# THE EFFECTS OF A PSYCHOMOTOR TRAINING PROGRAM ON INTEGRATION OF ATTENTION CONTROL IN EXCEPTIONAL CHILDREN

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IN EXCEPTIONAL CHILDREN

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# CHAPTER I

## INTRODUCTION

There has been a growing trend in psychology and education to believe that the experiences one has with one's body will have an effect on a myriad of psychological variables. Emotional stability, for example, has been claimed to be, in part, a function of the degree to which one is aware and acceptant of one's body (Fisher, 1973; Gunther, 1975; Lowen, 1975; Pesso, 1969). Similarly, it has been claimed that a variety of motor experiences provide the foundation from which perceptual-motor skills develop and which facilitate intellectual growth (Kephart, 1960; Piaget and Inhelder, 1956). Of special psychoeducational significance is the assertion made by these investigators that achievement in school is somehow related to the experience a child has with his physical body. Specifically, it has been suggested that academic achievement is based upon prerequisite motor learnings. Hence, several research endeavors have provided children with motor experiences and subsequently measured their academic achievement. Because they have met only moderate success, it has been questioned whether a motor program in schools would have any benefit. It is believed that the training of attention-control is one area that is more promising than others in determining the relation between motor training and school achievement. Therefore, the present study is concerned with how motor learning relates to attention control in children.

## Significance of the Study

One problem children have in school is paying attention. At times, they appear unable to settle down and concentrate. This is especially true for children with learning difficulties (Hallahan, 1975). This study is an attempt to evaluate the effectiveness of a psychomotor training program on the ability to maintain attention. If this program is effective, then it would be reasonable to include it within the educational curriculum of children with learning difficulties.

## Theoretical Assumptions

Children's inability to concentrate may be conceived as a generalized problem of attention control. Attention control refers to the ability to maintain attention on some specific stimulus for an extended period of time, whether that stimulus is kinesthetic, auditory, or visual. Thus, children may have difficulty maintaining their attention to a visual stimulus, an auditory stimulus or a kinesthetic stimulus. The crucial dimension along which attention control varies is temporal; attention control demands the maintenance of attention over time.

Attention control is a perceptual-focusing process. It specifically involves a maintenance of attentional focus, that is, the maintenance of attention onto a select portion of the total field of stimulation impinging upon an organism. Thus, attention control differs from attention span which is defined as the number of elements which can be retained in the mind at any one time (memory). Measurement of attention control necessitates some procedure which assesses

whether a subject does, in fact, maintain an attentional focus. Therefore, measurement techniques which involve observing a subject looking towards some object and postulating that the subject is attending to that object are unsatisfactory. What is needed is a performance measure which determines to what extent a subject actually perceives that specific portion of the stimulus field.

Attention control is conceived to generalize across perceptual modalities. Thus, children who cannot maintain attention on a visual stimulus also experience difficulty maintaining attention on kinesthetic and auditory stimuli. Within this framework, the effects of training in attention control with regard to any stimulus modality will transfer to attention control in other modalities. Thus, gains in kinesthetic attention control may effect changes in visual and auditory attention control. This is the theoretical assumption to which the present study is addressed.

## Statement of the Research Problem

This study is an attempt to determine the relation between kinesthetic attention control and auditory-visual attention control. Specifically, it is a test of the hypothesis that training in kinesthetic attention control will effect changes in auditory and visual attention control in children. A psychomotor training program is herein described. Its main objective is to develop kinesthetic attention control in children. It is hypothesized that following participation in the program, gains in kinesthetic attention control will be accompanied by greater visual and auditory attention control.

Pre- and post-test measures will be obtained on the Draw-A-Line

Test, the Walk Slowly Test, the Children's Embedded Figures Test, and three subtests of the Key Math Diagnostic Arithmetic Test (Mental Computation, Numerical Reasoning, and Word Problems). These measures are selected because performance on all tasks is believed to require the maintenance of attention. It is hypothesized that improvements on all measures will be significantly greater for those children who receive the psychomotor training program than those who do not.

## Limitations of the Study

1. Naturally, generaliability of the results is limited to other third grade students at Town and Country School, Tulsa, Oklahoma. Due to the unique subject population, this should be considered a severe limitation. The subjects are enrolled in a private school for children with moderate to severe academic and emotional difficulties.
2. The results of the treatment in this experiment may be highly dependent on the trainer's motivation. Although the experimental procedures are confounded by the subtle effect of the trainer's bias in coaching subjects during the exercises, it is felt that the coaching effect is, in part, necessary for successful implementation of the program.

## Definition of Terms

Attention: The act of focusing perceptual process onto a portion of the total stimulation impinging upon an organism.

Attention control: The ability to maintain a focus of attention with regard to any perceptual modality (kinesthetic, auditory, and visual).

Auditory attention control: The ability to maintain a focus of attention on an auditory stimulus; in this study measured by the Digit span subtest of the Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974), a test which requires the maintenance of attention on auditory simulation.

Body experiences: Kinesthetic experiences.

Kinesthetic attention control: The ability to maintain a focus of attention on kinesthetic stimuli produced by a motor act; in this study measured by the Walk Slowly Test and the Draw-A-Line Test, two tasks which require the maintenance of attention on kinesthetic experiences produced by a motor act.

Motor: Relating to movement initiated by muscular innervation.

Psychomotor: Relating to motor.

Visual attention control: The ability to maintain a focus of attention on a visual stimulus; in this study measured by the Children's Embedded Figures Test, a test which requires the maintenance of attention on a visual stimulus.

## Summary

The present study is an attempt to determine the effects of a psychomotor training program on attention control in exceptional children. It is hypothesized that the psychomotor training will induce greater kinesthetic attention control as well as auditory and visual attention control in second and third grade exceptional children. It is a test of the hypothesis that kinesthetic attention control is functionally related to auditory and visual attention control. Criterion measures include two kinesthetic attention control measures

(WS, DAL), a visual attention control measure (CEFT), an auditory attention control measure (DS), and a test of the integration of visual and auditory attention control (Key Math: Mental Computation, Numerical Reasoning, and Word Problems subtests).

# CHAPTER II

## SURVEY OF THE LITERATURE

### Effect of Body Experience on Behavior

The current interest in providing children with opportunities to experience their bodies stems from the notion that the experience one has with his physical body is somehow related to achievement in school. Body experiences may be provided for children by instructing them to engage in physical activity or to attend to their kinesthetic sensations. Reviewed below are two separate lines of research which are felt to lead to some general notions about how body experiences may relate to one specific academic skill, attention control. One group of research promotes psychomotor training for the development of perceptual and cognitive abilities and one group examines the subtle effects of body experience on body image and field dependence.

#### Effects of Body Experience on Perceptual and Cognitive Abilities in Children

The bulk of the research on the effects of body experience on academic performance of children has been conducted within the field of special education. For a number of years special educators have been aware of the importance of providing children with opportunities to experience their physical bodies, especially through motor activity. The

major tenet of these investigators is that higher mental processes are based upon prerequisite motor skills and that much of the exceptional child's difficulties stem from an inadequate repertoire of basic motor learnings. For example, Getman (1968) claims that movement is necessary for the development of visual-perceptual skills including form recognition, ocular control, and visual memory. Similarly, Barsch (1967) asserts that education must provide for the exploration of muscular relationships and balance. His movigenic theory emphasizes the need to help children move in space with the greatest efficiency.

Probably of greatest influence in prompting the use of motor activity to enhance perceptual and cognitive abilities in exceptional children has been Newell Kephart (1960). Kephart originally suggested that a variety of motor experiences is prerequisite to perceiving spatial and temporal relations. Exercises utilizing the balance beam and chalkboard training, for example, are prescribed for children with learning difficulties. It is claimed that by developing perceptual-motor competencies, the child becomes more equipped for the higher learning processes.

The perceptual competencies most relevant to body experience include concepts such as laterality, directionality, body image and convergence. For example, laterality (i.e., the perception of two sides of the body) is developed through experimental movement during which the child learns to innervate one side of the body and how to sense which side of the body must move for efficient interaction in space. The perceptual competency of directionality is the projection of laterality in space and is developed through experimental motor interaction with objects in space. The process of perceptual convergence

involves the fusion of vertical, horizontal, and depth coordinates in perceptual motor space. Movements such as rolling and tumbling are exercises which promote the integration of the spatial coordinates and hence function in developing convergence. The concept of time, too, is felt to be developed through motor activity. Rhythmic activity is coded in the central nervous system as a sequence of differentiated motor acts of specific duration. The elementary notions of time, thus, are conceptualized as the completion of particular motor sequences. Finally, body image refers to the perception of a differentiated body and, as such, its development requires experience of its differentiation. Kephart suggests that movement is necessary for the efficient development of all these functions.

The effectiveness of motor programs proposed by this group of special educators for groups of children have been carefully scrutinized. Getman and Barsch's programs are clinically-based; they have not been evaluated by experimental studies. Kephart's motor program, while given more credence, also suffers from a lack of support from well controlled research. Evaluative research that has been conducted has only minimally supported Kephart's main hypotheses. For example, studies reported by Cratty (1969) suggest that while perceptual-motor abilities were found to increase following Kephartian activities, improvement in academic achievement did not. It is highly probable that the activities designed by Kephart do remediate certain learning difficulties for some children. That the program is beneficial for unselected groups of children, however, has not been substantiated.

It is in the work of Bryant Cratty (1969) that one finds realistic and empirical statements of the worth of motor activity on learning

performance. Criticizing his "movement colleagues" for making unsupported claims that movement is the basis of the intellect, he does support the notion that certain cognitive variables do seem to be related to psychomotor efficiency. For example, intellectual expression, attention span, body image, and self-concept are felt to be related to psychomotor efficiency in fairly specific ways. However, Cratty emphasized that these perceptual-motor abilities will transfer to an academic setting only to the extent that the activities simulate classroom tasks.

This research suggested that psychomotor activity provides children with the experiences necessary to develop certain perceptual-motor competencies. Most importantly, it suggested that psychomotor training may enhance some kind of attention skill.

## Effect of Body Experience on Body Image and Field Dependence

Experimental studies initiated by Fisher (1970) and the Witkin group (Witkin, Dyk, Faterson, Goodenough, and Karp, 1962) suggested that the body experiences are related to other perceptual competencies, specifically to a differentiation of the body image and the external perceptual field. In contrast to the motor learning theories of Kephart, this group of research involved simply the focusing of attention onto the body or its parts during rest. Such attentional focusing resulted in a more highly differentiated body image and a consequent perceptual articulation of the environment surrounding the body.

Employing an objective scoring criterion with ink blots, Fisher operationally defined body image as the degree to which subjects

experience a definite boundary to their bodies as evidenced by greater demarcation of boundaries in their percepts of the ink blots. Fisher (1970) found that body boundary perceptions can be manipulated by certain concentration exercises. In one study (Fisher and Renik, 1966), it was found that female subjects instructed to concentrate on their skin and musculature demonstrated a post-treatment increase in body image (body boundary scores). Subjects instructed to attend to their internal organs and subjects in a control group did not demonstrate such change. These findings were corroborated by a replication study by Fisher (1970) and a study by Van DeMark and Neuringer (1969). The later study found subjects exposed to somatic stimulation (e.g., straining muscles, holding hands in cold water) and those who imagined such stimulation evidenced significant body image change, whereas, several control groups did not. Interestingly, there was no difference between those subjects exposed to direct stimulation and those subjects instructed to imagine such stimulation (Van DeMark and Neuringer, 1969). These studies indicated that at least temporary changes in body image could be produced by instructing subjects to focus their attention onto their bodies.

It was Witkin and his colleagues (1962) who suggested that an articulated body image coincides with a perceptual ability to separate figure from ground. A highly differentiated body image, thus, is related to a differentiation of the perceptual field outside one's body. Witkin referred to this ability as field independence as distinct from field dependence corresponding to the articulated versus global cognitive styles. Such a relation led to the supposition that changes in one's perception of the body and the environmental field will occur following experiences wherein subjects' focus attention onto their

bodies. Such a notion received empirical support from several investigations employing the Rod and Frame Test (RFT) and the Embedded Figures Test (EFT) to assess field dependence. Jacobsen (1966) for example, found an increase in field independence following a period of sensory deprivation, a time during which one would hypothesize that subjects were forced to attend to body experience. Kurie and Mordkoff (1970) too, found greater perceptual veriticality (field independence) as a result of sensory deprivation but that subjects instructed to concentrate their attention onto bodily sensations and experiences demonstrated even greater field independence. Similarly, Klepper (1969) found that subjects who concentrated on their skin and body musculature and who attended to body sensations during a tactile discrimination task demonstrated greater change in field independence than a control group. Finally, Linden (1973) trained third grade elementary school children in meditation, during which subjects were instructed to pay attention to themselves and their breathing while sitting quietly. Following the meditation training, children demonstrated a shift towards greater field independence as measured by the Children's Embedded Figures Test (CEFT) than did a non-meditating control group. The results of these studies demonstrated that instructing subjects to focus attention onto bodily sensations resulted in heightened field independence.

That field independence is attenuated by body concentration experience may seem more comprehensible when the experimental demands of such research are conceived as training in controlling one's attention. Attention control training may be viewed as the training of subjects in the ability to focus attention on some referent as instructed by

the trainer and resist distraction from other sources of stimulation for an extended period of time. Thus, Cratty's (1969) method of attention training requires children to prolong, and hence attend to, activities for an increasingly longer period of time. One object easily employed as a perceptual referent is one's physical body. In this case, attention control training requires the subjects to disregard extraneous stimuli and to attend only to the kinesthetic sensations produced by the body. That the physical body is an excellent referent for such training is supported by the fact that simply focusing attention onto the body tends to produce relaxation which is felt to be conducive to attention control (Linden, 1973; McKim, 1972). Thus, attention control training entails skills of concentrating and controlled shifting of attention from one referent (especially the body) to another. This is, essentially, a skill of perceptual disembedding.

The skills of concentration and the controlled shifting of attention are the abilities measured by the aforementioned field independence research. The two measures most widely employed to assess field independence are the RFT and the EFT which require the subjects to perceptually differentiate a figure which is embedded within a distracting background. Thus, the experimental demands of the field independence research may be conceived as training in focusing one's attention.

This research suggested that body concentration procedures may lead to a more highly articulated body image and may precipitate a shift towards greater field independence. These processes are conceived as attention control skills.

## Remediation of Hyperactivity and Attention Deficits

In the literature, remedial training for attention deficits has been couched in terms of a hyperactivity syndrome. Attention deficits have been seen as one symptom of hyperactivity which, in addition to impaired attention, includes heightened activity level, distractability, impulsiveness, and cognitive and motor dysfunctions (Alabsio, 1972). The improvement of attention, therefore, has been seen as remediation of hyperactivity. Consequently, there has been much confusion between activity level and attention. Various treatment approaches have been successfully employed to decrease activity level. Very few studies have demonstrated a remediation of attention deficits.

The most commonly employed method of treating children who are hyperactive and have attention deficits has been drug therapy. Numerous studies have related hyperactivity to dysfunctions of the reticular activating system (RAS) within the brain stem (Alabsio, 1972). Thus, chemical agents were examined as a means of controling hyperactivity. Two stimulants, dextroamphetimine and methylphenidate (Ritalin) have been prescribed for hyperactive children. The underlying theory has been that the effect of the drug activates an otherwise underaroused central nervous system (CNS). The drug, thus, acts to raise the excitability of the CNS to a level more suitable for intellectual functioning (Pragg, 1978). In children with no known anatomical brain lesions, stimulants have been found to have a favorable effect for many of those so treated (Pragg, 1978). While chemotherapy may be the treatment of choice in some cases, it is not without side effects. The

principal reported side effects have been disturbed sleep and reduced appetite and, less often, abdominal pain and nausea. Despite the fact that these effects have been minimized by dosage regulation and the fact that addiction to amphetimine prior to adolescence has not been reported, "amphetimine children" often have shown some degree of growth retardation (Pragg, 1978). Thus, drug therapy has been seen as less than desirable for the treatment of hyperactivity. Furthermore, it is unclear whether the improvements included remediation of attention or activity level alone.

Another method of intervention has been operant conditioning. Numerous studies have found that hyperactivity can be brought under operant control through the use of positive reinforcement (teacher attention, etc.) and punishment (withdrawal of teacher attention). Paterson's (1965) study did much to promote this type of intervention for both intellectually normal and retarded hyperactive children. Furthermore, Pihl (1967) was successful in reducing hyperactivity in children who did not respond to drug therapy. Other investigators have been able to reproduce these findings using primary (Grindee, 1965) and secondary reinforcement (Allen, Henke, Harris, Reynolds, and Baer, 1967). The outcome measure in these studies was activity level only. In addition, the generalization of these changes to nonacademic settings has not been adequately demonstrated.

In a few studies, operant conditioning procedures have been used to remediate attention behaviors (Knowles and Protsman, 1968; Martin, 1967); Quay, Spague, Werry and McQueen, 1967; Walker and Buckley, 1968). However, the target behaviors were lever pressing, looking at the teacher and time spent working on a teaching machine. These

behaviors can be performed by rote without maintaining a focus of attention. Whether an individual can actually perceive or learn more from looking at someone or doing something was left unanswered.

Some attention has been placed on the possible benefits of physical education on some kind of attention variable. In the late sixties, physical educators were promoting exercise for the improvement of perceptual-motor skills including concentration (Fox and Smith, 1971) and self control of arousal level (Kiphard, 1970). For example, Harrison (1966) found that a combination of music and exercise could decrease activity level, theoretically, through a change in self control of arousal in mental retardates. Cratty (1966), has outlined some physical education techniques for teachers to use to teach children to gain control of arousal level. However, as he admitted, research has not adequately examined the effects of exercise on attention skills.

Attention deficits have been conceived as one symptom of a constellation of behaviors referred to as hyperactivity. Much confusion existed in the literature over the adjustment of activity level and attention and how these concepts relate to hyperactivity in children. That activity level can be brought under the control by many children seemed certain. That the attentional deficits of exceptional children can be remediated was still unanswered.

## Summary

Two separate lines of research were reviewed. Both lines suggest that experiences children have with their physical bodies may relate to certain perceptual abilities. One group of studies suggests

psychomotor training may enhance, among other variables, some kind of attentional skill. The research of Kephart and other special educators comprise this group. Another line of investigation suggests that simply attending to one's physical body may enhance body image and field independence which also may be interpreted as an attentional skill. Witkin, et al. (1962) and Fisher (1970) are responsible for initiating this group of research. In concert, these separate lines of investigation suggest that the experiences children have with their physical bodies may relate to an attentional control variable.

Previous research on hyperactivity and attention training was also reviewed. Difficulties of existing treatment methodologies were outlined and a call for more refined approaches to attention training has been made. Psychomotor training was viewed as holding promise as a remedial technique for attention deficits which circumvents problems inherent to other remedial methodologies. Research was considered as needed to explore the possible benefits of such training. The present study was an attempt to meet this need.

# CHAPTER III

# METHOD

## Subjects

The subject population was composed of all the second and third grade students enrolled at Town and Country School, Tulsa, Oklahoma. Town and Country School is a private elementary school for children with developmental learning difficulties. These were children who, because of academic and emotional difficulties, did not adjust to a regular elementary school. Ages of the children ranged from eight to eleven years. None of the subjects were diagnosed as having intellectual, sensory, or physical handicaps. Although emotional overlays were present, severe psychological impairment was absent.

In order to meet guidelines designated for conducting research with children, parent release forms were secured for each subject. The forms stated that their child would be a subject in an experiment which involved physical exercise. A parent's signature was necessary before a subject was included in the study. The principal administrator was responsible for the dissemination and collection of the forms.

## Instrumentation

There existed no commonly-employed test for attention. In the past, the measurement of attention typically required an observer who recorded the amount of time a subject attends to a given stimulus.

This was a direct behavioral measure and it was necessary to assume that subjects actually perceived the stimulus to which they were attending. However, often a subject could have appeared to be attending to a stimulus when, in fact, his attentional focus was on some other irrelevant stimulus.

Theoretical foundations of the present study required performance measures that determined to what extent subjects actually maintained an attentional focus. Direct behavioral measures of attention were inadequate for the present study. Therefore instruments were selected because they produced a performance score of subject's ability to perceive and respond to a specific portion of the total field of stimulation. Two exceptions were the Walk Slowly Test and the Draw-A-Line Test which were direct behavioral measures of kinesthetic attention control.

An inherent weakness of indirect performance measures was that, although much of the variance in test scores was attributed to attention control, much was not. Performance on the dependent measures were affected by other variables, unrelated to attention control such as intelligence variables. Since, in the present study, these variables were not controlled, error variance was significant.

Draw-A-Line Test (DAL)

The DAL was developed by Maccoby and her associates (Maccoby, Dowley and Hagen, 1965) as a mesaure of inhibition of movement. The test consist of two series of dots drawn on a piece of paper. The dots are positioned six inches apart. After drawing a line between the first two dots, the child was given the following instructions, "Now,

let's see how slowly you can draw the line. Let's see how much time you can take. Remember, draw the line as slowly as you can." The total time to draw the line, under the "slowly" condition was recorded as subject's score. The task was considered difficult enough to require subject's attention in order to complete the drawing. The test-retest reliability of a sample of ten children was .77 (Maccoby, et al., 1965). The DAL was used in the present study as a measure of kinesthetic attention control.

Walk-Slowly Test (WS)

The WS was developed by Maccoby and her associates (Maccoby, et al., 1965) as a measure of inhibition of movement. A six-foot walkway, five inches wide, was marked off on the floor with the two strips of masking tape. The subject was required to walk down the line without stepping outside the line. On the second administration, the subject was told, "Now, walk down the line as slowly as you can. Let's see how much time you can take. Remember, walk as slowly as you can." Total amount of time to walk the line under the "slowly" condition was recorded as subject's score. The task was considered sufficiently difficult to require the subject's total attention while walking down the line. Based on a sample of ten children, the test-retest reliability of the score was .81 (Maccoby, et al., 1965). The WS was used in the present study as a measure of kinesthetic attention control.

Children's Embedded Figures Test (CEFT)

The CEFT was developed by Witkin and his associates (Witkin, et

al., 1962) as a measure of field independence. The CEFT is an individually administered perceptual test with scores ranging from 0-25. The subject's task on each trial was to locate a previously seen simple figure within a larger complex figure which has been so organized as to obscure or embed the simple figure. The number of simple figures correctly identified in the series of complex figures was recorded as subject's score. Performance on the CEFT required the subject to maintain attention onto a visual stimulus. Based on a sample of forty 9-10 year old elementary school children in Brooklyn, New York, the test-retest reliability was .88. The CEFT was used in the present study as a measure of visual attention control.

Key Math Diagnostic Test

Three subtests of the Key Math Diagnostic Arithmetic Test (Connolly, Natchman, and Pritchett, 1971) were selected. In the first subtest, Mental Computation, computational items were administered verbally by the examiner. The examiner proceeded slowly, one computation per second, and did not repeat the item. In the second subtest, Numerical Reasoning, subjects were required to solve computational problems containing a missing number fact. Items were presented visually to permit continued reference. In the third subtest, World Problems, items were story problems in which a problem was presented orally by the examiner while the subject was presented with a visual stimulus depicting the problem. The number of correct responses for all three subtests was recorded as subject's score. Possible scores may range from 0 to 36. Performance on all subtests was sufficiently difficult to require the maintenance of attention onto each test item.

Internal consistency reliability coefficients were obtained on all subtests of Key Math. Based on a sample of 107 third grade elementary school children, the obtained coefficients for Mental Computation, Numerical Reasoning, and Word Problems were .66, .79, and .64, respectively. Since performance on these subtests required the maintenance of attention onto both visual and auditory stimuli, it was used in the present study as a measure of the integration of visual-auditory attention control.

Digit Span (DS)

The DS is a subtest of the Revised Wechsler Intelligence Scale for children (Wechsler, 1974). The test consists of a series of digits which are presented verbally to the subject. The subject's task was to retain the digits in mind and repeat them back to the examiner both in the same order (digits forward) and in reverse order (digits backwards). This is a pure measure of attention span because it determines how many elements the subject can retain in the mind at one time. However, it is an indirect measure of attention control because in order to retain the elements in mind, the subject must first maintain attention onto the digits as presented by the examiner. The DS has frequently been discussed as a measure of attention and due to the paucity of other measures of attention, it has been suggested to be an adequate measure for studies of attention (Hallahan and Kaufman, 1976). The task was considered of sufficient difficulty to require the subject to maintain a focus of attention onto the test stimuli. Based on a sample of 102 children, aged 10½ to 11½, the test-retest reliability was .74 (Wechsler, 1974). The DS was used in the present study as a measure of auditory attention control.

## Procedure

Ten subjects from the population were randomly assigned to an experimental group. These subjects received the psychomotor training program as described below. Nine subjects were randomly assigned to a placebo control group. These subjects played simple word games. The same trainer that led the experimental group also directed the activities of the control group. Both groups met in the same room but at different times. The order of presentation of the experimental and control sessions was counterbalanced so that the experimental group met first on one day and the control group met first on the following day. Both groups participated in their activities three days a week for four weeks. Each training session lasted 20 minutes. Time required to travel to the training room was not included within this time period.

The criterion measures were administered to all subjects both before and after the experimental manipulation. The pre-test, post-test design was appropriate because of its effectiveness in situations where there is great subject heterogeneity (Kirk, 1968) as was true of the subject population of the present study. The CEFT, DS, and Key Math tests were administered by an assistant who was blind to the assignment of subjects to groups. This was done in order to eliminate bias of the investigator in the collection of data. Immediately prior to the post-test administration, the major investigator instructed subjects to perform the Forward Bend for 10 seconds. This was done in order to sensitize subjects to kinesthetic sensations and maximize the effect of any difference among subjects.

Change scores resulting from the pre-test, post-test administrations of all measures was subjects to *t*-tests to determine

differences between means of the experimental and control groups. Thus, five separate analyses were performed.

## The Psychomotor Training Program

The program was designed to develop voluntary control of motor behavior. It consisted of a series of exercises which required the children to stretch and relax muscles by assuming various postures. These postures required the child to increase muscular flexibility throughout the body and to control body parts for the duration of each exercise. The time spent maintaining these positions was continually prolonged; that is, the subjects were required to hold each position for a longer and longer period of time throughout the program. Prolonging activities has been suggested by Cratty (1969) to be one method of inducing greater self-control in children. The specific exercises have been adapted from various sources, including perceptual-motor efficiency tasks (Cratty and Martin, 1969), bioenergetics exercises (Lowen, 1975, 1977), Hatha Yoga asanas (Hittleman, 1969, Stern, 1965), and the tension-release method of relaxation (Jacobsen, 1938).

Throughout the duration of these exercises, subjects were instructed to control their breathing so that it remained rhythmical and so that inhalation and exhalation corresponded to specific parts of each exercise. Generally, subjects were instructed to inhale whenever muscular tension was encouraged or when the subject was constracting muscles and to exhale when relaxation was encouraged or when the subject was extending muscules. Subjects were instructed to focus their attention onto their bodies and the somaesthetic sensations produced by each activity. See the Appendix for a description of the exercises.

## Experimental Null Hypotheses

There will be no significant difference between the change scores of the experimental and control groups on the CEFT.

There will be no significant difference between the change scores of the experimental and control groups on the DAL test.

There will be no significant difference between the change scores of the experimental and control groups on the WS test.

There will be no significant difference between the change scores of the experimental and control groups on the DS test.

There will be no significant difference between the change scores of the experimental and control groups on the Key Math test.

# CHAPTER IV

## RESULTS

Several adjustments in the treatment program were felt necessitated by the subject's behavior. It was quickly learned that subject's motivation was an important variable determining success of the treatment. The exercises did not seem to be intrinsically rewarding to the subjects and consequently, the investigator needed to use much encouragement to elicit cooperation. It was necessary to divide the experimental and control groups into smaller groups of three subjects per group in order to gain better control of subject's attention.

To determine if there were significant differences between performances of the experimental and control groups on the dependent measure prior to the treatment, five separate t-tests were performed. Pre-test data for each of the five experimental measures were subjected to t-tests to determine differences between the group means. Results of these analyses revealed no significant differences signifying that the two groups were comparable with regard to the attention control measures. These results are reported in Table I.

To test the hypotheses that the experimental treatment would effect changes on the dependent measure, five separate t-tests were performed. Change scores were first derived by computing the difference between the pre-test and post-test scores for each subject on all five measures. Then, t-tests were performed. Change scores were first

TABLE I

TESTS OF DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS FOR PRE-TEST DATA

| Measure | $\bar{X}_e$ | $\bar{X}_c$ | $t$ |
|---|---|---|---|
| CEFT | 7.78 | 7.00 | .475 |
| DAL | 24.00 | 20.89 | .498 |
| WS | 19.44 | 16.33 | .611 |
| DS | 6.77 | 7.00 | .143 |
| MATH | 9.89 | 9.55 | .171 |

derived by computing the difference between the pre-test and post-test scores for each subject on all five measures. Then, $t$-tests were performed on the change scores. The resultant $t$ values revealed that there was a significant difference between the two groups on the CEFT ($t = 2.948$ df = 16, $p \leq .01$) but that there were no significant differences on the WS, DAL, DS, or Key Math tests. These results are reported in Table II and graphically expressed in Figure 1.

TABLE II

TESTS OF DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS FOR CHANGE SCORES

| Measure | $\bar{X}_e$ | $\bar{X}_c$ | $t$ |
|---|---|---|---|
| CEFT | 2.22 | 0 | 2.925* |
| DAL | 53.44 | 41.88 | 1.327 |
| WS | 18.55 | 15.89 | .665 |
| DS | - .778 | - .556 | 1.341 |
| MATH | 6.22 | 4.44 | 1.319 |

*$p < .01$.

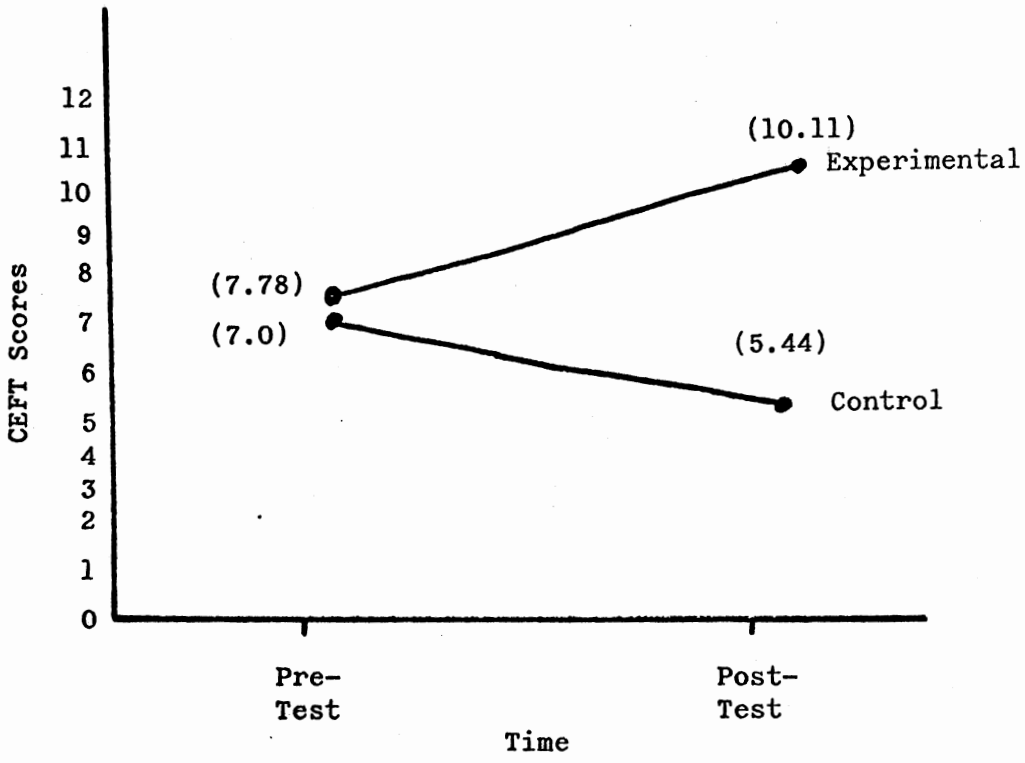


Figure 1. Graphic Demonstration of Change Between Pre- and Post-testing on CEFT

# CHAPTER V

## DISCUSSION

Results of the statistical analyses only partially supported the experimental hypotheses that the psychomotor training program would significantly increase attention control in exceptional children. The results supported the hypothesis that the treatment would significantly increase these children's performance on the CEFT but failed to support the other predictions for the DAL, WS, DS, and Key Math tests.

Without support for all the experimental hypotheses, the theoretical framework for a generalized attention control variable was questionable. The experimental treatment was developed to train exceptional children in kinesthetic attention control and if any change was effected, it would most likely have been demonstrated by change on the kinesthetic attention control measures, the DAL and WS tests. A major tenet of the theoretical framework was that an increase in kinesthetic attention control would transfer to other perceptual modalities. Thus, a change in visual attention control would have theoretically been predicated upon a change in kinesthetic attention control. However, this was not the case. Rather, the results indicated that a change in visual attention control was effected without the accompanying change in kinesthetic attention control. The framework for a general theory of attention control seemed highly circumspect.

A more satisfactory explanation of the results could have

completely avoided reference to a general theory of attention control. In consideration that the CEFT was developed as a measure of field independence, this experiment could have been viewed as a study in the experimental manipulation of a cognitive style variable.

Research reported earlier demonstrated that field dependence was susceptible to experimental alteration. Specifically, it was found that subjects shifted towards greater field independence following sensory deprivation (Jacobsen, 1966), sensory deprivation accompanied by instructions to concentrate on body sensations (Kurie and Mordkoff, 1970), instructions to attend to body sensations during a tactile discrimination task (Klepper, 1969), and meditation training (Linden, 1973). It was suggested that the experimental demands of these studies were similar in that they required subjects to maintain attention on kinesthetic stimulation for some length of time. Therefore, the present study supported this group of research since it, too, found a shift towards field independence following body attention procedures.

A question arose concerning the process by which the shift occurred. Was it necessary to concentrate on the physical body or would some other referent work as well? This question asked whether the change is produced by subject's heightened sensitivity to kinesthetic stimulation or simply by the practice in maintaining attention onto some object regardless of its relation to the body. Kurie and Mordkoff (1970) argued that the change in field dependence following the sensory deprivation experience resulted from the heightened salience of kinesthetic sensations and greater accuracy of kinesthetic perception. Similarly, Klepper (1969) attributed the change to increased articulation of the body from the field. Both explanations agreed with Witkin

et al.'s (1962) original contention that field independence was largely determined by articulation of the body concept.

On the other hand, Linden (1973) suggested that the change in field dependence resulting from his meditation training was a product of attention training, per se. His rationale was that meditation trained subjects to focus attention onto an object and resist distraction from other sources of stimulation, suggesting that the physical body is not the important variable but rather, the maintenance of attention. This reasoning agreed with the theoretical assumptions upon which the present study was based in that it was not the articulation of the body concept that mediates the change but rather, an attentional control variable. Disappointly, the results of the present study did not support this reasoning. If attention control had, in fact, been developed, then one would have expected improvement on the other measures selected to measure attention control.

Since the only significant change occurred on a measure of field dependence, it seemed likely that the training program did not affect attention control. Rather, the exercises may have sensitized subjects to kinesthetic sensations and, hence, produced a more highly differentiated body concept. This reasoning seemed to refute Linden's (1973) contention that meditation improves attention. His meditation training consisted of exercises where subjects attend to their physical bodies, especially to the sensations produced by breathing and, hence, was not significantly different from the sensory deprivation studies or from the present study. For this reason, the meditation training seemed confounded by the influence of sensitizing subjects to kinesthetic stimulation. There seemed to be greater support for Witkin

et al.'s (1962) notion that the field independence shift results from the heightened sensitivity to kinesthetic sensations.

The foregoing refutation of a generalized attention control variable rested upon the assumption that the dependent measures were accurate assessments of attention control. This assumption was highly questionable. Noteworthy was the great amount of variance in scores within each group on the dependent measures. This variance was uncontrolled and hence, in error. Future research needs to reduce this error by eliminating unsystematic sources of variance and identifying parameters which contribute systematically. Factors in the present study that may have affected performance on the measures included confusion of subjects while taking the tests and the integration abilities of subjects.

It was possible that the variance of scores on the WS and DAL tasks was due, in part, to subjects' confusion. It is an educational ethic for children to perform school tasks as quickly as possible. The nature of the WS and DAL tasks, on the other hand, demanded that they perform a task as slowly as possible. Such a demand may have been too incongruous for exceptional third grade children and the resulting confusion may have interfered with accurate measurement of kinesthetic attention control for which it was assumed to measure.

Another source of variance in this study may have been individual differences of integration ability. Subjects in the present study were known to be exceptional and one of their exceptionalities was likely to involve inadequate integration skills. A significant change in the integration of attention control with these subjects may have been too great a task for a four week program to accomplish. A more adequate

experimental design would have controlled for this source of variance.

Future research seems warranted to test the primary assumptions upon which the present study was based. That a generalized attention control variable exists needs to be examined. It may be that measuring instruments need to be developed to more directly assess attention control. Beyond this, factor analytic studies may be necessary to validate a general factor of attention control. This activity may be requisite to a study which attempts to manipulate attention control. In fact, the present study may have been a precocious attempt to manipulate a variable for which there was little evidence of existence.

There seemed to be little evidence for a generalized attention control variable that is subject to manipulation by a psychomotor program. That the training did affect performance on the CEFT encourages further examination of the possible benefits of such training for exceptional children. However, the real value of such an activity remained unclear.

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## APPENDIX

### PSYCHOMOTOR EXERCISES

The Cobra: Instruct children to lie on stomach with palms pressing floor at shoulder level. Slowly raise head, neck and upper back as far as possible, keeping lower half of body on floor. Instruct children to inhale while rising, exhale while descending. Repeat five times. This is similar to the Kraus-Weber exercise used as an assessment of perceptual-motor ability (Roach and Kephart, 1966).

Diagramatic Breathing: Instruct children to lie flat on back with knees pulled up, feet slightly apart. Inhale deeply and allow stomach to protrude. Exhale and pull stomach in. Continue until breathing becomes rhythmic.

Neck Rotations: Instruct children to allow head to droop forward. Inhale, raise and turn to right as far as possible. Hold five seconds, exhale and return to center. Repeat to left side.

Shoulder Rolls: Instruct children to raise shoulders as high as possible and roll shoulders forward and continue in circular fashion. Continue until it becomes uncomfortable. Reverse direction of arms.

Triangle: Instruct children to stand erect with feet spread two or three feet apart. Extend arms at sides, inhale and bend slowly to one side from waist until hand reaches ankle. Other arm swings in an arc all the way over the head to rest alongside the ear parallel to floor. Hold for longer periods of time. Repeat on other side.

Grounding Exercise: Instruct children to stand erect with feet below shoulders, feet slightly turned inward, knees slightly bent. Bounce on knees. Squat, with feet flat on floor. Return, very slowly, to upright position.

Forward Bend: Standing, inhale and raise arms high over head. Bend slowly down, exhale, keeping legs straight, bring hands to toes with face pressing in toward knees. Hold several seconds. Inhale while straightening up. Repeat. Progressively increase time spent in downward position.

Rock and Rolls: Instruct children to lie on back. Raise knees and clasp with fingers interlocked behind upper legs. Gently rock back and forth on rounded spine until sense of ease and rhythm is attained. Feel roundness of back and shoulders and the massaging action of the spine. Be careful of rolling too far back on neck in the beginning.

Balancing Exercise: Instruct children to extend arms to each side of body and raise left foot. Continue as long as possible. Repeat with right foot.

The Bow: Instruct children to lie on stomach, bend knees, reach back and forth and catch firm hold of ankles. Inhale and raise head and knees as though body were a bow and the arms the bow-string.

The Pump: (Alternate Leg Raising) Instruct children to lie down and press small of back against floor. Inhale and raise one leg high, keeping whole back flat on floor and rest of body relaxed. Move leg very slowly and with continuous movement. Exhale while leg is lowered. Repeat several times with alternating legs. Repeat, raising both legs.

The Plough: While lying down, instruct children to extend arms over head. Raise legs slowly and inhale, keeping hands pressed against floor. Without jerking or bending knees continue to raise hips and back, bringing legs all the way over the head until toes touch the floor behind. Breathe slowly throughout posture. Press chin against chest. Bring legs slowly back to floor, and come to sitting position. Continue two or three times and for progressively longer periods of time.

The Locust: Instruct children to lie on stomach. Inhale and raise legs. Use of the hands placed under thighs may be necessary. Hold position for as long as possible, exhale and lower legs.

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