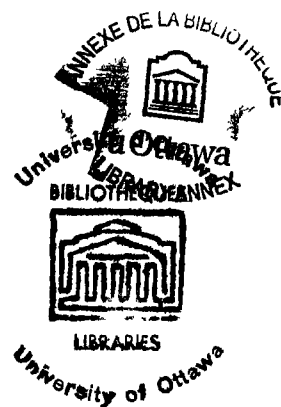


THE EFFECTS OF A CO-OPERATIVE PERCEPTUAL-MOTOR PROGRAM ON
THE DEVELOPMENT OF MOTOR SKILLS AND SOCIAL
CO-OPERATION IN THE LEARNING
DISABLED CHILD

by

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ABSTRACT

The purpose of this study was to determine the effects of a co-operative perceptual-motor program for learning disabled children on specific motor and social parameters. They included right-side-left-side orientation, static balance, dynamic balance, eye-hand co-ordination, throwing, striking, running, hopping and social co-operation.

Nineteen elementary school boys with learning disabilities were assigned to either an experimental group or a control group through a process of matching. The experimental group was involved in a co-operative perceptual-motor program and the control group was involved in a traditional games program. Pre testing on motor skills and social skills took place prior to the commencement of the programs. The programs ran for approximately five weeks with activity sessions held daily, lasting from thirty to forty-five minutes. Upon completion of the programs the children were post tested on the same parameters as the pre test along with an added measure of social co-operation (i.e. the "doll pull game").

The resulting motor and social data were factor analysed separately. Once clusters were determined multivariate analyses of variance with repeated measures and multivariate post hoc tests were performed. Independent t-tests were used to analyse the results obtained from the

observation scans, while descriptive statistics were used to describe the results obtained from the right-side-left-side orientation test and the "doll pull game".

A significant improvement in eye-hand co-ordination and running ability occurred in both groups. The experimental group performed significantly better than the control group in hopping and throwing, with hopping contributing more to this significant improvement than throwing. Static balance, dynamic balance and striking were performed significantly better by the experimental group than the control group. However striking contributed more than static and dynamic balance to the significant difference in the pre versus post measure following the programs. There was a more significant improvement in dynamic balance and striking abilities in the experimental group following the program than in the control group. A marked improvement was found in the experimental group's responses to the right-side-left-side orientation test, while no change was found in the control group's responses. With respect to social co-operation, results from the Skimetric Differential Inventory indicated that the experimental group increased significantly more in co-operative response than did the control group. Although results from the observation scans and the "doll pull game" did show a trend in favour of the experimental group becoming more co-operative they did not reach statistical significance. Independent t-tests performed on the observation scan results revealed that the

control group showed a significant decrease in co-operative behaviour.

In summary, co-operative games were found to have the potential to elicit co-operative responses in learning disabled children, as well as improve their motor abilities.

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CHAPTER I

INTRODUCTION

Children with learning difficulties have been described as suffering from developmental lags or imbalances (Gallagher, 1966, cited in Frostig, 1970:129). These lags may occur in sensory-motor functions, language, perception or social adjustment. The purpose of the present study was to determine the effects of a co-operative perceptual-motor program designed specifically to improve the motor and social skills of a learning disability population.

Previous studies indicate improvements in fine and gross motor functions as a result of participation in perceptual-motor programs (Lapray and Ross, 1966; Harring and Stables, 1966; Johnson and Fretz, 1967; and Buckley, 1971). Increased visual-perceptual skills, attention span and socialization skills are other benefits attributed to perceptual-motor training programs (Mosher, 1975). Although some investigators have indicated that the effects of successful perceptual-motor training programs extend to areas such as social adjustment (Frostig, 1970; Mosher, 1974), the training programs themselves have not been designed with the intention of affecting change in both motor and nonmotor characteristics of the atypical child. If the motor

components are combined in a training program with the social components, the overall benefits from the training program should be greater than if either set of components were taught in isolation.

Movement experiences make valuable contributions as children learn to perceive their bodies, the objects related to their bodies and the total environment in which they live. Held (1965) has suggested that perceptual organization does in fact occur through an active interaction of the individual with the environment. Motoric functioning improves the child's ability to structure, judge and order the events to which he is exposed and allows him to do so in a more efficient manner. As a child moves, he must organize his world visually. At the same time, he forms additional judgments about the visual space with which he is surrounded. For example, catching a ball involves various perceptual and motor components. Through movement children develop kinesthetic awareness which together with tactile, vestibular and visual information assist their early learning.

With respect to psychological well being, no aspect of human experience is more important than the social one. In this regard there are no skills more important to a human being than the skills of co-operation. "Co-operative interaction with others is essential for the development of trust, self confidence, goal setting and personal identity" (Johnson and Johnson, 1975).

The physical medium is a natural one for children's development. This medium can be utilized so that through various forms of co-operative games and activities children develop a positive sense of self and others as well as improve their fine and gross motor skills. If co-operative games can be used to prevent social isolation and to facilitate social interaction so as to permit the atypical child to function well in social play groups, they will be of immense value to the atypical child. "Co-operative social interaction, feelings of acceptance and fun are critical elements of children's lives" (Orlick,1978).

STATEMENT OF THE PROBLEM

The purpose of this study was to determine the effects of a co-operative perceptual-motor program for learning disabled children with respect to the following motor and social parameters:

- a) Right-side-left-side orientation
- b) Static balance
- c) Dynamic balance
- d) Sequential skills
- e) Eye-hand co-ordination
- f) Social co-operation

SCOPE OF THE STUDY

The sampling of subjects was limited to nineteen males with poor motor and social skills ranging in age from seven to ten years who attended Robert Hopkins Elementary School in Ottawa. The experimental and control programs ran for approximately five weeks with one session held daily. The sessions which were held on Monday, Tuesday and Wednesday lasted thirty minutes while the sessions on Thursday and Friday lasted forty-five minutes. The subjects were pre and post tested in the following areas: right-side-left-side orientation, static and dynamic balance, sequential skills (throwing, striking, hopping and running), eye-hand co-ordination and social co-operation (observation scans, Skimetric Differential Inventory and the "doll pull game").

DEFINITION OF TERMINOLOGY

Perceptual-Motor Program: A perceptual-motor program is one which provides multisensory experiences. It is sequentially structured as to task difficulty in order for the performer to gain a progressively higher order of experiences. The perceptual-motor program designed for this study consists of games and activities which commence at the child's present level of ability and steadily increase in

the level of difficulty. The program was designed to provide the child with multisensory experiences in the following areas: right-side-left-side orientation, balance, eye-hand co-ordination and sequential skills.

Co-Operative Perceptual-Motor Program: This program was designed to enhance motor and social skill development, through the use of co-operative games. Results from two earlier pilot studies where the effectiveness of the co-operative games was determined indicated that they were motivating and attained favourable responses from the children. The subjects had "fun" playing the games. In addition, it was evident that co-operative social interaction could be elicited within these games which had been designed for this purpose (See Appendix C).

Traditional Games Program: This program was based on suggestions made by teachers as well as some activities listed in the Carleton School Board's curriculum for physical education. The games used in this program simulate what would have likely been taught by many of the teachers had the study not taken place (See Appendix D).

Learning Disability: This term refers to significant deficits in essential learning processes which require special education techniques for remediation. Children with learning disabilities generally demonstrate a discrepancy between expected and actual achievement in one or more areas such as spoken or written language, mathematics, motor ability and spatial orientation. Children at any intellec-

tual level of ability may be affected (Frostig, 1970). With respect to this study, learning disabled children were selected from the special education classes by the teachers. In addition, subjects who had not been diagnosed as having a learning disability but who the teachers felt could benefit from a co-operative perceptual-motor program more than any other children in the school were also included. (See Appendix I).

Motor Skill: A motor skill is any muscular activity which is directed to a specific objective. It is designed for a specific result and the amount of variation is limited. An example is throwing a ball at a given target.

Social Co-Operation: This term refers to the act of working together toward a common end. It is operationally defined as the frequency of co-operative behaviour which occurs during a fifteen minute observation session. (For a behavioural definition see page 34).

Static Balance: This term refers to balance in which the support is stable and the individual is not in locomotion; operationally defined in this study, as the number of seconds a subject can maintain his balance on a static beam to a maximum of ten seconds.

Dynamic Balance: Dynamic balance is the ability to maintain a position while the individual is moving or the surface is moving; operationally defined in this study as the number of steps backward the subject can take without losing his balance on a beam to a maximum of eight steps.

Sequential Skills: This term can be defined as the

natural progression of a motor skill pattern. Within this program, sequential skills were divided into two distinct categories. One sequential skill category was comprised of running and hopping, or the locomotion skills. The second sequential category consisted of contact skills, i.e. throwing and striking. Various skill tests were used to measure sequential skills (See page 31).

Right-Side-Left-Side Orientation: This term has been defined as internalizing the awareness of the difference between right and left. This was operationally defined as the number of correct responses the subject makes out of a possible twelve, when asked to differentiate right from left with respect to: a) his own body parts, b) body parts of a man as illustrated in a photograph, c) his own body parts when the subject's eyes are closed.

Eye-Hand Co-Ordination: This term refers to the ability to use eyes and hands together to accomplish a task; operationally defined in this study as the total time the subject is able to keep the stylus in contact with a light revolving in a clockwise direction at a speed of thirty-five revolutions per minute, using the pursuit rotor apparatus.

CHAPTER II

REVIEW OF THE LITERATURE

The review of literature deals with three main areas. The first section includes studies pertaining to the general topic of perceptual-motor programs. The second section includes studies which deal with the motor skills of the learning disabled child and the effect of motor programs on these children. The final section presents a discussion on the social skills of the learning disabled child and the effect of co-operative games on social interaction.

PERCEPTUAL-MOTOR PROGRAMS

Within the last twelve years, and particularly during the last five or six years, a number of theories outlining ways in which various types of motor activities may aid children to improve a wide variety of attributes have received widespread exposure in the popular press. One theory suggests that motor activities, properly applied, will prepare children for spelling, reading and similar intellectual endeavours during the first grade. Other theories imply that severe sensory and motor disturbances that reflect pronounced brain damage can be remedied by recapitulating the stages of motor development through which a child passes as he learns to walk (Cratty, 1970:247).

Programs that deal with sensory perceptions coupled with movement or exploration in the learning process are

classified as perceptual-motor programs. These programs are more individualized than many group-oriented physical education programs. "Teaching basic physical movements in a perceptual-motor program involves breaking down activities into component parts, developing awareness of the sensory skills involved, and working at the developmental level at which the child is functioning" (Singer,1972:251).

Perceptual-motor programs are also defined as a means of teaching the child the use of the body mechanisms which serve to monitor and control body positions and movements and enable him to derive meaning from sensory experiences (Singer,1972).

According to Seefeldt (1970), perceptual-motor training programs have as their ultimate goal the improvement of academic achievement. Although many programs purport to improve the qualities of laterality, directionality, body image, spatial orientation, and eye-hand-foot co-ordination, it is often assumed that enhancement in the above qualities will somehow transfer to scholastic achievement. Seefeldt (1970), proposed two reasons for motor abilities being related to cognitive function and/or academic achievement: a) Child study reports have shown that intellectual function is an outgrowth of the earlier established motor functions. Longitudinal observations reveal that the infant engages in random exploration of the environment before purposeful behaviour becomes evident, and b) Correlation studies were carried out where students

of high and low levels of motor proficiency were compared in scholastic attainment and vice versa. The results of these studies generally produced low to modest positive correlations between motor ability and academic achievement, but they provided no explanation for the existence of these relationships.

The most recent surge of interest in perceptual-motor programs has been closely allied with the problem of learning disabilities. The most well known theorists and creators of specific programs are Getman (1952), Delacato (1959), Barsch (1965), Frostig (1970) and Kephart (1971). There are programs with varying degrees of similarity to those just mentioned such as those developed by McLeod (1967) and Robins (1968).

Possibly the most controversial of the programs to be considered is that of Delacato, based on the theory of "neurological organization". Learning difficulties are attributed to inadequacies in early motor function which have resulted from a) genetic causes, b) trauma and/or c) lack of opportunity to complete the neurological organization. Treatment procedures in "neurological organization" involve a replication of the motor patterns which allegedly are the cause of the learning disability. Active or passive manipulation or "patterning" of the body segments in prescribed movements is an essential part of the training program. This is based on the assumption that such movements will stimulate undeveloped parts of the brain or induce tissue to assume the function of cells which have

been destroyed. The establishment of cerebral dominance is viewed as the culmination of man's ontogenetic development and therefore incomplete or bilateral cerebral dominance is viewed as the cause of speech and reading disorders.

A review of the literature reveals that there are few published research reports, other than Delacato's (1959,1963) own writings, that support the theory. Experimental groups in a number of other studies (Robbins, 1966; O'Donnell and Eisenson,1969) have failed to show significantly more improvement than the control group. Thus there is no concrete evidence from other independent researchers to support the theory that Delacato's training will positively enhance academic achievement. Furthermore Seefeldt stated that "a note of caution should pervade any attempts to incorporate such a program into public school curricula for the following reasons: the rigid control required to supervise and administer the techniques of patterning would seem prohibitive in terms of available personnel. In addition the imposition of motor patterns and techniques such as rebreathing of expired air, restrictions of fluid intake, salt, sugar, music and use of the non-dominant eye and hand could have adverse psychological consequences" (Seefeldt, 1970:83).

Newell C. Kephart is another of the pioneers of perceptual-motor training aimed at increasing a child's academic potential and remediation of learning disorders. The approach Kephart takes is a developmental one rather than the neurological approach followed by Delacato. Kephart utilizes motor activities to develop skills in the areas of

eye-hand co-ordination, form perception, directionality, laterality and temporal-spatial relations. Proponents of this program insist that before being able to deal with symbolic material, such as numbers and letters, the child must first master spatial and temporal relations. These concepts are developed through the motor sphere and thus become part of perceptual systems which are precursors to the successful development of symbolic responses.

Several studies have utilized Kephart's techniques in experimental research to determine their effects on reading. Generally the results have not been supportive or significant. Roach and Brown (1966, cited in Cratty, 1970:252) found no significant differences in oral reading on the part of groups exposed to Kephart's techniques. Harring and Stables (1966), on the other hand, reported that various perceptual and motor attributes were improved in Kephart-type programs, but no reading measure was obtained in this investigation. Sullivan (1972), attempted to determine the effects of Kephart's perceptual-motor training procedures upon the reading performance of eighty-two poor readers in school grades four to twelve. She found little difference between the Kephart-based perceptual-motor program and the control group. Lapray and Ross (1966) found that visual training and large muscle activities led to improvements in perceptual-motor tasks while practice in reading led to improvements in reading. It would appear that, "the best way to teach reading is to teach letters and sounds and do

it well" as was proclaimed by Cohen (1969:498).

In summary, most of the available data fail to support the contention that, in groups of normal children and in children with reading problems, significant gains in reading competency will be achieved by participation in the techniques outlined by Kephart (Cratty, 1970).

It should be noted that Kephart's rather carefully designed methods of motor training of neurologically impaired youngsters should prove of value when attempting to improve motor functions (Cratty, 1970). Brown (1968), for example, has found that the attributes in Kephart's program that are trained for specifically, do improve.

A third program, and possibly the most researched of any is that designed by Marianne Frostig. Frostig's program is designed specifically for the remediation of reading problems and is based on the assumption that reading ability depends upon adequate visual perceptual skills. Like Kephart, Frostig has devised a number of fine and gross motor activities to provide remedial assistance in a number of areas such as eye-motor co-ordination, figure-ground, form constancy, position in space and spatial relationships.

Certain criticisms can be labelled against almost all studies involving the Frostig program, with respect to the length of the program and the actual testing. Two of the visual-perceptual training programs which have been evaluated operated for relatively short periods of time. For example, Sherk's (1967, cited in Anderson and Stern,

1972) training program consisted of 10½ hours of visual perceptual training, and Rosen (1966) provided only twenty-nine half-hour sessions. In addition, Sherk (1967) used the Frostig program with students older than for which the materials were specifically intended. Several studies have been conducted in which reading readiness has been measured as the groups participated in the Frostig program. Bennett (1969) used the Perceptual Forms Test to evaluate the influence of three months of Frostig training on a group of second graders and found that the training program seemed to have no effect on achievement measures. Similarly, Rosen (1966) when dealing with culturally disadvantaged youths, found no support for the hypothesis that kindergarten pupils participating in the Frostig program for nine months would perform better on a reading readiness test than those not enrolled in such a program.

It is interesting to note that the majority of studies conducted indicate that although improvements are evident on the Frostig Development Test of Visual Perception, little, if any, gains are noted in reading ability. The fact that there are improvements on the Development Test of Visual Perception is expected since the tasks in this test as well as those in Frostig's program are similar. A subject is in fact practising and learning the tasks involved in the testing situation.

The content and effects of the three perceptual-motor programs discussed indicate a general trend with respect to

perceptual-motor programs. Training appears to be specific to the skills which have been practised. If one is looking for an improvement in motor skills the program should stress motor skills. Programs based on the hypothetical transfer of improvement in perceptual-motor skills to reading achievement or reading readiness have generally failed to meet this transfer objective.

MOTOR SKILLS

Motor ability is reportedly one of the most prized and esteemed abilities of elementary school children (Scanlan, 1976). However many children with learning disorders have very limited motor responses. Rubin and Braun (1968) report that 40 per cent of a group of children who were diagnosed as "maladjusted" showed dysfunction in both cognitive functions (perceptual and intellectual) and motor behaviour. Such limitations in motor behaviour are particularly apparent in the areas of relationship to gravity, laterality and overall co-ordination (Kephart, 1968). Awkward muscle co-ordination particularly in precise control of large muscles, is noted as a major concern. Children with specific learning disorders are poor at sports (such as basketball) which require good muscle co-ordination. These children cannot throw a ball with accuracy. In the early years, poor co-ordination is indicated by a below-normal-for-age ability at hopping on one foot or jumping rope

(Carter, 1970). Nicks and Fleishman (1960, cited in Frostig,1970:34) are of the opinion that good co-ordination depends upon the smooth functioning of the nervous system, with the cortex probably playing the major role. Ayres' studies support this view. She has published several studies (1965,1966,1966) on the role of the central nervous system in co-ordination. Neurologically handicapped children and children with learning difficulties frequently show poor motor co-ordination, especially in movements that involve crossing the midline of the body. They often cannot execute cross-lateral movements, such as moving the right leg and left arm simultaneously or walking sideways, by crossing one leg behind the other (Frostig,1970).

Following World War II there was a renewed interest in the manner in which movement experiences might aid the capacities of those children evidencing obvious movement deficiencies. Studies by Getman (1952) and Oliver (1958) illustrated educators' interest in the role that motor activities could play in educating normal as well as atypical children. About ten years later, Johnson and Fretz (1967, cited in Frostig,1970:134) reported that seventy-nine children given a basic eight week neuromotor-perceptual training program showed statistically significant gains in speed of visual perception, motor performance and greater tolerance for frustration. Lapray and Ross (1966, cited in Cratty,1970) conducted an experiment and found that visual training and large muscle activities led to significant

improvements in perceptual-motor tasks. The purpose of Buckley's study (1971) was to investigate the effects of a gross motor training program upon visual-motor performance at different grade levels. Eighty children of normal intelligence were selected as subjects. The researcher concluded that perceptually handicapped and normal subjects demonstrated significant differences in eye-hand co-ordination and that their motor training program did have a positive effect upon younger children's visual-motor performance.

An interesting study done by Painter (1967) with kindergarten children investigated the effects of a rhythmic and sensory motor activity program on body image and perceptual-motor integration. The twenty lowest functioning children in a normal kindergarten class were divided into an experimental and a control group. The experimental group was given a systematic rhythmic and sensory motor activity program based on nine movement areas of Barsch's Movegenic Theory and on suggestions from Kephart. Twenty-one half-hour training sessions were given to the experimental group, extending over a period of seven weeks at a frequency of three times per week. The results indicated that a carefully designed program of rhythmic and sensory motor experiences can bring about significant gains in body image and perceptual-motor integration.

Some educators have gone so far as to state that programs for children with learning difficulties should be

based primarily on physical education combined with perceptual training (Frostig,1970). Drowatsky (1965), supports this proposition and states that skills such as running, jumping and throwing should form the basic elements of such a program.

SOCIAL SKILLS

It has often been pointed out that learning disabled children lack various social skills, have emotional and behavioural difficulties, do not relate to their peers or form social relationships easily (Bachara,1976).

Bryan (1974, cited in Bachara,1976) in summarizing the results of five separate studies, concluded that learning disabled children were more egocentric and less attuned to the affective states of others. Bryan found that teachers described learning disabled children as less tactful and less socially accepted than their peers. These children were more likely to be ignored by classmates and teachers than comparison "normal" children. Bachara (1976) found that learning disabled children were more deficient in the ability to empathize with others than children who were not experiencing any learning problems. Results seem to confirm that learning disabled children were less able to perceive social situations appropriately and often had difficulty forming productive interpersonal relationships.

Frostig (1970) felt that all learning disability

children tend to be self doubting and over sensitive to criticism because of their many previous failures. For the same reason she felt they tend to have difficulty in social adjustment.

The physical medium is a natural one for children's psycho-social development. This medium can be utilized so that through various forms of co-operative activities and games children develop a positive sense of self and others. One reason that co-operative games have great potential is that the structure of the game can ensure a certain level of acceptance for each child. Co-operative games and co-operative learning experiences may be of particular significance to children who are shy or withdrawn, who lack self confidence or feel insecure, who don't feel liked, who have inadequate social skills (Orlick,1978).

Sherif (1956) has maintained that the probability of achieving harmony (which includes co-operation, positive social interaction and liking for one another) is greatly enhanced when groups are brought together to work toward common ends. Aronson (1975) concurs with Sherif. After conducting a series of well controlled studies comparing co-operative classroom learning groups with traditional classroom groups (all competing on an individual basis) Aronson concluded that co-operative learning results in a) kids liking each other more and b) stronger and more positive self concepts. The findings of a follow-up study by Blaney et al (1975,cited in Orlick,1978) also indicate

that interpersonal relations prosper under co-operation and deteriorate under competition. Additional support comes from Devries and Mescon (1974) who found that elementary school age isolates are more often integrated into the group and accepted by peers under co-operative rather than under competitive conditions.

"Co-operative experiences are the most essential ingredient for the development of psychological health. Co-operative interaction with others is essential for the development of trust, self confidence, goal setting, personal identity and cognitive development which are the foundation for a person's mental health. No aspect of human experience is more important than co-operative interaction among others... There are no skills more important to a human being than the skills of co-operative interaction" (Johnson and Johnson,1975).

Preliminary work done by Orlick (1976,1977) has established the fact that properly designed co-operative games are effective in eliciting co-operative behaviour among elementary school children within the game environment. If co-operative games which stress specific motor skills can be used to increase motor skill ability, prevent social isolation and facilitate positive social interaction they will be of immense value to the learning disabled child. "Co-operative social interaction, feelings of acceptance and fun are critical elements of children's games and children's lives" (Orlick,1978).

It is interesting to note that many proponents of perceptual-motor programs believe that one positive outcome of these programs is social development. "The opportunity for involvement with one's peers, fun oriented experiences and possible general social and physical development should not be overlooked when assessing the effects of involvement in any of these programs. In fact these outcomes in terms of overall effect may prove to be the greatest lasting value of existing perceptual-motor programs" (Mosher, 1974: 15). Although there is this belief among perceptual-motor theorists, social interaction, co-operation and social development have not been directly stressed through activity structures nor have they been measured in the programs themselves.

After a thorough review of the literature, it seemed clear that a program which centers on motor development as well as social development was necessary to help overcome the deficient motor and social functions in children with learning disabilities. Consequently a combined motor-social program was implemented and assessed for the purpose of this study.

CHAPTER III

METHODOLOGY

This chapter provides a detailed account of the procedures followed to analyse and evaluate a co-operative perceptual-motor program. The evaluative measures used in the study are presented along with the method of analysis for the specific parameters.

OVERALL RESEARCH PLAN

The subjects, selected on pre-determined age, motor skill and social skill criteria were pre tested in the following areas: right-side-left-side orientation, static balance, dynamic balance, sequential skills (throwing, striking, hopping, running), eye-hand co-ordination and social co-operation. The total testing time for both the pre and post program measures extended over the period of approximately one week. The experimental and control programs commenced the day after completion of the pre testing and ran for twenty-one days thereafter. Activity sessions were held once daily during the school week for thirty minutes on Monday, Tuesday and Wednesday and for forty-five minutes on Thursday and Friday. Upon completion

of the programs the subjects were post tested on the same specific parameters as the pre test. Post testing was conducted in an identical manner to the pre test. It should be noted that an additional test, the "doll pull game", was used in the post testing session as a potential index of co-operativeness, as measured through an experimental game situation.

SUBJECTS

A total of twenty male subjects enrolled at Robert Hopkins Elementary School in Ottawa were originally employed in the study. However this total was reduced to nineteen when medical problems prevented one child from participating in the post testing. The children were selected according to the following criteria: The teachers were asked to select children between the ages of seven and ten years who either had a diagnosed learning problem or who the teachers felt had a learning problem. The teachers were also encouraged to include the names of those children with learning problems who might benefit from a program which stressed motor and social skill development. A list of twenty-seven children was compiled by the teachers. These children were then pre tested on the following motor skills:

- Right-side-left-side orientation
- Static balance
- Dynamic balance
- Throwing
- Running

Hopping
Eye-hand co-ordination

The sample was reduced to twenty males by eliminating those children the teachers had included who were six years old and eleven years old (six children). The seventh child was eliminated because it was felt that his motor skill ability exceeded the rest of the sample.

Once the twenty subjects were selected they were assigned to two groups such that both groups were matched according to sex, age and motor skill ability. The skills by which they were matched included: right-side-left-side orientation, static and dynamic balance, throwing, running, hopping and eye-hand co-ordination. The children were matched through a process of ranking. The seven and eight year olds were ranked on each test according to their raw scores. The total rank score of all seven tests was then compiled for each subject. This process was then repeated for the nine and ten year olds. The subjects were then assigned to the two groups accordingly (See Appendix A).

In order to verify that both groups were equated the mean score of each group was computed and it was found that the mean score for Group 1 was 38.6, while the mean score for Group 2 was 38.4.

The experimental group was involved in the co-operative perceptual-motor program and the control group was involved in a traditional games program (See Appendices B,C and D).

APPARATUS

Level of motor ability with respect to static balance, dynamic balance and eye-hand co-ordination was determined using the following pieces of apparatus:

Static Balance: two balance boards, one with a width of two inches, the other with a width of one inch.

Dynamic Balance: one inverted bench with the following dimensions: length $96\frac{1}{2}$ inches, width 2 inches, height 13 inches.

Eye-Hand Co-Ordination: a Lafayette Photoelectric Rotary Pursuit Apparatus.

PROCEDURE

The procedures used in the pre and post testing for the six parameters assessed in this study are outlined below.

Motor Skill Testing

The tests for static balance, throwing and running were taken from the Basic Motor Ability Test compiled by Arnheim and Sinclair (1975) for which validity had already been established. Norms for this test had been established by testing 1,065 children between the ages of four to twelve

years, of various ethnic, cultural, social and economic groups. Using various random samples, the retest reliability for the entire test battery was 0.89. The test for dynamic balance was taken from the Hamm-Marburg test developed by Schilling and Kiphard (1967). They administered this battery to 800 children between the ages of three and fourteen years from various socioeconomic levels. Using various random samples the test-retest reliability for the separate tasks was 0.80. The test for right-side-left-side orientation was taken from the neuropsychological test battery used by Dr. R. Trites at the Royal Ottawa Hospital. The remaining motor tests used in this study were constructed or adapted specifically for this study.

Right-Side-Left-Side Orientation

The Trites's test for right side-left side orientation required the subject to verbally answer twelve questions related to the child's understanding of right and left. The questions were:

Examiner to subject (eyes open)

Show me your:

1. left hand
2. right eye
3. left ear
4. right hand

Examiner with illustration of male torso (Figure 1)

Point to the man's:

5. right eye
6. left leg

- 7. left ear
- 8. right hand



Figure 1

Illustration of Male Torso

Examiner to subject (eyes closed)

Show me your:

9. right hand
10. left leg
11. right eye
12. left ear

The number of correct responses out of twelve was recorded.

Static Balance (two balance boards - one with a width of two inches, the other with a width of one inch) (Figure 2)

The tester demonstrated on each board, explaining that either foot may be used but the hands must be kept on the hips with the non-supporting foot behind the other knee. The child was given two trials on each board with his eyes open and then repeated this with his eyes blindfolded. Each trial lasted ten seconds. The total combined number of seconds the child was able to maintain a balanced position on the eight trials was recorded. Criteria for discontinuing a trial was touching the foot to the floor, removing either hand from the hips, or opening the eyes.



Figure 2. Static Balance Board

Dynamic Balance (one bench inverted with the following dimensions: length $96\frac{1}{2}$ inches, width two inches, height 13 inches)

The child was asked to maintain his balance while walking backwards on an inverted bench. He was given two trials, and was awarded one point for each step he took without losing his balance, up to a maximum of eight points. The total number of steps the subject was able to take backwards on the two trials was recorded.

Eye-Hand Co-Ordination (Lafayette Photoelectric Rotary Pursuit Apparatus) (Figure 3)

In the performance on the pursuit rotor apparatus the subject stood in front of the machine, which was on a table twenty-nine inches high. He held the handle of the stylus in his preferred hand. It was requested that subjects not switch hands during the performance. Subjects began with the stylus in the center of the circle. The tester would then switch the machine on and indicate to the subject to start on the signal "go". On the signal "go" the subject attempted to keep the point of the stylus above the revolving target without making contact with the glass plate, i.e. $1\frac{1}{4}$ inches above the glass. The turntable moved

in a clockwise direction at a speed of thirty-five revolutions per minute. The turntable was wired to an electric timer which registered the subject's time on target. The subject was given three trials of thirty seconds each. Each trial was separated by a thirty second rest period. Following each of the trials the time-on-target score was recorded and the clock was reset. The subject's score was the accumulated time in which the stylus was in contact with the revolving target during the three thirty second test trials.

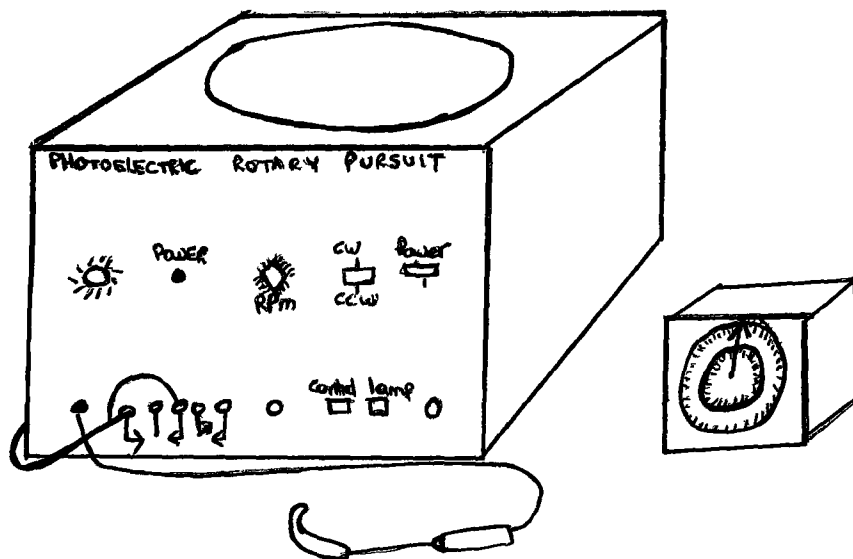


Figure 3. Photoelectric Rotary Pursuit

Sequential Skills

Sequential skills consisted of the contact skills (i.e. throwing, catching, striking and kicking) and the locomotion skills (i.e. running, jumping, hopping and

skipping). For the purpose of the pre and post testing the following tests were used to measure each subject's ability in the sequential skills area.

Throwing:

A target consisting of three squares measuring 5, 11, and 18 inches was attached to a wall with the bottom 4 feet from the floor. The subject stood behind a restraining line ten feet from the target and threw fifteen 4 by 5 inch beanbags at the target. The tester demonstrated by throwing two bags underhand at the target while explaining that the small square had a value of three points, the middle sized square had a value of two points, and the large square a value of one point. The child was told to score as many points as possible in fifteen throws. The total score was determined by adding the points earned in the fifteen throws. If a beanbag landed on the line between two squares, the higher score was awarded.

Striking (Figure 4):

A target, measuring 18 inches square, was attached to a wall, with the bottom four feet from the floor. The subject stood behind a restraining line ten feet from the target with the side of his body facing the target. The tester rolled a ball down a bench which was supported perpendicularly by a balance beam. The subject was required to allow the ball to bounce and then strike it in the direction of the target. A wooden paddleball racquet

was used by the subject to strike the ball. Three points were awarded if the subject struck the target, two points if the ball hit the wall around the target, one point if the subject managed to make contact with the ball and zero points for a miss. The subject was given ten trials and the total score was determined by adding the points earned in the ten trials.

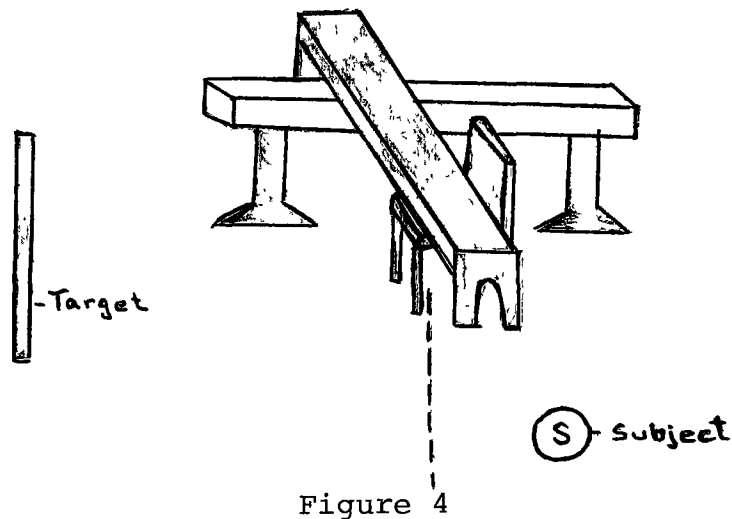


Figure 4

Lay Out of Apparatus Used In The Striking Test

Running:

Four cones were placed five feet apart in a straight line. The tester explained that on the command "Go" the child was to run as fast as possible in a zigzag pattern around the cones, starting on the right side of the first cone. This was followed by a demonstration. The scoring was based on the total number of cones that were passed in twenty seconds. For a complete run down and back the child received a total of eight points. Each subject was given

two test trials. The total number of cones passed during the two trials was recorded.

Hopping:

A hopscotch pattern consisting of six squares measuring one foot by one foot was securely placed on the floor.

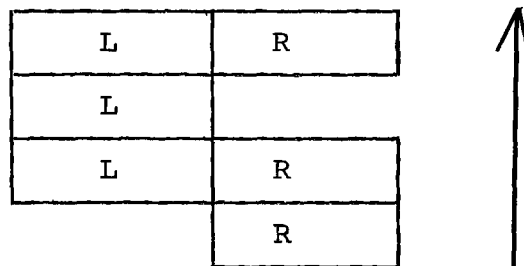


Figure 5. Hopscotch Pattern

The subject was required to hop into the squares using the appropriate foot. Once he reached the end he performed a half-turn and repeated the pattern back. A maximum of twelve points were awarded per trial. One point was awarded each time the subject landed in the appropriate square on the correct foot. The subject was given one practice trial followed by two actual test trials. The total number of errorless hops for the two test trials was recorded.

Social Skill Testing

Social Co-Operation (Observation Scans)

The following pieces of equipment were placed in the gymnasium: 2 benches, 1 balance beam, 4 mats, 2 basketballs, 10 hoops, 4 large balls, 6 small balls, 5 ropes, 1 box of

beanbags, 4 cones and one football (See Figure 6). The subjects were given the opportunity to do as they wished for a fifteen minute free play period. During this time two trained observers used a continuous observation procedure where each observer continuously scanned one half of the gymnasium in a slow and methodical manner for any incidents of co-operative behaviour. Upon viewing any co-operative event, the observers recorded the event and the children involved in it (Orlick, 1976). Individual assessments were carried out in this manner. In order to facilitate recognition of the subjects, numbered pinnies were worn by the children. The gymnasium was set up in an identical fashion in the pre and post tests.

Co-operation was defined as: any behaviour directed toward another child which involved some shared, reciprocal, mutual or helpful quality. More specifically co-operative social interaction was delineated as follows:

1) Co-operative task behaviour- One child shared, assisted or executed a task with another child. The emphasis here was upon doing things together, working together for a common goal, alternating responses between children, sharing material, or one child behaving in a manner explicitly to help another child.

2) Co-operative physical contact behaviour: a) One child physically supported another child. b) Two or more children engaged in physical contact of an affectionate nature.

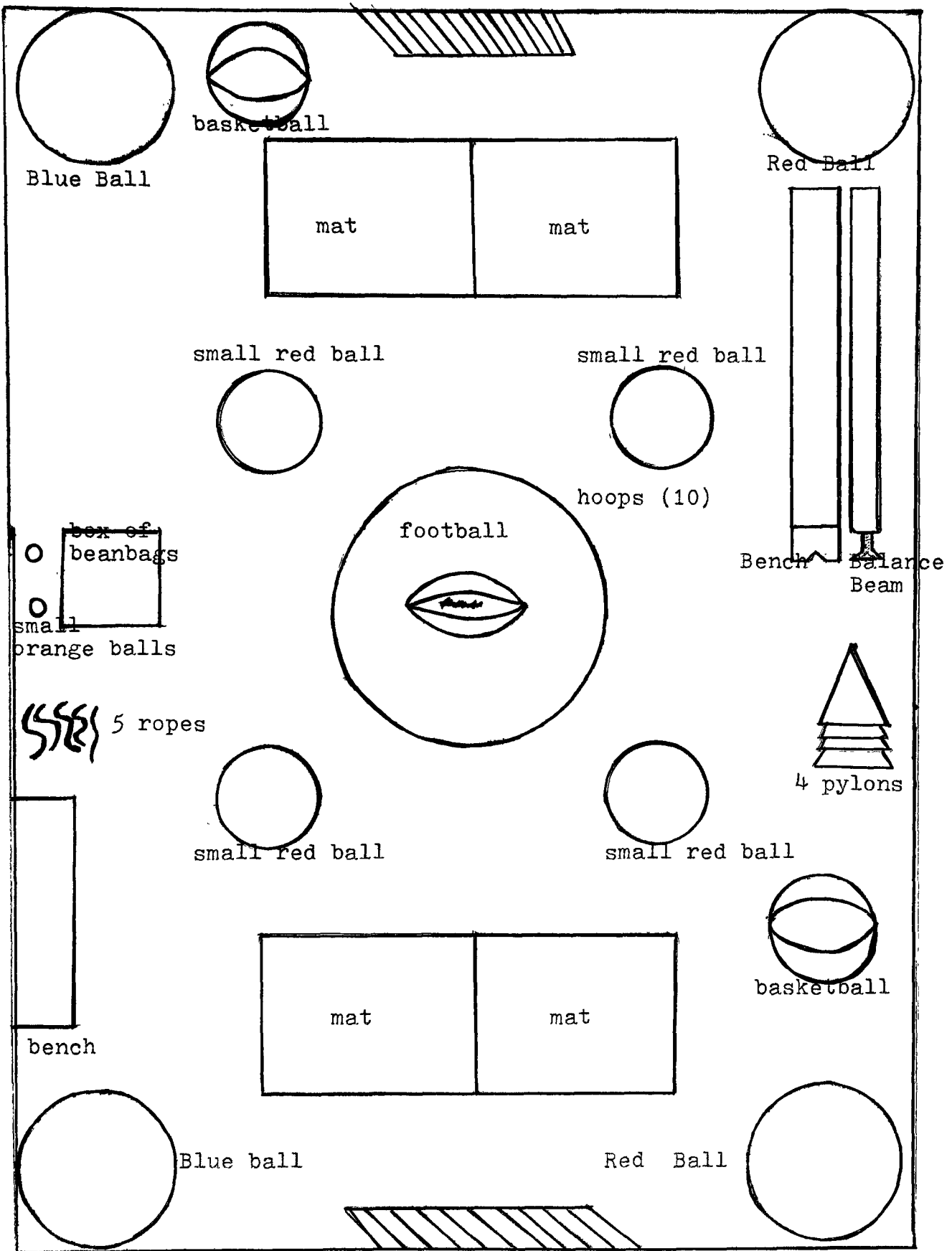


Figure 6

Lay Out of Equipment For Observation Scans

3) Co-operative verbal behaviour- Verbal interaction was accepted as meeting the criteria for co-operative social interaction only if it had some definite co-operative quality. For example if one child gave another child instructions on how to do something (Orlick,1976).

The pre test consisted of two observation sessions of fifteen minutes each, and the post test consisted of two observation sessions of fifteen minutes each, plus an additional session lasting thirty minutes. With respect to the latter observation session, it took place the day after completion of the program and was followed the next day by a fifteen minute observation period. The last fifteen minute observation scan occurred ten days after the initial post test observation session. The total number of co-operative acts the child engaged in for the two fifteen minute pre and post sessions as well as the additional thirty minute post session was recorded.

In order to ensure acceptable levels of inter-rater reliability on the part of the observers, two five-minute reliability checks were done in the pre test. In the first session both observers watched one-half of the gym and observed for co-operative behaviour. They indicated which child was co-operating, what he was doing and the frequency. The results indicated that they agreed on four out of the five incidents of co-operative behaviour (80% agreement) and three out of five on the subjects who participated in the co-operative behaviour. In a second reliability check both

observers observed the same child for a period of thirty seconds and noted whether or not he had engaged in a co-operative act. They repeated this procedure on different subjects until five minutes had elapsed. In this case they had 100% agreement.

For the post test the latter type of individual reliability check was repeated, with the same results (i.e. 100% agreement).

The observers used in this study were "blind observers" to the extent that they did not know whether the subjects they were observing were in an experimental or control group, or the details of the specific treatment conditions.

Skimetric Differential Inventory

In addition to the observation scans, subjects were requested to complete the Skimetric Differential Inventory (Orlick, Partington, Scott, Glassford, 1975) (See Appendix E). This is a psycho-social inventory designed specifically for children. Six of the twenty-two Skimetric scale items were directly related to the co-operative social interaction domain. They included questions 2, 9, 17, 18, 20 and 22. On each of the cartoon like items, subjects were requested to place themselves anywhere along a continuum which extended from one extreme to another with respect to that characteristic. The inventory was read to both groups to assure that the items were understood by the subjects.

The maximum score range on a particular item was from

zero to eight depending upon where one placed himself on the eight centimeter line. The Skimetric scale was scored by measuring the distance from the beginning of the line to the mark made by the subject.

The "Doll Pull Game"

The "doll pull game" was included in the post testing session for the sake of interest and as a further measure of social co-operation.

The game was adapted from an experimental game developed by Madsen (cited in Nelson and Kagan,1972) to study co-operative and competitive behaviour in children.

The children, in pairs, faced each other across a table. Each held a string connected to a wooden doll that would move in either direction depending on which string was pulled. The object of the game was to slide the doll so that it would pass over a chalk line marked at both ends of the table. If the children co-operated this was possible. However, if both children pulled on their string at the same time the doll would break apart and neither child could pull the doll over his line. One child had to relax his string while the other pulled, if either were to obtain a prize. The subjects could resolve this conflict of interest if they agreed to take turns, or agreed that each should get half of the available prizes.

The tester demonstrated where the doll had to end up to receive a prize and gave the following instructions: "If

you get it over the line on your side, you (A) get a candy. If you get it over on your side, you (B) get a candy". The children were told that they had four chances to obtain prizes. The prizes included jelly beans and chocolates. The children were told they could talk to each other if they wished and they could play the game any way they wanted.

The number of times each pair was able to slide the doll over one of the lines was recorded as an index of co-operation.

ANALYSIS OF THE DATA

The eight motor dependent variables were factor analysed. A MANOVA with repeated measures was then calculated for each of the three derived motor clusters (J.E. Carlson's Full Rank Multivariate Linear Model Computer Program, University of Pittsburgh, 1977). The data was further analysed using multivariate post hoc tests (Wilks' Lambda Criterion, Roy's Largest Root Criterion, Lawley-Hotelling Trace Criterion and Pillai's Trace Criterion) if significance was attained among the main effects at the .05 level.

The data for the right-side-left-side orientation test was not included in the multivariate analysis of variance since the test required dichotomous responses from the subjects and because these scores did not form a normal distribution. Descriptive statistics were employed in this

case.

A factor analysis was performed on the seven social variables (six questions of the Skimetric Differential Inventory, and the observation scan results). For each of the three factors which evolved one variable was selected which loaded highly on that factor and low on the other two. A MANOVA with repeated measures was performed on this social grouping. The data was further analysed using multivariate post hoc tests (Wilks' Lambda Criterion, Roy's Largest Root Criterion, Lawley-Hotelling Trace Criterion and Pillai's Trace Criterion) when significant differences were found among the main effects.

Significance testing (i.e. t-tests) and descriptive statistics were employed to analyse the remaining social data. More specifically, independent t-tests were calculated for the observation scan results and descriptive statistics related the findings obtained from the "doll pull game".

It should be pointed out that when referring to "matching" we are dealing with matched groups and not matched individuals. Therefore the standard process of matching used in statistics was not followed. Because of this, the design was not a standard one since there were not strictly independent samples nor statistically matched groups. Therefore the most appropriate design, MANOVA, due to the above circumstances was used. This was the best approximation that could be found. The results should then be interpreted

in this context, and those that would be most affected by this approximation would be the interactions.

CHAPTER IV

RESULTS¹

The results of the factor analyses and the consequent multivariate analyses of variance and post hoc tests on the motor and social groupings will be discussed in the following pages.

The motor and social data were factor analysed separately using the Statistical Package for the Social Sciences (Principal Axis 2) and multivariate analyses of variance were performed using J.E. Carlson's Full Rank Multivariate Linear Model Computer Program (University of Pittsburgh, U.S.A., 1977).

Factor Analysis Of The Motor Variables (See Appendix G)

A factor analysis was performed on the eight motor dependent variables. The results of this analysis are presented in Table I. (See Page 44). Variables were considered to contribute to a particular factor if their loadings exceeded .50. This criterion usually resulted in a cluster of two or three variables within each factor.

¹Raw scores and mean scores for the motor and social skills can be found in Appendix F.

Age was included as a variable in this particular analysis in an attempt to determine its relationship to motor performance. It loaded heavily on two factors (Table I), indicating that it is related to certain aspects of motor performance with learning disabled children. As shown in Table II, age correlated positively with all the motor variables except for hopping, where there was a negative correlation. However the correlations were low to moderate.

Eye-hand co-ordination (.97) and running (.62) were found to load heavily on factor I. In both of these tasks changing direction was an important component. In the eye-hand co-ordination task the subjects were required to follow a revolving light with a stylus held in their hand; while in the running task subjects were required to run in a zigzag pattern around cones given a certain time limit. Perception of direction may attribute to the communalities of these two variables.

The variables loading heavily on factor 2 were right-side-left-side orientation (.85) and hopping (.51). In both skills the ability to know right from left was an important underlying element. In the test for right-side-left-side orientation subjects were asked to verbally answer questions related to their understanding of right and left. The test for hopping also required knowledge of right and left since the single squares of the hopscotch pattern were designed such that the subject had to hop into it using the appropriate foot to obtain points. Points were deducted if the

subject hopped into a square with the incorrect foot. It appears that knowledge of right and left attributed to the common loading of these two variables.

It should be noted again that since the scores from the right-side-left-side orientation test were not normally distributed this test could not be included in the multivariate analysis of variance, which was performed once the clusters were determined from the factor analysis. Therefore only hopping loaded high on Factor 2. Since multivariate analysis of variance cannot be computed with only one variable in a cluster, throwing, a variable which did not load heavily on any factor, was added to this grouping.

Factor 3 was found to have three variables with high loadings. They were dynamic balance (.90), static balance (.76), and striking (.56). One assumption which may explain this relationship is conscious attention to balance is not necessary at the higher levels of performance however for the unskilled performer, balance may be an underlying skill one must be conscious of before an adequate performance can take place. Balance related to posture may be one of the essential components underlying these motor skills. Alternatively, balance may be necessary to assume the correct stance prior to striking and during the follow through.

Factor Analysis Of The Social Variables (Appendix H)

A factor analysis was performed on the seven social variables. The results of this analysis are presented in

TABLE I

Factor Pattern Of The Eight Motor Dependent Variables
And Age for Learning Disabled Children
Aged 7 to 10 Years

	FACTOR 1	FACTOR 2	FACTOR 3
Age	0.56020	-0.86561	0.46622
RtLt	-0.09186	-0.85414	0.29782
StatBal	-0.31106	-0.02353	0.75965
Eye Hand	0.97020	0.05463	-0.32820
Throw	0.33412	0.15005	0.24905
Run	0.61901	-0.30763	-0.12628
DyBal	-0.06014	-0.32073	0.90087
Hop	-0.25858	0.50989	0.24099
Strik	0.42188	-0.12955	0.56325

TABLE II

Correlation Coefficients Between Age and The Eight Motor
Dependent Variables For Learning Disabled
Children Aged 7 to 10 Years

	Age	RtLt	StatBal	EyeHand	Throw	Run	DyBal	Hop	Strik
Age	1.0	.42	.13	.47	.23	.39	.35	-.42	.45

Table III. Variables were specifically selected if they loaded heavily on one factor (i.e. greater than .50) and low on the other two factors.

The six questions of the Skimetric Differential Inventory and the observation scan results comprised the seven variables which were analysed. The variable with the highest positive loading on factor 1 was Ski 5 (.82) (Question 20 of the Skimetric Differential Inventory), for factor 2, the observation data (.60) and for factor 3 Ski 2 (.95) (Question 9 of the Skimetric). However after performing a multivariate analysis of variance on these representative variables significance was not reached at the .05 level. This lack of significance was attributed to the observation scan data. Therefore Ski 6 (Question 22 of the Skimetric Differential Inventory) which also loaded heavily on factor 2 was substituted for the observation scan variable in the subsequent multivariate analysis of variance.

Multivariate Analyses

Upon completion of the factor analyses, multivariate analyses of variance with repeated measures were performed on each of the motor clusters and on a single social cluster. J.E. Carlson's Full Rank Multivariate Linear Model Computer Program was used.

TABLE III

Factor Pattern Of The Seven Social Variables
(i.e. 6 Skimetric Questions And The
Observation Scan Results) For
Learning Disabled Children
Aged 7 to 10 Years

	FACTOR 1	FACTOR 2	FACTOR 3
SKI 1	0.71517	-0.69927	-0.00520
SKI 2	0.00468	0.07022	0.95324
SKI 3	0.74684	0.20454	-0.26633
SKI 4	0.51644	0.10011	0.26161
SKI 5	0.81947	0.01882	0.07532
SKI 6	0.24844	0.57121	-0.06843
OBS	0.02875	0.60045	0.08515

Multivariate Analyses Of The Motor Skills

Eye-Hand Co-Ordination, Running

A MANOVA for the eye-hand co-ordination and running data (Table IV) yielded significant differences for the pre versus post main effect¹. These results indicate that there was a significant improvement in performance following the programs in these two motor skills.

Because the pre versus post main effect was significant, multivariate post hoc tests (Wilks' Lambda Criterion, Roy's Largest Root Criterion, Lawley-Hotelling Trace Criterion, and Pillai's Trace Criterion) were performed. It was found that neither eye-hand co-ordination nor running contributed solely to the significant difference from the pre to the post test measure. Therefore one can conclude that both variables contributed to the increase in performance in the post test.

Hopping, Throwing

A MANOVA for the hopping and throwing data indicated that the two main effects as well as the interaction were significant. These results denote that: a) there was a significant difference between the experimental group and control group, in that the experimental group performed better than the control group, b) there was a significant

¹ $p < .05$ was accepted as the criterion level for significance in this study.

TABLE IV

MANOVA: Eye-Hand Co-ordination, Running
For Learning Disabled Children
Aged 7 to 10 Years

Source	Calculated Value	Critical Value
Exp vs Control	Wilks' Lambda = .608	Wilks' Lambda (4,1,17) = .529
	Roy's Criterion = .392	Roy's Criterion (1,1,6) = .47
	Lawley-Hotelling = .645	Lawley-Hotelling (1,1,6) = .89
	Pillai's = .392	Pillai's (1,1,6) = ____
Pre vs post	Wilks' Lambda = .314*	Wilks' Lambda (2,2,17) = .562
	Roy's Criterion = .684*	Roy's Criterion (2,-.5,7) = .405
	Lawley-Hotelling = 2.169	Lawley-Hotelling (2,-.5,7) = ____
	Pillai's = .693*	Pillai's (2,-.5,7) = .575
Interaction	Wilks' Lambda = .816	Wilks' Lambda (2,1,17) = .688
	Roy's Criterion = .184	Roy's Criterion (1,0,7) = .310
	Lawley-Hotelling = .225	Lawley-Hotelling (1,0,7) = .45
	Pillai's = .184	Pillai's (1,0,7) = ____

*p < .05

difference between the pre test measures and the post test measures signifying that the subjects performed better following the program and c) there was a significant difference between the pre versus post measures in the experimental and control groups. That is the experimental group improved significantly more than the control group. A summary of the MANOVA is presented in Table V.

Because the two main effects as well as the interaction were significant multivariate post hoc tests were computed (Table VI). Application of the post hoc to the experimental versus control main effect revealed that both hopping and throwing contributed to the significant improvement in the experimental group's performance. Hopping was found to contribute to a greater degree than throwing to the significant difference in the pre versus post main effect. Thus there was a more significant improvement in hopping following the program. The significant interaction (Figure 7) revealed that hopping contributed more to the improvement of the experimental group than the control group following the program.

Static Balance, Dynamic Balance and Striking

A MANOVA for the static balance, dynamic balance and striking data (Table VII) yielded significant differences for the three main effects. These results indicate that: a) the experimental group performed significantly better in the three motor skills than the control group, b) there was

TABLE V

MANOVA: Hopping, Throwing For Learning
Disabled Children Aged 7 to 10 Years

Source	Calculated Value	Critical Value
Exp vs Control	Wilks' Lambda = .409*	Wilks' Lambda (4,1,17) = .529
	Roy's Criterion = .591*	Roy's Criterion (1,1,6) = .47
	Lawley-Hotelling = 1.446*	Lawley-Hotelling (1,1,6) = .89
	Pillai's = .591	Pillai's (1,1,6) = _____
Pre vs Post	Wilks' Lambda = .275*	Wilks' Lambda (2,2,17) = .562
	Roy's Criterion = .718*	Roy's Criterion (2,-.5,7) = .405
	Lawley-Hotelling = 2.570	Lawley-Hotelling (2,-.5,7) = _____
	Pillai's = .742*	Pillai's (2,-.5,7) = .575
Interaction	Wilks' Lambda = .536*	Wilks' Lambda (2,1,17) = .688
	Roy's Criterion = .464*	Roy's Criterion (1,0,7) = .310
	Lawley-Hotelling = .865*	Lawley-Hotelling (1,0,7) = .45
	Pillai's = .464	Pillai's (1,0,7) = _____

*p < .05

TABLE VI
Post Hoc: Hopping Throwing

Source	Range	
Pre vs Post Contrast		
Throw	Hop	
-1.7	-2.45*	+ 2.87 2.03
.111	-0.50	- 3.00 2.13
Interaction Contrast		
Throw	Hop	
-1.811	-1.95*	+ 2.41 1.70

*p < .05

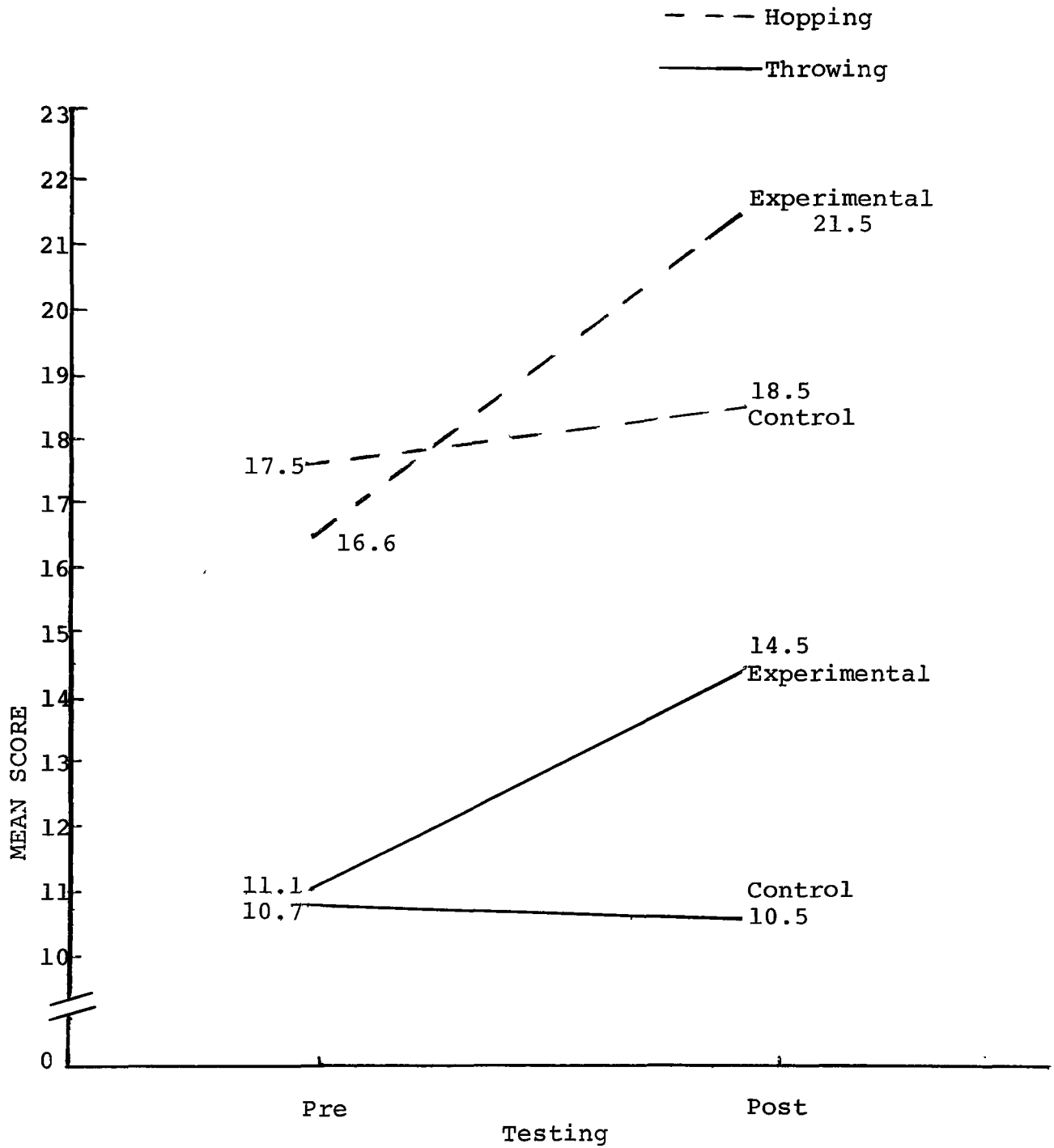


Figure 7

Hopping, Throwing: Experimental versus Control x Pre Versus Post Interaction

a significant improvement following the program, and c) there was a greater improvement in the performance of the experimental group following the program as compared to the control group.

Because the main effects were significant post hoc procedures (Table VIII) were computed. Application of the post hoc analyses to the experimental versus control main effect revealed that none of the variables contributed significantly more than any other to the significant difference. Therefore one can state that the experimental group improved significantly in static balance, dynamic balance and striking, however the contribution was not significantly greater in any one skill. Post hoc analyses of the pre versus post test results indicate that striking contributed more than static and dynamic balance to the subjects improvement in performance following the program. The significant interaction (Figure 8) revealed that the experimental group showed significantly more improvement following the program than the control group, and that dynamic balance and striking contributed more to this improvement than static balance.

Right-Side-Left-Side Orientation

Analysis of the right-side-left-side orientation test was limited to descriptive statistics for the following reason: The test itself, demanded knowledge of left and right and therefore the subject was limited to either a

TABLE VII

MANOVA: Static Balance, Dynamic Balance, Striking
For Learning Disabled Children
Aged 7 to 10 Years

Source	Calculated Value	Critical Value
Exp vs Control	Wilks' Lambda = .267*	Wilks' Lambda (6,1,17) = .400
	Roy's Criterion = .733*	Roy's Criterion (1,2,5) = .600
	Lawley-Hotelling = 2.739*	Lawley-Hotelling (1,2,5) = 15
	Pillai's = .733	Pillai's (1,2,5) = _____
Pre vs Post	Wilks' Lambda = .174*	Wilks' Lambda (3,2,17) = .454
	Roy's Criterion = .825*	Roy's Criterion (2,0,6.5) = .500
	Lawley-Hotelling = 4.721	Lawley-Hotelling (2,0,6.5) = _____
	Pillai's = .834*	Pillai's (2,0,6.5) = .699
Interaction	Wilks' Lambda = .433*	Wilks' Lambda (3,1,17) = .603
	Roy's Criterion = .567*	Roy's Criterion (1,.5,6.5) = .397
	Lawley-Hotelling = 1.310*	Lawley-Hotelling (1,.5,6.5) = .658
	Pillai's = .567	Pillai's (1,.5, 6.5) = _____

*p < .05

TABLE VIII

POST HOC: Static Balance, Dynamic Balance, Striking

Source				Range		
Pre vs Post Contrast						
Stat	Dy	Strik				
-7.17	-3.95	-3.60*				
			+	10.17	4.19	3.26
-1.706	- .667	- .889	-	10.71	4.42	3.44
Interaction Contrast						
-5.464	-3.283*	-2.711*				
			+	7.88	3.25	2.53
			-			

*p < .05

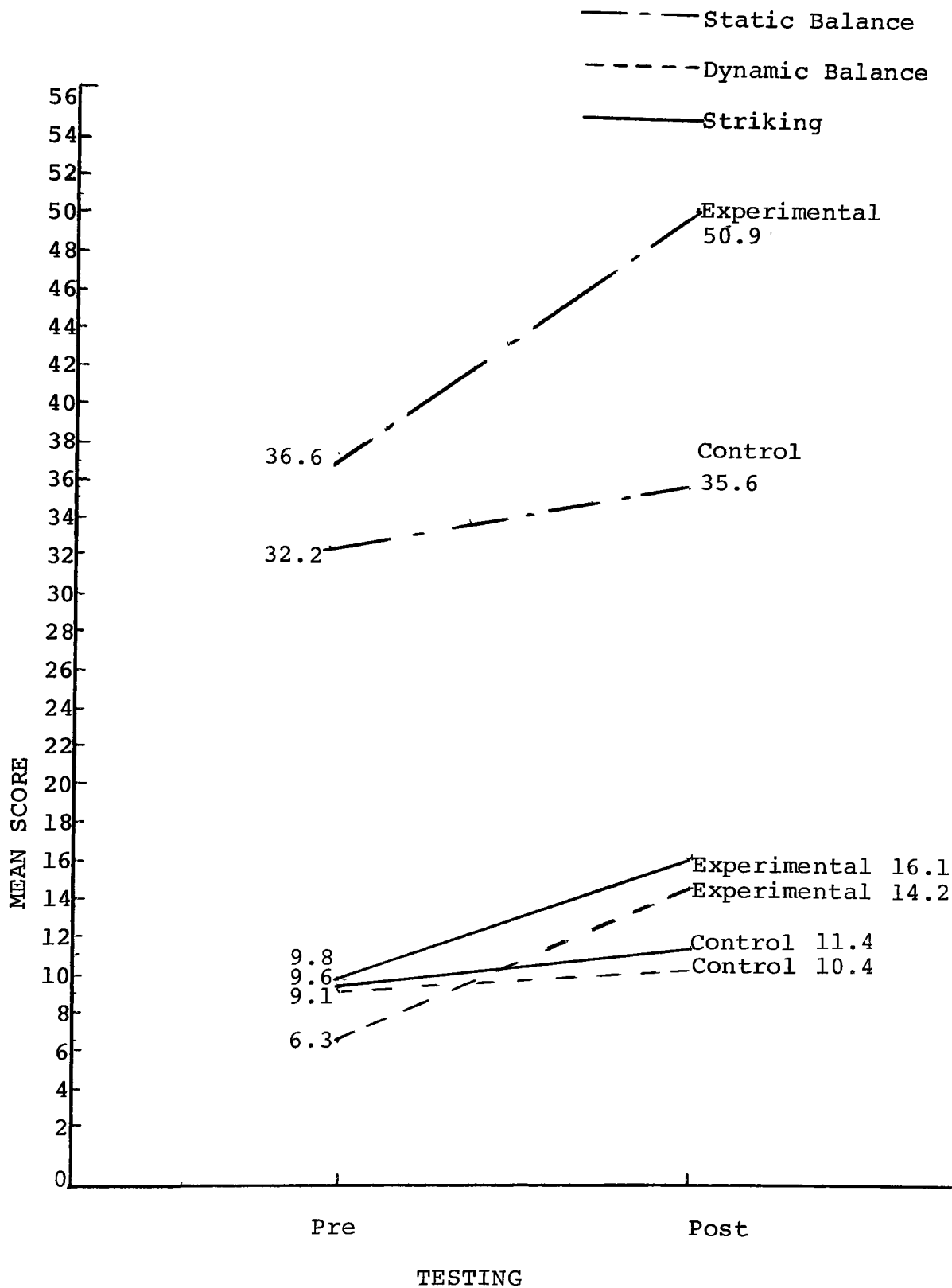


Figure 8

Static Balance, Dynamic Balance and Striking: Experimental Versus Control X Pre Versus Post Interaction

correct or incorrect response leading to a dichotomous response. Non parametric statistics are generally preferred when dealing with dichotomous scores. However several factors had a prohibitive effect on the beneficial use of non parametric statistics in this case: the sample was small ($n=10,9$) and all the experimental subjects responded correctly to all twelve questions in the post test which resulted in a ceiling effect, thus affecting the distribution of scores.

Descriptive statistics show that on the experimental group pre test the mean score (out of a possible score of 12) was 9.5 and on the post test the mean score was 12. The control group's mean score was 7.7 on the pre test and 7.6 on the post test (See Figure 9). It is evident that the experimental group improved markedly following the program while the control group remained at approximately the same level. It should be emphasized that all experimental subjects were able to respond to all twelve questions correctly following the program. Clearly this was not the case for the control group.

Multivariate Analysis Of The Social Cluster

A MANOVA for Questions 9 (many friends-left out), 20 (likes teamwork-prefers working alone) and 22 (helping others-beating others) of the Skimetric Differential Inventory (Table IX) yielded significant differences for the pre versus post main effect and the interaction main effect.

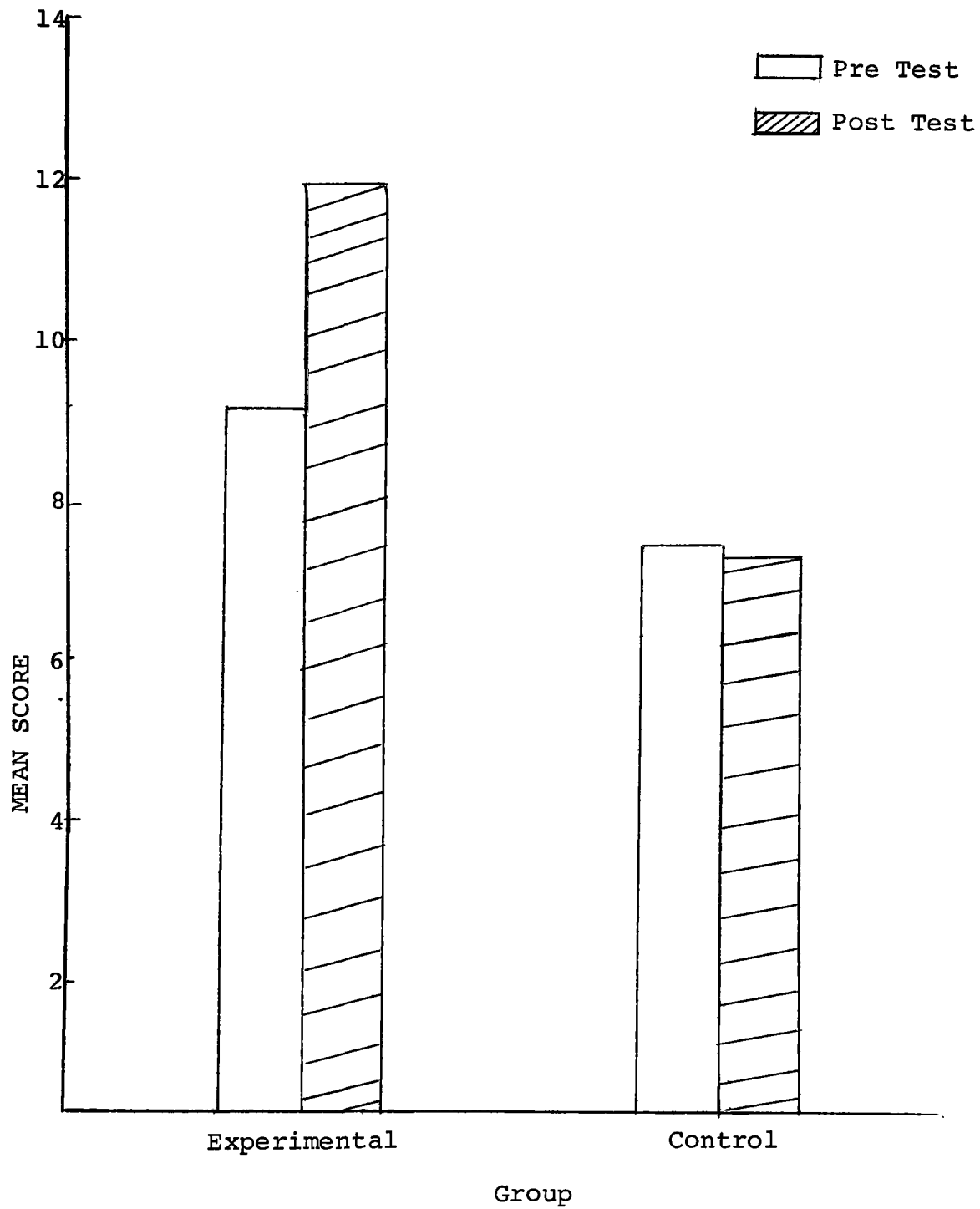


Figure 9

Mean Scores For The Experimental and Control Group
On The Pre and Post Tests For Right-Side-
Left-Side Orientation

TABLE IX

MANOVA: Social Cluster: Questions 9,20 and 22
For Learning Disabled Children
Aged 7 to 10 Years

Source	Calculated Value	Critical Value
Exp vs Control	Wilks' Lambda = .377	Wilks's Lambda (6,1,16) = .372
	Roy's Criterion = .623	Roy's Criterion(1,2,4.5) = .628
	Lawley-Hotelling = 1.653	Lawley-Hotelling(1,2,4.5) = 1.69
	Pillai's = .623	Pillai's (1,2,4.5) = _____
Pre vs Post	Wilks' Lambda = .359*	Wilks' Lambda (3,2,16) = .431
	Roy's Criterion = .526*	Roy's Criterion (2,0,6) = .515
	Lawley-Hotelling = 1.430	Lawley-Hotelling(2,0,6) = _____
	Pillai's = .769*	Pillai's (2,0,6) = .699
Interaction	Wilks' Lambda = .563*	Wilks' Lambda (3,1,16) = .583
	Roy's Criterion = .437*	Roy's Criterion(1,.5,6) = .417
	Lawley-Hotelling = .776*	Lawley-Hotelling(1,.5,6) = .716
	Pillai's = .437	Pillai's (1,.5,6) = _____

p < .05

These results indicate that: a) there was a significant increase in co-operation responses in the specific self report situation provided by the Skimetric Differential Inventory following the program, and b) the experimental group saw themselves as being significantly more co-operative than the control group following the program.

Because the two main effects were significant multi-variate post hoc tests were performed. It was found that none of the variables contributed solely to the significant difference from the pre to the post test measure and that none of the variables contributed solely to the experimental group's improved performance following the program as compared to the control group. Therefore all three variables contributed equally to the significant changes in behaviour response.

Observation Scans

Two independent t-tests were performed on the pre-post differences to determine whether any significant changes occurred in co-operative behaviour between: 1) the combined two fifteen minute free play observation sessions of the pre test and the two combined fifteen minute sessions of the post test, and 2) the two combined fifteen minute sessions of the pre test and the thirty minute session of the post test. In the first case no significant change was found at the .05 level of confidence. However in the second case significance was attained indicating that the control group

became significantly less co-operative after exposure to the traditional games program (Table XI).

"Doll Pull Game"

The subjects responses to the "doll pull game" (of co-operation) reveal that two of the four pairs involved in the experimental program co-operated at least once, while none of the control group pairs co-operated at all (See Table XII). In the experimental group one pair co-operated in the last trial and another pair co-operated during all four trials. In percentage terms, 50% of the experimental group succeeded in finding a co-operative solution at least once in comparison to 0% of the control group.

TABLE X

Total Number of Co-Operative Acts Engaged In By The
Experimental and Control Groups On The Pre
And Post Tests of The Observation Scans

Group	Pre	Post	
	Total two 15 min. sessions	Total one 30 min. session	Total two 15 min. sessions
Experimental	24	22	21
Control	18	7	11

TABLE XI

Independent T-Tests On The Observation Scan Results

Variable	Degrees of Freedom	Table Value of t	Calculated Value of t
Ob. Scan #1	13	1.771	.53
Ob. Scan #2	13	1.771	2.53*

*p < .05

TABLE XII
Raw Scores Doll Pull Game

Experimental Group Pair #	1	2	3	4	Score
1	0	0	0	1	1
2	0	0	0	0	0
3	0	0	0	0	0
4	1	1	1	1	4
Control Group Pair #					
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0

CHAPTER V

DISCUSSION

Motor Skills

The significant improvements in gross motor skills as a result of perceptual-motor training concur with the results of Lapray and Ross (1966), Haring and Stables (1966), Johnson and Fretz (1967), Brown (1968), Cratty (1970) and Buckley (1971). The particular areas of improvement and possible explanations for these changes are discussed in this chapter.

Eye-Hand Co-Ordination, Running

The multivariate analysis of variance and accompanying post hoc tests for the eye-hand co-ordination and running data indicate that both the experimental and control groups improved significantly in these two abilities following the programs. One possible explanation for these results is that both programs stressed these motor abilities within their games. For example, traditional games program activities such as floor hockey, ship-shore, kickball and frisbee throw involved either running, eye-hand co-ordination or both. The perceptual-motor program also included activities designed specifically to improve these

abilities (See Appendix C). Therefore it is expected that improvements in these two motor abilities are attributable to the programs.

Hopping, Throwing

Statistical analysis of these two variables established that the experimental group performed significantly better than the control group following the program in both hopping and throwing. Hopping contributed more than throwing to this significant improvement. Both these abilities, particularly hopping were important elements of the experimental program (See Appendix B). More specifically, hopping and throwing were stressed on twenty-one occasions during the experimental program and on only seven occasions during the control program.

Although hopping contributed more than throwing to the greater improvement of the experimental group as compared to the control group, this result is difficult to interpret because an attempt was made to emphasize both abilities equally. One possible explanation for this result is that midway through the program the instructor noticed that many of the subjects were still experiencing difficulty with their hopping ability. Therefore at the beginning of each class for the last two weeks, some time was spent on improving this ability using the game "Follow the Leader". Perhaps this emphasis near the end of the program led to the above results.

It should also be noted that one of the requirements of the hopping test was knowledge of right and left. The hopscotch pattern used in the hopping test was designed so that the subject could only hop into a single square with either his left or his right foot. Points were deducted if the subject hopped into a square with the incorrect foot. As indicated previously in the Results Section all the experimental subjects had learned to differentiate their right from their left by the end of the program. Therefore improvement in right-side-left-side orientation may have also been reflected in the experimental group's hopping ability.

Static Balance, Dynamic Balance and Striking

The experimental group performed significantly better than the control group in these three motor areas following the programs. Post hoc testing further established that, a) striking contributed more to the significant improvement following the program than static and dynamic balance, and b) both dynamic balance and striking contributed more to the significant interaction than static balance.

Considering that these three motor abilities were stressed in the great majority of the experimental games it can be concluded that improvements were a result of the co-operative perceptual-motor program. With respect to the more significant improvement found in striking ability, it would appear that once the skill of striking is broken down into components and taught in stages using the "part" method,

improvements will result as long as each stage is perfected. However static and dynamic balance appear much more difficult to break down into steps for the learner. As a result it may be harder or take longer to perfect these skills.

Since static balance was not emphasized to the same degree in the experimental program as was dynamic balance or striking, the finding that these two latter abilities contributed more to the significant improvement of the experimental group than the control group seems justified.

Right-Side-Left-Side Orientation

Studies reveal that children with learning disabilities have problems differentiating their right from their left (Frostig, 1970). As a result of this knowledge many of the games in the co-operative perceptual-motor program were adapted such that the children were required to specifically use either their "left" or "right" hand or foot to accomplish a task (e.g. bean bag toss, jumping skills). In addition games were devised which provided training in differentiating right from left (e.g. Matilda, Hoo-Chi-Koo-Chi). As a result of this applied training, all the experimental subjects were able to answer all twelve post questions of the right-side-left-side orientation test correctly. When one teacher was asked how one of her students liked the program she commented: "Said he liked it, it was fun. He learned left, right which he didn't know before and which I

was unaware of".

Motor Summary

Studies by Ayres (1965,1966), Rubin and Braun (1968), Kephart (1968), Carter (1970) and Frostig (1970) have shown that children with learning disabilities are limited in motor behaviour particularly co-ordination, sequential skills, balance and ability to differentiate right from left. The co-operative perceptual-motor program was designed to provide training in the skills that these atypical children were deficient in. The results of this study substantiate the theory that training in specific motor areas will lead to their improvements.

Social Skills

The findings in the present study provide some support for the hypothesis that a co-operative perceptual-motor program will increase positive social co-operation responses in learning disabled children. The results from the major social areas assessed are discussed below.

Skimetric Differential Inventory

The multivariate analysis of variance on Questions 9, 20 and 22 of the Inventory established that the experimental group showed a significantly greater increase in co-operative response following the program than the control group.

Positive change in behaviour (i.e. the tendency toward

co-operative behaviour) may initially manifest itself in the form of thought, conceptualization or a change in self perception. This change was reflected in the experimental subjects responses to the Skimetric Differential Inventory. Overt changes in behaviour are more difficult or take longer to effectuate as indicated by the observation scans and the "doll pull game".

Observation Scans

The number of co-operative acts which were performed by the experimental group in the pre test numbered twenty-four for the combined two fifteen minute sessions; while in the control group the frequency of co-operative acts numbered eighteen. This baseline difference may have been related to the fact that there was one less subject in the control group as compared to the experimental group for the pre test. A thirty minute observation session took place immediately following the program. When comparing the two fifteen minute sessions of the pre test to the thirty minute session of the post test the following results occurred: the experimental group co-operated a total of twenty-four times during the pre test and twenty-two times during the post test--an 8.3% decrease. However the control group dropped from eighteen co-operative acts in the pre test to seven co-operative acts in the post test--a 60% drop. It would appear that children following traditional programs become more competitive rather than more co-operative over

time. This is supported by the results of the t-test mentioned in the Results Section.

Two subsequent fifteen minute observation sessions were also included in the post testing. The results indicated that the experimental group dropped from twenty-four co-operative acts to twenty-one co-operative acts, while the control group decreased from eighteen co-operative acts to eleven.

A number of factors may have contributed to the lack of a significant increase in co-operative behaviour among the experimental group. The fact that the children had been playing "the in thing" at recess which was "war" probably resulted in "war" being played when they had a free opportunity and many objects to throw. Had this confounding and uncontrollable variable of recess "war" been controlled the results may have been different. It is interesting to point out that although there was an unexpected change in the style of free play in both groups (i.e. war games), the number of co-operative acts which occurred was two or three times greater for the experimental group than for the control group. In addition the observers noted that although both groups engaged in war games the experimental group worked as a team, while the control group pitted themselves one against the other.

Time may have also been a limiting factor in this study. Orlick, McNally and O'Hara (1977) in a study on kindergarten children found no significant increase in

co-operative behaviour after an eight week program of co-operative games. Although the teachers began to see qualitative changes, they were not picked up by outside unbiased observers. However when the program was continued for a total of eighteen weeks a significant increase was observed in the childrens co-operative behaviour. This points out the importance of giving a program aimed at behaviour change sufficient time to take effect. Considering the fact that physical fights were a common occurrence among these subjects and that children with learning disabilities generally lack social skills, have emotional and behavioural difficulties and do not relate to their peers or form social relationships easily (Bachara, 1976), positive behaviour change may require a longer period of time. Although significant improvements in co-operative free play behaviour were not attained during this five week co-operative perceptual-motor program the experimental group did not slide backward with respect to co-operative behaviour which was clearly seen in the control group.

In addition to the time limitation, sex must also be considered. In previous research it was found that females at all levels were more receptive to co-operative games than males with the exception of four and five year olds where they are usually equally receptive (Orlick,1978). Since the sample in this study was an all male population the results may have been inhibited by this sex factor.

Age may be considered as another limiting factor in

this study. There is evidence to suggest that young children (e.g. five year olds) are more co-operative in their response to both active co-operative games (Orlick,1976,1977) and experimental co-operative table games (Kagan and Madsen, 1971; Nelson and Kagan,1972) than their older counterparts (e.g. nine and ten year olds). Orlick and Foley (1977) concluded that co-operative games seem to have more potential for co-operative socialization impact with four year olds than with five year olds.

Other considerations relate to sample size and available play equipment. Since the sample size was small, significance was more difficult to attain. A larger sample may have offered a greater chance to reach significance. Lastly, the type and amount of equipment set out in the gymnasium during the pre and post testing may not have been conducive to facilitating co-operative behaviour. With a large amount of equipment each child can have his own. Perhaps had only two balls and four beanbags been placed in the gym the subjects would have been compelled to transfer what they had learned from the program to the free play period.

In summary, given more time, a larger sample, the inclusion of females and less equipment set out in the gymnasium, perhaps significant changes may have occurred. These factors should be considered in future research with learning disabled populations.

It should be pointed out that although significant

differences were not found after the five week program, the experimenter, the observers and teachers reported qualitative changes and cited critical incidents of increased co-operative behaviour among the co-operative games children. A few examples are listed below.

- The experimental group responded well to clean-up instructions with children helping to put benches away. The control group on the other hand did not respond as well to the instructions and clean-up took longer and the instructions had to be repeated.

- While two of the experimental subjects were playing Row Beam Row, it was interesting to note that the remaining children formed their own little circle and were interacting on their own.

- In the control group many of the children were unable to cope with the demands of the competitive games resulting in, children sitting out, the shedding of tears, and feelings of "not being good enough". This was not seen in the co-operative perceptual-motor program as the games were structured to insure a certain level of acceptance for each child. In addition it was noted that many of the children in the control group did not know the names of the other children in the group even at the end of the program. This was not the case in the experimental group.

- During the post test observation session one child from the experimental group was observed helping another child put on his pinnie. At the beginning of the post testing one child asked "Anyone want to play Log Roll?"

- Samples of teachers comments about children involved in the experimental program include such responses as:

"There seems to have been an improvement in his frequency of participation and in self confidence".

"I think that this program did a lot for Geoff. He seemed to be getting along much better with the other children".

"Doll Pull Game"

The data from the co-operative "doll pull game" which is an experiment where children can choose to co-operate or

not to co-operate adds further support to the potential of co-operative games. At the conclusion of the program 50% of the experimental pairs were able to reach and act upon a co-operative solution to the experimental co-operative game, whereas none of the control group pairs were capable of doing this.

In summary, when one is attempting to change behaviour, the ultimate goal is behaviour change in the real world situation. However change in behaviour may initially occur at a conceptual level and be capable of assessment through written responses followed by an acting out of the conceptualization in a contrived situation (e.g. "doll pull game").

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The purpose of this study was to determine the effects of a co-operative perceptual-motor program for learning disabled children on specific motor and social parameters. The related literature suggests that an improvement in motor functioning will result from perceptual-motor training. Although positive socialization has also been one of the stated aims of many perceptual-motor programs, little has been done in terms of structuring the programs to accomplish this objective. In addition, there has been little or no attempt to assess whether specific social and behavioural objectives were being fulfilled. In the interest of determining the effects of a program which stresses both motor and social skill development through the use of co-operative games the present study was conducted.

Nineteen elementary school boys, (aged seven to ten years) with diagnosed or assumed learning disabilities, were selected for the study. They were assigned to two groups such that both groups were matched according to sex, age and motor skill ability. The experimental group was involved in

the co-operative perceptual-motor program and the control group was involved in a traditional games program. Pre testing on the following motor and social skills took place prior to the commencement of the programs: right-side-left-side orientation, static balance, dynamic balance, eye-hand co-ordination, running, hopping, throwing, striking and social co-operation. The programs began the day after completion of the pre testing and ran for approximately five weeks thereafter. Activity sessions were held daily and lasted from thirty to forty-five minutes. Upon completion of the programs the children were post tested on the same specific parameters as the pre test. In addition the "doll pull game" was included in the post testing as an added measure to determine the co-operativeness of the subjects in a contrived game situation.

The resulting motor and social data were factor analysed separately in order to cluster two or three variables together to facilitate the use of multivariate analysis. Once the clusters were determined multivariate analyses of variance with repeated measures and multivariate post hoc tests were performed on the groupings. Independent t-tests and descriptive statistics were used to describe the results obtained from the right-side-left-side orientation test, the social co-operation observation scans and the "doll pull game".

CONCLUSIONS

Within the limitations of this study the following conclusions have been drawn:

1) A significant improvement in eye-hand co-ordination and running ability occurred in both the experimental and control groups following the respective programs.

2) The experimental group performed significantly better than the control group in hopping and throwing. Results from the post hoc analyses indicated that hopping contributed more to this significant improvement than throwing.

3) The experimental group performed significantly better than the control group in static and dynamic balance and striking. Striking contributed more to the significant improvement following the program than static and dynamic balance. There was a more significant improvement in dynamic balance and striking abilities in the experimental group following the program as compared to the control group.

4) A marked improvement was found in the experimental group's responses to the right-side-left-side orientation test, while no change was found in the control group's responses.

5) The written responses from the Skimetric Differential Inventory indicated that the experimental group increased significantly more in co-operative response than the control group.

6) Analysis of the observational data did not reveal significant changes in terms of the experimental group but the control group did become significantly less co-operative over the period of the program.

7) The results from the "doll pull game" indicated that the experimental group was more capable of arriving at a co-operative solution than the control group, however the results did not reach statistical significance.

In conclusion, co-operative games do have the potential to elicit positive social co-operation behaviour in learning disabled children as well as improve their motor skill abilities.

RECOMMENDATIONS

In order to provide suitable programs for children with learning disabilities, teachers and programmers must re-evaluate their procedures and practices and adapt their activities to the children's requirements. They must become more aware of the motor and social skills in which these children are poor and then begin to design or implement activities which will help train these children to overcome their deficiencies.

The results of this study suggest that there are advantages to be derived by learning disabled children from the co-operative perceptual-motor program. After conducting several training programs in various schools it has become

quite evident that teachers welcome innovative ideas to help improve specific skills in learning disabled children. Therefore the implementation and continued assessment of this program is recommended in school and hospital settings where the welfare of the learning disabled child is a growing concern.

The length of the co-operative perceptual-motor program and limiting conditions such as sex and population size described in the present study should be considered by future investigators. More time than was allotted in this study is likely needed before improvements occur in the co-operative free play behaviour of learning disabled children. If during the school hours, as well as after school, one can change the focus and begin to concentrate on positive social interaction and co-operative experiences the desired behaviour changes may be reflected in overt actions. Future research is also needed to determine the effects of such a program on a larger sample of learning disabled children and on females.

In conclusion, the effects of co-operative perceptual-motor training may contribute something of real value to these children's lives particularly if the above recommendations are implemented and the program is continually assessed.

Note: For future studies to facilitate the analysis, the subjects should be matched statistically to form matched pairs or randomly assigned to groups. In such cases a standard design could be used.

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APPENDICES

APPENDIX A
ASSIGNMENT OF SUBJECTS TO TWO GROUPS

RAW SCORES AND RANKINGS OF THE SEVEN MOTOR TESTS
FOR THE 7 & 8 YEAR OLDS IN ORDER
TO FORM TWO MATCHED GROUPS

Subject	HOPPING		DYNAMIC BALANCE		RUNNING	
	Raw Score	Rank	Raw Score	Rank	Raw Score	Rank
D. K.	22	2.5	4	7	42	9.5
G. P.	22	2.5	7	5	44	8
D. J.	18	4.5	9	3	49	2.5
C. G.	17	6	3	9	48	4
E. D.	15	9	3	9	46	7
G. E.	18	4.5	9	3	47	5.5
M. S.	15	9	11	1	47	5.5
C. S.	16	7	6	6	55	1
K. C.	23	1	9	3	49	2.5
O. S.	15	9	3	9	42	9.5

Subject	THROWING		EYE-HAND COORD		STATIC BALANCE	
	Raw Score	Rank	Raw Score	Rank	Raw Score	Rank
D. K.	11	6	15.18	2	40.10	3
G. P.	12	4.5	9.17	6	31.30	5.5
D. J.	15	1	10.70	3	41.7	2
C. G.	8	8	9.23	5	20.7	10
E. D.	6	9	9.75	4	28.2	7
G. E.	13	2.5	15.92	1	24.1	8
M. S.	3	10	1.63	10	31.3	5.5
C. S.	13	2.5	8.77	7	33.1	4
K. C.	12	4.5	4.33	9	53.9	1
O. S.	9	7	5.55	8	22.9	9

Subject	RT SIDE LEFT SIDE	
	Raw Score	Rank
D. K.	8	6
G. P.	0	9.5
D. J.	0	9.5
C. G.	12	2
E. D.	8	6
G. E.	8	6
M. S.	12	2
C. S.	8	6
K. C.	12	2
O. S.	8	6

SUBJECTS TOTAL RANK SCORE

D. K.	G. P.	D. J.	C. G.	E. D.	G. E.	M. S.	C. S.
2.5	2.5	4.5	6	9	4.5	9	7
7	5	3	9	9	3	1	6
9.5	8	2.5	4	7	5.5	5.5	1
6	4.5	1	8	9	2.5	10	2.5
2	6	3	5	4	1	10	7
3	5.5	2	10	7	8	5.5	4
6	9.5	9.5	2	6	6	2	6
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
36.0	41.0	25.5	44	51	30.5	43.0	33.5

K. C.	O. S.
1	9
3	9
2.5	9.5
4.5	7
9	8
1	9
2	6
<hr/>	<hr/>
23.0	57.5

RANKED BEST TO POOR

1. K. C.
2. D. J.
3. G. E.
4. C. S.
5. D. K.
6. G. P.
7. M. S.
8. C. G.
9. E. D.
10. O. S.

RAW SCORES AND RANKINGS OF THE SEVEN MOTOR TESTS
FOR THE 9 & 10 YEAR OLDS IN ORDER
TO FORM TWO MATCHED GROUPS

Subject	HOPPING		DYNAMIC BALANCE		RUNNING	
	Raw Score	Rank	Raw Score	Rank	Raw Score	Rank
J. K.	16	4	6	7	52	3
K. B.	17	3	7	5.5	50	6
M. D.	14	8	5	8.5	51	4.5
R. C.	15	5.5	10	4	44	10
S. D.	12	10	2	10	54	1.5
S. P.	14	8	5	8.5	46	8.5
S. E.	14	8	15	1	46	8.5
G. L.	20	1	14	2	54	1.5
A. B.	18	2	12	3	48	7
G. B.	15	5.5	7	5.5	51	4.5

Subject	THROWING		EYE-HAND COORD		STATIC BALANCE	
	Raw Score	Rank	Raw Score	Rank	Raw Score	Rank
J. K.	12	6.5	28.42	1	28.2	8
K. B.	5	10	7.97	8	24.9	9
M. D.	9	9	15.91	5	38.3	4
R. C.	15	1	4.60	10	47.6	1
S. D.	13	5	15.72	6	13.8	10
S. P.	12	6.5	5.60	9	45.2	2
S. E.	14	3	11.80	7	35.0	6
G. L.	14	3	19.53	4	30.3	7
A. B.	11	8	22.44	3	35.7	5
G. B.	14	3	25.94	2	43.5	3

Subject	RT SIDE LEFT SIDE	
	Raw Score	Rank
J. K.	4	10
K. B.	12	3
M. D.	12	3
R. C.	10	7
S. D.	12	3
S. P.	8	8.5
S. E.	12	3
G. L.	12	3
A. B.	8	8.5
G. B.	11	6

SUBJECTS TOTAL RANK SCORE

J. K.	K. B.	M. D.	R. C.	S. D.	S. P.	S. E.	G. L.
4	3	8	5.5	10	8	8	1
7	5.5	8.5	4	10	8.5	1	2
3	6	4.5	10	1.5	8.5	8.5	1.5
6.5	10	9	1	5	6.5	3	3
1	8	5	10	6	9	7	4
8	9	4	1	10	2	6	7
10	3	3	7	3	8.5	3	3
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
39.5	44.5	42.0	38.5	45.5	51.0	36.5	21.5

A. B.	G. B.
2	5.5
3	5.5
7	4.5
8	3
3	2
5	3
8.5	6
<hr/>	<hr/>
36.5	29.5

RANKED BEST TO POOR

1. G. L.
2. G. B.
3. S. E.
4. A. B.
5. R. C.
6. J. K.
7. M. D.
8. K. B.
9. S. D.
10. S. P.

MATCHED GROUPS

Experimental Group		Control Group	
	Total Rank Score		Total Rank Score
K. C.	23.0	D. J.	25.5
C. S.	33.5	G. E.	30.5
D. K.	36.0	G. P.	41.0
C. G.	44.0	M. S.	43.0
E. D.	51.0	O. S.	57.5
G. B.	29.5	G. L.	21.5
S. E.	36.5	A. B.	36.5
J. K.	39.5	R. C.	38.5
M. D.	42.0	K. B.	44.5
S. P.	51.0	S. D.	45.5
	$\bar{X} = 38.6$		$\bar{X} = 38.4$

APPENDIX B
SCHEDULE OF DAILY EVENTS

SCHEDULE OF DAILY EVENTS

Thursday April 28	Motor Skill Testing
Friday April 29	Motor Skill Testing
Monday May 2	Motor Skill Testing
Tuesday May 3	Motor Skill Testing
Monday May 9	Reliability Checks
	Observation Session (15 minutes per group)
Tuesday May 10	Observation Session (15 minutes per group)
Wednesday May 11	Striking Pre Test
Thursday May 12	Administering of The Skimetric Differential Inventory
Friday May 13	
<u>Experimental</u>	<u>Control</u>
Introduction Game	Ship Shore
Log Roll	Dodge Ball
Frozen Bean Bag	Snatch The Beanbag
co-operative Tag	
Monday May 16	
<u>Experimental</u>	<u>Control</u>
Introduction Game (cont-d)	Simon Says
Simon Says	Kickball
Follow The Leader	
Introduction To Right- Left Orientation (left hand trick)	
Tuesday May 17	
<u>Experimental</u>	<u>Control</u>
Co-Op Volleyball -individ. pair circle	Trampoline
Co-Op Beam Walk	

Wednesday May 18
Experimental

Control

"8" Roll-pairs
 Co-Op Beam Walk (with
 a beanbag on head)
 Hoo-Chi-Koo-Chi

Trampoline

Thursday May 19
Experimental

Control

Eye-Hand Co-Ordination
 Exercises:-throw bean bag
 in air and
 catch it
 -Repeat but
 clap hands
 -Walk while
 attempting the
 above

Frisbee Toss
 Hot Potato

Throwing Exercises:
 Pylon Roll
 -Roll ball along
 floor into cone
 Frozen Bean Bag on Benches

Friday May 20
Experimental

Control

End of week so allowed
 children to play the
 games they wished:
 Co-Op Tag
 Roll Ball into Cone
 Frozen Bean Bag
 Log Roll

Trampoline

Tuesday May 24
Experimental

Control

Throw Bean Bag back
 and forth (pairs)
 Davis Special

Soccer

Wednesday May 25
Experimental

Control

Davis Special
 Meatball - floor
 bench

Relay Races

Thursday May 26
Experimental

Meatball - sticks
 arms
 legs
 Throwing Exercises
 throw small ball
 through suspended
 hoops
 Shuttle Hoop

Control

Floor Hockey

Friday May 27
Experimental

Right-Left Orientation
 Exercises
 End of week so allowed
 children to play the
 games they wished:
 Bean Bag Toss
 Co-Op Tag
 Meatball
 Shuttle Hoop

Control

Pass The Message
 Red Rover

Monday May 30
Experimental

Skin The Floor
 Ammunition
 Terry's Special

Control

Spud

Tuesday May 31
Experimental

JJ Special
 Meatball on JJ

Control

Shoe Scramble
 Crows and Cranes
 Frozen Tag

Wednesday June 1
Experimental

Practised Right-side-
 Left-Side Orientation
 Jumping Exercises: Boys
 stood on bench holding
 hands with person next
 to him
 1) They all had to step
 down from bench
 2) Do it simultaneously
 with partner

Control

T.V. Tag
 Red Light Green Light

- 3) Jump from bench and land on 2 feet
 - 4) Jump from left foot and land on left foot
 - 5) Jump from right foot and land on right foot
- Tug-A-Mat

Thursday June 2
Experimental

Control

Matilda
Tug-A-Mat
By-Pass

Floor Hockey

Monday June 6
Experimental

Control

By-Pass
Ammunition

Hoop Exercises

Tuesday June 7
Experimental

Control

Follow The Leader
Co-Op Paint In

Pushball

Wednesday June 8
Experimental

Control

Follow The Leader
Balance and Throw

Ship Shore
Snatch The Hat

Friday June 10
Experimental

Control

Body Build
Follow The Leader
End of week so allowed children to play a game that they wished:
Ammunition

Circle Straddle Ball
Circle Soccer

Monday June 13
Experimental

Control

Body Build
Follow The Leader
Skin The Floor

Club Guard

Tuesday June 14	
<u>Experimental</u>	<u>Control</u>
Using a ladder placed on the floor, children had to bunny hop (2 foot takeoff and landing and 1 foot takeoff and landing) into the rungs: Ladder Game Co-Op-Tag- skipping Row Beam Row	Kickball (outside)
Wednesday June 15	
<u>Experimental</u>	<u>Control</u>
Co-Op Beam Walk on the <u>balance beam</u>	Bombardment
Thursday June 16	Post Test Observation Session (30 min.)
Friday June 17	Post Test Observation Session (15 min.)
Monday June 20	Post Striking Test
Tuesday June 21	Administering of The Skimetric Differential Inventory
Wednesday June 22	Motor Skill Testing
Friday June 24	Motor Skill Testing
Monday June 27	Post Test Observation Session (15 min.)

APPENDIX C

ACTIVITIES IN THE CO-OPERATIVE PERCEPTUAL-MOTOR PROGRAM

ACTIVITIES IN THE CO-OPERATIVE PERCEPTUAL-
MOTOR PROGRAM

Introduction Games

THIS IS MY FRIEND:

Children sit in a circle holding hands. One person begins by introducing the person next to him (on his left) by saying "this is my friend (Steve)". When he says his friend's name, he raises his friend's hand in the air. His friend then introduces the person on his left, saying his name and raising his hand. This continues until everyone has been introduced and all hands are in the air with everyone still holding hands with the friend who introduced them and the friend they introduced. As the program progresses the children can ask their friends some simple questions to gain additional information to share with others (e.g., this is my friend Dave, he has a dog; he likes painting, etc.). A more active introduction game can also be incorporated where in a circle formation, one child throws a ball to another child and at the time of release the child shouts the name of the person he is throwing the ball to. This continues until everyone has had a turn.

LOG ROLL:

Six or more players (logs) lie next to one another on

their stomachs on the floor. One player lies on his stomach across their backs. All the logs begin rolling in the same direction giving one player (the rider) a ride across the top of the logs. When the rider reaches the other side he becomes the first rolling log, and the last log becomes the rider. This continues all the way across the gym.

Balance Activities

Static Balance:

SIMON SAYS "BALANCE !"

The purpose of this activity was to assess, in a game situation, the balance ability of each individual child. It was used to introduce balance as the initial activity for subsequent progressive stages.

The leader stands in front of the scattered group and performs various balance positions to which the children mimic when given the command "Simon Says do this !". However if the instructor says "Do this !" (without saying Simon Says), any child who followed these instructions was transferred to a second group where he would repeat the activities under a second instructor.

Specific activities stressed included alternating single foot balance, and then repeating the same, only crossing one's arms across one's chest. While standing on one foot, with the arms crossed in front of the body, the subjects were asked to close their eyes while maintaining

the position. On the floor, "Simon" directed the children to a four-point stance, a three-point stance and finally a two-point stance.

Dynamic Balance:

BASIC BEAM SKILLS:

Each child was asked to walk forward, backward and sideways, on a bench and then on a balance beam. Spotting was encouraged by the performer's partner alongside the bench and beam as he performed. Verbal interaction between the two children was also encouraged.

CO-OP BEAM WALK:

The same basic skills of walking forwards, backwards and sideways were repeated only in a partner formation. That is, partners hold hands and one walks forward as the other child walks backwards. Eye contact was stressed between the two children in order that each partner guide the other verbally towards the end of the beam, rather than each child looking out for himself and focussing solely on the beam.

Subjects can then attempt this with a bean bag placed on their heads.

The purpose of the dynamic balance activities was to establish within the child, a continuous awareness of the effect and direction of gravity and to give each child some

perception of their bodies in relation to themselves, to other people, and in relation to the whole environment in which they are moving.

THE "DAVIS SPECIAL":

a) SOLO TASK BALANCE:

In the first stage each child holds a tray in front of him with a hand on each side. An object, such as a block of wood, is placed on the tray. The child walks forward and then backward with the objects on the tray, initially on the bench and then on the beam. Difficulties may be encountered due to the child's inability to differentiate his trunk from upper extremity movements or his inability to interact with his environment. With a loss of equilibrium, the child may move his arms and thus upset the objects on the tray. Once the child is able to carry the object on the tray it is assumed that he has learned to control his arm movements and use his trunk to maintain balance. Again, spotting by the performer's partner is encouraged.

b) DUAL TASK BALANCE:

On the bench or beam, two children face each other and hold each end of the tray. Objects, such as blocks, are balanced on the tray. On the beam, the children become more dependent on each other than in the case of performing the task on the floor. In this manner, increased awareness of

the other child is hastily increased. Verbal communication is encouraged between partners as they cross the beam forwards and backwards.

c) MEAT-BALL:

Each pair of children is given two sticks, i.e. floor hockey sticks. Each child holds one end of the two sticks in each hand. A ball is held in between the sticks. The children must work together to keep the ball from rolling, or falling through the sticks. As they move back and forth across the beam they learn to work together in order to be able to co-operatively carry the object with another individual successfully. They also become increasingly aware of one's partner and his actions.

At specified points along the beam (for example, the two ends and the middle of the beam), the children plan together the exact moment at which they will release the ball by pulling the sticks further apart. They release the ball so that it bounces off the bench or beam and rebounds to such a height that the children are able to work together and catch the ball between the sticks.

This can be practiced on the floor before the children attempt it on a bench or beam. Once the children can do it with sticks, they can attempt Meatball using only their arms or legs.

ROW BEAM ROW:

Two children sit on a bench facing each other. Their knees are bent and their feet are touching each other. A skipping rope is folded into two and one end of the rope is given to each child. As one child leans forward, the other one slowly lies down on the bench still holding the rope and still maintaining a flexed knee position. In order that the child resume his sitting position, it is mandatory that his partner gradually pull on the rope to help him up while at the same time lowering his body to a supine position. This rowing action by the two children is repeated in the hope of enhancing whole body balance. For additional difficulty, the activity could be transferred to the balance beam.

J.J. SPECIAL:

Two benches are placed parallel to each other and propped against a jungle-jim so that the benches are gradually inclined. Depending on the type of bench in the gymnasium, they may have to be tied to the rungs of the jungle-jim to ensure the safety of the activity. The children were first asked to walk forward and then backward on the sloping bench. Spotting by partners was emphasized. Secondly, two children holding hands walked side by side on the two benches, first forward and then backward. They then turned to face each other and sidestepped up and down the bench holding hands. The sidestep was repeated except the

children balanced a ball between two sticks while travelling up and down the bench. (Refer to the Davis Special activity). Similarly, a small ball was tossed back and forth between the two children as they climbed up and down the benches.

On one sloping bench, two children walk forward and backward on the bench while facing each other and holding hands. Verbal communication is suggested and readily reinforced and encouraged.

As the final progression, two children stand at opposite ends of the same bench facing each other. As they walk towards their partner, they meet their partner usually around the center of the bench. The children must co-operate and develop a method to pass each other, on the bench, in order that each child continue up or down the bench to the other end.

BALANCE AND THROW:

This activity was designed to enhance the balancing ability of the child while he is performing an isolated gross motor skill. That is, while the child is standing on the bench or beam, he is given a bean bag with which he must throw into a waste basket, six to ten feet away. Throwing the bean bag was progressive, i.e. from an underhand toss to an overhand throw. The activity can be modified to integrate co-operation where the partner of the child on the beam, holds a hoop through which the bean bag is tossed. The

partner can vary the height, the distance and the angle of the hoop so that his partner must adjust to the different conditions.

BYPASS:

A more difficult task which again involved the cooperative interaction of two children is Bypass. Each child stands on either end of the bench. The purpose of the task is to walk across the bench to the other end. Since there are two children on the same bench, they must co-operate and devise a way to walk across the bench and pass each other on the bench in order to reach the other end. Spotting is mandatory by their partners to ensure the children's safety.

FROZEN BEAN BAG:

Each child in the class places a bean bag on their head, and they walk, run, skip around the classroom or gym. The object of the game is to help your friend. If the bean bag falls off one's head, the child is "frozen" and is not allowed to move or change his body position. The only way the child can "thaw out" and resume his activity, is if another classmate picks up the bean bag and places it back on his friend's head. Once the bean bag is properly placed the child can begin to move. This can also be attempted with partners walking on a bench to promote balance ability.

TUG A MAT:

The class surrounds a small to medium sized mat. One person stands in the middle of the mat. The rest of the children co-operatively pull the mat from one end of the gym to the other. The child in the center of the mat tries to maintain his balance as the mat is pulled across the gym. The purpose of this activity is to enhance the balance ability of the child in the center of the mat and to increase the co-operative interaction of the children. Once the mat is moved from one end to another, another child moves into the center of the mat.

TERRY'S SPECIAL

Each of the following stunts requires two people to work together to achieve success. In the first one, two people sit facing each other on the floor with their knees bent and feet together. They hold hands as they try to pull each other up to a standing position.

In the second stunt, the two children sit back to back, elbows hooked and knees bent. Again the object of the activity is to assume an erect stance together by pushing on each other's back to support themselves as they stand up.

The third stunt is identical to the second stunt, except the elbows are not hooked. This method requires greater co-operation between the two children. In this activity, the instructor may ask the pair not only to stand

up but also to sit down and also to walk back and forth across the room in a semi-squat position.

Activities for Sequential Skills

Throwing, Catching and Striking:

a) Rolling:

EIGHT-ROLL AND CATCH:

This game was introduced by drawing the figure "8" and asking the children what number it was. Following this, two children stand back to back, one of whom is holding the ball. Once they lean forward, they trace a "figure 8" by rolling the ball along the floor between their legs. The figure is repeated three times and the activity is concluded by passing the ball between the partners' legs so that eight complete catches are made. This can be done in a sitting position with the partners facing each other.

The purpose of this activity is three-fold. First, the children learn the number eight by physically tracing its shape. Secondly, they learn to manipulate and control the ball. Thirdly, given instructions to roll the ball only with their right or left hand, children increase their awareness of right-side-left-side orientation.

PYLON ROLL:

Children were divided up into pairs and given one ball

and one pylon per pair. The pylon was placed on its side on the floor so that the base of the pylon faced out. At a given distance one child attempted to roll the ball into the pylon while the other child retrieved the ball. The subjects switched roles after five attempts. The distance was increased accordingly.

b) Throwing and Catching:

WARM-UP EXERCISES:

Children were asked to throw a bean bag in the air and catch it. The next step was to clap one's hands together while the bean bag was in flight and then catch it. Once this was perfected children were required to throw a bean bag up in the air and catch it while walking.

In pairs, children were required to throw a bean bag back and forth to each other. The distance between the two children was increased according to the children's abilities.

Hoops were suspended on hooks on the wall. At a given distance the children were asked to throw the ball inside the hoop. Underhand and overhand throwing skills were demonstrated.

AMMUNITION:

The class is divided into two equal teams. Each team stands behind its own line, (usually selected at both sides of the gym close to the wall). Each child is given three

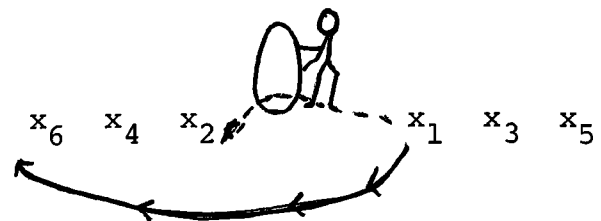
bean bags and faces the opponents on the other side of the gym. A large ball is placed in the middle of the gym at an equal distance from both teams. On the word "Go" the children throw their bean bags at the large ball in order to make it move. The object of the game is to roll the ball over the opponents' line by successfully hitting the ball with the bean bags. One player from each team acts as a fielder. Since his teammates are not allowed to cross over their respective lines, the fielders are responsible to supply their team with the bean bags or ammunition. They fulfill this duty by picking up any stray bean bags, which are lying within the open area, and passing them back to their teammates behind the line. A goal is scored when the large ball crosses the opponents' line.

The game may be adapted to have the children form a single line in a semi-circle formation. They must hit the ball with the bean bags co-operatively in order to make the ball knock down one or two bowling pins placed at the furthest point away from the children.

SHUTTLE HOOP:

--- Path of ball
 — Path of player

The children form two equal teams on either side of a large suspended hoop. The first child of one team (e.g. x_1), throws a medium sized ball using both hands through the hoop to the first



child of the other line, (e.g. x_2). x_1 follows his pass by running to the end of the other line. x_3 moves forward to assume x_1 's former position. Meanwhile x_2 has caught the ball, and when x_3 is in position, he throws the ball through the hoop to x_3 . Again he follows up his pass and runs to the end of the opposite line. And the activity is repeated so that each child catches and throws the ball and runs to the end of the opposite line.

c) Striking:

CO-OP VOLLEYBALL:

This activity is designed to combine the skills of striking and eye-hand co-ordination. Individually, each child is asked to keep a balloon up in the air as long as possible. The instructor tells them whether to use both hands to keep the balloon up or whether to use only the right or only the left hand. The same procedure is used when the children divide up into pairs using one balloon. As a class, in circle formation, the game is repeated.

This activity may be adapted to a game of badminton where the children repeat the same progressions but use a badminton birdie and racquets.

Jumping Hopping and Running:

FOLLOW THE LEADER:

One person acts as the leader. The rest of the

children form a line behind the leader and mimic the activities of the leader. Skills practiced are running forward and backward, hopping on one foot and on two feet and skipping.

WARM-UP EXERCISES:

The children stand on a bench in a straight line holding hands with the person next to him (in pairs). They are asked to perform the following movements:

- 1) Step down from the bench
- 2) Step down from the bench simultaneously with their partner
- 3) Jump down from the bench and land on two feet
- 4) Jump from the left foot and land on the left foot
- 5) Jump from the right foot and land on the right foot.

LADDER GAME:

A ladder was placed flat on the floor. Children were asked to bunnyhop (two foot takeoff and landing) from one rung to the next in one direction. On the way back they hopped on one foot (one foot takeoff and landing). One person acted as an assistant.

CO-OP PAINT IN:

The purpose of this activity was to integrate the vertical jump, group co-operation and eye-hand co-ordination. The children were divided into two equal

groups, preferably of varying heights. On the blackboard two geometric shapes, drawn on paper, were taped at a height at which the children had to jump upwards in order to mark the drawing. They were asked to dip their index finger into a pot of thick paint. Once they had approached the blackboard, they were required to select a point on the outline of the drawing, jump vertically upwards and mark this point with their painted finger. Eventually, the entire outline of the shape should be covered in paint. Each group works co-operatively to outline the shape. For example, the taller children would be responsible for marking the higher limits of the drawing, whereas the shorter children would be responsible for marking the sides and/or baseline of the figure.

SKIN THE FLOOR:

One child stands in the center of the group of children holding one end of a skipping rope. As he swings the rope around in a circle along the floor, the other children jump over the rope as it comes towards them. The object of the game is to keep the rope in motion. Therefore, each child must watch the rope very carefully and jump at the instant the rope would pass beneath him. The person who stops the motion of the rope assumes the central turning position for the activity. The object of the game is to work together, as a group, to keep the rope in motion as it skims the surface of the floor. Individually, each child must develop

the capacity to synchronize his jump to the moment the rope approaches him.

CO-OPERATIVE TAG:

Similar to the traditional game of tag one child called "It" tags another child. Instead of switching the roles of "IT", both children hold hands and tag another child. Eventually, all the children, who have been tagged, are holding hands.

Running is used as the means with which to tag a child and/or flee from the "It" person or chain. Skipping, jumping, hopping or any means of locomotor movement, may be used instead of running. The purpose of the activity is to promote gross locomotor abilities in a game situation.

Right-Side-Left-Side Orientation:

WARM-UP ACTIVITY:

The left hand trick was introduced. Children were asked to place their hands flat on the floor, palms down. They were then told to note that their left thumb and index finger formed the letter "L". This was an easy trick for the children to remember their right from their left.

BODY BUILD:

The objective of this game was to draw a human figure on the blackboard. To stress co-operation within the group

each child was asked to draw one body part which would contribute to the final human figure.

This game can be implemented to stress right-side-left-side orientation. That is, once the total figure is drawn, the children can be asked to differentiate the left from the right in terms of the body parts. Once this is accomplished, the children may be asked to draw a front view and a back view of a figure in order to understand the changes which take place when the body changes its direction from front to back.

BEAN BAG TOSS:

This activity was developed to promote co-operation and the concept of right-side-left-side orientation. One subject was positioned in the center of the gymnasium with a box filled with bean bags. The rest of the group was scattered around the gymnasium. The person in the middle of the gym tossed out beanbags individually in all directions. The rest of the group had to pick up one beanbag at a time and return it to the box before the box was emptied. Therefore, the group worked together to ensure that the box was always full. To encourage the concept of right-side-left-side orientation the subjects were asked to use their right hands to pick up the beanbags, followed by their left hands. The right foot and left foot could also be used, and the subjects would pick up the beanbag with their toes, and hop back to the box.

HOO-CHI-KOO-CHI:

This activity is a sing-a-long game to develop the children's concept of right-side-left-side orientation. The class forms a circle and the leader teaches the song and demonstrates the words and actions which correspond to the words. The words of the song are as follows:

Example: You put your right foot in,
You take your right foot out,
You put your right foot in
And you shake it all about.
You do the Hoo-chi-koo-chi
And you turn yourself around.
And that's what it's all about !
(Clap hands twice).

To do the "Hoo-chi-koo-chi", the children shake their bodies. The rest of the song is self-explanatory. Different parts of the body can be substituted in the song's verse.

MATILDA:

The instructor acts as a puppeteer and one of the children acts as the puppet. The children in the class are seated on the floor in front of Matilda, the puppet. The children are told that Matilda is about to go outside but needs the assistance of the children to dress her warmly and properly. The puppeteer indicates to the children the articles Matilda will need to keep warm and reviews the

different parts of the body which will be clothed. She will also mention different articles that Matilda needs to function in her daily routine. As the tester points out these articles, she will address a particular student to come forward and place the object on Matilda.

Example:

1. "Here are Matilda's keys. She needs them to lock her doors at home. She places them in her right back pocket of her pants".

(Then the puppeteer calls on a child to place the keys in Matilda's right back pocket).

2. "Matilda needs warm socks to wear before she goes out to play- one on her right foot, and one on her left foot".

(For the right and left articles of clothing, such as gloves, socks and shoes, two children at one time are asked to come forward and dress Matilda but identify which arm, leg, hand or foot he is dressing).

Other articles which may be used are earrings, shoes, a watch, rings, a wallet or bus ticket, a sweater and "pig-tails".

Once Matilda is all dressed, the puppeteer reviews every article and where it has been placed.

The game Matilda, was especially designed to increase the awareness of body parts and the concept of right-side-left-side orientation. The purpose of using a puppet and puppeteer was to escape the formal and structural method of

teaching this concept, and body awareness. It was developed as a unique and unstructured activity which the children would enjoy.

EYE-HAND CO-ORDINATION:

CO-OP VOLLEYBALL:

Please refer to this activity listed under Striking Activities of Sequential Skills.

MEAT BALL:

Please refer to this activity described in the "Davis Special" included in the Balance Activities.

THROWING AND CATCHING EXERCISES:

Please refer to these activities in the Sequential Skills section.

APPENDIX D

ACTIVITIES IN THE TRADITIONAL GAMES PROGRAM

ACTIVITIES IN THE TRADITIONAL GAMES PROGRAM

SHIP SHORE:

One person is the leader and calls out instructions to the rest of the children. The children who do not follow the instructions are out. The instructions are:

SHIP: Children line up against one wall

SHORE: Children run to the other wall

CAPTAIN IS COMING: Children stand up straight and salute
the leader

BOMBERS: Children hit the floor on their stomachs. The
only way they can get up is if the leader yells
"Rescue"

RESCUE: Children jump up on their feet and yell "yea"

SUBMARINES: Children lie on the floor on their backs and
raise one leg in the air

DODGEBALL:

Half of the children form a circle and the other half are in the center. One ball is given to the circle players. The circle players roll the ball at the feet of the center players, trying to hit them. The center players move around to dodge the ball. When a center player is hit, he leaves the circle.

After a period of time or when all the children have

been hit, the teams trade places. If a specified time limit is used, the team having the fewest hits wins. Or, the team which puts out all the opponents in the shortest space of time wins.

SNATCH THE BEANBAG:

Two equal teams are formed. They line up in a straight line facing each other. Both teams are numbered off so that each team has a number "1", "2", etc. A beanbag is placed in the middle. The instructor calls out a number, for example, #2. The number 2's from both teams run to the beanbag. The person who can pick up the beanbag and return it to his team without being tagged scores a point. The team with the most points is the winner.

SIMON SAYS:

One player is selected to be "Simon" and stands in front of the class. He gives a variety of commands like, "Stand up," "Clap your hands," "Turn around," and others. He may or may not precede a command by the words, "Simon says." No one is to move unless the command is preceded by these words. Those who move at the wrong time are eliminated and must sit out the game.

The leader gives commands rapidly, changing to different movements. He tries to confuse the class by doing all movements himself.

KICKBALL:

This game is played like baseball with the following exception. With one team in the field at regular positions, the pitcher rolls the ball to the "batter" who instead of batting the ball, kicks it and immediately runs to the bases. The ball is now treated as a batted ball and regular baseball rules prevail. The team who scores the most points is the winner.

TRAMPOLINE EXERCISES:

Children were allowed to do as they liked, however the following stunts were suggested and demonstrated:

- a) seatdrop
- b) kneedrop
- c) swivel hips
- d) touch toes
- e) sequencing of stunts with jumps between the stunts

FRISBEE THROW:

The children are divided up into pairs and practice throwing the frisbee to each other and catching it. Different tricks are demonstrated and the children attempt them.

HOT POTATO:

Children are seated in a circle formation on the floor.

One child is selected as the music man and he sits with his back to the circle. As the music man begins singing or humming the children in the circle begin handing a ball from one person to the next. The object of the game is to pass the ball or beanbag rapidly so no one gets "stuck" with the ball when the music stops. The person who has the ball when the music stops is out. The winner is the child who never got "stuck" with the ball when the music stopped.

SOCCKER:

The teams take a designated position on the floor. The object of the game is to kick the ball through the opponents goal. At the start of the game and after each score, play is started in the center of the floor. One point is given for each goal scored. The winner is the team who scores the most goals. If a person touches the ball with his hands, the opposing team is given a free kick.

RELAY RACES:

The following races can be used:

- a) Run to the wall and back
- b) Run backwards to the wall and back
- c) Crab walk to the wall and run back
- d) Wheelbarrow race to the wall and run back
- e) Dribble a ball to the wall and back

FLOOR HOCKEY:

The teams take a designated position on the floor. The object of the game is to hit the puck through the opponents goal. At the start of the game and after each score, play is started with a face-off. One point is given for each goal scored. The winner is the team who scores the most goals.

PASS THE MESSAGE:

Children are seated on the floor in a circle. One person thinks of a phrase or a sentence and whispers it in the ear of person sitting next to him (i.e. on his right). The message is then passed on to the next person in the same fashion. When the message arrives at the last person he shouts it out. The idea is to see how much the message changes from its original form.

RED ROVER:

Two teams line up in a straight line facing each other twenty-five feet apart. The children hold hands. One team begins by saying "Red Rover, Red Rover, We call Johnny over. Johnny then runs from his side to the other and tries to break through the link made by two children holding hands. If he breaks the link he brings a member of the opposing team over to his side. If he fails to break the link he joins the opposing team's line. The opposing team then call over a person. The team with the most members

at the end is the winner.

SPUD:

Players are numbered consecutively and stand in a small circle. One player is in the center, holding the ball. He tosses the ball straight up moderately high, at the same time calling the number of one of the other players. All players scatter immediately, except the player whose number was called. He goes to the center of the circle, catches the ball, and immediately calls, "stop". All players stop at once in their place and must not move their feet from the fixed position. The player with the ball takes three steps in any direction, selecting a player whom he wishes to hit. He throws the ball at this player, trying to hit him. If he misses, he gets a point (dud) against him. If he hits a player or the player moves his feet, the player gets one point against him. The player against whom the point was scored throws up the ball for the next game. When a player gets a stipulated number of points, he is out of the game or he can pay a penalty.

SHOE SCRAMBLE:

Children form two teams, one on either side of the gym. Each child puts one shoe in the center of the floor. The children run to the pile of shoes, find their own shoe, put it on and return to their own side of the gym. The first complete team back and sitting down, wins.

CROWS AND CRANES:

Children are divided into two groups, the "Crows" and the "Cranes." The groups face each other at the center of the area about 5' apart. The leader calls out either "Crows" or "Cranes" using a "Kr-r-r-r-r" sound at the start of either word to mask the result. If "Crows" is the call, the Crows chase the Cranes to the goal. If "Cranes" is given, then the Cranes chase. Any child caught goes over to the other side. The team which has the most players when the game ends is the winner.

FROZEN TAG:

One child is "IT". The rest of the children are scattered over the area. When caught he is "frozen" and must keep both feet in place. Any free player can tag a "frozen" player and release him. The object of the tagger is to freeze all the players.

T.V. TAG:

One child is "IT". He attempts to tag the other children, who can be safe if they yell three television programs. The child tagged changes places with "IT".

RED LIGHT GREEN LIGHT:

A starting and finishing line are established forty feet apart. One child is "IT" and stands on the finishing

line with his back to the rest of the children. The remainder of the children stand on the starting line. The object of the game is to reach the finish line first. When "IT" yells "Green Light" the children proceed toward the finish line. When "IT" yells "Red Light" he turns around and faces the children who at this point must freeze. Any child caught moving when "IT" turns around must return to the starting position. The first child who crosses the finish line is the winner and becomes "IT".

HOOP EXERCISES:

Each child is given a hoop and asked to devise different ways of using it.

PUSHBALL:

The teams takes a designated position on the floor. The object of the game is to push the ball with one's hand through the opponent's goal. At the start of the game and after each score, play is started with a face-off. One point is given for each goal scored. The winner is the team who scores the most goals.

CIRCLE STRADDLE BALL:

Children are in a circle formation, facing in. Each stands in wide straddle step with the side of his foot against the neighbour's. The hands are on the knees.

One ball is used. The object of the game is to roll

the ball between the legs of any player before he can get his hands down and stop it. Each time the ball goes between the legs of an individual, a point is scored against him. The players having the least points against them are the winners.

CIRCLE SOCCER:

Players kick the ball back and forth inside of the circle. The object is to kick the ball out of the circle underneath shoulder level of the circle players. A point is scored against each of the players where the ball left the circle. However, if the lost ball is clearly the fault of a single player, then only the point is scored against him. Any player who kicks the ball over the shoulders of the circle players has a point scored against him. Players with the lowest points scored against them win.

CLUB GUARD:

A circle about 15' in diameter is drawn. Inside this circle at the center, an 18" circle is drawn. The club is put in the center of the small circle. One child guards the club. The other children are back of the larger circle which is the restraining line for them. This circle should be definite.

The circle players throw the ball at the club and try to knock it down. The guard tries to block the throws with his legs or body. He must, however, stay out of the smaller

inner circle.

The outer circle players pass the ball around rapidly so one of the players can get an opening to throw, as the guard needs to maneuver to protect the club. Whoever knocks down the club becomes the new guard.

If the guard steps in the inner circle, he loses his place to whoever has the ball at that time.

BOMBARDMENT:


A line is drawn across the center of the floor from wall to wall. This divides the floor into two courts, each of which is occupied by one team. Another line is drawn 25' from the center line in each court. This is the club line. Each team sets their clubs on this line. These should be spaced. Each team is given two of the balls. More balls can be used.

The object of the game is to knock down the other team's clubs. Players throw the balls back and forth but cannot cross the center line. Whenever a club is knocked over by a ball or accidentally by a player, the club is removed. The team with the most clubs standing is declared the winner.


Out-of-bounds balls can be recovered but must be thrown from the court.

APPENDIX E
SKIMETRIC DIFFERENTIAL INVENTORY

2.




"Right now I'm full of energy and I feel like doing something."




"Right now I'm tired and I don't feel like doing anything."

"most of the time I don't like to be with other kids."





"most of the time I like to be with other kids."




3.

"most of the time I am a happy, cheerful person and I like being the way I am."





"most of the time I am a sad and unhappy person and I wish I were different."

"I'm pretty strong"




"I'm ~~not~~ very strong"




4.

"I'm dumb about most things and forget what I learn."




"I'm smart about most things, and remember what I learn."




6.

"when I say Let's do something most of the other kids do it"




"when I say Let's do something none of the other kids want to do it"




7.

"I'm a good person and I behave myself."




"I do many bad things and get in trouble a lot."




8.

"I spend my doing things rather than thinking about them"



"Let's go"



"GOOD IDEA"

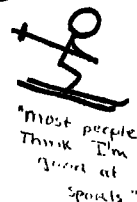
"I spend a lot of time thinking about things"



"It's hard for me to make friends, AND I feel left out of things"

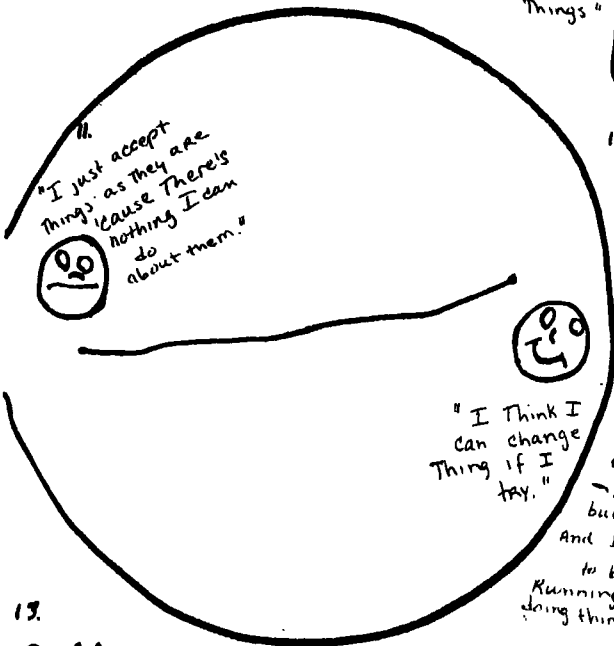


"I'm not very good at sports"



"Most people think I'm good at sports"

"I'm a lazy person, and I like to lay around a lot."



"I just accept things as they are cause there's nothing I can do about them."

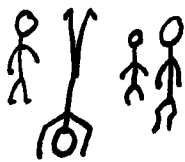


"I think I can change things if I try."

"I'm a lively person bubbly with energy and I always like to be running around doing things"



13.



"I like to do things in front of other people I'm a bit of a show off"

"I like to do things on my own with nobody else around."

KEEP OUT

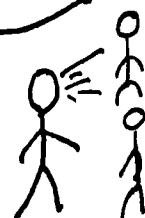


14.

"I'm a shy quiet person. I'm mostly quiet when I'm with other people."



"I'm an outgoing person and I talk a lot with other people, even strangers"



15.

"If I get some money I like to go and spend it right away."



BANK



"If I get some money I like to save it for later."

16.

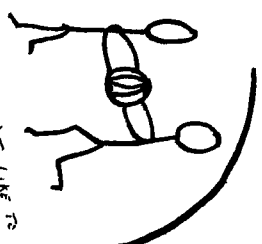
"The most important thing is to just have fun AND enjoy yourself."



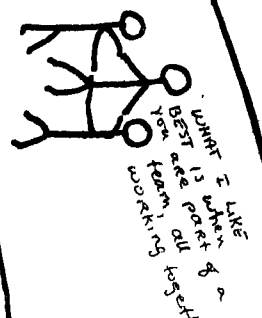
"The most important thing is to study hard AND work hard"

19. 9
5
1

Don't like
as kids
'play
with
my things'



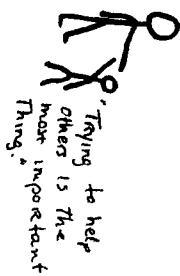
'I LIKE TO
SHARE THINGS
WITH OTHER
KIDS'



'WHAT I LIKE
BEST IS WHEN
DAD & BEST
FRIEND ARE
TOGETHER
WORKING
TOGETHER'

'WHAT I LIKE BEST
IS WHEN YOU
ARE ON
YOUR OWN
AND YOU
DON'T
HAVE TO
WORK
TOGETHER'

18.



'Trying to help
others is the
most important
thing.'

'Trying to beat
(or be better than)
others is the most
important thing.'

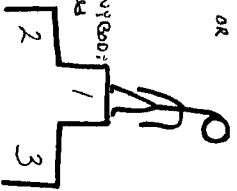


21. If you just won a race would
you want to:
TELL EVERYBODY
HOW GOOD
YOU DID.



OR

'NOT TELL ANYBODY
IN CASE THEY
WOULD
THINK YOU
WERE A
BIG
SHOT.'



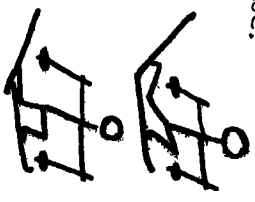
19. Which would you rather do :

Ski over a really hard trail all
the way to the end.



win a race.

OR

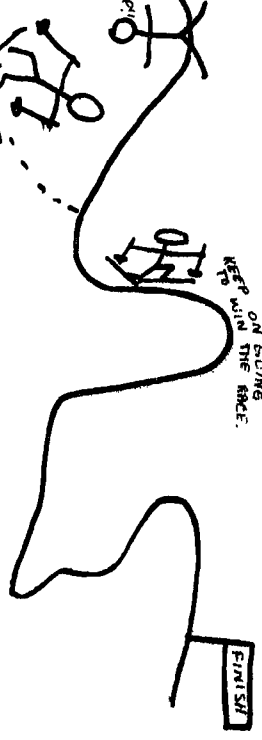


22. WHAT WOULD YOU DO if you
were in a race and one of the kids
couldn't get out?

KEEP ON SKIING
KEEP WITH THE RACE.



HELP!
STOP TO
HELP



FINISH

FINISH

APPENDIX F

RAW SCORES

MOTOR RAW SCORES

EXPERIMENTAL

Name	Right- pre	Left- post	Static pre	Balance post	Eye-Hand pre	Co-ord post	Throwing pre	post
D.	8	12	40.10	65.7	15.18	15.43	11	14
J.	4	12	28.2	41.1	28.42	38.53	12	17
C.	8	12	33.1	46.4	8.77	16.70	13	10
K.	12	12	53.9	48.7	4.33	7.94	12	16
M.	12	12	38.3	57.6	15.91	18.78	9	13
G.	11	12	43.5	38.3	25.94	22.72	14	16
S.	8	12	45.2	51.7	5.60	15.60	12	18
S.	12	12	35.0	58.9	11.80	27.26	14	16
C.	12	12	20.7	42.2	9.23	15.39	8	17
E.	8	12	28.2	59.0	9.75	12.18	6	8
	—	—	—	—	—	—	—	—
MEAN	9.5	12	36.6	50.9	13.49	19.05	11.1	14.5

CONTROL

G.	0	4	31.3	29.4	9.17	2.89	12	7
A.	8	4	35.7	38.3	22.44	25.32	11	16
G.	8	5	24.1	32.4	15.92	19.57	13	9
K.	12	12	24.9	19.6	7.97	10.75	5	12
M.	12	12	31.3	31.8	1.63	2.33	3	3
R.	10	12	47.6	62.0	4.60	11.39	15	16
O.	8	8	22.9	33.3	5.55	16.68	9	4
D.	0	0	41.7	48.4	10.70	14.36	15	12
G.	12	12	30.3	25.3	19.53	23.94	14	16
	—	—	—	—	—	—	—	—
MEAN	7.77	7.66	32.2	35.61	10.83	14.13	10.7	10.5

EXPERIMENTAL

Name	Running pre post	Dynamic pre	Balance post	Hopping pre post	Striking pre post
D.	42 56	4	16	22 20	AB 12
J.	52 52	6	16	16 23	11 15
C.	55 58	6	9	16 23	11 19
K.	49 53	9	16	23 24	9 17
M.	51 54	5	16	14 21	8 20
G.	51 57	7	12	15 23	18 19
S.	46 49	5	16	14 19	6 16
S.	46 48	15	16	14 21	15 18
C.	48 51	3	10	17 20	6 15
E.	46 48	3	15	15 21	5 10
	-----	-----	-----	-----	-----
MEAN	48.6 52.6	6.3	14.2	16.6 21.5	9.8 16.1

CONTROL

G.	44 46	7	11	22 21	12 11
A.	48 49	12	10	18 21	16 19
G.	47 48	9	11	18 18	9 16
K.	50 47	7	6	17 17	12 15
M.	47 48	11	8	15 19	4 4
R.	44 52	10	16	15 18	7 6
O.	42 47	3	13	15 15	3 3
D.	49 50	9	6	18 18	12 15
G.	54 52	14	13	20 20	12 14
	-----	-----	-----	-----	-----
MEAN	47.2 48.7	9.1	10.4	17.5 18.5	9.6 11.4

SOCIAL RAW SCORES

EXPERIMENTAL

Name	SKI # 9		SKI #20		SKI #22		OBSERVATION ¹		SCAN
	pre	post	pre	post	pre	post	pre	post ¹	post ²
K.	1.1	4.6	5.3	4.7	0.9	1.0	1	1	4
C.	0	0	4.8	4.2	0	0	4	5	1
D.	ABSENT						ABSENT		
C.	4.3	8.0	4.0	8.0	7.9	8.0	4	3	6
E.	0	0.2	0	0.2	0	0.2	3	3	3
G.	4.0	4.1	0.5	0.3	0.3	0.2	ABSENT		
S.	0	4.4	4.6	8.0	8.0	8.0	1	1	1
J.	7.1	8.0	4.2	7.5	0.8	0	0	1	0
M.	1.2	1.1	0.8	0.9	0.7	0.9	3	3	3
S.	8.0	7.6	4.8	7.4	8.0	7.4	8	5	3
MEAN	2.8	4.2	3.2	4.5	2.9	2.8	TOTAL24	22	21

CONTROL

D.	8.0	7.9	0.2	5.2	0.1	0.1	ABSENT		
G.	7.8	7.8	3.0	0.2	7.8	7.8	3	1	1
G.	7.6	1.1	0.6	0.4	0.4	0.5	2	1	1
M.	3.5	1.7	0.3	0.4	0.3	0.3	2	0	1
O.	0.3	0.1	0.3	0.2	6.8	7.9	ABSENT		
G.	1.0	0.7	1.2	7.5	7.7	7.8	4	2	1
A.	4.5	4.4	0.4	4.0	0.5	0.4	3	2	1
R.	4.9	4.5	0.1	3.2	0	0.1	2	0	5
K.	8.0	8.0	7.9	8.0	0	8.0	2	1	1
MEAN	5.0	4.0	1.5	3.2	2.6	3.6	TOTAL18	7	11

NOTE: The Skimetric Scale Scores have been weighted in the appropriate direction (see Orlick et al, 1975)

Post¹ refers to the thirty minute observation session

Post² refers to the two fifteen minute observation sessions

APPENDIX G

FACTOR ANALYSIS OF THE MOTOR DEPENDENT VARIABLES

FACTOR ANALYSIS PROCEDURES

As a result of limiting the number of factor solutions to those where the eigenvalues exceeded 0.50, six factors were generated from the data. A further test, known as the "Scree Test" was performed on the data. This test involved plotting the eigenvalues on a graph and determining where the curve became linear. The results of this procedure indicated that there were actually only three major factors (Figure 1). The remaining factors, known as unique factors were attributed to a large number of random small influences arising from correlations among independent specifics in the population, and measurement errors. It is for this reason that only three factors have been discussed in depth.

It should be added that in order to better interpret the factor loadings the axes were rotated obliquely in increments of .3 beginning at delta .50. It was concluded that the best interpretation lay in the delta .70 position.

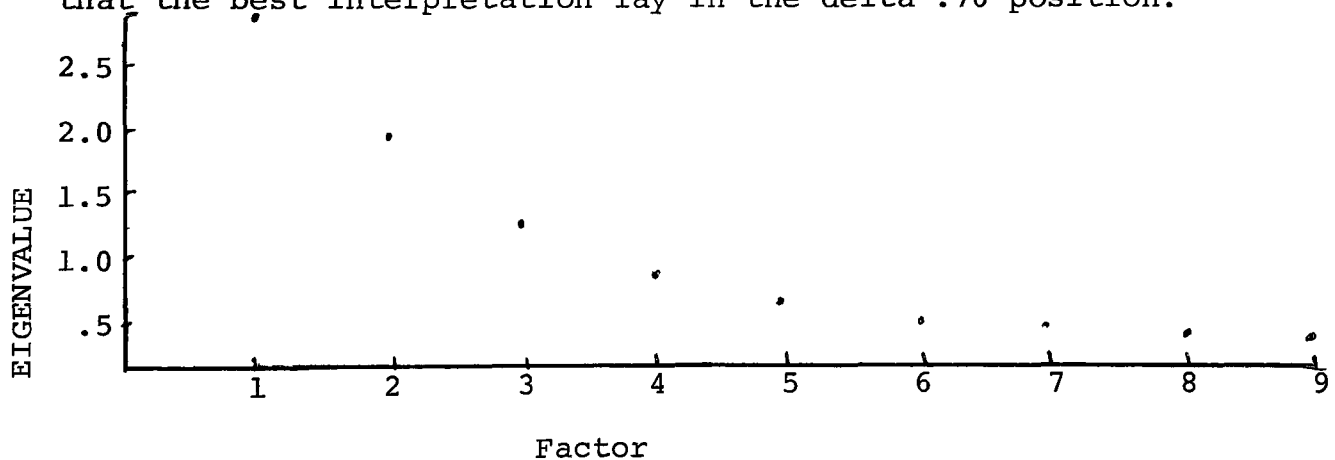


Figure 1

SCREE TEST-MOTOR

APPENDIX H

FACTOR ANALYSIS OF THE SOCIAL DEPENDENT VARIABLES

FACTOR ANALYSIS PROCEDURES

The eigenvalue was set at 0.50 limiting the analysis to four factor loadings. To determine the common factors the eigenvalues associated with the generated factors were plotted on a graph in descending order and examined by means of the Scree Test for the point in the distribution where the curve became a straight line thus marking the beginning of unique factors. The results of this procedure indicated that there were actually three common factors (Figure 2).

The axes were rotated obliquely in increments of .30 beginning at delta .50. It was concluded that the best interpretation lay in the delta .40 position.

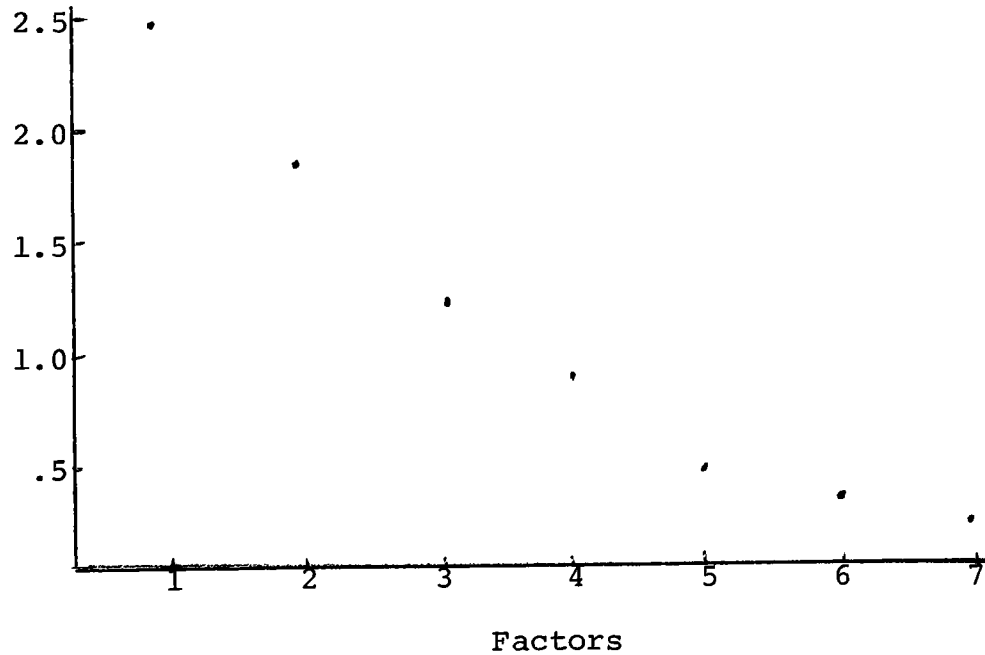


Figure 2

SCREE TEST-SOCIAL

APPENDIX I
ACADEMIC BIOGRAPHIES OF THE SAMPLE

ACADEMIC BIOGRAPHIES OF THE SAMPLE

The following information was taken from each child's Carleton Board Student Achievement Form.

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
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A.	29-9-68	3
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Program level of instruction: Receiving special emphasis on basic facts and fundamentals in Language Arts.

Comments: Works very slowly due to lack of fluency in handwriting. Experiences difficulty in Word Attack Skills, spelling, printing/handwriting and knowledge of tables in mathematics.

B.	18-9-69	2
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Program level of instruction: Receiving special emphasis on basic facts and fundamentals in Language Arts.

Comments: He is experiencing difficulty in reading. He relies on a phonetic attack approach and is at yr. 1/3 mo. level. Mother feels child has developed a negative self-image. He experiences difficulty in Problem-Solving Skills (Mathematics) and Knowledge of Tables (Mathematics).

C.	1-12-68	4
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Program level of instruction: Working in a program with special goals or for special reasons in Language Arts, Mathematics.

Comments: His achievement levels are below average in reading, spelling and mathematics. He is weak

in visual perception, visual memory, visual association, and auditory memory. He requires specific programming in these areas. He was placed in a special education Primary S L D Class.

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
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D.	4-2-68	3
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Program level of instruction: Working in a regular program.

Comments: His overall performance in gross motor areas appears awkward and clumsy. He has a great deal of difficulty with balance, eye-hand co-ordination activities and general physical education games. His spelling is not accurate or consistent and reversals are still in evidence. In the auditory areas, K. has a great deal of difficulty remembering oral directions. His auditory recall is poor.

E.	9-8-68	3
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Program level of instruction: Receiving special emphasis on basic facts and fundamentals in mathematics.

Comments: He experiences difficulty in fluency of oral reading, word choice and grammar, fluency of speech, and knowledge of tables in mathematics.

F.	1-5-69	2
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Program level of instruction: Working in a regular program.

Comments: There is a large gap between O.'s apparent ability and his performance. Learning occurs

only when he is in a small group situation or on a one-to-one basis - he requires much reinforcement of skills. He is making below average progress in cursive writing and physical education. His attention span is short. He does not socialize very much with his peers.

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
G.	25-10-66	Special education

Program level of instruction: Working in a program with special goals or for special reasons in Language Arts and mathematics.

Comments: He experiences difficulty in knowledge of tables (mathematics), Understanding of concepts and Computation Skills. He has a short attention span and requires placement in a well structured class for part of his work, and given remedial assistance and help in the development of certain Spatial Skills including right-left orientation, reproducing geometric forms, rapid eye-hand co-ordination ability and discriminating forms from a complex background.

H.	23-12-69	2
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Program level of instruction: Receiving special emphasis on basic facts and fundamentals in Language Arts.

Comments: He is easily distracted and is frequently unattentive. He is still below grade level and needs remedial work. He experiences difficulty

in Word Attack Skills, fluency of oral reading, written expression, knowledge of tables (mathematics) and Computational Skills. He experiences great difficulty in working and playing with others.

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
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I.	12-5-67	4
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Program level of instruction: Receiving special emphasis on basic facts and fundamentals in Language Arts.

Comments: He has great difficulty with spelling, mathematics and Word Attack Skills. He shows lack of co-ordination in P.E. program. He lacks self confidence.

J.	4-8-68	3
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Program level of instruction: Working in a regular program.

Comments: He experiences difficulty with printing/hand-writing, fluency of speech, and knowledge of tables (mathematics). He has coordination difficulty.

K.	14-3-68	3
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Program level of instruction: Working in a regular program.

Comments: He experiences difficulty with fluency of speech and a greater effort is desired in physical education. R. is a very shy boy and he will only respond with a minimum answer. He must try harder to express his thoughts and feelings.

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
L.	10-12-69	2
<p>Program level of instruction: Working in a regular program.</p> <p>Comments: What D. needs is a positive self image. Great effort is desired in attentive listening.</p>		
M.	21-3-68	Special education
<p>Program level of instruction: Working in a program with special goals or for special reasons in Language Arts, Mathematics.</p> <p>Comments: He has an acute fluency problem in oral reading and speech. He experiences difficulty with attentive listening. His general co-ordination indicates a need for gross motor training. His spelling is below grade two level.</p>		
N.	7-8-67	3
<p>Program level of instruction: Working in a program with special goals or for special reasons in Language Arts and mathematics.</p> <p>Comments: He is very weak in reading and written skills. Specifically he requires remediation in the area of phonics. He experiences difficulty in Comprehension Skills, Word Attack Skills, fluency of oral reading, word choice and grammar, spelling, knowledge of tables, problem-solving skills, skill development in physical education. Tested to have dyslexia.</p>		

<u>Name</u>	<u>Birthdate</u>	<u>Grade in Sept. 1976-77</u>
O.	29-6-67	Special education
Program level of instruction: Working in a program with special goals or for special reasons in Language Arts.		
Comments: He experiences difficulty in comprehension skills, word attack skills, fluency of oral reading, word choice and grammar, spelling, and problem-solving skills.		
P.	31-5-70	1
Program level of instruction: Receiving special emphasis on basic facts and fundamentals in Language Arts.		
Comments: He experiences difficulty with fluency of oral reading, word choice and grammar, attentive listening. Tumbling and gross motor activities present problems.		
Q.	5-6-70	1
Program level of instruction: Working in a regular program.		
Comments: He has found listening during group instruction quite difficult. He does not follow through on tasks. He is slow to begin and follow through on his tasks. He gets behind easily. Listening skills need consistent effort. He loses confidence easily, and as a result does not perform as well as might be expected.		
NOTE: * The academic bibliographies for two students were not available since these subjects were transferred from Robert Hopkins Public School.		