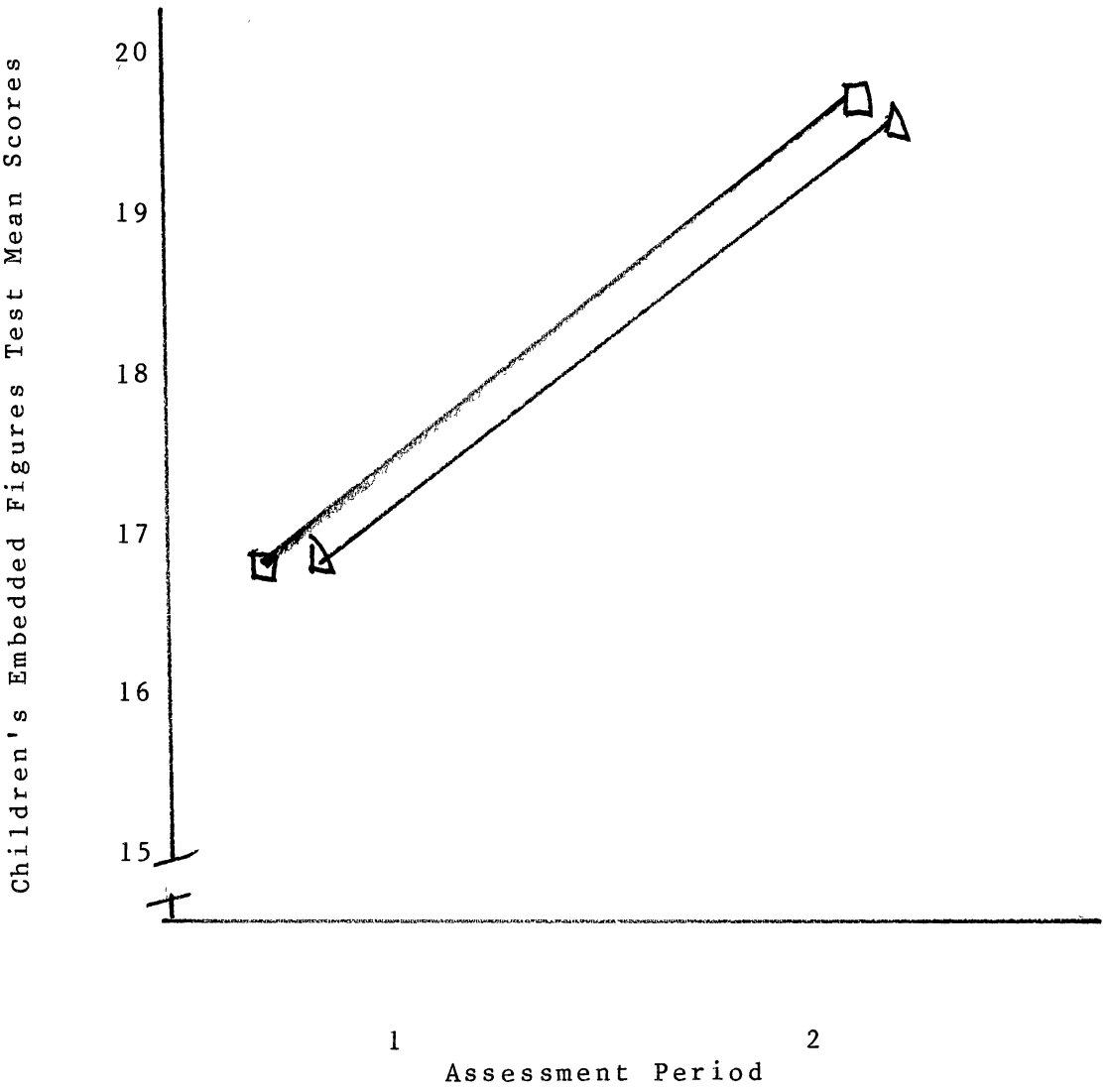

Figure 4. Groups by Assessment Periods Interaction: Children's Embedded Figures Test

Research Hypothesis No. 3

There is a significant between-group difference on impulsivity. Students with verbal self-instruction training will be more reflective.

An examination of Table II reveals scores on the Matching Familiar Figures Test indicating a significant univariate difference on Treatment ($F_{1,59} = 5.14$, $p = .027$) with Eta squared accounting for 10% of the variance and on Time ($F_{1,59} = 10.24$ $p = .002$) with Eta squared accounting for 5% of the variance. There was no significant interaction effect ($F_{1,59} = .23$, $p = .64$). The scores are illustrated in Figure 5.

There was a decrease in the number of errors (2.04 for the Treatment Group and 2.76 for the Control) made by both groups of students. This reveals a possible practice effect. The Control Group, which was the younger, remained consistently higher in errors (15.53 & 12.76 versus Treatment errors of 12.61 & 10.57) to account for the significant difference in scores within groups.

Table II indicates no significant effects on the MFFT Latency scores for Treatment ($F_{1,59} = 1.65$, $p = .20$), Time ($F_{1,59} = .04$, $p = .84$), and Interaction ($F_{1,59} = .06$. $p = .80$). Latency remained essentially the same with both groups on pre- and post-testing times (12 seconds for treatment and 11 seconds for the control group). The scores for the MFFT are illustrated in Figure 6. In view of the non-

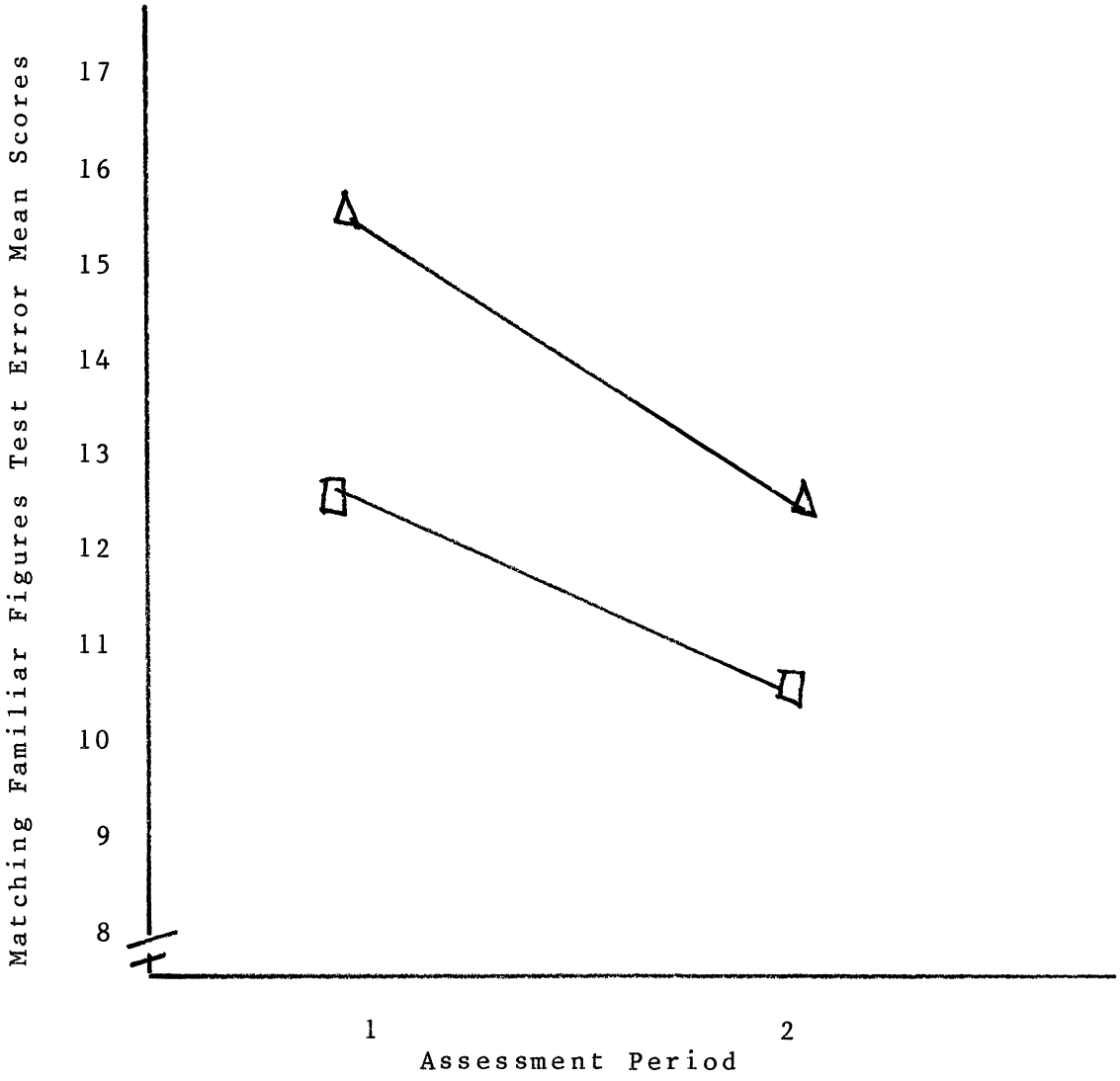

Figure 5. Groups by Assessment Periods Interaction: Matching Familiar Figures Test, Error Scores

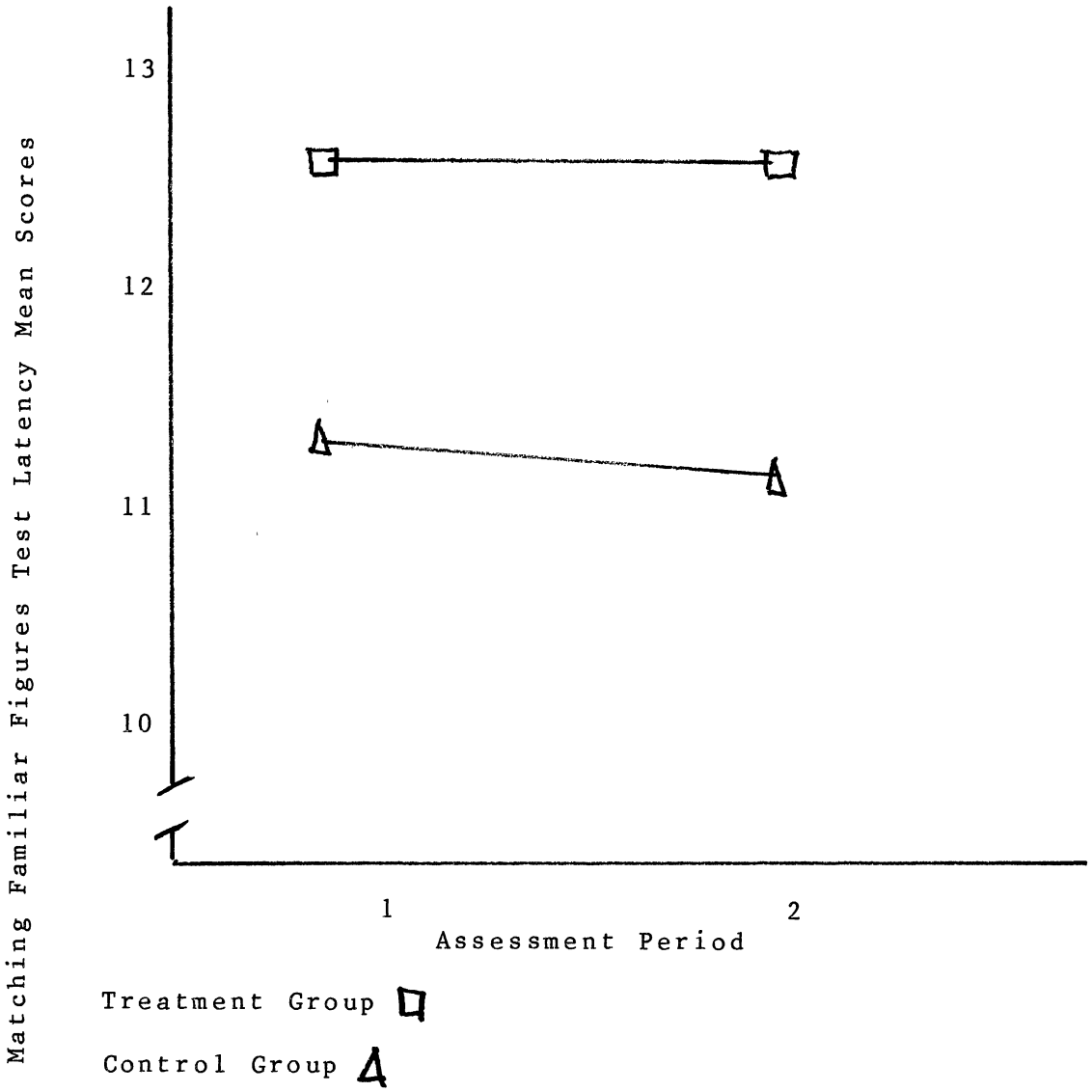

Figure 6. Groups by Assessment Periods Interaction: Matching Familiar Figures Test, Latency Scores

significant results on the interaction of the Treatment by Time effect, Research Hypothesis No. 3 was not accepted.

Research Hypothesis No. 4

There is a significant between-group difference on simultaneous processing. Students with verbal self-instruction training will exhibit greater skill in simultaneous processing.

Table II depicts a significant effect for Time on the Coloured Progressive Matrices univariate analysis ($F_{1,59} = 15.15$, $p = .000$). Eta squared accounts for 4% of the variance. The increase in scores is attributed to a practice effect of taking the test the second time. No significant effects were found in the Treatment ($F_{1,59} = .08$, $p = .78$) nor in Treatment by Time ($F_{1,59} = .21$, $p = .65$). There was a high degree of consistency in both sets of scores. This is illustrated in Figure 7.

The lack of significant interaction of Treatment by Time on the CPM does not permit an acceptance of Research Hypothesis No. 4. There is no between-group difference in simultaneous processing.

Research Hypothesis No. 5

There is a significant between-group difference on successive processing. Students with verbal self-instruction training will exhibit greater skill in successive processing.

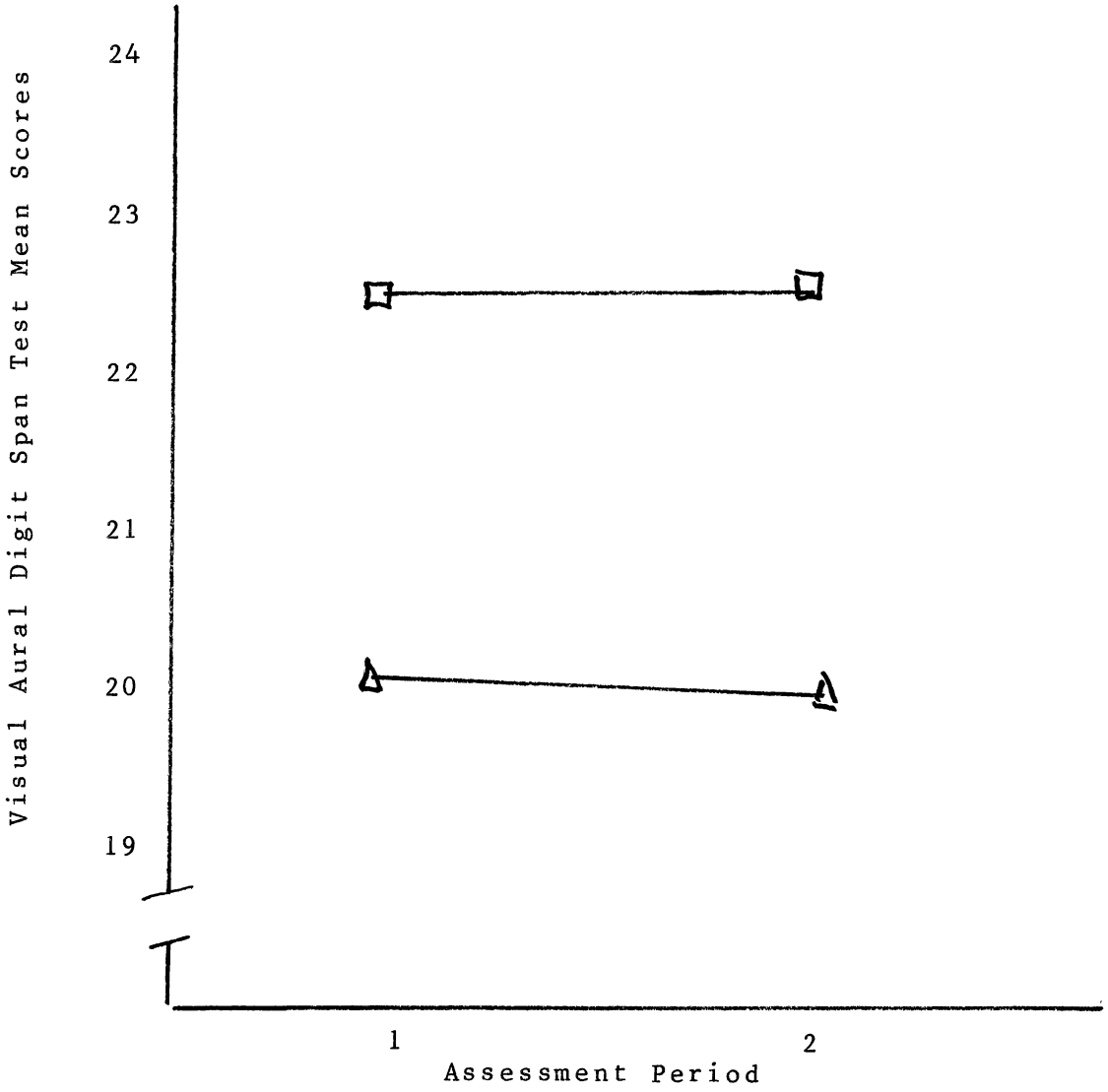

Figure 7. Groups by Assessment Periods Interaction: Visual Aural Digit Span Test

Table II indicates no significant univariate effect of the Visual Aural Digit Span Test scores on Time ($F_{1,59} = .09$, $p = .77$) and Treatment by Time ($F_{1,59} = .27$, $p = .61$) This is illustrated in Figure 8. The Treatment effect was significant ($F_{1,58} = 7.57$, $p = .008$). Eta squared shows the VADS accounted for 10% of the variance. Once again, the difference in scores could reflect the correlation ($r = .68$) of the VADS with age favoring the older Treatment Group. The lack of a significant interaction of Treatment by Time precludes acceptance of Research Hypothesis No. 5. There is no between-group difference in successive processing.

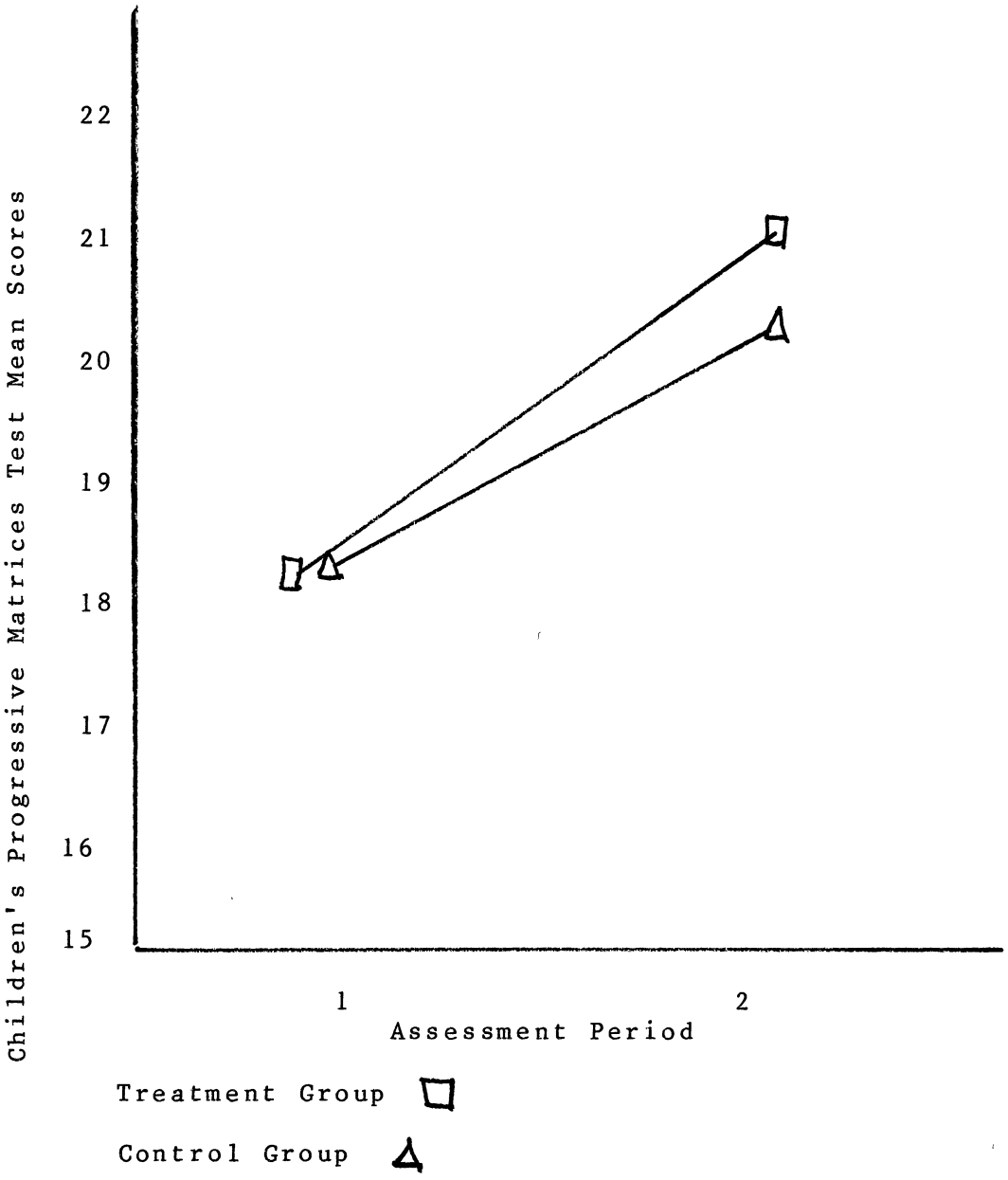

Figure 8. Groups by Assessment Periods Interaction: Children's Progressive Matrices

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of the Investigation

The present study examined the effect of verbal self-instruction training on five dependent variables: classroom behavior, impulsivity, field dependence, successive cognitive processing, and simultaneous cognitive processing. To achieve the purpose a new school was selected. Students and teachers for each grade were randomly assigned to classes. One class from each grade, one through six was randomly selected to serve as the verbal self-instruction treatment group. Teachers rated all children in the school on the Self-Control Rating Scale (Kendall and Wilcox, 1979). Students in grades one through six, who were rated highly impulsive, constituted the research subjects. The teachers for the treatment group were trained in a one-day workshop by two faculty members from a university teacher training program. Teachers were given six weeks to adapt their subjects to verbal self-control training procedures. Just prior to the eight week treatment period, an additional half-day workshop was conducted to review procedures, to have teachers demonstrate competency in verbal self-instruction training, and to answer any questions.

A total of 70 students, ages 6 to 12, who received three or more scores in the highly impulsive range on the SCRS were selected to be included in this study. There were 36 students in the Treatment Group and 34 in the Control. Prior to treatment, all students were given a group IQ test and individually evaluated for impulsivity, field dependence, simultaneous, and successive processing. Teachers of the Treatment Group worked with the impulsive students in a small group. Approximately 10 minutes a day of individual instruction were given each student with the others in the group observing while not being trained. Normal daily assignments were used as the material for training sessions in an attempt to see if such academic training could generalize to cognitive styles. Teachers kept daily logs of the amount of time spent training each student. The treatment was administered for eight weeks. Students were retested on all variables.

Children receiving verbal self-instruction training procedures were compared with children in a non-treatment control condition. All five independent variables were analyzed with a multivariate analysis of variance with repeated measures (Nie, 1983) that consisted of two treatment groups with pre- and post-tests on each dependent variable.

The results of this study allow for the acceptance of only one research hypothesis. Verbal self-instruction training did result in differences in children's impulsive classroom behavior. The other cognitive styles

investigated--field dependence, impulsivity, simultaneous processing, and successive processing, showed no significant differences.

Discussion and Conclusions

The findings of the present study indicated that verbal self-instruction training had a significant effect on the decrease of impulsive classroom behavior of students in the treatment group. The Treatment Group did decrease impulsive classroom behaviors while the Control Group increased impulsive behaviors. Verbal self-instruction training had no significant effect on field dependence since children in both treatment and control groups became less dependent. Verbal self-instruction training had no significant effect on reflectivity and both groups of children exhibited no increase in reflectivity. Verbal self-instruction training had no significant effect on simultaneous processing skills since both treatment and control groups increased skills. In addition, verbal self-instruction training had no effect on sequential processing skills since both groups increased insignificantly.

Two major areas will be addressed in this chapter. (1) The interpretation of the findings and their previously related research will be discussed. (2) The implications of the present study will be considered.

Research Hypothesis No. 1

Students with verbal self-instruction training will exhibit greater control of impulsive classroom behavior. They will be more reflective in their actions.

While the overall MANOVA was not significant on the Treatment by Time effect, the ANOVA was significant beyond the .01 level. The results on the ANOVA indicated there was a between-group difference in impulsive classroom behavior. The Self-Control Rating Scale showed that students with verbal self-instruction training exhibited greater control of impulsive classroom behavior and substantiated previous research (Douglas et al., 1976; Kendall and Finch, 1978; Kendall and Wilcox, 1980; Meichenbaum and Goodman, 1969, 1971, 1975). There were no other significant differences on the Treatment by Time effect and the statistical power lost in the number of cells could have prevented a significant effect on the MANOVA. Thus, the ANOVA could be considered a better estimate of reality. There was a significant ($p < .01$) 17 point drop in the scores on the SCRS in the Treatment Group, and a significant ($p < .05$) 8 point increase in impulsive behaviors of the Control Group which resulted in a significant interaction. Therefore, acceptance of this research hypothesis is based on the ANOVA.

While there was a year advantage in age for the Treatment Group, the Treatment Group was more impulsive than the Control Group based on the pre-test SCRS scores by 8

points. This finding implies that any age related factor should work against the goal of the study. The within-groups pattern of SCRS scores suggests age is of little consequence. The total reversal of means would make any pre-differences unimportant. Kendall and Wilcox (1979), the test authors, report no age differences on the SCRS.

This increase in self-control was not confirmed with the Matching Familiar Figure Test error scores or latency scores which measures reflectivity or lack of impulsive behavior. With the lack of further confirmation, three conflicting conclusions could be reached: (1) verbal self-instruction does improve behavior as indicated by scores on the SCRS and a large body of research; (2) there was improvement in students' impulsive classroom behavior because of teacher expectations; (3) teachers perceived the students in verbal self-instruction training to have become less impulsive and more reflective.

Previous research has measured improvement in reflectivity with the Matching Familiar Figures Test. While error scores decreased in both groups by the same amount, this can be attributed to the effects of practice. Both latency scores remained within a fraction of a second of each other at both testings indicating no change in the time taken to respond.

A possible explanation of this improvement as reported on the Self-Control Rating Scale could be the Pygmalion effect. The original Pygmalion study was done by Rosenthal

and Jacobson (1968) involving poor children who were given the so called Harvard Test of Inflected Acquisition (in reality, it was a standard IQ test). Names, of 20% of the students chosen randomly, were given to teachers as the students who were supposed to be the ones who would bloom during the coming year. Eight months later these bloomers were retested and their IQ scores gained significantly, nearly 4 points on the total IQ and 7 points on reasoning IQ. In addition, the teachers rated these students as intellectually more curious, happier and better adjusted, and less in need of approval than their control group.

In a further study, Rosenthal and Rubin (1978) reviewed 345 studies that validated the Pygmalion effect in the classroom. Smith (1980) noted that the Pygmalion effect on raising IQ is inconclusive but teacher expectancies including teacher-pupil interaction and achievement had been confirmed over a wide variety of experiments.

A third possible explanation was teacher perception. The teachers involved in this experiment had invested eight weeks of time and effort in the training of these students and they expected students to be better self-controlled. On the other hand, students received individual attention from their teacher for approximately 10 minutes a day during the training and based upon the results of the SCRS, this procedure could have improved the interpersonal relations between student and teacher. With this close relationship, the perceptions of the child could have changed. Kanfer

(1971) noted that most training procedures involved the child making a contract with the adult to behave in a more appropriate fashion and in most cases did so.

It is of interest that while the overall MANOVA was not significant, the ANOVA indicated a significant ($p < .01$) Treatment by Time effect on the SCRS. Among the dependent variables, ten of the 21 correlation coefficients were greater than .26 which is significant at the .05 level. Often with the high correlations among the dependent variables, MANOVA misses differences for any one of the variable because it controls, i. e. covaries the others (Maxwell, 1977). With the evidence of significantly improved classroom behavior of the Treatment Group, the ANOVA procedure provided a better basis on which to draw conclusions.

As the result of verbal self-instruction training during the eight week period, it can be concluded that impulsive students in the Treatment Group did improve their self-control while the control group increased the amount of impulsive behavior. Hypothesis No. 1 can be accepted.

Research Hypothesis No. 2

Students with verbal self-instruction training will exhibit greater field independence. They should be better able to attend to relevant cues.

The results did not indicate any change in field dependent behavior due to the treatment. An examination of scores on the Children's Embedded Figures Test by grade did

confirm Whitkin's et al. (1962) thesis that children become more field independent as they grow older. Scores on both groups reflected fewer errors over the time period due to maturity or practice. Verbal self-instruction training produced no change between the groups. This would indicate that this cognitive style is stable over time and not easily changed.

Research Hypothesis No. 3

Students with verbal self-instruction training will be more reflective. They will stop to think before responding.

The treatment did not provide any change in reflectivity on either the error scores of the Matching Familiar Figures Test or on the latency scores. The latency scores on the MFFT remained within a second for each group on both testing periods showing consistent stability and resistance to change.

Research Hypotheses No. 4 and No. 5

Students with verbal self-instruction training will exhibit greater skill in both simultaneous and successive processing. Their coding of data will be more efficient.

Hypotheses four and five dealing with simultaneous and successive processing can not be accepted. Scores on the Coloured Progressive Matrices and Visual Aural Digit Span Test showed no significant interaction. Although Das, Kirby, and Jarman (1979) suggest that cognitive processing

can be improved through training, these results were not obtained in this study.

The Failure of Verbal Self-Instruction to Generalize

A possible explanation for the failure of verbal self-instruction to generalize is that it is a sequential, step-step-by-step process. Children in both groups exhibited weak sequential processing skills, with over 50% of both groups falling below the 25th percentile on the VADS. In Treatment Group only 7 children were above the 50th percentile, 10 between the 26th and 49th percentile, and 11 below the 25th percentile or 39% of the group. Das, Kirby, and Jarman (1979) suggest that remediation programs be based on the strengths of the students. For those students falling below the 25th percentile, verbal self-instruction may not be the optimal process for this procedure.

Das, Kirby, and Jarman (1979) state that the most effective approach to improving cognitive processing is to use related materials for remediation. If improved reading is the goal, use reading materials in training procedures. Since improved sequential processing was desired in this study, the sequential approach of verbal self-instruction was an appropriate medium for such a goal. Despite efforts to provide for generalization using a variety of school subjects such as mathematics, reading, and spelling, children simply may not have used the self-instructional statements outside of the training environment, or the self-statements

may not have served to prompt or guide the desired behaviors.

During the training sessions, teachers reported that the children learned the verbal-self instruction procedure and retained it from day to day. The students appeared to comprehend the concept of self-instruction. The children were creative and spontaneous in the use and creation of self-statements during training.

The Efficacy of Verbal Self-Instruction Training

Except for self-control, verbal self-instruction may be an ineffective procedure for changing cognitive styles in children. Several possible explanations for failure to support the present research are discussed in this section.

The theory of self-instruction should be an effective means of instruction since it requires children to be an agent of change. Children guide their behavior, have a means of self-coping and self-reinforcement which should strengthen behavior and generalize to other envioronments.

Wertsch (1980) offers a possible explanation for the inability of verbal self-instruction to generalize to other areas. In reviewing the work of Vygotsky (1962) and his followers, Wertsch (1980) has attempted to explain the Soviet theory of how children develop the ability to carry out goal-directed actions. Adults will lead children through the steps needed to achieve these goals. Children may not understand what the overall structure of the goal is

while being lead by the adult through the process of reaching the goal. In many cases children may achieve the desired goal without ever realizing that a plan of action or a goal was involved. Children are not working toward a goal that they have set for themselves. Rather, children are working toward a goal which the adult has perceived to be the goal. Children are working on a goal that can only be carried out on the interpsychological plane of functioning, i.e., children are unable to formulate the goal and carry it out independently. Children have not formed an abstract representation of the goal and are dependent on the adult to mediate and regulate their actions. If left without adult guidance, children are sure to be distracted by what is going on around them in the environment and, consequently, are easily diverted from the task.

If children are to carry on the task on their own, they must utilize the intrapsychological plane of functioning, i.e., children are able to carry out the goal-directed actions using the same means the adult has used to carry out the goal and regulate their actions. Children are able to function in the intrapsychological plane where they could previously only function through the interpsychological plane. Vygotsky (1962) states that the most important means for self-regulation is self-directed speech which must be carried on by the child.

A plausible explanation of no significant change between the two groups could be that the children were

functioning on the intrapsychological plane. The children were not involved in the formulation of goals that required them to make an abstract representation of the task and its purpose. The children's actions, instead, were dependent on the adult and the environment. The environment provides many and varied stimuli that easily distract impulsive children and make it very difficult for them to stay on task. One could conclude that the children did not form their own goals and representations and, therefore, could not be directed by their own verbal self-instructions.

Forest-Pressley and Gillies (1983) do not believe that knowledge of procedures such as verbal self-instruction is sufficient, for it tends to produce mimickers (children who can mimic a verbal response but do not have the knowledge to improve performance). What is needed is more specific knowledge, practice in using different strategies, evaluation of the effectiveness of these strategies, practice in monitoring, comparing and measuring the effectiveness of strategies, and appropriate feedback.

From the standpoint of information processing, the five steps in Meichenbaum's training procedures may overload the working memory. There may be too many pieces of information for the student to properly attend to the learning sequence. The amount of information used in verbal self-instruction may need to be minimized. To assure the salience of the cues to which they must attend, the level should be

decreased to the point where it can be accommodated in working memory (Case, 1983).

The integrity of treatment is another factor that could have entered into the effectiveness of the training program. Cognitive behavior programs in social problem solving such as that of Weissberg and Gesten (1982) were carried out successfully in a school. In developing the plan utilizing teachers and graduate students, Weissberg and Gesten (1982) required regular training and supervision and made frequent revisions in their program. They had an unusual group of teachers with several years of experience in the program.

While this research demonstrated that paraprofessionals could provide effective treatment, most schools lack the resources for monitoring and training. One of the purposes of this research was to determine if self-instruction training could be implemented under ordinary conditions in a school with brief (one full day with an additional half day just prior to treatment) training and minimum supervision.

The conditions in the school were ideal for implementation. The administration of the school system participated enthusiastically, allowing the children and teachers to be randomly assigned to all classes for the purposes of research. The elementary supervisor, principal, and counselor wanted to be involved, and all attended the training sessions. All teachers in the school were dedicated professionals who had voluntarily left white, middle class schools to serve in a minority, low socioeconomic school.

When the six teachers were chosen randomly to be the trainers, all agreed to serve and contributed a Saturday for the one-day training. They did their assignments of mastering the techniques of verbal self-instruction and adapting their daily instruction to this method. They later remained after school for the half-day session just prior to the beginning of the treatment.

During the training, the teachers kept daily logs of time spent. An examination of these logs showed that different pencils and pens were used intermittently by five of the teachers, adding to the evidence that they were filled in daily. There was one exception, the eight logs from one teacher seemed to be filled in hurriedly at one time with the same writing instrument.

One problem arose with a teacher who had nine students classified as impulsive in her class. On her own, she cut down the time of training to five minutes for each child and created another small group. In dealing with impulsive students, great effort is required on their part to remain attentive while other students are being trained. Due to the limitations of the teacher's time, 30 to 40 minute sessions are the practical limits. These findings indicate that no more than three or four children can be trained with the limited time available to teachers.

Self-instruction training requires an elaborate procedure and time consuming effort on the part of both trainer and subject. Baratis and Ford's (1977) study with

kindergarten and second grade students, 55% of whom were impulsive, indicated that simple instructions such as "do your best," "it's important to choose one exactly like this one," and "speed-up" produced results as they were told to do so without the elaborate five step Meichenbaum training. This would indicate that the eight week period should have been ample time to achieve a change in behavior.

Whether the teachers did exactly as they had contracted is a matter of some importance. The training did go on for two months and it was time consuming. In view of the professionalism exhibited by the teachers in all prior commitments, it can be assumed that they did follow through, and conduct training as prescribed.

The results of these finding are in keeping with other research. In a review of the literature, Pressley (1979) found that there was very little evidence that verbal self-instruction produced any general improvement beyond self-control.

Recommendations for Further Research

The present study indicates that verbal self-instruction training as carried out in the classroom by teachers was only effective with the improvement of classroom behavior. The study failed to demonstrate a significant differential treatment group effect on the other four cognitive styles investigated. Due to the findings and

limitations of this study, the following recommendations are made:

1. Future research should investigate the maintenance of improved self-control in the classroom. The possibility of such change should be examined by follow-up assessment over a longer interval.
2. The present study investigated the effects of verbal self-instruction training on children, who indicated weak or nonexistent sequential processing skills. Thirty-nine percent fell below the 25th percentile which Koppitz (1977) considers deficient successive processing skills. For other children high in sequential processing skills, the results might be different. Investigations should be carried out with children at various levels of successive processing skills.
3. The present study investigated impulsive students. Future studies should investigate verbal self-instruction training on non-impulsive students.
4. The present study investigated the perception of change in impulsive students by their teacher's on the SCRS. Outside observers should rate students on the SCRS to obtain objective ratings.
5. The present study investigated the feasibility of training by paraprofessionals. Future investigations should monitor this training to determine if the required training procedures are followed.

6. The present study considered the effects of training developed and prescribed by the trainer not involving the child in the goals of the treatment. Future investigations should have the goals set and created by the student.
7. The present study consisted of a sample of 70. Ten families provided two or more children with 35% of the sample related to one or more students in the study. The genetic aspect of impulsivity should be investigated.
8. In a future study a placebo group should be formed.
9. A final factor of experimental interest is that of length of training. Much longer training periods may be required in order to effect and maintain changes in cognitive style. Further research should be designed to examine the effects of this variable on treatment outcomes.

The most obvious conclusion of the present study is that self-instruction training is only effective with the modification of self-control. Verbal self-instruction training does not generalize and is an ineffective technique for modifying field dependence, impulsivity, and simultaneous and successive cognitive processing. The result of this study and the equivocal results of previous verbal self-instruction training studies carried on in the classroom may indicate that classroom training by

paraprofessionals and the use of academic materials may not be an effective means for altering these cognitive styles.

Recommendations for more intensive training for longer periods of time with school age children are commonly offered by researchers who do not obtain significant findings. The possibility remains that verbal self-instruction training as, currently designed and implemented, does not effect change, beyond self-control, as intended.

BIBLIOGRAPHY

Abikoff, H. Cognitive training intervention in children: Review of a new approach. Journal of Learning Disabilities, 1979, 12, 65-77.

Ault, R. Problem-solving strategies of reflective, impulsive, fast-accurate, and slow-inaccurate children. Child Development, 1973, 44, 259-266.

Ault, R. Crawford, D. & Jeffery, T. Visual scanning strategies of reflective, impulsive, fast-accurate, and slow-inaccurate children. Child Development, 1972.

Baratis, S. W. & Ford, L. H. Reflection-impulsivity, conservation, and the development of the ability to control cognitive tempo. Child Development, 1977. 48, 953-959.

Barrett, D. E. Reflection-impulsivity as a predictor of children's academic achievement. Child Development, 1977, 48, 1443-1447.

Becker, L. D. Conceptual tempo and the early detection of learning problems. Journal of Learning Disabilities, 1976, 9, 433-443.

Blackman, S. & Goldstein, K. M. Cognitive styles and learning disabilities. Journal of Learning Disabilities, 1982, 55, 106-112.

Cairns, E. The reliability of the MFFT. British Journal of Educational Psychology, 1977, 47, 197-198.

Case, R. The underlying mechanism of intellectual development. In J. R. Kirby & J. B. Biggs (Eds.), Cognition, Development, and Instruction. New York: Academic Press, 1983.

Cathcart, G. & Liedtke, E. Reflectiveness/impulsiveness and mathematics achievement. Arithmetic Teacher, 1969, 16, 536-567.

Craighead, W. e. A brief clinical history of cognitive-behavior therapy with children. The School Psychology Review. 1982, 11, 5-13.

Cummins, J. & Das, J. P. Cognitive processing and reading difficulties: A framework for research. The Alberta Journal of Educational Research, 1977, 23, 245-256.

Das, J. P. Patterns of cognitive ability in nonretared and retarded children. American Journal of Mental Deficiency, 1972, 77, 6-12.

Das, J. P. The use of attention. The Alberta Journal of Educational Research, 1973, 19, 99-108. (a)

Das, J. P. Structures of cognitive abilities: Evidence for simultaneous and successive processing. Journal of Educational Psychology, 1973, 65, 103-108. (b)

Das, J. P. & Cummins, J. Academic performance and cognitive processing EMR children. American Journal of Mental Deficiency, 1978, 83, 197-199.

Das, J. P., Kirby, J., & Jarman, R. F. Simultaneous and successive synthesis: An alternative model for cognitive abilities. Psychological Bulletin, 1975, 82, 87-103.

Das, J. P., Kirby, J., & Jarman R. F. Simultaneous and successive cognitive processes. New York: Academic Press, 1979.

Das, J. P., Lelong, C. K., & Williams, N. H. The relationship between learning disability and simultaneous-successive processing. Journal of Learning Disabilities, 1978. 11, 618-625.

Das, J. P., Manos, J., & Kanungo, R. N. Performance of Canadian native, black, and white children on some cognitive and personality tasks. Alberta Journal of Educational Research, 1975, 21, 183-185.

Das, J. P., & Malloy, G. N. Varieties of simultaneous and successive processing in children. Journal of Educational Psychology, 1975, 67, 212-220.

Douglas, V. I., Parry, P. Marton, P., & Garson, C. Assessment of a cognitive training program for hyperactive children. Journal of Abnormal Psychology, 1976, 4, 259-276.

Egeland, B. & Weinberg, R. W. The Matching Familiar Figures Test: A look at its psychometric credibility. Child Development, 1976, 47, 483-491.

Epstein, M. H., Hollahan, D. P. & Kaufman, J. M. Implications of the reflectivity-impulsivity dimension for special education. Journal of Special Education, 1975, 9, 11-25.

Forest-Pressley, D. L. & Gillies, L. A. Children's flexible use of strategies during reading. In M. Pressley and J. Levin (Eds.) Cognitive strategy research, New York: Springer-Verlas, 1983.

Gardiner, W. I. Cognitive styles in categorizing behavior. Journal of Personality, 1953, 22, 214-233.

Glenwich, D. S. & Barocas, R. Training impulsive children in verbal self-control by use of natural change agents. Journal of Special Education, 1979, 13, 187-199.

Goldstein, K. M. & Blackman, S. Cognitive style: Five approaches and relevant research. New York: Wiley, 1978.

Goodnough, D. R. The role of individual differences in field dependence as a factor in learning and memory. Psychological Bulletin, 1976, 83, 675-694.

Guilford, J. P. Cognitive styles: What are they? Education and Psychological Measurement, 1980, 40, 715-735.

Harris, A. Historical development of the Soviet theory of self-regulation. in G. Zivin, (Ed.), The development of self-regulation through private speech. New York: Wiley, 1979.

Holtzman, P. S. & Gardner, R. W. Leveling-sharpening and memory organization. Journal of Abnormal and Social Psychology, 1959, 59, 151-155.

Hollon, S. D. & Kendall, P. C. Cognitive-behavioral interventions: Theory and procedures. New York: Academic Press, 1979.

Jarman, R. F. Cross-modal and intramodal matching relationships to simultaneous and successive synthesis and levels of performance among three intelligence groups. Alberta Journal of Educational Research, 1978, 14, 100-112.

Jarman, R. F., & Das, J. P. Simultaneous and successive-synthesis and intelligence. Intelligence, 1977, 1, 151-169.

Jastak, F. J. & Jastak, S. The Wide Range Achievement Test. Willmington, Del.: Jastak Assoc., 1946.

Kagan, J. Individual differences in the resolution of response uncertainty. Journal of Personality and Social Psychology, 1965,2, 154-160.

Kagan, J. Reflection-impulsivity: The generality and dynamics of conceptual tempo. Journal of Abnormal Psychology, 1966, 37, 17-24.

Kagan, J. The role of evaluation in problem solving. in Cognitive studies. Vol. II, J. Hellmuth, (Ed.), New York: Bruner/Mazel, 1971.

Kagan, J. & Kogan, N. Individuality and cognitive performance. In P. Mussen (ed.), Carmichael's manual of child psychology Vol. I, New York: Wiley, 1970.

Kagan, J., Pearson, L., & Welch, L. Modifiability of an impulsive tempo. Journal of Educational Psychology, 1966, 57, 359-365. (a)

Kagan, J., Pearson, L., & Welch, L. Conceptual impulsivity and inductive reasoning. Child Development, 1966, 37, 583-594. (b)

Kagan, J., Rosman, B. L., Day, D. Albert, J. & Phillips, W. Information processing in the child: Significance of analytlc and reflective attitudes. Psychological Monographs, 1964, 57, 359-365.

Kagan, R. M. Generalization of verbal self-instructional training in cognitively impulsive children (Doctoral dissertation, University of Texas at Austin, 1976). Dissertation Abstracts International, 1977, 37, 4148B. (University Microfilms No. 77-3926)

Kagan, S. & Zahn, G. L. Field dependence and the school achievement gap. Journal of Educational Psychology, 1975, 67, 643-650.

Kanfer, F. H. Self-regulation. In C. Neuringer and J. L. Michael (Eds.), Progress in behavior modification. (Vol. 5) New York: Appleton-Century-Crofts, 1971.

Karp, S. A. & Konstadt, N. Children's Embedded Figures Test Manual, Palo Alto, CA: Consulting Psychologist Press, 1971.

Kaufman, A. S. & Kaufman, N. L. Kaufman Assessment Battery for Children: Interpretive manual. Circle Pines, Minn: American Guidance, 1983.

Kaufman, D. & Kaufman, P. Strategy training and remedial techniques. Journal of Learning Disabilities, 1979, 12, 416-419.

Kazdin, A. E. Current developments and research issues in cognitive-behavioral interventions: A commentary. School Psychology Review, 1982, 11, 75-82.

Kendall, P. C., & Finch, A. J. A cognitive-behavioral treatment for impulsivity : A group comparison study. Journal of Consulting and Clinical Psychology, 1978, 46, 110-118.

Kendall, P. C., & Finch, A. J. Self-control in children: The development of a rating scale. Journal of Clinical and Consulting Psychology, 1979, 47, 1020-1029. (a)

Kendall, P. C., & Finch, A. J. Developing nonimpulsive behavior in children: Cognitive behavioral strategies for self-control. In P. Kendall and S. Hollon (Eds.) Cognitive-behavioral interventions: Theory, research, and procedures, New York: Academic Press, 1979. (b)

Kendall, P. C., & Hollon, S. D. Cognitive-behavioral interventions: Overview and current status. In P. C. Kendall and S. D. Hollon (Eds.), Cognitive-behavioral intervention: Theory research, and procedures. New York: Academic Press, 1979.

Kendall, P. C., & Wilcox, L. E. Self-control in children: A development of a rating scale. Journal of Constulting and Clinical Psychology, 1979, 47, 1120-1029.

Kendall, P. C., & Wilcox, L. E. Cognitive-behavioral treatment for impulsivity: Concrete versus conceptual training in non-self-control problem children. Journal of Consulting and Clinical Psychology, 1980, 48, 80-91.

Kendall, P. C., Padawar, W. J., & Zupan, B. A. Developing self-control in children: A manual of cognitive behavioral strategies. Minneapolis, Minn.: University of Minnesota, 1980.

Keough, B. K., & Donolon, F. Field independence, impulsivity and learning disabilities. Journal of Learning Disabilities, 1972, 5, 331-336.

Kirby, J. R., & Das, J. P. Information processing and human abilities. Journal of Educational Psychology, 1977, 70, 58-66.

Korzeniowski, M. A. Effects of verbal self-instruction training on arithmetic performance of children with special education needs. Dissertation Abstracts International, 1981, 42, 4760.

Koppitz E. M. The Visual Aural Digit Span Test. New York: Grune and Stratton, 1977.

Leon, J. A., & Pepe, H. J. Self-instructional training; Cognitive behavioral modification for remediating arithmetic deficits. Exceptional Children, 1983, 50, 54-60.

Luria, A. R. The role of speech in the regulation of normal and abnormal behavior. New York: Liverlight, 1961.

Luria, A. R. The mentally retarded child. New York; Macmillan, 1963.

Luria, A. R. Human brain and psychological process. New York: Harper and Row, 1966.

Luria, A. R. The working brain. London: Penquin, 1973.

Margolis, H., Brannigan, G. G., Gould, J., Heaverly, M. A., Molteni, A., Potter, J., & Samuels, D. D. Conceptual tempo as a moderator variable in predicting first grade achievement test scores. Journal of School Psychology, 1982, 20, 313-321.

Maxwell, A. E. Multivariate analysis in behavioral research. New York: Wiley, 1977.

Meichenbaum, D. Cognitive behavior modification. New York: Plenum Press, 1977.

Meichenbaum, D., & Goodman J. The developmental control of operant motor responding by verbal operants. Journal of Experimental Psychology, 1969, 7, 553-565. (a)

Meichenbaum, D., & Goodman, J. Reflection-impulsivity and verbal control of motor behavior. Child Development, 1969, 40, 785-797. (b)

Meichenbaum, D., & Goodman, J. Training impulsive children to talk to themselves: A means of developing self-control. Journal of Abnormal Psychology, 1971, 77, 115-126.

Meichenbaum, D., & Goodman, J. The nature and modification of impulsivity. Paper presented at the first international congress of child neurology, Toronto, Ontario, 1975.

Messer, S. B. Reflection-impulsivity: Stability and school failure. Journal of Educational Psychology, 1970, 61, 487-490.

Messer, S. B. Reflection-impulsivity: A review. Psychological Bulletin, 1976, 83, 1026-1052.

Minucci, P. K., & Connors, M. M. Reaction time under three viewing conditions: Binocular, dominate eye, and non-dominate eye. Journal of Experimental Psychology, 1964, 67, 268-275.

Nie, N. H. SPSS User's Guide, New York: McGraw-Hill, 1983.

O'Malley, J., & Eisenberg, L. The hyperkinetic syndrome. Seminars in Psychiatry, 1973, 5, 95-103.

Otis, A. S., & Lennon, R. T. Otis-Lennon Mental Ability Test: Manual for administration. New York: Harcourt, Brace, and World, 1969.

Piaget, J. The language and thought of the child. New York: The Humanities Press Inc., 1965.

Pressley, M. Increasing children's self-control through cognitive interventions. Review of Educational Research, 1979, 40, 319-370.

Proger B. B., Bayuk, R. J., McGowan, J. R., & Mann, L. The relative predictive and construct validities of the Otis-Lennon Mental Abilities Test, the Longe-Thorndike Intelligence Test, and the Metropolitan Readiness Test in grades two and four: A series of multivariate analysis. Educational and Psychological Measurement, 1971, 31, 529-538.

Raven, J. C. R. Raven's Standard Progressive Matrices. London: H. K. Lewis, 1956.

Raven, J. C. R., Court J. H., & Raven, J. Manual for Raven's Progressive Matrices and Coloured Progressive Matrices. London: Lewis and Co., 1976.

Reynolds, A. G., & Flagg, P. W. Cognitive psychology. Boston: Little, Brown, 1983.

Rosenthal, R., & Jacobson, L. Pygmalian in the classroom. New York: Holt, Rinehart, and Winston, 1968.

Rosenthal, R., & Rubin, D. B. Interpersonal expectancy effects: The first 345 studies. The Behavioral and Brain Sciences, 1978, 3, 377-387.

Santostefano S. Cognitive controls versus styles: Diagnosing and treating cognitive disabilities in children. Seminars in Psychiatry, 1969, 1, 291-317.

Schleser, R., & Thackwray, D. Impulsivity: A clinical developmental perspective. School Psychology Review, 1982, 11, 42-46.

Scott, W. A. Cognitive complexity and cognitive flexibility. Sociometry, 1981, 25, 405-414.

Smith, M. L. Teacher expectations. Evaluation in Education, 1980, 4, 53-55.

Torgeson, J. K., Bowen, C., and Ivey, C. Task structure versus modality of presentation: A study of the construct validity of the Visual-Aural Digit Span Test. Journal of Educational Psychology, 1978, 70, 451-456.

Vygotsky, L. S. Thought and language. New York: Wiley & Sons, 1962. (Originally published, 1934)

Weissberg, R. P., & Gesten, E. L. Considerations for developing effective school-based social problem solving training programs. School Psychology Review, 1982, 11, 56-63.

Wertsch, J. W. The concept of activity in Soviet psychology: an introduction. in J. Wertsch, (Ed.), Introduction to Soviet psychology, Armok, N. Y.: Sharp, 1980.

Wilkinson, J. B. and Grissom, S. Instructional procedures for reducing impulsivity. Unpublished manuscript. Oklahoma State University, 1981.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R., & Karp, S. A. Psychological differentiation, New York: Wiley, 1962.

Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, W. W. Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 1977, 47, 1-64.

Witkin, H. A. Oltman, P. K., Raskin, E., & Karp, S. A. Manual for the Embedded Figures Tests. Palo Alto, CA: Consulting Psychological Press, 1971.

Zivin, G. Removing common confusions about egocentric speech, private speech, and self-regulation. in G. Zivin, (Ed.), The development of self-regulation through private speech. New York: Wiley, 1979.

Zelniker, T., & Wendall, E. Reflective and impulsive children: Strategies of information processing underlying difference in problem solving. Monographs of the Society for Research in Child Development, 1976, 41, 1-59.

APPENDIXES

APPENDIX A

THE SELF-CONTROL RATING SCALE

BEHAVIOR RATING SCALE FOR CHILDREN

Name of Child_____ Grade_____

Rater_____

Please rate this child according to the descriptions below by circling the appropriate number. The underlined 4 in the center of each row represents where the average child would fall on this item. Please do not hesitate to use the entire range of possible ratings.

1.	When the child promises to do something, can you count on him or her to do it?	1 2 3 4 5 6 7 always never
2.	Does the child butt into games or activities even when he or she hasn't been invited?	1 2 3 4 5 6 7 never often
3.	Can the child deliberately calm down when he or she is excited or all wound up?	1 2 3 4 5 6 7 yes no
4.	Is the quality of the child's work all about the same or does it vary a lot?	1 2 3 4 5 6 7 same varies
5.	Does the child work for long-range goals?	1 2 3 4 5 6 7 yes no
6.	When the child asks a question, does he or she wait for an answer, or jump to something else (e.g., a new question) before waiting for an answer?	1 2 3 4 5 6 7 waits jumps
7.	Does the child interrupt inappropriately in conversations with peers, or wait his or her turn to speak?	1 2 3 4 5 6 7 waits interrupts
8.	Does the child stick to what he or she is doing until he or she is finished with it?	1 2 3 4 5 6 7 yes no
9.	Does the child follow the instructions of responsible adults?	1 2 3 4 5 6 7 always never
10.	Does the child have to have everything right away?	1 2 3 4 5 6 7 no yes

11.	When the child has to wait in line, does he or she do so patiently?	1 2 3 4 5 6 7 yes no
12.	Does the child sit still?	1 2 3 4 5 6 7 yes no
13.	Can the child follow suggestions of others in group projects, or does he or she insist on imposing his or her own ideas?	1 2 3 4 5 6 7 able to follow imposes
14.	Does the child have to be reminded several times to do something before he or she does it?	1 2 3 4 5 6 7 never always
15.	When reprimanded, does the child answer back inappropriately?	1 2 3 4 5 6 7 never always
16.	Is the child accident prone?	1 2 3 4 5 6 7 no yes
17.	Does the child neglect or forget regular chores or tasks?	1 2 3 4 5 6 7 never always
18.	Are there days when the child seems incapable of settling down to work?	1 2 3 4 5 6 7 never often
19.	Would the child more likely grab a smaller toy today or wait for a larger toy tomorrow, if given the choice?	1 2 3 4 5 6 7 wait grab
20.	Does the child grab for the belongings of others?	1 2 3 4 5 6 7 never often
21.	Does the child bother others when they're trying to do things?	1 2 3 4 5 6 7 no yes
22.	Does the child break basic rules?	1 2 3 4 5 6 7 never always
23.	Does the child watch where he or she is going?	1 2 3 4 5 6 7 always never
24.	In answering questions, does the child give one thoughtful answer or blurt our several answers all at once?	1 2 3 4 5 6 7 one answer several
25.	Is the child easily distracted from his or her work or chores?	1 2 3 4 5 6 7 no yes
26.	Would you describe this child more as careful or careless?	1 2 3 4 5 6 7 careful careless

27. Does the child play well with peers (follows rules, waits turn, cooperates)?
1 2 3 4 5 6 7
yes no

28. Does the child jump or switch from activity to activity rather than sticking to one thing at a time?
1 2 3 4 5 6 7
sticks to one switches

29. If a task is at first too difficult for the child, will he or she get frustrated and quit, or first seek help with the problem?
1 2 3 4 5 6 7
seek help quit

30. Does the child disrupt games?
1 2 3 4 5 6 7
never often

31. Does the child think before he or she acts?
1 2 3 4 5 6 7
always never

32. If the child paid more attention to his or her work, do you think he or she would do much better than at present?
1 2 3 4 5 6 7
no yes

33. Does the child do too many things at once, or does he or she concentrate on one thing at a time?
1 2 3 4 5 6 7
one thing too many

APPENDIX B

INSTRUCTIONAL PROCEDURES FOR REDUCING IMPULSIVITY

INSTRUCTIONAL PROCEDURES

FOR

REDUCING IMPULSIVITY

Barbara Wilkinson, Ph.D.
Associate Professor

Stephen Grisson, Ph.D.
Assistant Professor

Applied Behavioral Studies
in Education
Oklahoma State University

STEPS IN TEACHING SELF-INSTRUCTION

Mastery Modeling

First: Select the task to be preformed. You model the successful completion of the task by verbally (out loud) following the self-instruction sequence. Proceed slowly and accurately, without mistakes.

Second: Present the same, or a similar, task to the students and have them proceed using overt verbal self-instruction. Stop the students at any time when a self-instruction is omitted or when the speed of performance accelerates. Slow the students down and request repetition of the full self-instruction.

Third: Repeat the above steps until masted. Be sure to verbally praise students for accurate performance.

Coping Modeling

First: After tasks have been master modeled, you need to model coping skills. Select another task and proceed to complete the task using verbal self-instruction, but make some mistakes. Allow students to catch your mistakes and tell you how to redo the error and to proceed. As you err, use neutral statements such as, "I made a mistake," "I forgot to say..." or other reflective comments. Thus you are modeling how to cope with mistakes by not becoming frustrated, impulsive, or angry.

Second: Place the students in a more difficult task situation and have them proceed. Stop the students when responses become impulsive, frustrated, or angry and have them proceed with affectively neutral self-instruction. Assist them to mastery of procedures and verbal praise.

Errors

The errors for which a student must be stopped and assisted in redoing correctly include:

1. working or talking too fast.
2. forgetting to orally say one of more of the self-instructions.
3. getting a wrong answer.

Internalization

Begin with oral self-instruction. When this is mastered, with tasks being accurately and correctly completed, have the students whisper self-instructions. When this is mastered, have the students perform tasks using

internal (Silent) self-instruction. Continue to stop and redo tasks when performance rates accelerate or when errors are made.

Suggested Activities

- Following directions
- Workbook assignments
- Specific Skills Series
- Little Professor and other calculator activities
- Tangram puzzles
- Educational games/board games
- If...then problem situations
- Solving classroom or behavior problems
- Role playing situations
- Academic exercises
- Preparing for field trips and assemblies
- Preparing for class parties, plays, or pro-
- Solving worksheets
- Checkers and other strategy games

VERBAL SELF-INSTRUCTION

Adapted from Developing Self-Control in Children: A Manual of Cognitive-Behavioral Strategies by P.C. Kendall, W. J. Padawar, and B. A. Zupan, University of minnesota, 1980.

Verbal self-instructions serve to break down the process of problem solving into discrete steps for the child. Each self-instruction represents one step of solving the problem. Verbal self-instructions that are taught to the children include:

Content of Self-Instruction	Sequence of Self-Instruction
Problem definition	the therapist models task performance and talks out loud while the child observes;
Problem approach	the child performs the task, instructing himself out loud;
Focusing of attention	the therapist models task performance while whispering the self-instructions, followed by;
Choosing an answer	the child performs the task, whispering to himself;
Self-reinforcement or	the therapist performs the task using covert self-instructions with pauses and behavioral signs of thinking (e.g., stroking beard or chin)
Coping Statement	the child performs the task using covert self-instructions.

As shown above, the content of self-instructions includes five types of statements. The self-reward is used only with correct responses and the coping statements only with incorrect responses. Coping statements are designed to facilitate reflectivity and inhibit a disturbing outburst such as "I am dumb" or "That was stupid of me." Neutral statements, such as "I made a mistake" are encouraged.

VITA

Virginia Lock Hoover

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE EFFECT OF VERBAL SELF-CONTROL TRAINING ON THE COGNITIVE STYLES OF IMPULSIVE ELEMENTARY SCHOOL CHILDREN

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born at Denver, Colorado, on January 20, 1925, the daughter of the late Michael L. and Mary H. Lock. Married to Edwin L. Hoover.

Education: Attended East Denver High School in Denver, Colorado, graduated in June, 1943; attended the University of Denver, Denver, Colorado, and received the Bachelor of Science degree in March, 1947, with a major in Business Administration; entered graduate school at Memphis State University, Memphis, Tennessee, in January, 1966; received the Masters of Education degree in Counseling in May, 1968; completed the requirements for the Doctor of Philosophy degree in December, 1985, at Oklahoma State State University.

Professional Experience: Account Executive, Bradley Lane Advertising Agency, Denver, Colorado, 1947 to 1950; Counselor, Whitehaven High School, 1968 to 1972; School Psychologist, Muskogee Schools, Muskogee, Oklahoma, 1972 to 1973; Administrator of the State Department of Education Region X Education Serivce Center, 1973 to the present.

Organizations: Member of National Association of School Psychologists, Oklahoma School Psychological Association, American Psychological Association, Council for Exceptional Children, American Council for Learning Disabilities, Soroptimists International.