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A COMPARISON OF MOTOR SKILLS OF FIVE
AND SIX YEAR OLD CHILDREN

By

EUGENE DAVIS

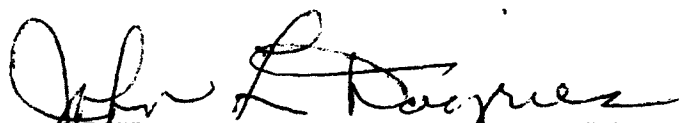
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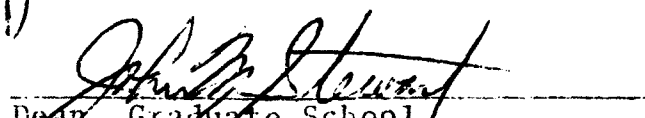
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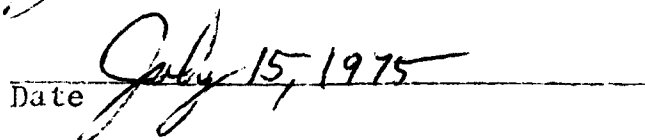
Master of Science for
Teachers of Physical Education
UNIVERSITY OF MONTANA

1975

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CHAPTER I

INTRODUCTION

The Importance of Motor Skills

Motor ability and skills in physical performance are essential to a child's development and to his maturation into adulthood. The importance of being able to perform certain basic physical skills successfully can hardly be overestimated. Body control skills, vocational, social, and recreational skills make up a great part of one's life activities. High value is placed on physical skill by many educational and scientific authorities. For example, Hurlock said:

Because motor skills play such an important role in the child's success in school and in his play with other children, the child whose motor development lags behind that of other children of his age is greatly handicapped. When he is awkward and lacks skills other children have, he is likely to withdraw from the group and develop unhealthy attitudes toward himself and social life.¹

Baldwin stated that motor skill is essential for adjustment in our culture. He states that:

¹Elizabeth B. Hurlock, Developmental Psychology (New York: McGraw-Hill Company, Inc., 1959), p. 172.

We should not think that motor skill is unimportant; although our society does not require as highly developed motor skill of its members as do some of the primitive societies, it is essential for the child's adjustment to our culture. In later childhood the importance of motor skill lies in the fact that it is a source of recognition and popularity in the group.²

Delacato³ proposed that reading readiness depends on "complete neurological organization," properly fostered by the correct sequence of infant developmental motor activity. He also proposed that reading difficulty can be treated by proper developmental physical exercise, programmed in terms of the gaps which, he hypothesizes, have occurred in the normal sequence of infant motor development; and that reading difficulty can be prevented from occurring in the primary years if such treatment has been adequately administered in the pre-school years.

Espenschade and Eckert⁴ concluded that in the years from two to six, all of the usual locomotor patterns are perfected and a variety of eye-hand coordinations are learned. They pointed out that motor skills play a significant role in social development, even at these early ages.

²Alfred L. Baldwin, Behavior and Development in Childhood (New York: The Dryden Press, 1955), p. 293.

³Carl H. Delacato, Neurological Organization and Reading (Springfield, Illinois: Charles C. Thomas, 1966), p. 121.

⁴Anna S. Espenschade and Helena M. Eckert, Motor Development (Columbus, Ohio: Charles E. Merrill Books, Inc., 1967), p. 105.

They also noted that the child gains approval from his parents as he learns to do things for himself and that his early contacts with other children are frequently through parallel and manipulative play in which objects may circulate among the group.

Singer pointed out that there may be a strong relationship between early motor skills and intellectual achievement. He stated that:

During infancy and early childhood, a strong relationship between the physical, neurological, and intellectual processes has been demonstrated. Abilities are more general at this point in life, but become more specific with time. There is a similar development of motor patterns and intellectual skill, and it appears that achievement in basic motor movements will contribute to intellectual achievement.⁵

Oxendine concluded that physical fitness and general motor capacities are important in establishing one's readiness to learn and perform more advanced skills.

He also concluded that the activity of an individual through his elementary school years will, to a great extent, determine his readiness for a wide variety of activities or a few specific sports at the junior high school level. Activity tends to promote readiness for further activity. The best way of promoting readiness for learning and performance in motor activities is by encouraging general physical activity. This broad base of activity can be instrumental in the development of basic components essential for participation

⁵Robert N. Singer, Motor Learning and Human Performance (New York: MacMillian Company, 1968), p. 160.

in a wide variety of activities.⁶

Lawther stated that early motor skill training seems to be related to higher peaks of skill achievement in later life. He further stated that:

Skill, ability to succeed, more opportunity for the more skilled to participate, growth of interest with increase in skill, all may contribute to superiority in skills as an adult for the child who starts younger.⁷

We often overlook the fact that during infancy and pre-adolescent years the child has almost indefatigable energy. If he is healthy and is not denied the opportunity, he practices various body-control and socio motor skills almost every waking moment. Moreover, never again will he have available such a great amount of vigorous activity time.

Abilities in physical performance may well be linked to a child's being accepted by others. Popularity in high school may be contingent upon the ability to compete successfully on the football field or to perform skillfully on the dance floor. Practically all of the activity of adult life involves physical performance to some degree. The importance of motor skills is often an important factor in such areas as social standing and happiness and self-

⁶Joseph B. Oxedine, Psychology of Motor Learning (New York: Appleton-Century-Crofts, 1968), pp. 146-147.

⁷John P. Lawther, The Learning of Physical Skills (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 32.

confidence. Moreover, a very evident lack of ability in physical skills may result in feelings of inferiority. "A study of the expert opinions of professional workers with the handicapped revealed that feelings of inferiority headed the list of behavior characteristics mentioned by 26 authors in general articles about the handicapped."⁸

The Changing Environment and Motor Skill Development

It has been hypothesized that the changing environment and culture of today, as contrasted with earlier years, has brought about changes in the ability of children to perform various motor skills. The life and activity of man would presumably change with marked changes in economic and social life, urbanization, and automation of industry. During the past three decades this nation has achieved scientific and technological advances unparalleled in the history of mankind. New knowledge has been added to old and these advances have had far-reaching implications with respect to physical activities and motor skill development.

Our children currently enjoy the benefits of sophisticated knowledge of foods and nutrition with accompanying improvement in health, vigor, and physical size. New types

⁸Beatrice A. Wright, Physical Disability--A Psychological Approach (New York: Harper and Brothers, 1959), p. 138.

of play equipment have been invented for children of all ages. A much richer society allows its members the luxury of advanced equipment utilized in developing motor skills. As the nation focuses on the eradication of poverty, the disadvantaged also have access to skill developing equipment. However, the additional leisure time of present day society, and the decrease in need of physical work may have had both positive and negative effects on physical development.

This country has slowly experienced a massive movement from a rural to an urban society with its accompanying decrease in emphasis on agricultural processes. It seems likely that the motor skills of those living and working on a farm would differ from those utilized in urban living. Cureton has offered the conclusion that "physical training programs are not compensating rapidly enough for urbanization with its associated mechanization, indoor work, dependence on motor vehicles, and lack of necessity of hard physical work in youth."⁹

Automation has replaced the vocational need for development of various motor skills; i.e., man is becoming increasingly dependent on machines. There has been, of course, a necessity to develop some new motor skills to manipulate

⁹T. K. Cureton, "The Unfitness of Young Men in Motor Fitness," Journal of American Medical Association, 123 (August, 1943), p. 69.

these machines. "No one can foresee the full potentialities of automation within the next decade, but given a constant level of production, economists estimate that automation will replace the labor of anywhere from 1.5 million to 2.5 million workers per year."¹⁰

Types of recreation and entertainment have, of necessity, changed much from those employed during earlier days when there was more necessity for hard physical work. "It has been shown that specialized labor gives niggardly and one-sidedly to physical development and that play is needed to supply all-around use of the muscles in a normal way."¹¹

Statement of the Problem

The problem of this investigation was that of assessing the general motor skill levels of selected five and six year old students. More specifically, the study attempted to assess selected motor skills of five and six year old children enrolled in a Head Start Program and private kindergartens in Missoula, Montana.

In addition, it attempted to answer the following questions:

¹⁰Reo M. Christenson, Challenge and Decision, Political Issues of Our Time (New York: Harper and Row, 1964), p. 84.

¹¹Wilbur P. Bowen and Elmer D. Mitchell, The Theory of Organized Play, Its Nature and Significance (New York: A. S. Barnes and Company, 1925).

1. What levels of performance may be expected from five and six-year-old children?
2. Are there significant differences in performance levels between boys and girls?
3. Are there characteristic need areas which may have implications for physical education training programs?
4. In considering varied socio-economic backgrounds, are there differences in proficiency levels among children of the same age?

Significance of the Study

It is hoped that this study has contributed significant findings regarding the present day motor achievements of five and six-year-old children. Moreover, it is hoped that these findings will be useful to parents and educators in assessing levels of growth and development, and in planning suitable physical education programs for young children and in selecting play equipment for use in schools and playgrounds.

Limitations of the Study

The study was limited to 111 five and six-year-old children enrolled in a Head Start program in Missoula, Montana and 49 five and six-year-old children enrolled in private kindergartens. The study was further limited to an

appraisal of ten selected motor skills, namely, hopping, skipping, galloping, jumping, climbing, sliding, tricycling, bouncing, throwing and catching a ball. These are fundamental skills typically engaged in by children at this age level. No attempt was made to appraise total motor achievement.

Definition of Terms

The following terms and their definitions were used in the study. All terms and definitions coincided with those used by Gutteridge in her study:¹²

Early childhood. That period in the life of a child from two to six years.

Motor Skills. Refers to the activities of hopping, skipping, galloping, jumping, climbing, sliding, tricycling, bouncing a ball, throwing a ball, and catching a ball.

Proficiency Level. Refers to defined standards of achievement for the motor skills.

Hopping. A series of even jumping movements along the horizontal level of the floor or ground.

Skipping. A series of rhythmical movements along the horizontal level of the floor or ground involving a slight hop on alternating feet.

¹²Ibid., p. 39.

Galloping. Bounding forward with a long step on the forward foot.

Jumping. Launching the body from one solid surface to another over a distance.

Climbing. Ascending from a lower to a higher level by means of feet in stepping.

Sliding. Propelling the body or allowing it to slip down a sloping board.

Tricycling. Using the tricycle as a means of locomotion involving pedaling with the feet and guiding by the hands.

Bouncing the Ball. Launching the ball downwards so that it hits the ground sharply and is deflected upwards again.

Throwing the Ball. Launching the ball by quick movement of the hand and a release of the ball.

Catching the Ball. Holding hand or hands in such a position that the ball is grasped while it is in flight.

CHAPTER II

REVIEW OF RELATED LITERATURE

Motor Development Patterns in Early Childhood

Although some investigators consider the division between infancy and early childhood to be at an age of eighteen months, most researchers consider the period of early childhood to encompass the age range of two to six years. Regardless of the age used to divide these groups, an examination of the literature concerned with the motor behavior of young children reveals that it is generally during this time span that the usual locomotor patterns are perfected and a variety of eye-hand coordinations are learned. In the evolutionary process of developing the young child will learn to walk, run, and speak by the age of two. McCarthy¹ has reported that a child of two will have a mean vocabulary of 29.1 different words and that the gain in new words is greatest between two and three years of age. He also reports that a child of five and one-half years will have a mean vocabulary of approximately one hundred different words.

¹D. A. McCarthy, The Language Development of the Pre-School Child (Minneapolis: University of Minnesota Press, 1930).

Landreth suggested that young children are able to make gains in both speech and walking simultaneously but do so at the expense of each other. She also believes that motor development takes precedence over speech development during this period and this is especially true of young boys.

Espenschade² pointed out that early behavior patterns are generally consistent among young children, but development rates differ widely among individuals. There may be various reasons for this among which may be heredity and/or environmental deprivation or enrichment. She concluded that there is a tendency for certain phases in the developmental sequence to be achieved by children at approximately the same time. She further concluded that although no distinction is generally made in the motor performance of boys and girls in most activities during infancy and early childhood because the differences are not very great, there are some events in which one sex tends to exceed the other in either maturity of pattern development or in objective measure. Espenschade further concluded that in the years from two to six all of the usual locomotor patterns are perfected and a variety of eye-hand coordinations are learned.

²Anna Espenschade, "Motor Development," in Warren B. Johnson (ed.), Science and Medicine of Exercise and Sports (New York: Harper and Brothers, 1960).

Development of Fundamental Motor Skills
Of Young Children

Seils³ conducted a study in which he attempted to determine if there were an existing relationship between measures of physical growth and maturity of 517 primary school children and their proficiency in performing certain gross motor activities. Height and weight were used as measures of physical growth while physical maturity was assessed by X-rays of the carpal bones of the wrist. Gross motor performance was assessed by appraising each child's proficiency in the following several items: running, jumping, throwing, balancing, agility, striking, and catching.

From this investigation the author concluded that the mean performance of both boys and girls improves at each successive grade level. He further concluded there was little or no correlation between the gross motor skill performance of the subjects studied in this investigation and their age, weight, and height. While a relationship between maturity and certain gross motor skills existed it was considerably low.

Cowan and Pratt⁴ examined the motor coordination of chil-

³LeRoy Seils, "The Relationship Between Measures of Physical Growth and Motor Performance of Primary-Grade School Children," Research Quarterly, XXII (May, 1951), pp. 244-260.

⁴Edwina A. Cowan and Bertha M. Pratt, "The Hurdle Jump as a Developmental and Diagnostic Test of Motor Coordination for Children from Three to Twelve Years of Age," Child Development, V (June, 1934), pp. 107-121.

dren between the ages of three and twelve. Of the 540 children used in the study forty were five years old and twenty-seven were six years old. The standing jump over an adjustable hurdle was selected by the investigator as a test of motor coordination because of its practicability and it did not require any hand-eye coordination by the subjects. The data gathered for this study included the highest jump made by each child and the form in which the jump was made. From the results of this study the authors reported that the older the child was the higher he jumped; and that the weight of a child was not a determining factor in the height of a jump. Also, the investigators concluded that the relation of height to weight was not significant in determining the height of a jump. In addition to these findings, the authors reported that the standing jump was of diagnostic value in uncovering slight retardations in motor coordination. Finally, it was reported that there was very little difference in jumping performance between boys and girls of the same age and what difference there was seemed to be in favor of the girls up to seven years of age.

In 1938 McCaskill and Wellman⁵ studied the common motor achievements of ninety-eight children, ages two to six years,

⁵Carra Lou McCaskill and Beth L. Wellman, "A Study of Common Motor Achievements at the Preschool Ages," Child Development, IX (July, 1938), pp. 141-150.

enrolled in the preschool laboratory at the University of Iowa. The objectives of the study as stated by the authors were to discover: (1) the stages of development in selected motor achievements, (2) the sequence of development of these stages, (3) the interrelationships of these motor achievements, and (4) their relationship to sex and to ascendance scores. Activities selected by the investigator in determining motor development were: ascending and descending ladders and steps, hopping, skipping, jumping, balancing, ball throwing, ball catching, and ball bouncing. The author concluded that boys appeared to be somewhat superior to girls on steps and ladder and ball activities, and girls somewhat superior in hopping and skipping. These results appear to be consistent regardless of age up to six years.

In 1938 Gutteridge⁶ studied the motor achievements of 1973 young children from ages two to seven. The subjects represented a wide range in racial background and social status and were for the most part attending nursery school, kindergarten or first grade classes in city or rural areas in various parts of the United States. Children were observed and rated in the following activities: climbing, jumping, sliding, tricycling, hopping, galloping, skipping, throwing, bouncing, and catching. The rating scale devised by Gutteridge consisted of a continuum representing a ten

⁶Ibid.

point scale of motor achievement. The skill levels were given numerical values on the basis of direct observation and comparisons were made between the achievement ratings of age groups, between boys and girls in each skill and between the results of one activity and those of another. From an analysis of the results, Gutteridge concluded that sliding and tricycling were mastered at an earlier age (24 to 41 months) than were the other activities. The child is next proficient in climbing (42 to 47 months), followed by jumping (54 to 59 months), skipping, hopping, and throwing a ball (60 to 65 months). Finally, the author concluded that the activities of galloping, bouncing a ball and catching a ball are not executed proficiently by the child until the age range from 66 to 71 months.

Some of Gutteridge's implications were: (1) Young children show motor control and proficiency far in advance of the common belief and tradition, at least as represented by the equipment customarily provided for children of these ages; (2) Nursery school, kindergarten, and primary school equipment is not adequately challenging and does not provide varying opportunities or adequate stimulation for developing the motor abilities of children; (3) The equipment now provided for motor activities in nursery school, kindergarten and first grade is stereotyped and does not meet the requirements of the majority of children nor does it provide varying

opportunities in line with growing abilities; and (4) Wide variation of individual differences in the children.

Wellman⁷ reported on studies of ninety-eight children who ranged in age from 26 to 74 months. She developed a scoring system to evaluate motor performance in which each child was asked to respond to twenty-three tasks. These performances were divided to include ascending and descending steps and ladder, jumping, ball activities and hopping, skipping and walking on a path and circle.

Wellman found that descending steps and ladders were more difficult than ascending for the children and that alternating feet appear as a method about one and one-half years later on descending than in ascending.

She noted that the children found hopping on one foot to be more difficult than hopping on both feet. There were three distinct stages in attempting to skip which began with the shuffle, then skipping on one foot and finally alternating feet. At the age of five, one-half of the children had mastered this task. At the age of three, the children were able to walk a ten foot path which was one inch wide but walking a circle was not accomplished until eight months later. The jumping stages included jumping with help, alone with one foot ahead, and alone with both feet together.

⁷Beth L. Wellman, "Motor Achievements of Preschool Children," Childhood Education (March, 1937), pp. 311-316.

Two-thirds of the two-year-old children were able to throw the ball less than three feet whereas only half of the six-year-olds were able to throw it the entire seventeen feet. In ball bouncing the children would use one hand for the smaller ball and both hands for the larger ball until the age of six years. There were several methods employed in catching the ball such as holding the arms straight, holding the elbows in front of the body or at the side of the body.

Wellman concluded that children were uneven in development and the various factors in considering these differences might include experience, body proportions, size, strength, and school experiences.

Johnson⁸ noted from her study of how play equipment affects behavior that individual endeavor is encouraged by more extensive playground equipment while at the same time social contact and undesirable behavior is discouraged. The added opportunities for activity appeared to promote an atmosphere of well being which in turn lead to expressive action.

Gesell⁹ formulated behavioral descriptions of the five-year-old child by examining the following areas: motor

⁸Marguerite Walker Johnson, "The Effect on Behavior of Variation in the Amount of Play Equipment," Child Development, 6: pp. 56-68.

⁹Arnold Gesell, et al., The First Five Years of Life (New York: Harper and Brothers, 1940).

skills, adaptive behavior, language and personal social. He suggests the neuro-motor system of the five year old is well advanced in its development. The five year old skips smoothly and jumps well. He can negotiate a 4 cm. walking board usually with a two-foot stepdown. He can stand on one foot and balance on his toes for several seconds. He usually has a well developed sense of equilibrium. Under wholesome conditions his postural attitudes show natural grace. He has greater ease and economy of movement which is noticeable in finer coordinations. He can brush his teeth, comb his hair and wash his face.

Summary of Review

This chapter has attempted to review studies concerned with motor development and achievements of five and six-year-old children. During the investigation of the related literature it was found that the majority of the studies fell into two groups, those dealing with the general motor development of the young child and those dealing more specifically with the fundamental motor skills of young children. The age range of early childhood was defined from the ages of two to six years. The motor skill in which the investigator was interested in studying were those in which the children of this age are typically engaged in at this time.

CHAPTER III

PROCEDURES OF THE STUDY

This investigation attempted to assess and compare the general motor skill levels of selected five and six-year-old students. The students were selected from kindergarten and Head Start Programs in Missoula, Montana, in 1968.

Their motor skills were assessed and compared by use of a rating scale developed by Mary V. Gutteridge in 1939. The ten motor skills included in the rating scale are hopping, skipping, galloping, jumping, climbing, sliding, tricycling, bouncing, throwing, and catching a ball.

Source of Data

The subjects for this study were selected from the Head Start Program and the private kindergartens in Missoula, Montana. Permission to administer the tests to the 111 Head Start children was secured from Mrs. Marjorie Carrier, Director of the Head Start Program. Permission was secured from Mrs. Grace McCleod and Mrs. Joan Christopherson to administer the tests to forty-nine other children enrolled in two kindergartens in the city of Missoula. The children had

been enrolled in the programs for approximately six months before this study was undertaken. The tests were administered in March and April of 1968 to five and six-year-old children enrolled in these programs.

Eligibility of the children entering the Head Start Program was determined according to family income as established by the Office of Economic Opportunity. The private kindergarten children came from middle class or higher socio-economic levels.

The researcher discussed the purposes and procedures of the study with the Head Start Director and the two kindergarten teachers. With the permission of the program directors appointments were then scheduled with each of the nine classroom teachers to administer the test.

The children were asked to perform ten skill tests and were then observed by the writer. An evaluation of motor proficiency was then made and the children were rated numerically, one to ten, according to the scale devised by Mary Gutteridge in her study. Skill levels eight, nine, and ten were, by definition, levels of proficiency.

Selection and Description of Motor Skills

The same motor skills were evaluated in this study as were described in the work by Gutteridge to facilitate a comparison between the two. These were hopping, skipping,

galloping, jumping, climbing, sliding, tricycling, bouncing, throwing and catching a ball. These same criteria were used in this study to determine the degree of motor achievement.

Here is a description of the tests the children were asked to perform:

Climbing. The children were asked to climb up a ladder to the top of a slide and then to slide down the slide. The ladder was eight feet in height. This performance was used as a test for climbing and as a test for sliding. When no ladder was available, an eight-foot jungle-jim was used to measure climbing ability. The jungle-jim was found on all of the playgrounds of the schools. The children were rated on their ability to ascend and descend, with special attention given to the rate of ascent and descent, the use of alternating feet, or not, and the confidence exhibited during the performance.

Jumping. Two variations of jumping were used. The children were asked to jump over an obstacle, such as a rope, which was less than six inches from the ground or floor. They were also asked to jump across a four-foot distance on a floor or ground area with both feet off the ground at the same time and land on both feet, simultaneously. Mats were used on the floor in both jumping exercises in order to insure the safety of the children. The form used during the jump was important in the rating, as well as the distance of the jump.

Sliding. If a slide was available, the children were asked to climb the ladder and slide down the slide. The slide was eight feet high, with a slope of forty degrees. The slide itself was twelve feet long. If there was no slide, a sloping board was arranged for this skill. Special attention was given to the approach to the slide, the mounting of the slide, and the actual act of sliding.

Tricycling. The children were asked to mount the tricycle and ride it around three obstacles arranged in a triangle on the floor or playground. The obstacles were fifty feet apart. The tricycle was thirty inches in height from the ground to the handlebars. While the children rode the tricycle the observer watched for the maneuverability of the tricycle by the children, such as turning around obstacles, moving forwards and backwards, and the speed of propelling the tricycle.

Hopping. The children were asked to hop, using both feet rather close together, along the horizontal floor or playground, for a distance of twenty feet. The observer demonstrated the type of movement desired. The child was also tested on his ability to hop twenty feet, using one foot only. Balance was the most important aspect of the hopping skill.

Galloping. The children were asked to make a galloping movement around the room or playground with the same

foot ahead at each jump. Again the observer demonstrated the type of movement desired. In determining the proficiency of the galloping skill, special emphasis was given to the placing of the forward foot ahead of the other foot, throwing the weight onto the forward foot during the exercise.

Skipping. The skip (a step-hop with feet alternating) was demonstrated to the children, and then they were asked to skip around the room or playground. The children were required to do a step and a hop on each foot, and then change to the alternate foot.

Throwing Balls. A rubber ball twelve inches in diameter was used for throwing, bouncing, and catching. The observer played "catch" with each of the children. In observation, special attention was given to the method of throwing the ball, the accuracy of the throws, the length of the throws, and the direction the ball went. In the throwing and the catching skills, the subject stood five feet or more from the test administrator, and threw the ball so it could be caught, or caught a ball thrown the same distance by the administrator of the test.

Bouncing Balls. The observer bounced the ball to the children from a distance of five feet or more, and had them bounce it back. The children had to throw the ball at approximately the correct angle, so that the ball would refract upwards and be caught by the observer.

Catching Balls. The observer threw the ball to the children a variety of ways, some high, some low, and some at a diagonal. The distance of the throw was approximately five feet. The children were observed for their ability to catch the ball, by squeezing their fingers together at the appropriate time, judging the distance and speed of the ball.

Design of Rating Scale

The skills were rated numerically, one to ten, on a special rating scale to estimate the degree of skill. The scale represents a continuum of motor skill levels, ranging from very poor to very good, with the numerical value rating. Skill levels eight, nine, and ten were, by definition, levels of proficiency. If the performance level were rated below eight, the child was not considered proficient at that particular skill level.

The criteria for levels eight, nine, and ten were:

8. Movements coordinated--elimination of unnecessary movements--actions now show controlled use of selected muscles--precision in action and good direction of effort.
9. Easy performance with display of satisfaction--with such coordination of muscles child is able to achieve results--shows definite satisfaction in bodily skill and power over material.

10. Evidence of accuracy, poise, and grace--gives appearance of effortless skill without apparent conscious attention to component movements--as a result of refinement of movements and adjustment to requirements shows ease, grace and poise in bodily action.

If the performance level were rated between three and seven it meant that the student was just in the process of forming the skills involved. The criteria for levels three, four, five, six and seven were:

3. Attempts activity but seeks help or support--makes movements indicative of willingness to participate in activity, to use tool, try toy or equipment but seeks support and needs encouragement to make any advance.
4. Tries even when not helped or supported, but is inept--makes decided attempts without help or support to try out the tool, toy, or equipment and to master the technique--but is clumsy--movements are uncoordinated.
5. Is progressing but is still using unnecessary movements--makes more useful effort but still movements are exaggerated and involve the use of unnecessary muscles and parts of the body not directly concerned with the basic movements

of the skill.

6. Is practicing basic movements--practice is concentrated on learning the basic movements through repetition of the gross performance though certain crudities are apparent and no obvious effort is directed toward refining.
7. In process of refining movements--the basic movements are now more definite and selected but still need further refining--practice is having the effect of furthering precision.

If the performance level was rated either one or two there was no attempt made to do the skill. The criteria for levels one and two were:

1. Withdraws or retreats when opportunity is given--appears afraid of making actual attempt to perform activity--shows definite unwillingness to make effort--signs of hesitancy in new situation.
2. Makes no approach nor attempt but does not withdraw--although showing no outward sign of fear or hesitancy exhibits no interest even when confronted with opportunity--makes no effort at all to seek out or to venture into new activity.

The skill tests were administered to each child in the sample and their proficiency level was determined by a trained observer.

Treatment of Data

The percentages of children proficient in each of these ten skills were calculated. Comparisons were then made (1) between the children in the study and the children observed in Mary Gutteridge's study; (2) between the Head Start children observed and the kindergarten children observed; and (3) between the boys and the girls observed in this study.

In making these comparisons the following data were required:

1. The numerical ratings of the children on each motor skill by the observer and entry of name, date, sex, age, and raw scores on the rating scale.
2. The percentages of proficient Head Start children.
3. The percentages of proficient kindergarten children.
4. The proficiency percentages of the children observed in Mary Gutteridge's study.

Since the data were ungrouped, the test used for statistical computation was the difference between the percentages for uncorrelated data. Two formulae were used to compare the groups. The first formula was used to compare the groups with over one hundred subjects, namely, the total sample from this study and the total sample from Gutteridge's study. A second formula was used for the remainder of the comparisons because their number was less than one hundred.

The formula for the comparison of groups when the number of subjects is greater than one hundred is:¹

$$S_{D/P} = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2}}$$

Where $S_{D/P}$ = Standard error of the difference between two percentages.

p_1 = Percentage score of sample (1).

q_1 = (100% - p_1)

N_1 = Number of subjects in sample (1).

p_2 = Percentage score of sample (2).

q_2 = (100% - p_2).

N_2 = Number of subjects in sample (2).

The "z" test was used to determine the levels of significance.

Where z = Difference between two statistics divided by the standard error of this difference.

The formula for the comparison of groups when the number of subjects is less than 100:²

$$S_{D/P} = \sqrt{pq \left(\frac{1}{N_1} + \frac{1}{N_2} \right)}$$

¹N. M. Downie and R. W. Heath, Basic Statistical Methods (New York: Harper and Row, 1965), p. 148.

²Ibid., p. 149.

Where S_{DP} = Standard error of the difference between two percentages.

P = Percentage score of the sample

q = (100% - p)

N_1 = Number of subjects in sample (1).

N_2 = Number of subjects in sample (2).

CHAPTER IV

ANALYSIS OF RESULTS

Presentation of Findings

Direct comparisons were made between the kindergarten children and the Head Start children, between the boys and girls in this study, and between this study and the study by Mary Gutteridge.

Figures 1 through 8 represent a comparison of the percentages of children achieving the level of proficiency in the ten motor skills. Each figure shows the percentage of children in each group achieving proficiency in each motor skill.

The five-year-old kindergarten children (Figure 1) obtained a higher rating than the Head Start children on each skill, although there were no significant differences between the two groups using the t test. The greatest difference was in the skill of throwing. The highest rating was in the skill of sliding while the lowest were in the skills of bouncing a ball and catching.

The kindergarten children, six years of age (Figure II), rated higher than the Head Start children of the same age in

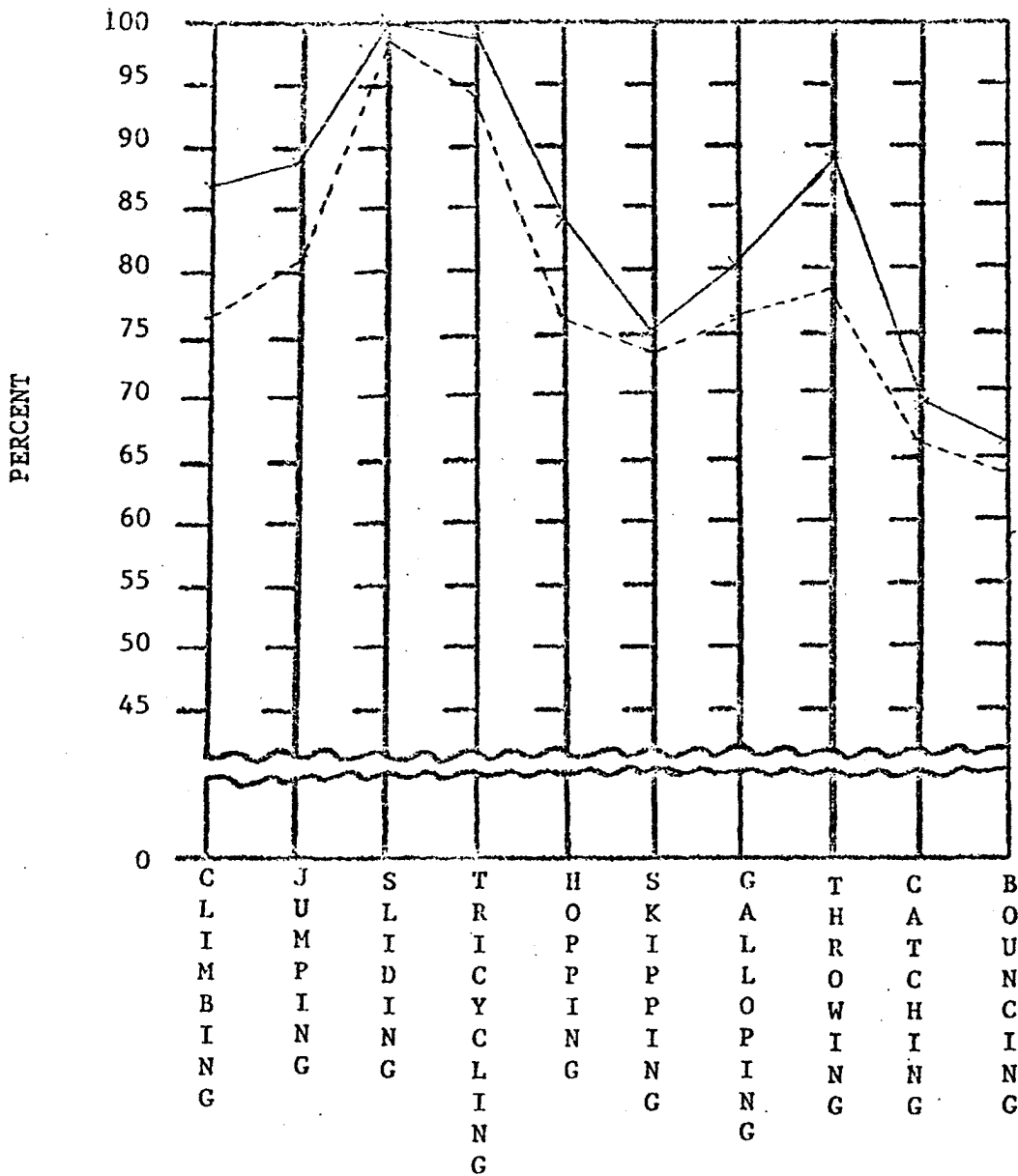


FIGURE I

PERCENT OF FIVE-YEAR-OLD KINDERGARTEN AND HEAD
START CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— Kindergarten subjects - - - Head Start subjects

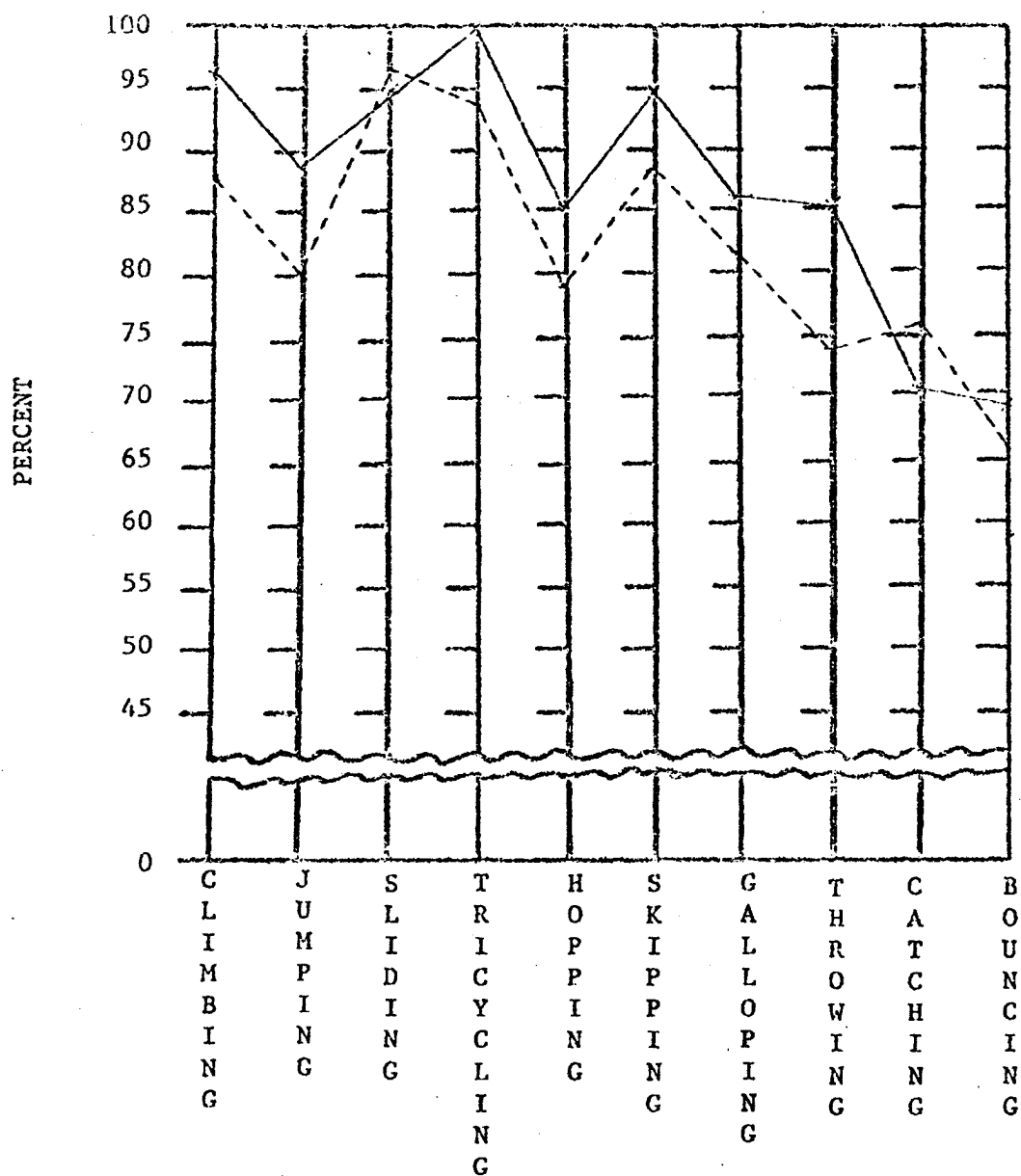


FIGURE II

PERCENT OF SIX-YEAR-OLD KINDERGARTEN AND HEAD
START CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— Kindergarten subjects - - Head Start subjects

the skills of climbing, jumping, tricycling, hopping, skipping, galloping, throwing and bouncing the ball. The Head Start children rated higher in the skills of sliding and catching the ball. The kindergarten children were significantly higher at the .01 level of significance in the skill of throwing using the t test. The highest rating of the six-year-old kindergarten group was in the skill of tricycling, while the highest in the Head Start Group was in the skill of sliding.

The five-year-old boys in the Head Start Program (Figure III) were rated higher than the girls in the following skills: climbing, jumping, tricycling, hopping, skipping, galloping, catching, and bouncing. The girls were rated higher in throwing. The skill of sliding was rated the same in both the boys and the girls in the Head Start Group who were five years old. The greatest range in scores occurred in the skill of climbing. The skill with the lowest scores was ball bouncing. There was no significant difference between the two groups in any of the skills observed using the t test.

The six-year-old boys in the Head Start Program (Figure IV) rated higher than the girls in the skills of climbing, jumping, sliding, tricycling, skipping, galloping, catching, and bouncing. The girls rated higher in hopping and throwing. The greatest difference was in the skill of bouncing. The highest scores were recorded in the skill of sliding, while the lowest were in the skill of bouncing a ball.

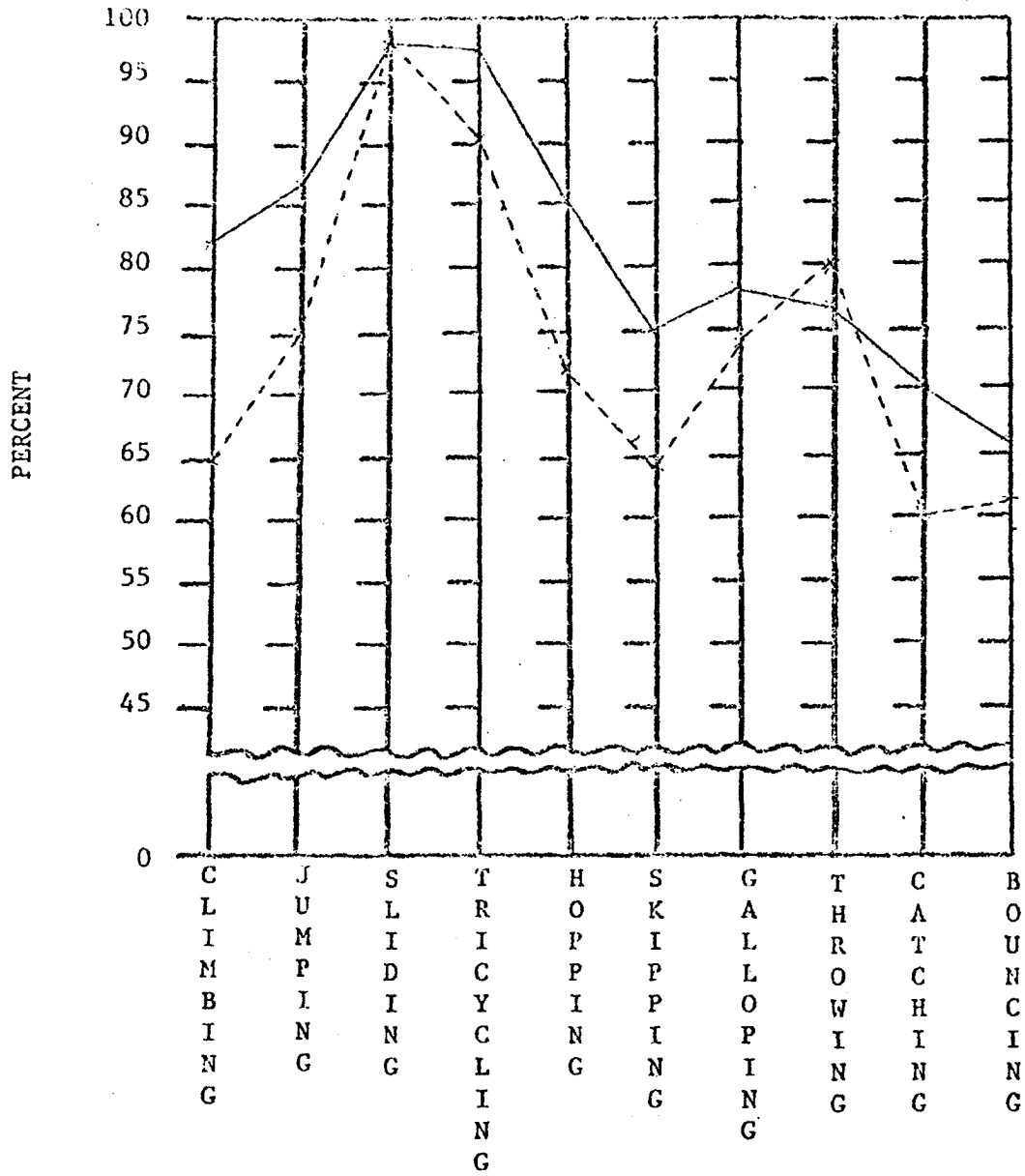


FIGURE III
 PERCENT OF FIVE-YEAR-OLD HEAD START
 CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— boys - - girls

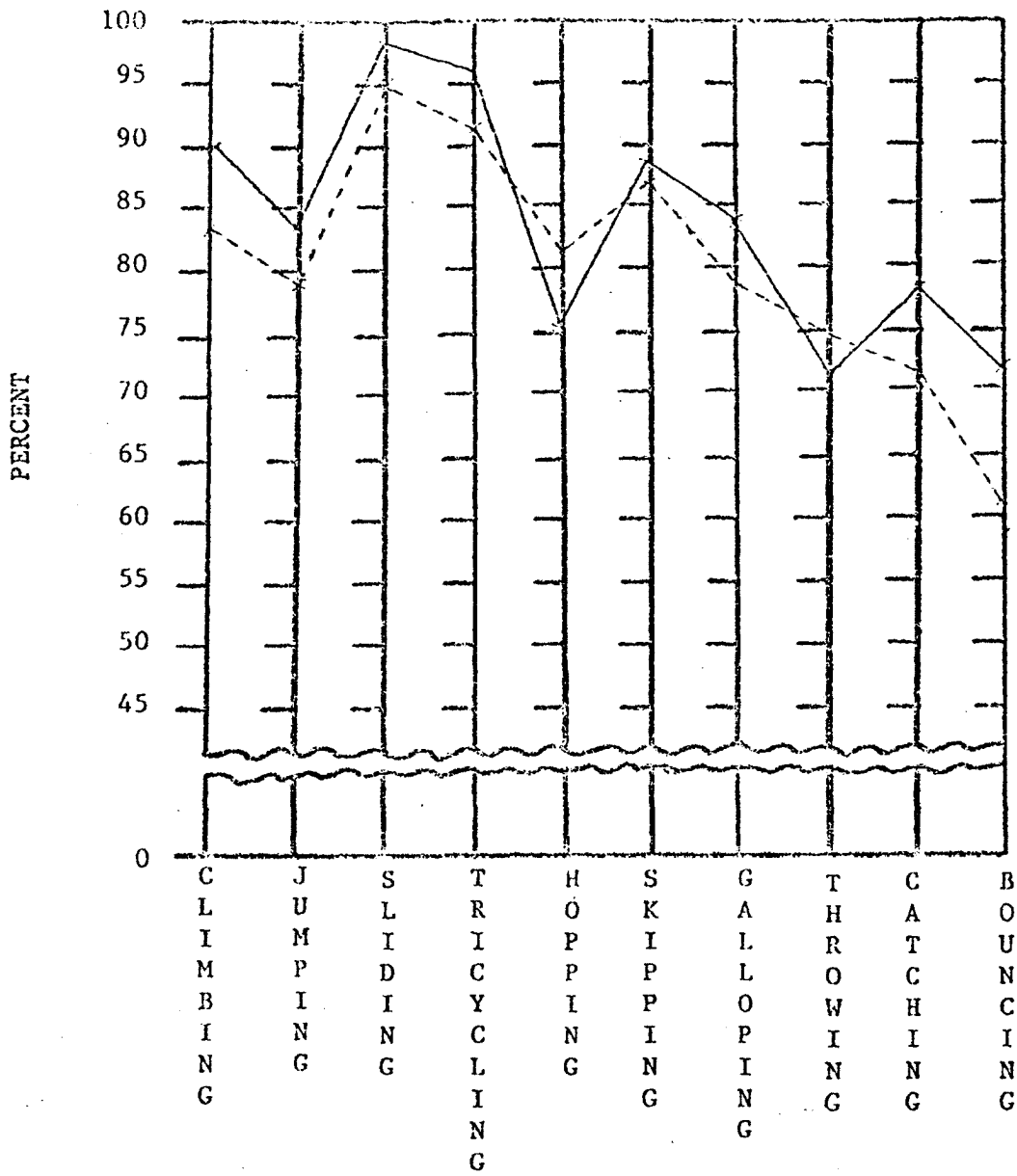


FIGURE IV
 PERCENT OF SIX-YEAR-OLD HEAD START
 CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— boys - - girls

The girls in the five-year-old kindergarten group (Figure V) were rated higher than the boys in the skills of climbing, jumping, skipping, and bouncing. The boys were rated higher in tricycling, hopping, galloping, throwing, and catching. The highest scores were in the skill of sliding in which both groups scored 100 percent. The boys scored lowest in bouncing a ball. The girls scored lowest in catching a ball. The greatest range in scores was in skipping.

The boys in the six-year-old kindergarten group (Figure VI) scored higher than the girls in climbing, jumping, sliding, galloping, throwing, and catching. The girls were rated higher in the skills of hopping, skipping, and bouncing. Both the boys and the girls scored 100 percent in tricycling. The boys scored lowest in the skill of bouncing a ball, while the girls scored lowest in catching a ball. This group was the highest rated group of this study.

The five-year-old children (Figure VII) from this study rated numerically better than the children of Gutteridge's study in each skill. However, only bouncing, catching, tricycling, sliding, and climbing resulted in a significant difference at the .01 level with the z test. Jumping, hopping, skipping, and throwing were not significantly different. Galloping was rated numerically the same. The greatest difference between the two groups was in the skill of ball bouncing. (The rating of 45 percent for bouncing a ball by

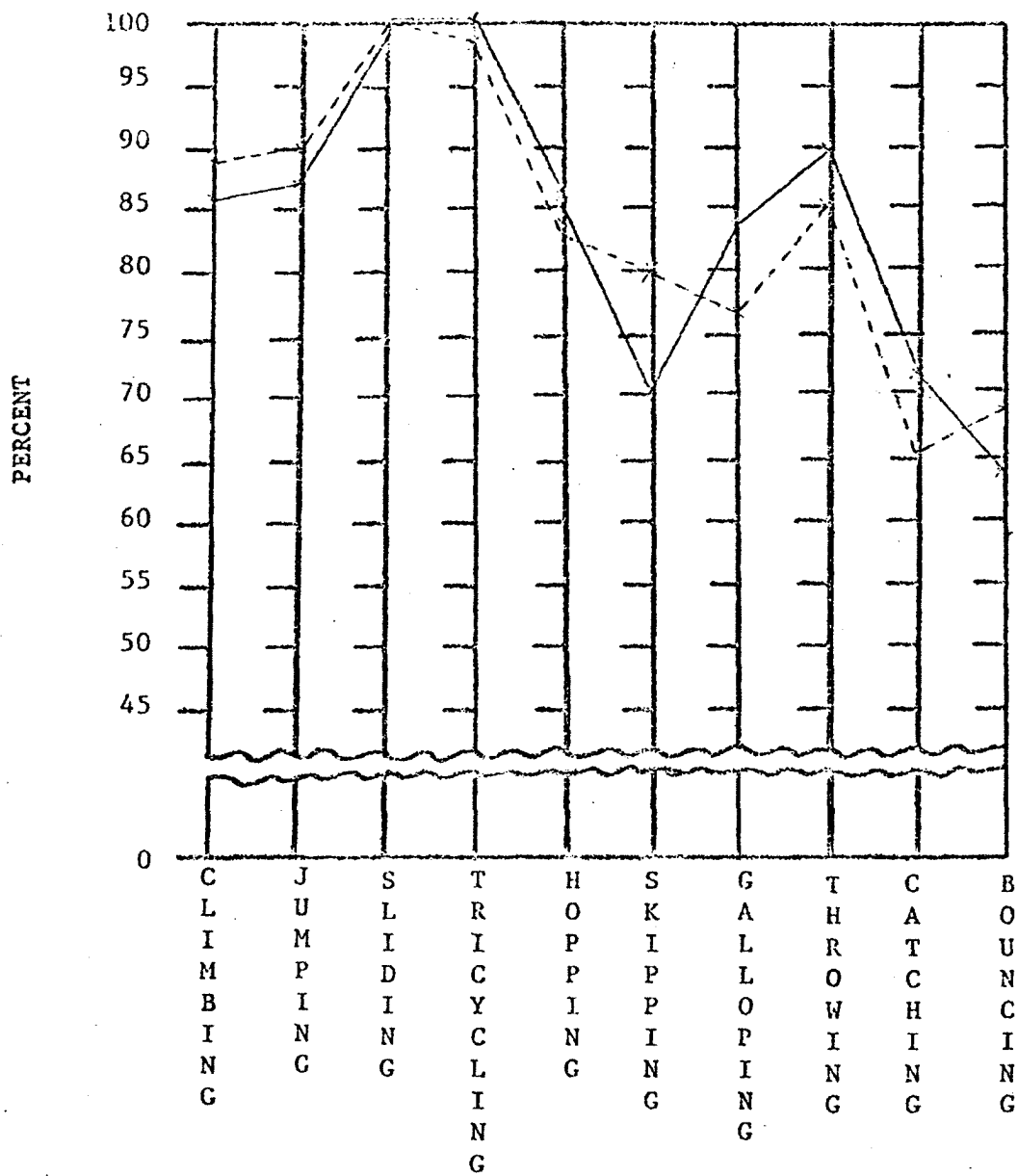


FIGURE V
 PERCENT OF FIVE-YEAR-OLD KINDERGARTEN
 CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— boys - - girls

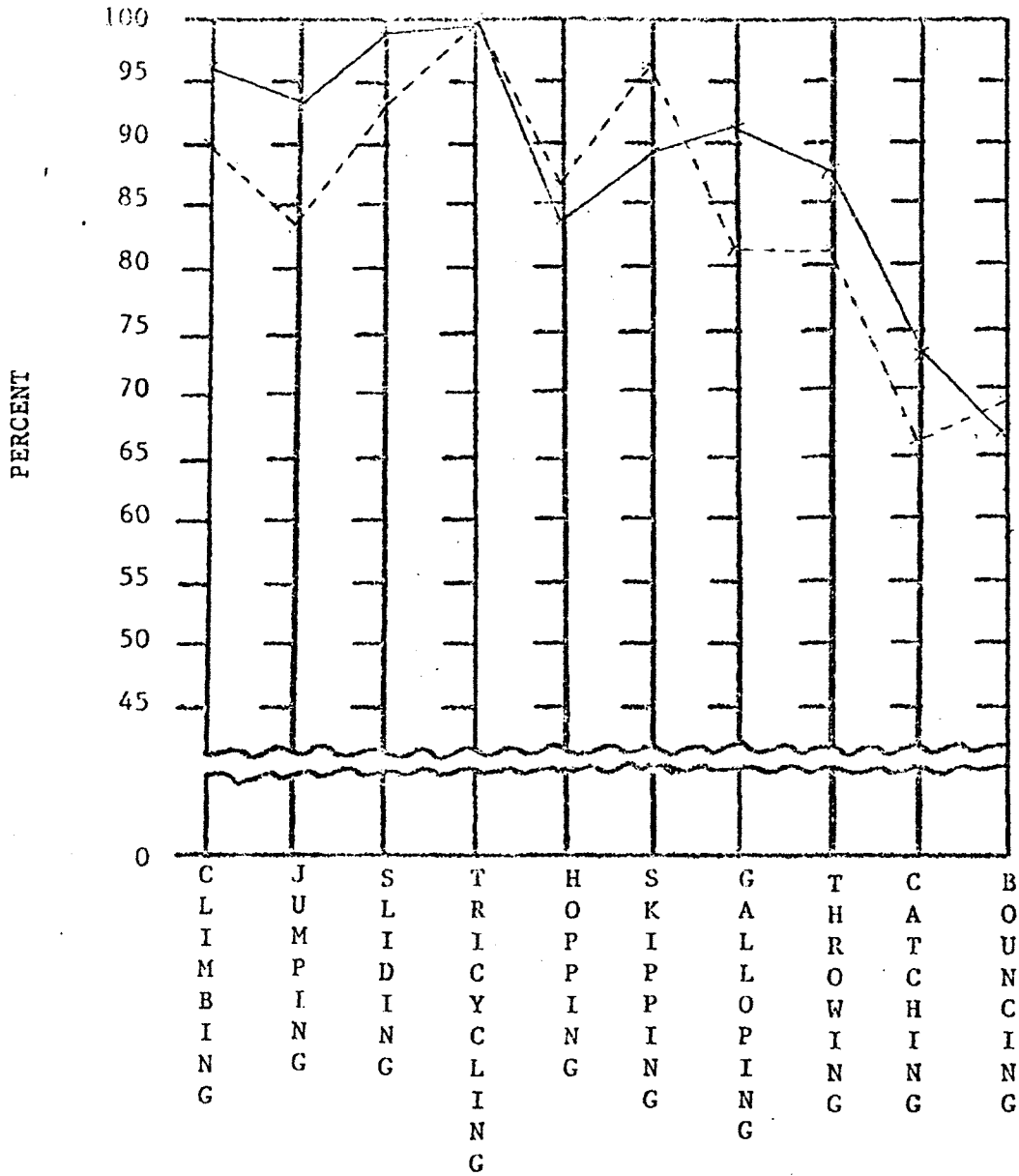


FIGURE VI
 PERCENT OF SIX-YEAR-OLD KINDERGARTEN
 CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— boys - - girls

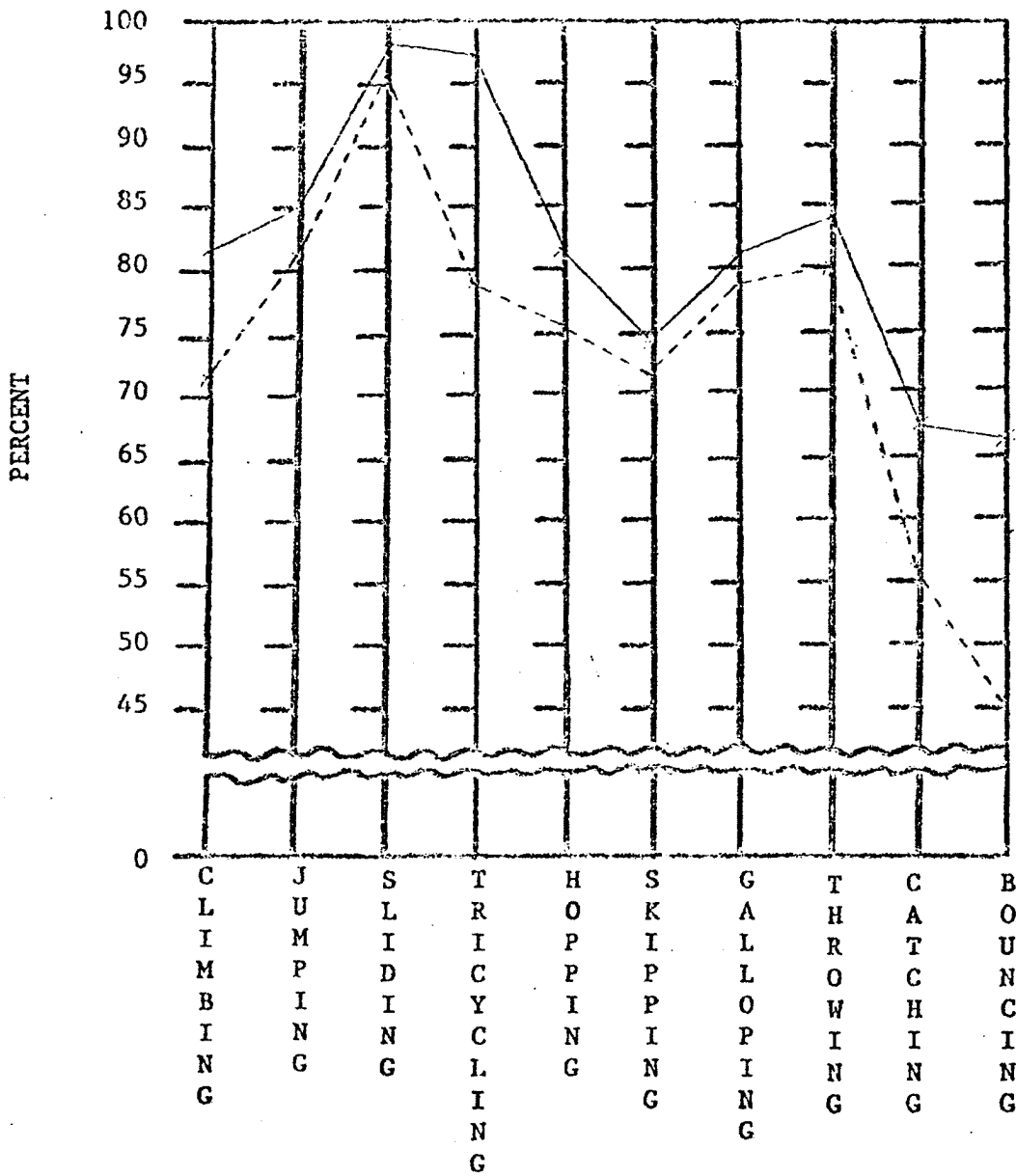


FIGURE VII

PERCENT OF FIVE-YEAR-OLD MISSOULA AND GUTTERIDGE
CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— Missoula subjects - - Gutteridge's subjects

Gutteridge's children was the lowest percentage in either of the two studies on any skill performance.)

The six-year-old children (Figure VIII) from this study were significantly better, at the .01 level, than the children in Gutteridge's study in the skill of catching. Ball bouncing was significantly higher for the children of this study at the .05 level of confidence. The children from Gutteridge's study were significantly better at the .01 level in galloping. The skills of climbing, jumping, sliding, throwing, catching, and bouncing were rated numerically higher in this study, but there was no significant difference. Tricycling, hopping, skipping, and galloping were rated higher in Gutteridge's study, but there was no significant differences.

In summary, a number of comparisons between the groups in this study should provide a means for evaluating the motor skills of the children enrolled in the kindergarten and the Head Start Programs.

The five-year-old children from this study rated numerically higher than the children in Gutteridge's study on all but one of the skills observed in this study. The one skill was galloping; both groups scored the same. The five skills in which there was a significant difference were climbing, tricycling, sliding, bouncing, and catching.

The six-year-old children from this study were rated numerically higher than the children of Gutteridge's study

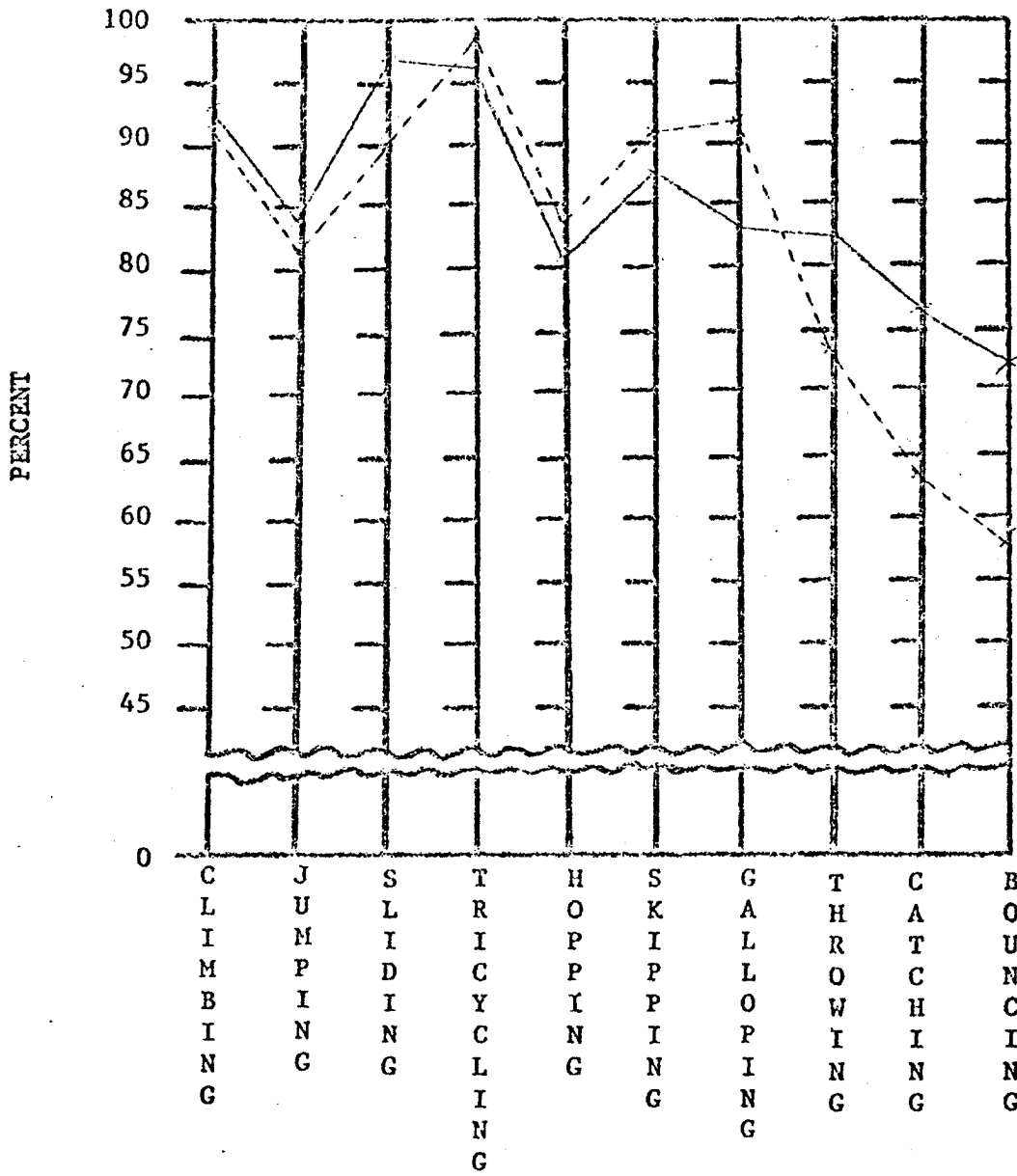


FIGURE VIII
 PERCENT OF SIX-YEAR-OLD MISSOULA AND GUTTERIDGE
 CHILDREN ACHIEVING LEVEL OF PROFICIENCY

— Missoula subjects - - Gutteridge's subjects

in the skills of sliding, skipping, throwing, catching, and bouncing. The skills in which there was a significant difference were catching, ball bouncing, and sliding. The children from Gutteridge's study were rated numerically higher on the skills of tricycling, hopping, and galloping.

Discussion of Results

It seems likely that the activities in which the children of today are involved differ greatly from the activities of children in 1939. This difference is possibly due to the steady movement from a rural to an urban society. This may have both negative and positive effects on physical development. The children who live on farms are usually involved with physical work, while the children in urban areas are often much less involved with physical work. By contrast, children living in urban areas might have more access to play equipment in the parks and gymnasiums which would provide greater opportunity to develop their physical skills.

It would seem young children of today have greater opportunities for pre-school training through the various nurseries, kindergartens, and other programs which usually involve periods of free and/or organized play.

The children in this study scored significantly higher in the skills associated with play equipment, such as jungle jims, tricycles, slides, and balls. Most of the children in this

study have had the opportunity to use playground equipment, which has been developed in recent years. By contrast the children from Gutteridge's study may not have had this opportunity.

There is a pronounced difference between the children of this study and of Gutteridge's study in the ball-handling skills of bouncing and catching. Children of today have a greater exposure to games in which balls are used as implements. There were balls provided on each of the playgrounds which were used in this study.

The children in this study scored significantly higher in sliding and climbing which may be attributed to the access to slides and climbing equipment on the school playgrounds, public parks, and private play equipment available to many homes.

The five-year-old kindergarten children were rated numerically higher than the Head Start children in all of the motor skills observed in this study. The six-year-old kindergarten children were rated higher in all but two of the motor skills, which were sliding and catching.

This difference could be attributed to the varying amounts of time the children spent on the playground. The kindergarten play periods that were observed were forty minutes in length, while the Head Start play periods were twenty minutes long.

Another factor to account for the numerical differences between the two groups may be the variations in playground equipment. The equipment provided on the kindergarten playground included swings, slides, jungle jims, horizontal ladders, tricycles, play-tractors, hanging bars, play houses, and balls of different sizes. The equipment on the Head Start playground consisted of a jungle jim, swings, and playground balls. A tricycle was provided for the purpose of observing the skill of tricycling.

It would seem that the greater accessibility of the play equipment and the greater length of time the children in the kindergarten group spend on the playground would have a positive effect on their degree of motor proficiency. Another factor might be varying degrees of motivation between the children. Another might possibly be associated with the socioeconomic backgrounds of the children. Perhaps children with less access to elaborate playground equipment during developmental years have not had the opportunity to realize their full potentials in developing their skill.

The five-year-old boys in the Head Start Program were rated higher than the girls in all the skills except throwing and sliding, which were numerically rated the same. The six-year-old boys in the Head Start Program were rated higher in all of the skills except hopping and throwing. The girls scored higher in throwing in both groups, but the boys in the

Head Start Program scored higher in the other skills observed in this study.

The five-year-old girls in the kindergarten program were rated higher than the boys in the skills of climbing, jumping, skipping, and bouncing. The boys were rated higher in tri-cycling, hopping, galloping, throwing, and catching. The six-year-old kindergarten girls scored higher than the boys in the skills of hopping, skipping, and bouncing. The boys scored higher in the skills of climbing, jumping, sliding, galloping, throwing, and catching. There was no significant difference in the percentage ratings of the boys and the girls in the kindergarten program. There were only slight differences in the skill levels of the boys and the girls in the kindergarten programs observed in this study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to determine the degree of accomplishment in ten specific motor skills of children at ages five and six; and to compare these findings with the levels of skill of the children reported by Mary V. Gutteridge in her study completed in 1939. The same ten motor skills were used in both studies. These skills were rated numerically between one and ten on a special scale and were used to estimate the degree of skill. The skill levels of eight, nine, and ten were, by definition, levels of proficiency.

The subjects for this study were selected from the Head Start Program and the private kindergartens in Missoula, Montana. Comparisons were then made between the children in this study and those from the study of Mary V. Gutteridge, between the Head Start children and the kindergarten children, and between the boys and the girls in this study. The findings were as follows:

1. The five-year-old children from this study rated numerically higher than the children of Gutteridge's study in each of the ten skills, except one. However, the differences were statistically significant in bouncing, catching, tricycling, sliding, and climbing.
2. The six-year-old children from this study rated significantly higher than the children of Gutteridge's study in the skills of catching and sliding. The children from Gutteridge's study rated higher in the skill of galloping.
3. The five-year-old kindergarten children obtained a higher rating, numerically, than the Head Start children on each skill, although there was no significant difference between the two groups.
4. The six-year-old kindergarten children were rated numerically higher than the Head Start children in all the skills except sliding and catching. The only skill that was significantly different was throwing.
5. There were no significant differences between the boys and girls in the Head Start Program. The five-year-old boys were rated higher in each of the skills, except throwing and sliding. In the skill of sliding, the boys and the girls scored the same percentage. The six-year-old boys were

rated higher than the girls in all of the skills, except hopping and throwing.

6. There was no significant difference between the boys and the girls in the kindergarten program. The girls in the five-year-old kindergarten group were rated higher than the boys in the skills of climbing, jumping, skipping, and bouncing. The boys were rated higher in the remainder of the ten motor skills. The six-year-old girls were rated higher in the skills of hopping, skipping, and bouncing. The boys were rated higher in the remainder of the ten skills.

Conclusions

The following conclusions were made from this study:

1. The children from this study were more proficient than the children in Gutteridge's study in the skills associated with ball-handling and play equipment, such as bouncing, catching, tricycling, sliding, and climbing. Most of the children in this study have had the opportunity to use play equipment and balls, while the children from Gutteridge's study may not have had this opportunity.
2. The six-year-old kindergarten children were more proficient than the Head Start children in the

skill of throwing.

3. There were no differences in the skill proficiencies between the boys and the girls in this study.
4. Of all of the groups compared in this study, the five-year-old children from Gutteridge's study scored the lowest.
5. The six-year-old kindergarten group was the highest rated group of this study.

Recommendations

The following recommendations are made in view of the findings and conclusions from this study:

1. A comparable study should be conducted using a larger sample to verify the conclusions. This study should be done during the same months as the present study to insure validity and reliability.
2. A study should be conducted in a different area to determine the motor proficiencies of children that are involved in different activities.
3. A study should be conducted using different age groups, comparing them to Gutteridge's study to determine if any differences exist.
4. Further study is needed in order to develop a more objective rating scale.

5. More advanced and more diversified play equipment is needed on the Head Start playground in order to challenge these youngsters, and hopefully to improve their motor skills.