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A CHILD'S MOVEMENT PERFORMANCE USING LABANOTATION AND REFERENCED TO THE LABAN FRAMEWORK: A CASE STUDY

The University of North Carolina at Greensboro ED.D. 1980

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A CHILD'S MOVEMENT PERFORMANCE USING LABANOTATION AND REFERENCED TO THE LABAN FRAMEWORK: A CASE STUDY

by

Kathryn Lucille Kisabeth

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

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1980

Approved by

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APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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The purpose of this study was to examine, in detail, the observable movement behavior in the performance of a child attempting to perform a complex movement task from a visual model. A secondary focus concerned the usefulness of Labanotation as a method for data recording in the study of complex manipulative movement.

This was a single case study of a 10-year-old boy as he attempted to perform a complex manipulative movement task from a nonverbal, visual, video-taped movement performance. The movement task was unfamiliar to the child prior to his participation in the study. The investigator asked the child to view the movement task. The specific task involved throwing, and catching, and striking a 7-inch plastic ball with different body parts. The use of all spaces around the body, varing the amount of effort, and moving in relation to the ball were considered parts of the task. Video-taping of the movement performances of this 10-year-old boy proceeded on 6 separate days during a 2-week period. Approximately 10 minutes of movement activity were recorded on each of the 6 days. The movement performances were Labanotated from the video tapes then transcribed and analyzed.

There were three categories of data: the first included the number of times the child viewed the visual model during each data collection session, as well as any specific segments of the visual model he viewed. The second data category consisted of the child's verbal behavior in viewing the model tape and during the debriefing discussion. The third and primary data category consisted of the video tapes of the movement performances. These data were presented in the form of frequency counts for movement components and medians and ranges for movement sequence variables.

One hundred and ten movement components were identified in the movement data derived from the child's movement performances. These components were categorized under Laban's aspects of movement: Body, Space, Effort and Relationships. In addition, movement data were examined in relation to the movement sequences which were identified in the movement performances. Six variables were examined for each movement sequence; medians and ranges were calculated.

The changes which occurred in movement component use were considered as progress in relation to the movement task. Some of the movement component changes which were considered important were (a) the increased number of steps, (b) the increased frequency of striking, (c) the increased use of high level for striking, and (d) the shift from punches to dabs in striking.

The child was characterized as an experimenter in relation to movement component use and to movement sequence variables. Analysis of movement component use revealed that the child used (a) the largest number of body parts for striking on Days 1 and 2, (b) the widest variety of effort actions on Days 2 and 3, and (c) the largest variety of compound directions and levels on Day 3. The verbal behavior indicated that the child's goal was to increase the length of time the ball was in the air. An analysis of the movement sequence data indicated that the child had achieved this goal.

Labanotation proved to be versatile enough to record data in this complex manipulative task. The major advantages of Labanotation were its respect for individuality and the relational information it provided. The disadvantages related to implementation, specifically the time and expense involved.

DEDICATION

To the other nine and to my parents, Mr. and Mrs. Edward Kisabeth, for respecting me as being different.

ACKNOWLEDGEMENTS

The writer would like to express thanks to numerous individuals whose assistance was invaluable in the completion of this study. Their contributions are acknowledged at this time.

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CHAPTER I

INTRODUCTION

The uniqueness of an individual has been viewed as valuable to educators, problematic to measurement experts, and delightful to parents but seldom as the subject of research. Researchers in motor learning (Martenuik, 1974) and motor development (Bayley, 1956) have indicated that the individual pattern of development or learning is the rule rather than the exception. However, the majority of development and learning studies are conducted with a cross-sectional method, and the data are utilized to establish standards or norms. Care is taken in the selection of subjects to achieve a homogeneous group in development studies. In learning studies, the emphasis is on the selection of a random group which is representative of the population. The assumptions underlying such selection techniques are that (a) the individual differences will be similar in similar individuals, and (b) the individual differences will be randomly distributed among the individuals. The interesting result of studies conducted in this manner is that few, if any, INDIVIDUALS match the findings and conclusions.

> In our longitudinal studies, where we have made repeated observations on the same children over time, and charted the development of each child in relation to the norms, we find that individual patterns are the rule. It is a rare child who follows the same course in all of the observed variables through all of his growth. To explain these individual patterns, we are repeatedly being forced to re-examine the nature of development, and to reconsider the relevant conditions that can determine the course of growth in an individual organism. (Bayley, 1956, p. 45)

This information could then be used to predict future behavior and to control behavior in applied settings. Such information would be invaluable to those educators with control and prediction in mind. However, what if an educator valued the individuality of an individual and sought to maintain that individuality throughout the learning situation? Would that person need control and predictive information ? It would appear that a different type of information would be needed and that such information would, by necessity, be obtained through a different research approach. The situation described is not hypothetical. It is the real dilemma faced by those physical educators who place value on the belief that an individual varies from moment to moment and who maintain that this variability is to be respected and encouraged in the learning of movement skills.

An additional problem faced by the practitioner is the fact that the type of skills most conducive to experimental research bear little if any resemblance to the type of skills taught in the physical education classroom. This gap between basic and applied research in motor learning was discussed by Sloan.

> Among motor learning specialists within the subdiscipline, there appears to be unanimity in the view that unearthing the basic laws and principles which govern the motor learning process will eventually contribute to more effective teaching of movement skills. The key word is "eventually," and there are varying tolerance levels for this period among motor learning specialists, as reflected in their research objectives and in the tasks studied. (Sloan, 1977, pp. 30-31)

Just as there are apparent differences in the objectives among researchers, there are obvious differences among researchers seeking to establish behavioral principles and laws and educators searching for explanations about individuality.

The data needed to understand individuality must be derived from studies which examine the ways individuals approach and learn movement skills. The case study design of research is most suitable for this problem. Eventually, common factors or clusters might be discovered among individual cases. However, the initial step is in the careful examination of separate individuals. Idiographic research designs in motor development have recently been suggested as appropriate methods for the examination of basic research questions (Roberton, 1978).

There is, however, a difference between the purpose of motor development research and the research needed to examine "personalized learning" of movement skills. Such difference lies in the type of question asked and the nature of the skill studied. The researcher who inquires into "personalized learning" is faced with open-ended outcomes that are difficult to predict. The fact that the outcomes of the learning are open-ended necessitates a comprehensive systematic process for recording data during the study. The recording process utilized must accommodate the diverse outcomes without restricting the diversity. The results of such studies would most probably produce more questions than answers. Stake (1978) stated that "the case study, however, proliferates rather than narrows. One is left with more to pay attention to rather than less " (1978, p. 7).

The researcher, concerned with individuality in movement skill learning, requires tools and guidelines that are congruent with the concept of individuality. Such tools and guidelines in movement studies would, by necessity, be an objective recording system, a framework for classifying movement, and a theory of movement. The work of Rudolf Laban provides all of the tools. Labanotation is identified as the most scientific and comprehensive movement notation system in existence (Stepanov, 1891/1969). Throughout Laban's writings and the interpretations of his work, references are made to the value of individuality in movement. It

is, therefore, logical to select Laban's movement theory and notation system as the tools and guidelines for the present study.

Statement of the Problem

The purpose of this study was to examine, in detail, the observable movement behavior in the performance of a child attempting to perform a complex movement task from a visual model. A secondary focus in the study was concerned with the usefulness of Labanotation as a method for data recording in the study of complex manipulative movement.

1. What components of movement does the child demonstrate in his performance?

2. In what ways do the child's performance and concurrent verbal behavior characterize his movement in reference to Laban's framework for movement analysis?

3. What are the advantages and disadvantages of the utilization of Labanotation for recording the data of children's movement performances?

Definition of Terms

The terms used in the study are defined in the following section:

Components of Movement: The simplest or most specific part of Laban's framework for human movement (e.g., right palm).

Complex Movement Problem: A movement task, presented to an inexperienced individual, which requires the integration of striking with different body parts in an open environment that includes changing spatial dimensions, force requirements, and continuity of movement.

Expert: The individual who analyzed and accepted the video-taped movement problem.

Laban Framework for Human Movement: The classification of movement into four aspects: Body Awareness, Space Awareness, Effort, and Relationships as

well as the subdivisions of these aspects identified as components and dimensions as modified by Barrett (1977).

Labanotator: The trained individual who observed and notated the movement performances of the child from the video tapes. The notator used the structured form of Labanotation.

Learning: "The changes in the child while he or she maintains the same goal of the task" (Teeple, 1978, p. 5).

Visual Model: The nonverbal video-taped example of the complex movement problem as performed by two children.

Assumptions Underlying the Study

The researcher made the following three assumptions which underlie the study:

1. The video-taped movement problem was unfamiliar to the child involved in the study.

2. There are discernable movement components which can be observed and notated by trained individuals.

3. The expert who accepted the pre-taped movement problem was a qualified judge of the content involved in the complex movement task.

Scope of the Study

1. The case study examination of one child does not allow for the results of the study to be generalized.

2. The manipulative activities of body use in the study were striking, throwing and catching without implements. The predominant activity was striking.

3. The presentation of the complex movement problem was nonverbal, visual.

4. The data of movement performances were collected in six 10-minute activity sessions for the child.

Significance of the Study

There is a need in educational research to break new ground, to unearth the assumptions which underlie beliefs, to cultivate new ideas with new tools, to harvest the results, and then to painstakingly sift the chaff from the grain. There is an implicit bond between a research question asked and the strategy underlying its study. The bond is actualized by the principal investigator who first perceives the need for the question, who thoughtfully structures the question, and who is committed to seek the answer(s). The researcher thus acknowledges fundamental assumptions and specific information which impinge upon the problem. Educators who believe in the uniqueness of the individual, who seek explanations about that uniqueness, and who desire to nurture individuality must develop approaches to research which are congruent with their beliefs, their needs, and their aims. Such research approaches appear as departures from traditional research designs of the past. But the belief in, and the nurturing of, individuality is a radical departure from the search for behavioral laws. Therefore, it is natural and logical that different assumptions about the individual yield different forms of inquiry.

Personalized learning inquiries may be considered as curricular studies from the individual perspective. Personalized learning has its historical roots in value and belief systems, not in a particular learning theory. Personalized movement learning inquiries are appropriate studies in physical education curricular research. One focus of these studies is the personalized learning of complex movement tasks. The information gained from the examination of individuality in approach to, and learning of, complex movement tasks has implications for elementary school curricula. Knowledge about "personalized learning" can serve as a basis for curricular decisions. The information gained from studies focused on individuality of learning could help teachers plan more personalized experiences

and lessons. North (1973) identified the importance of such information in relation to personal movement patterns in Movement Education:

> The teacher who has a greater awareness of the possible ranges of human movement, a recognition of personal patterns and rhythms, will be able to make more appropriate responses to the child. (p. 14)

Idiographic research is the most logical method to utilize in the examination of individuality. "Case studies can be used to test hypotheses, particularly to examine a single exception that shows the hypothesis to be false " (Stake, 1978, p. 7) Roberton's (1978) work on the verification of "stages" in motor development is an excellent example of this application of the case study. The case study has been utilized as a preliminary step in theory development (e.g., Piaget's work in cognitive development, and Freud's work in psychoanalysis). Such uses, however, might not be the "best" application of the case study. Stake (1978) suggested that "its (the case study) best use appears to me to be for adding to existing experience and humanistic understanding" (1978, p. 7). This usage most closely aligned with the needs of educators who value individuality and seek explanations about uniqueness.

A present approach to movement skill learning, providing the child opportunity for discovery, could be enhanced by information which might lead to more effective teaching. This information should be acquired from studies which involve the same kinds of skills as are being taught in the classroom. The description of the results must be in a form which can be taken back into the classroom if application is the goal. The logical source of this information lies in the observable changes within the individual's movement responses and in the individual's self-reporting of intent and strategy for learning. The data-recording techniques must be objective to allow for disclosure of variations, comprehensive to accommodate the complexity of the event, and systematic to facilitate analysis.

The study described in this paper is exploratory. The question asked is one that concentrates on individuality. The methods utilized allow for expansion, explanation, and disclosure -- not control, prediction, and generalization. Such a study is a beginning, an adventure, an attempt. The significance lies in the potential discovery of a new form of inquiry for the examination of the uniqueness of the individual engaged in the learning of complex movement skills. The potential value of the research is accrued in addition to specific findings about individual skill learning.

CHAPTER II

REVIEW OF LITERATURE

Literature from diverse sources provided the background for this study. The present study focused on the movement skill development of one child. There have been no studies completed in the format upon which this one depends. Consequently, the research methodology as well as the conceptual base had to be derived from a combination of learning and movement development research. The literature discussion has been divided into two major sections: research methods and Rudolf Laban. The methodology section contains both learning and movement development literature. The second section is a review of Rudolf Laban, his theory of movement, and his movement notation system.

Research Approaches

Both learning and movement skill development studies have occurred in any one of three research formats: longitudinal, cross-sectional, and case study. Although all three were used at times incorrectly, given current knowledge of differences between learning and development, each method did enable the investigator to examine behavioral change in a different way. The present study is unlike those which have been completed in the past; their conceptual frameworks, analysis techniques, and assumptions have assisted this investigator and enabled the avoidance of some mistakes, invalid assumptions, and repetition of previous research.

Longitudinal Studies

Researchers have utilized the longitudinal method, which implies a long time span, to study changes both across individuals and within individuals. Shirley (1931) and Bayley (1935) utilized the longitudinal method in studies of infants to determine the chronological appearance of motor patterns. The results of both studies focused on the individual differences in rates of development. The Shirley and Bayley studies exemplify research conducted in accordance with a "maturation" viewpoint of development. This viewpoint implies that development resulted from a natural unfolding of predetermined processes. The behavioral changes within individuals, while recorded, were utilized to verify chronological development patterns.

McGraw (1935) also reported a longitudinal study on twins, Johnny and Jimmy. The McGraw study involved an investigation of the effect of practice on behavioral patterns. McGraw was interested in the process of development of various developmental patterns and not in growth increments. The implication of this interest was that some studies using the longitudinal method were "in fact little more than inventories of the same child-subjects at different chronological periods" (p. 4). It is important to note that McGraw did not subscribe to the maturation viewpoint of development. She supported the theory of epigensis which was derived from studies of embryological development. This theory implied that development was a process of change from general to particular, and that the progress was gradual. McGraw focused the findings of her studies on the changes within the individual as related to various developmental patterns.

Halverson and Roberton (1966) reported on a longitudinal study of six children, ages 3 through 9. The study was an attempt to investigate interskill development of certain fundamental motor patterns. Data were collected by a

cinematographic technique and were analyzed individually. The purpose of the study was to investigate changes within individuals in relation to inter- and intra-skill development. The investigators believed that development occurred as a result of interaction between the organism and the environment.

Roberton (1978) reported a longitudinal investigation of overarm throwing in 76 children. She collected data over a 2- to 3- year time period and analyzed each child individually in an attempt to examine the organismic developmental theory concept of "stages". She proposed the use of an idiographic method of inquiry because it allowed the investigator to examine individual cases of development by detecting exceptions to the developmental stage criteria.

Cross-Sectional Studies

The cross-sectional method of inquiry has been used to investigate both movement skill development and learning. Data collected in cross-sectional studies have related to behavioral changes across and within individuals.

Goodenough and Brian (1929) examined learning of a simple motor skill in 20 four and one-half-year old children. Each child performed a simple ring toss task for 50 days. The researchers analyzed the data on the basis of individual differences and from the standpoint of changes within the individual children. Data related to the verbal behavior of the child and the technique used for tossing the ring were recorded on each child during the 50 days.

McCaskill and Wellman (1938) conducted a correlational study on 98 preschool children to investigate motor achievements. They reported new information about developmental stage, sequence, and age achievement of various fundamental motor patterns, in 4-, 5-, and 6-year old children. The study focused on developmental patterns, but the data collection process occurred in a 2-week time period.

Wild (1938) investigated the overarm throwing pattern in 32 children. She was interested in the throwing process of different children at successive age levels. The study was descriptive, and the data were derived by cinematographic analysis. The detailed descriptions of the overarm throwing pattern resulted in the identification of four clearly defined "stages." This study became the prototype for several additional studies related to throwing and other fundamental skills.

Gutteridge (1939) conducted a descriptive observational study of motor achievements in children aged 2 to 7 years. Trained teachers in different parts of the country collected the data over a 1-year time period. One of the unique characteristics of the study was that the data were collected on the children in their natural play situations. Gutteridge reported both quantitative and qualitative analyses of data. The quantitative analysis resulted in achievement ratings for various motor skills as related to age and sex. The qualitative analysis indicated the variations in performance of the different motor skills by different children.

Espenschade (1947) investigated motor coordination in adolescents using the Brace test. The reported study was a combination of a 1940 longitudinal study of 86 adolescents and a cross-sectional study of 610 adolescents. The investigator intended to establish age differences for performance on the various items of the Brace test and to examine individual performance changes on the same test item over a period of years. This study was one of the rare motor skill development studies conducted with adolescents.

Deach (1950) conducted an investigation of motor skill ability in 83 children aged 2 to 6 years. She attempted to establish age achievement scores in throwing, catching, striking, kicking, and ball bouncing. Deach was also interested

in the performance patterns of the various motor skills and in the comparison of the children's patterns of performance with the performance patterns of skillful adults.

Hellebrandt, Rarick, Glasgow, and Carns (1961) reported a combination longitudinal, cross-sectional study concerned with two-foot jumping in 47 different individuals. A cinematographic analysis technique allowed the identification of developmental patterns in jumping behavior. In one part of the study, the researchers attempted to "differentiate inborn or pre-experiential neuromuscular patterning from the learned aspects of the motor skill" (p. 14). The focus on underlying developmental processes in the study was somewhat similar to McGraw's work in 1935.

Hoffman (1974) conducted a learning study on backward jumping in 10-year-old boys. He used cinematographic techniques to examine the effects of practice on the consistency of performance and collected data on 8 consecutive days with a 2-day interval between the fourth and fifth days. The data collected indicated the changes in joint displacement measurements. These data were statistically analyzed using ANOVA's on repeated measures. The study represented learning research with a focus on process changes within individuals while learning a motor skill.

Case Studies

The case study method of inquiry was used in early developmental studies in the form of "baby biographies." The biographies were usually longitudinal studies on one or two children. This form of inquiry was replaced in the early 1930's by the more controlled longitudinal method. Hersen and Barlow (1977) indicated that the case study method was the basic form of inquiry for applied research in clinical settings through the first half of the twentieth century.

Craig (1976) utilized the case study method in an investigation of the personalized curriculum of one child in a physical education classroom situation. This particular study was the only one related to the current study and therefore was reviewed in more detail than previous studies. The Craig study was closely related to the specific content in the present study. Craig (1976) investigated the personalized curriculum of a single child by an analysis of movement responses in relation to a teacher's verbal behavior. The movement responses of a 10-year-old male were recorded on video tape during six consecutive lessons, 2 days a week for a 3-week period of time. The video tapes were made during the child's physical education classes. Neither the teacher nor the child was aware of the exact subject of the study during the taping sessions.

Craig developed a scheme for recording the subject's movement responses off the video tapes. The scheme was based on Laban's framework for movement and on Mauldon and Redfern's (1969) classification and analysis of games framework. The scheme consisted of the four aspects of movement (Body Awareness, Space Awareness, Effort, and Relationships) and selected components of each of these aspects. The scheme for recording the movement responses was developed prior to the recording of the actual data.

The specific question investigated related to the child's personalized curriculum and to the progression of this curriculum during the six lessons. The personalized curriculum question was related to the specific movement aspects, dimensions, and components identified in the movement responses. The progression question was related to the manner in which the dimensions and components of movement evolved over the 6-lesson period. Craig was particularly interested in the child's personal curriculum as it related to the curriculum as presented by the teacher. The data were reported in frequencies of appearance of a particular

dimension or component. Changes in frequency of response to the verbal behavior of the teacher were also reported.

Craig discussed her conclusions for the child's personalized curriculum in relation to Body, Space, Effort and Relationship. The data revealed that the right hand, left hand, both hands, right knee, left knee, right arm, left arm, right foot, left foot, right leg, head and back were the body parts utilized in the striking activity. The Space components identified in the personalized curriculum were high center front, low center front, high right front, high left front, low right front, high right side, high left side, high center back, and low center back. The effort qualities in striking were identified as sudden, direct, and bound. The effort qualities identified in the child's locomotor movements were sudden, direct, flexible, and free. Four relationship components were identified as individual, partner, self-designed games, and those with a plastic ball.

Progression was discussed in relation to the body parts used most often, the spatial zones and directions used most often, and the effort qualities used most frequently. Simple to complex progression was identified in relation to the variety of body parts used in early and later portions of the lessons and in the child's ability to initiate movement responses.

Summary

A review of the methods used to investigate movement skill development and learning revealed that (a) both the longitudinal and cross-sectional methods have been utilized extensively, (b) most of the data from these studies were analyzed across individuals to develop age achievement scores or normative scales, and (c) few development or learning studies focus on behavioral changes within individuals. The studies by Halverson and Roberton (1966) and Roberton (1978) were the only studies to specifically examine intra-individual developmental

changes in a longitudinal manner. Goodenough and Brian (1929) were the only learning researchers to report both across and within individual changes in relation to a learning study. Hoffman (1974) was the only investigator found to be studying intra-individual learning variability for a fundamental skill in children. Craig (1976) was the only investigator who studied content similar to the current study and who focused on personalized learning within a curriculum context.

Rudolf Laban

The Man

Rudolf Laban was born on December 15, 1879 in Czechoslovakia, the oldest child of four children and the only boy. Laban often accompanied his father, an army general, to military posts in many parts of the country. These trips introduced him to the peasant dances, religious processions, and other movement-oriented events which captivated him (Laban, 1951). "For someone with eyes and ears for this kind of beauty, it was impossible to miss the great importance of movement in life" (n.p.). His self-education in movement proceeded, and at the age of 14 he apprenticed to a stage painter at the municipal theatre in Bratislava and watched the Czech, Hungarian, Austrian, and Italian touring companies (Laban, 1951). Laban recalled that the apprenticeship taught him far more than painting:

> He was the first person to whom I confessed any intention of becoming an artist, and from that day on he took me firmly in hand and forced me to learn real craftmanship, for which I am eternally grateful to him. He taught me both to observe and to perceive and introduced me to his philosophy of life, the principles of which were love of work, scrupulous fulfillment of duty and unaffected behavior. (Laban, 1975a, p. 10)

Laban's profound interest in movement apparently evolved from these rich opportunities to observe movement in various settings.

As a young man, he pursued his interest in the study of movement, both in the sciences and the arts, by attending the centers of learning throughout Europe. He selected courses of study which "he deemed essential to the student of movement" (Moore, 1954, pp. 38 - 39). His studies included mathematics, physics, chemistry, physiology, and anatomy (Moore, 1954). His study in art included painting, sculpture, stage design, theatrical productions, drama, dancing, and theatre architecture (Bodmer, 1958; Thornton, 1971). This blend of art and science enabled him to avoid static conceptions of art performed in solitude and to commit himself instead to "an art which needed active participation from more than one person" (Thornton, 1971, p. 4).

Laban was a man who attempted to accomplish his visions and dreams. "I dreamt of movement which nobody could perform" (Laban, 1951, n.p.). Today this form of movement is known as Modern Educational Dance and is taught in educational settings both in England and in America. "I had to write down my vision and so I invented my Kinetography (movement notation) which is to-day fairly wide-spread, though used for quite different purposes" (Laban, 1951, n.p.). Labanotation or Kinetography Laban is reviewed in greater detail later in this paper. "I dreamt also of a new kind of theatre building, which brought me early to Paris where I studied architecture at the Ecole des Beaux-Arts" (Laban, 1951, n.p.). The building, a "Saltarium," was designed and won him a gold medal, but was never constructed as it was far beyond the technical capabilities of the time.

Twenty years later a committee organised to erect this building at a Chicago World's Fair found themselves unable to overcome the

> difficulties. I am glad that it was not built then, because the time was not ripe to fill it with the right (sic) contents [movers, dancers]. (Laban, 1955, p. 5)

Laban dedicated many years to the development of dancers throughout Europe. He founded numerous "dance farms," movement choirs, and dance schools (Bodmer, 1958; Laban, 1951; Thornton, 1971). He also created several full-length dance compositions which "established an entirely new art form on the stage, often combining dance, music, and verse" (Bodmer, 1958, p. 3). "By 1923 Laban had established dance schools in Bache, Stuttgart, Hamburg, Prague, Budapest, Zagreb, Rome, Vienna, and Paris" (Thornton, 1971, p. 5).

Dance for the stage was not Laban's only form of production. Movement choirs were a dance form in which all people could participate. The idea of the movement choir grew from the fact that many people who observed performances of Laban's work wanted to participate (Thornton, 1971). The movement choir was established for the layperson.

Laban also staged large festivals in open-air theatres. The performers for such productions were members of the movement choirs and students in the dance schools. The movement choir members who joined in the mass dancing were from factories, shops, and other occupations. One festival (1927), the "Cortege of Crafts and Industries," was conducted in Vienna and involved 10,000 performers (Laban, 1955). In reference to these large festivals, Laban stated:

> The main thing for me was, of course, the getting in touch with all these people and their joys and sorrows. It is perhaps worth mentioning that the insight gained into the work in several hundreds of industrial concerns greatly contributed to my interest in the

> improvement of working movement and the psychological attitudes of industrial man, including managers. (Laban, 1955, p. 8)

Laban was appointed balletmaster at the state theatres of Berlin in 1930 (Bodmer, 1958). During the next 6 years, he established a choreographic archive in the Berlin Municipal Opera House and used several movement choirs in mass scenes on the stage (Laban, 1951). The use of the movement choirs introduced his newly created dance-drama art form to the theatres of Berlin. In 1936, Laban's work in Germany came to an end.

> In an attempt to unite 1,000 lay-dancers in a great festival, the scores of the composition were sent to movement choirs in thrity different towns. They studied their parts and came together in a dress rehearsal before 20,000 guests in a large arena. Everybody, including the audience, was most enthusiastic, except some representatives of the then Nazi government. The performance never took place because it was pro-hibited and so were all my other activities. (Laban, 1955, p. 9)

Laban then migrated first to Paris for 2 years and after that to England (Laban, 1955).

In 1938, Laban arrived in England. From that time until his death in 1958, he continued his work on the study of movement. During his 20 years in England, the elaboration of the educational side of his work and the extension of his early ideas about the working movement were significant accomplishments (Bodmer, 1958; Thornton, 1971). He lectured on the art of movement and dance history in various schools in England. His professional work with industrialist L. C. Lawrence resulted in "effort assessment tests" for the analysis of working movements.

Laban had a long life, 75 years, which was filled with many and varied accomplishments. After his death in 1958, Sylvia Bodmer stated:

> He was in essence a great explorer, never content with what he had already achieved, always embarking on a new field of interest, finding wider and wider possibilities for the application of his theories on movement. His principle was to study life itself and thus to elucidate new knowledge of immeasurable value to all of us. (1958, p. 4)

The force behind Laban's profound interest in all forms of human movement was his belief that movement was a vital part of life. Thornton (1971) acknowledged this belief when he stated that "it is true that Laban studied movement, but he used this as a means to the study of man. For to Laban man is movement and movement is life" (1971, p. 12).

Theory of Movement

Rudolf Laban never explicitly stated a theory of movement and, over the years, controversy has arisen concerning his use of terms like principle, laws, and research (Redfern, 1973). Laban did, however, make several contributions to the study of movement which are widely recognized. The four most significant contributions to the study of movement are (a) 16 movement themes for dance and a classification system for movement, (b) space harmony or choreutics, (c) an effort analysis system for all forms of movement including industrial, and (d) Kinetography, a movement notation system.

The 16 movement themes for dance provide a basic and comprehensive outline of the content for dance teaching. These themes have been simplified and condensed in the text of Modern Educational Dance (Redfern, 1973). Several other authors and educators have applied the movement themes in educational

settings (Barrett, 1977; Russell, 1965; Stanley, 1969). The movement concepts within these themes have provided a prototype of themes in educational gymnastics (Standeven, 1977; Williams, 1974) and in educational games (Barrett, 1977).

The classification framework for dance content and all movement has also been applied in the educational setting by several individuals (Logsdon & Barrett, 1969; Logsdon, Barrett, Ammons, Broer, Roberton, Halverson, & McGee, 1977; Russell, 1965; Stanley, 1969). The rudiments of Laban's movement framework are presented in Mastery of Movement (1971). An examination of the literature revealed that the framework, as applied in educational settings, was developed by persons other than Laban. The four aspects (Body, Awareness, Space Awareness, Effort, and Relationship) are, however, integral to Laban's theory of movement. The framework is organized around the four aspects. Each aspect of movement has been further subdivided into dimensions and then into components of movement (Logsdon et al., 1977; Russell, 1965; Stanley, 1969). Logsdon et al. identified four uses of the movement framework in physical education: "1) structuring content, 2) observing and analyzing movement, 3) communicating with others, and 4) evaluating the content of the program"(p. 118). An example of this framework is provided in Appendix A.

Laban's space harmony work is far too complex for review at this time. Persons interested in pursuing this particular aspect of Laban's work are referred to Choreutics published in 1966. Lisa Ullmann also wrote a series of articles explaining the underlying concept of space harmony. These articles appeared in the Laban Art of Movement Guild Magazine from 1952 to 1955.

The most widely applied contribution of Rudolf Laban, in fields other than education, was his work on Effort. Laban and Lawrence (1947) published Effort which explained the application of effort analysis in industrial forms of movement. Effort analysis has since been applied to therapeutic investigations by Lamb (1965)

and in psychoanalytic research by Bartenieff and Davis (1965) and Kestenberg (1966). It is in Laban's work on effort that his belief in the uniqueness of individual movement expression is most apparent. Effort analysis provides for both a qualitative and quantitative description of movement behaviors. Laban believed that an individual's personality was overtly displayed through the qualities of movement apparent in gesturing and shadow movements. These qualities are termed movement elements: time, weight, space and flow. Each element contains two factors which describe the extremes of the element. An example of these elements and their corresponding factors is provided in Appendix A. According to Laban, the effort elements, when used for quantitative descriptions, refer to the amount of the element that is present in the movement. The instrument for measurement is the trained eye of the observer who detects greater or lesser amounts of each element. These descriptions, though quantitative in nature, are not synonymous with a bio-mechanical analysis of movement.

Thornton (1971), after a thorough review of Laban's writings, concluded his interpretations in the form of two principles of movement. The principles identified by Thornton summarized Laban's significant contributions to the study of movement:

1. Movement enables man to realize his physical potential.
2. Movement characterises man. (Thornton, 1971, p. 38)

Laban asserted a mind-body wholeness in all of his writings. This assertion was most clearly stated in an article published after his death in 1958:

> Looking at the whole range of the innate and acquired impulses of man, one is tempted to search for a common denominator. In my opinion this denominator is not mere motion, but movement with all its spiritual implication. In movement none of the spiritual or physical values can

> be left aside. The good man is he who exemplifies in his movement physical, mental and spiritual values as a unified whole. The practice of body-mind movement in all its variations has to be supplemented by a thorough research into the nature and ramifications of movement. (Laban, 1958, p. 12)

One interpretation of this statement, in light of the first principle of movement identified by Thornton, is that man must realize his physical potential in order to achieve the wholeness of life.

Laban's work on effort analysis revealed his belief in the uniqueness of each human. Laban believed that the individuality of man was disclosed through the use of the four effort elements. The manner in which these components were used in movement could not be hidden and were the overt signs of inner attitudes, tensions, and moods (Thornton, 1971).

Movement Notation System

Kinetography Laban (or Labanotation) was one of Rudolf Laban's significant contributions to the study of human movement. The system was "a logical development of Laban's belief in the significance of movement and dance in the life of man" (Thornton, 1971, p. 60). Laban perceived a need for the preservation of movement and dance in its own language. He sought a way to create a literature for movement and dance. Such a literature would provide more than an objective historical record of dance or movement. Laban envisioned a much deeper purpose.

> Man aspires to be something greater than he is and knows that he can acquire the greatness that he covets, if only during the imaginative moments when he is lifted above himself in dance. Whether the

> sincere repetition of such dances produces deeper effects than this, and whether man's spirit is really strengthened by the decision to become his own better self, is an open question. I think we may learn more about this over the years, if we accustom ourselves to notating and pondering the structure of human movement. (Laban, 1956, p. 32)

The writings and theories of Laban indicated that he believed man revealed himself in movement and, of equal importance, that movement revealed the inner attitudes of the mover (Thornton, 1971). Laban believed that the preservation of human movement from various generations, cultures, and individuals would provide a richer understanding of human life.

> The necessity of an adequate script is more urgent now even than it was because movement study has come to be recognised as a most important feature in industry, education and therapy. In all three fields, a rich tradition of movement knowledge is running to waste since many bodily actions and exercises cannot be preserved. We cannot rely solely on people's memory of movement: nor can the choreographer rely upon his memory, for he might have excellent ideas which he cannot use at the moment, and when he can use them he may find that the ideas have entirely escaped his mind. (Laban, 1956, p. 14)

Labanotation has achieved his goal; a literature of movement and dance was and continues to be created. In 1954, Laban was aware that this vision had been achieved more quickly than he thought possible.

> I have often been sceptical because I believed that it would be several generations before the creation of a dance literature could

> become a reality. However, we have moved on more quickly and here now, in 1954, is this book of Ann Hutchinson as a harbinger of things to come. (Hutchinson, 1954, Foreword)

At the present time, Labanotation is considered by some experts to be the most complete and scientific of the available notation systems (Hutchinson, 1977; Lange, 1977; Stepanov, 1891/1969). The system has been in general use for over 50 years, and during that time, relatively few changes have been made. Laban accredited that durability to the fact that the underlying principles of the system, as first devised, were sound and practical (Laban, 1956). Hutchinson implied that the system will survive the present age of technology as well.

> Every few years a new system appears. Most fall back on one or the other of the devices already tried, and most favor one form of dance. As modern technology develops, the emphasis is upon mathematical systems which can be adapted to the computer. It is essential, however, that the human aspect is not lost. The system which can record objectively the changes in the angles of the limbs, the paths in space, and the flow of energy and can also record the movement motivation and the subtle expression and quality deserves special attention. Labanotation is such a system. (Hutchinson, 1977, p.4)

Kinetography, in the present form, evolved out of many years of struggle, study, and experimentation. Laban worked on the system 10 years prior to its first publication in Choreographie (1926). Initially, the notation was in the form of scribbles which had little meaning to anyone but Laban. The present dance signs evolved after study of the ancient writing systems, symbols, and signs.

> In my search for primary action signs, I found fascinating examples of movement description in the mantic symbols invented by ancient

> Tibetan monks and in the cuneiform characters of the Assyrians and Babylonians. In Egyptian and Chinese scripts I found a rich variety of movement symbols which are, in a sense the archetypes of dance notation signs. (Hutchinson, 1954, Foreword)

Another source of information was the dance system of Beauchamp and Feuillet.* Laban acknowledged that he utilized four graphical principles of the Beauchamp system.

> 1. The central line separating movements of the right side of the body from those of the left.
>
> 2. The partitioning of this middle line by bar-strokes indicating a metrical division of time.
>
> 3. The use of directional signs and shape symbols guiding the dancer or moving person.
>
> 4. The indication of basic body actions, such as gliding, hitting, etc. by special stress signs. (Laban, 1956, p. 7)

An additional and important source of information used in the development of the notation system was Laban's knowledge, understanding, and appreciation of the human body and movement. He recognized the structural and functional limits of the body. His system reflects an understanding and appreciation of the totality of man in movement.

> Although it is obvious that the words and phrases of the language of movement have no determinable verbal meaning, they are nevertheless

---

*Beauchamp was recognised in 1666 by a French Act of Parliament as the inventor of a system of dance notation. Feuillet published dances recorded in this notation a few decades later (Hutchinson, Foreword, Footnote, 1954, p. xiii).

> subject to an ordered principle, namely the balanced flow and harmony of movement. The structure and function of the body limits the number of movements which the human being can perform. ...Our facial expression and bodily carriage can indicate morosity or cheerfulness according to our inner mood, but we can also feign moods and hide our thoughts behind our movement. ...We can be sincere or false in movement, and curiously enough, it is by our movements that people are often made aware of our insincerity. (Laban, 1975b, p. 9)

Although Laban discovered the principles and invented the basic symbols, he gave credit to his many students and friends without whose assistance the system might not have reached final form (Laban, 1956). He also expressed gratitude to those who opposed this particular system "who have involuntarily helped to overcome the initial weaknesses of the great vision of a literature of movement and dance, with its own language and its own symbolic representation of an important manifestation of the human spirit" (Laban, 1956, p. 9).

Lange (1977) identified four principles which account for the universality of Laban's notation system.

> 1. The <u>vertical</u> is the <u>universal</u> and the usual stance of all human beings, irrespective of race and culture. Therefore in respect of spatial orientation we refer first of all the the ideal vertical as a means of reference.
>
> 2. Similarly all possible directions resulting from the different degrees of going away from the vertical refer to the universial spatial dimensions. The spatial dimensions and the ideal directions intermediately located remind us of the universal spatial model, to which

any observable action will be related and possible deviations from it recorded.

3. However, as soon as the weight of the body is moved, a different criterion is applicable and this is the centre of gravity. Again this is a universal phenomenon and Laban applied it to his system.

4. The relativity of experience and achievement is another universal trait of the human race. On (sic) spite of identical characteristics human beings are not uniform creatures. Some physical or cultural features may condition a different approach in solving universally human actions. This applies not only to particular human groups, it is already evident with each individual human being. In his system of analysing and recording movement Laban respected this principle all the way through. (Lange, 1977, pp. 10-12)

The universality of the notation system can be realized in its wide range of application to movement study. Laban utilized the system to notate movement in diverse settings: in dance festivals which involved thousands of people, in agriculture, forestry, mills, and work shops. Subsequently, the system was used to improve work methods, train apprentices, select operators and managers, and assess the physical and mental capacities of industrial personnel to assist in suitable job placement (Laban, 1975).

The application of the notation system in industry was a joint project between Laban and Lawrence during the 1940's. Effort (1947; 1974) introduced a specialized form of movement notation into industry as a tool of the effort assessor.

The psychological factors involved in movement notation, whether dealing with artistic work on the stage or with training in trade schools,

technical institutes and factories, have made it possible to extend the use of the script to psycho-therapeutic investigations. (Laban, 1975, p.13)

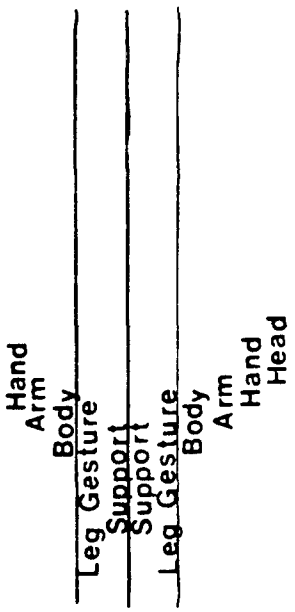
The use of Labanotation has progressed far beyond the initial goal of dance and movement presentation.

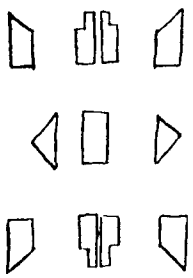
Mechanics of the System. A movement notation system must record four-dimensional movement onto a two-dimensional piece of paper. The four dimensions of movement (specifically, the body part moving, the direction of movement, the level of movement, and the time of movement) are recorded simultaneously in graphic form. This feat was accomplished in a logical, simple manner.

Three vertical, parallel lines form the staves on which the movement signs are written. The use of three lines allowed for the split of the body at the midline vertically. Therefore, actions of body parts on the right side of the body are recorded to the right of the center line; actions of the left side are recorded on the left side of the center line. There are 11 columns in the standard staff, each column representing a separate body part. The two columns directly beside the center line, one right and one left, are designated as the support columns. An example of the notation staff is presented in Figure 1.

The location of movement signs on the staff indicates what body part is moving. The dimensions of space, both direction and level, and the dimension of time are recorded in the form of a single movement sign. Each sign indicates direction by its shape, level by its shading, and time by its length. The placement of a sign on the staff indicates its body part referent.

Additional signs are used to indicate various refinements of the movement, such as dynamics of the movement, the degree of motion, the pathway of movement, etc. "The basic principle of structured Labanotation is that simple, natural movement should be written in the simplest and most direct way. A second premise is





Direction is indicated by Shape

High

Medium

Low

Level is indicated by Shade

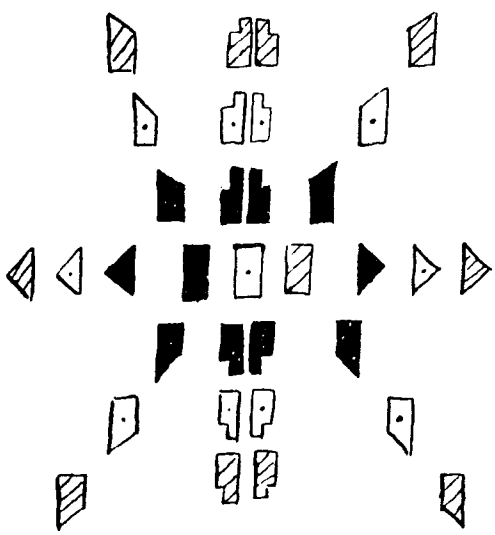


Figure 1 Notation Staff and Symbols

that everything that occurs must be recorded" (Hutchinson, 1977, p. 13). The two statements are not as contradictory as they appear. The important idea is to record exactly what happens in a simple way for the intended purpose (Nicholson, 1959). An example would be the notation of a walk for the purpose of exact duplication of style and distance, versus notating a walk for the purpose of moving the person from one part of the floor to another irrespective of style.

Such a brief explanation of Labanotation does not do justice to the genius of its creator. It is hoped that the explanation has provided a basic understanding of the system. The question of why a movement notation system is needed in the research of physical education and general human movement study might remain unclear. Hutchinson spoke to this point with a simple analogy.

> The scientist would be lost without his symbols by which he can communicate his ideas objectively to his colleagues everywhere. The student of movement requires a similar method of notation in order to compare variations of the same movement patterns and reach conclusions which would not otherwise be possible. Only through a language can all forms of movement research be expressed in a way that is internationally understood. The Laban system provides such a language. (Hutchinson, 1977, p. 9)

The advancements in cinematography and video-recording techniques have not eliminated the need for such a notation system, just as audio recordings have not eliminated the need for the music score. "But the study of the work itself for performance, for critical evaluation, or for educational purposes is still achieved through music notation" (Hutchinson, 1977, pp. 7-8). The same case can be made for a movement notation.

Summary

Rudolf Laban dedicated his life to the study of human movement. Among his most significant contributions to movement study were: (a) his 16 movement themes for dance, (b) his framework for movement classification, (c) his effort analysis system, and (d) his Labanotation. Laban's deep belief in individuality and his conceptualization of movement as consisting of four distinct yet related aspects were consistent threads throughout his work. Laban was fascinated with all forms of movement and his contributions to the study of movement have a universal application to movement study.

CHAPTER III

PROCEDURES

The purpose of this study was to examine, in detail, the observable movement behavior in the performance of a child attempting to perform a complex movement task from a visual model. A secondary focus in the study was concerned with the usefulness of Labanotation as a method for recording data in the study of complex manipulative movement. The procedures in this study entailed three processes: (a) preliminary preparations, (b) collection of data, and (c) data analysis.

Preliminary Preparations

The preliminary preparations involved five steps: (a) Human Subjects Review Committee, (b) development of the visual model, (c) validation of the visual model, (d) Labanotation, and (e) conduct of the pilot study.

Human Subjects Review Committee

A Human Subjects Review Committee form and a copy of the study proposal were submitted for review to Dr. Pearl Berlin, Chairperson of the committee, on April 27, 1978. A copy of the Human Subjects Review Committee form appears in Appendix B. This procedure protected the rights of the students who participated in the pilot study, the model tape preparation, and the actual study.

Development of the Visual Model

The decision to utilize a visual model of the movement task was made for several reasons. The video-taped model would provide a consistent example of the movement task across the data collection period. Also, the visual model would

eliminate the need for verbalization of the movement task; consequently, sentence structure and intonation did not influence the performance order of movement components within the task. Finally, the nonverbal model was selected in order to avoid the confusion that might result from unfamilar terminology.

An effective visual model for children possesses certain characteristics. These characteristics are especially important when no direct reward is available to the subject. The effective model is one who is older or who possesses higher social status (Bandura & Walters, 1963). Bandura (1969) suggested that high competence on the part of the model commands more attention and is more influential than models lacking this quality. The sex of the model is important in that female models are more effective with females and male models are more effective with males (Dubanaski & Parton, 1971; Perry & Perry, 1974). The characteristics of age, skill, race, and sex were considered in the selection of the performers for the visual model of the movement task.

Preparation of the Visual Model

The preparation of the visual model involved four steps: (a) selection of the movement task, (b) selection of the movement task performers, (c) video taping process, and (d) production of the model video tape.

Selection of the Movement Task. The movement task was an open, complex dynamic manipulative skill that involved numerous movement dimensions. The researcher intended the task to be challenging, but at the same time possible to attain. The specific task involved throwing, catching, and striking a 7-inch plastic ball with different body parts. The use of all spaces around the body, varying the amount of effort and moving in relation to the ball were considered parts of the task. The movement task was presented as a visual, nonverbal video-taped movement performance.

Selection of the Movement Task Performers. The characteristics that were considered in the selection of performers for the movement task were age, skill, sex, and race. The children selected to develop the visual model video tape were sixth-grade students at an elementary school in the Greensboro City School system, Greensboro, North Carolina. These children had participated in a movement approach physical education program and had experienced content ideas in the areas of gymnastics, dance, and games. Physical education classes met 2 days a week for 30 minutes each day.

Four highly skilled children, evenly balanced by sex and by race, were selected. Mr. John Taylor, principal of the elementary school, contacted the parents of the children by phone. After this initial contact with the parents, the investigator wrote a letter to the parents explaining the purpose of the study and requesting permission for the children to participate. The letters were distributed to the children by their classroom teacher. The signed Informed Parental Consent forms were returned to the classroom teacher by the children. The consent forms and the letters are presented in Appendix B.

Video Taping Process. The four children came to the cafetorium as a group and were asked to practice the movement task described as throwing, catching, and striking the plastic ball with different body parts. They were asked to try to keep the ball moving while using all the spaces around the body and varying the force. The children had had experience with this task during their physical education classes. The movement performances of the children were video-taped on 5 separate days.

On each day, the children practiced the task as a group for approximately 10 or 15 minutes. After the initial group practice periods, the movement performances of individual children were video taped. The individual movement performances served as the basis for the actual visual model of the movement task.

These video tapes were studied by the investigator and Dr. Marie Riley, Associate Professor, University of North Carolina at Greensboro, in the School of Health, Physical Education and Recreation. Dr. Riley was asked to serve as a consultant because of her expertise in games-teaching content at the elementary school level.

The movement performance segments most representative of the movement task were selected for use on the visual model to be viewed subsequently by the fourth-grade children. These performances were identified as more skillful because of the clarity and variety of movement responses which illustrated the movement dimensions in the stated movement task. The performance segments of the more skillful girl and boy were selected for use on the model video tape.

Production of the Model Video Tape. The actual visual model of the movement task was produced by Dr. David Jonassen, in the School of Education at the University of North Carolina at Greensboro. Two compatible video tape recording decks were used to complete the dubbing process.

Selected segments of the taped movement performances of the black female and the white male student were dubbed onto a new video tape. Each segment of movement performance was then repeated to increase the length of viewing time. After each repeated segment of movement performance, a blank space was recorded. The blank spaces were used to separate the movement segments and to provide a brief rest for the viewer between segments.

Three different segments of movement performance by the female were used in the visual model. Two different segments of movement performance by the male were included on the video taped model. In general, the female was more skillful than the male; therefore, more of her performances were included in the visual model. The order and length of each movement performance segment and each

blank space comprising the visual model is recorded in Table I. The visual model was 2 minutes, 35 seconds in length. After the taped visual model of the movement task was completed, it was given to the expert for analysis and approval.

Table I

Visual Model Format

Order	Time
Female Movement Performance	27 seconds
Repeat	27 seconds
Blank Space	8 seconds
Male Movement Performance	9 seconds
Repeat	9 seconds
Blank Space	3 seconds
Female Movement Performance	20 seconds
Repeat	20 seconds
Blank Space	8 seconds
Male Movement Performance	21 seconds
Repeat	21 seconds
Blank Space	8 seconds
Female Movement Performance	27 seconds
Repeat	27 seconds
Total	2:35 seconds

Validation of the Visual Model

Dr. Marie Riley, Associate Professor in the School of Health, Physical Education and Recreation at the University of North Carolina at Greensboro, served as the expert to judge the visual model of the movement task. She has written numerous articles and has served as a consultant at several workshops on the topic of games teaching in elementary schools. Dr. Riley was asked to verify the visual model of the movement task as representative of the movement content described in the movement task. More specifically, she was asked to indicate whether the performances on the visual model were skillful representations of (a) throwing and catching, and striking with different body parts, (b) use of all the spaces around the body, (c) varying use of effort, and (d) moving in relation to the ball.

Dr. Riley had the option to agree or disagree with the entire tape or with portions of the tape. If any portion of the tape was unsatisfactory to the judge, the unacceptable section was not used in the final visual model. The first visual model tape was unacceptable to the judge because it lacked clarity of movement content. The visual model was revised by removing those segments of performance which lacked clarity and incorporating new segments of performance which were more demonstrative of the movement task. On May 9, 1978, Dr. Riley, indicated that the revised visual model video tape represented the movement task as described in the study.

Labanotation

Labanotation, the most complete system for analyzing and recording movement, was used to transcribe the movement performance data from the video tapes made of one fourth-grade student in a pilot effort and later of the fourth-grade student in the actual study. The notation system provided a "structural description" of the movement performances. The structural description included an expression

of movement in relation to four major categories: (a) the specific body parts that move, (b) the specific spatial location of the movement, (c) the time or duration of the movement, and (d) the quality of the movement. An example of the notation staff and a glossary of the symbols used in Labanotation appear in Appendix A.

Labanotators. Two Labanotators were employed to notate the movement performances from the video tapes. These notators had completed Advanced Notation as an Independent Study at the University of North Carolina at Greensboro under the direction of Ms. Virginia Moomaw, Professor Emerita and Certified Teacher of Labanotation. Both of the notators were trained dancers and had previous experience in notating dance as a movement form.

Training. The investigator studied Labanotation on an independent basis under the direction of Ms. Moomaw during February and March, 1978. The investigator had had prior work with Labanotation during her undergraduate study. At the end of 12, 1-hour sessions with Ms. Moomaw, the investigator had acquired a competency in reading, writing, and comprehension of Labanotation. In addition to these study sessions, the investigator practiced reading and writing the notation of data under the direction of Ms. Moomaw. Upon the completion of these procedures, Ms. Moomaw indicated that the investigator had acquired a reading comprehension competency equal to that of an Advanced Notation student.

Adjustments in Labanotation. Three types of adjustments were made on the structural form of Labanotation to accommodate the data in this study: (a) the development of new signs, (b) the modification of sign meanings, and (c) the representation of movement detail. Three new signs were developed to accommodate the video tape medium of the data and the particular construction of the room used for data collection. The new signs and their meanings are presented in Table 2.

Table 2

New Notation Signs

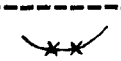
Sign	Meaning
( )	Assumption: The movement was not totally visible. What was notated seemed to be the logical result of the guessed movement.
	Break: The appearance of this sign across the entire staff indicated that the picture changed suddenly. The change was the result of the stopping and subsequent starting of the video camera.
	Invisible: Recorded in one column. This indicated that the portion of the movement normally notated in the specific column could not be seen.

The manipulative skill nature of the data necessitated some changes in sign meanings. The Effort signs were utilized to designate the qualitative dynamics of the body part involved in the action at the point of contact with the ball. The flight of the ball, when visible, was indicated in the ball (prop) column. The height of the ball was indicated by the use of Space Measurement Signs. These changes in sign usage meaning are presented in Table 3.

Some of the effort signs were modified by the use of strong and weak dynamic signs. These modifiers were used in instances when the Effort quality of the

Table 3

Symbol Usage

	Directing the ball: The aim of the ball may not agree with the results.
	Focus: When the focus ceases to follow the ball, it will be indicated by:
	a) Head in the same position, but not looking at the ball.
	b) Looking toward front.
	c) Looking in the direction and level indicated.
	d) The return of the focus to the ball.
	Height of the ball:
	a) Ball travels off the surface at about the same level.
	b) The ball goes up about $\frac{1}{2}$ the length of the arm.
	c) The ball goes up about 1 arm length.
	d) The ball goes up about 2 arm lengths.
	e) The ball goes up about $2\frac{1}{2}$ or more arm lengths.
	Bounce: Indicates that the ball is bouncing.
	Roll: The ball is rolling on floor or body.
	Passing: The ball passed close but was not touched.
	Grasp: The ball is caught or being held.
	Strong: The energy level is more than the effort notated, not sufficient to be another effort.
	Weak: The energy is less than that indicated.

movement was perceived to exist between any two of the eight basic effort actions.

The third type of notation accommodation involved restricting the amount of detail presented. Not all of the detail possible with Labanotation was utilized. In most instances the child focused on the ball. The head tilt or rotation as the focus followed the ball was not notated. The momentary loss of focus, when the ball was tossed to bounce on the head, was not notated as well.

When the palm was "place high" and the fingers were in the same direction as the arm, the fingers were not notated. The ankle was flexed on all strikes unless the notation indicated otherwise. Arm movements were notated only when these actions were related to the action on the ball or served as balance mechanisms for the ball.

The support columns represented the only continuous notation sequence throughout the movement performance. The notation also included every action on the ball. These adjustments in the representation of detail were made to simplify the notation process without sacrificing the recording of the essential movement of the child's performance.

Conduct of the Pilot Study

A pilot study was conducted to verify (a) the visual model, (b) the procedural format for data collection, (c) the data analysis forms, (d) the amount of time needed for each data collection session, and (e) the Labanotation process. One fourth-grade child was involved in the pilot study. She was not a member of the potential subject pool from the Greensboro City School system. Selection of the child was arbitrary. The Parental Informed Consent form is in Appendix B.

Data were collected in six separate sessions on April 6, 8, 10, 17, 18 and 19, 1978. Ten minutes of movement data were collected in each of these sessions. The sessions

on April 6 and 19 required 35 to 40 minutes. The other four sessions required approximately 20 minutes each for completion. The data collection schedule in the pilot study differed slightly from the schedule in the actual study because of the availability of the child and of the video-recording equipment. The visual model tape of the movement task used in the pilot study was approximately four minutes in length. This version of the visual model was an earlier edition of the model used in the actual study and had not been validated by Dr. Riley.

Decisions Based on the Pilot Study. Several decisions resulted from information gained in the pilot study.

1. The visual model of the movement task was shortened to 2 minutes and 35 seconds in length. The decision to shorten the visual model was based on the suggestions of the judge and the reactions of the child involved in the pilot study. The child indicated that the model was too long and therefore not interesting to watch.

2. The child viewed the visual model a different number of times in each of the 6 data-collection sessions. She also viewed different amounts of the visual model during each session. Based on this information, a record was kept to indicate the number of times a child viewed the visual model during each session, as well as the segments of the model that were viewed.

3. The procedural format for data collection on 6 separate days remained unchanged. The collection of one hour of data was obtained by taping 10 minutes of performance during each of the six sessions. The video tape time was approximated by recording the numbers on the counting mechanism built into the video tape deck.

4. The video recording procedure consisted of taping the performance only during the times when the ball was under control. The pilot study revealed that

several minutes were utilized while the child recovered the ball. Based on this information, the camera was stopped when the ball was lost or out of reach for any period of time. This decision was strictly an economical one; since no comparisons were made between on-task and off-task behaviors, it was decided that this taping procedure would not bias the study. In addition, the camera was stopped when the child indicated the need to rest or to tie a shoe. An attempt was made to tape 10 minutes of movement performance that involved the child actually working with the ball in manipulative activity.

5. The pilot study reinforced the need to keep an audio tape recorder operating during each data collection session. The child in the pilot study spontaneously discussed what she was attempting to perform as well as what she was observing on the visual model of the movement task. The purpose of recording the child's verbal behavior was to ascertain information related to the child's strategy for accomplishing the movement task and to record information related to the child's initial perceptions of the movement task on the visual model.

6. The data analysis forms consisted of predetermined lists of movement components derived from Laban's movement framework as modified by Barrett (1977). These forms (shown in Appendix C) were discarded based on experience with movement data in the pilot study. These forms were too restrictive for recording the variety of movement responses apparent in the notation of the child's performance. For example, diagonal directions were not included on the framework, but were observed in the child's movement performance.

A new form was developed to record the movement data in the actual study. The movement data served as the basis for developing the recording forms. The frequency of each movement component identified in the movement data was recorded on a separate form. Examples of these forms are provided in Appendix D.

7. The pilot study demonstrated that different amounts of time were needed for the various data-collection sessions. The first and sixth sessions required 35 minutes. The other four sessions required 20 minutes or less. These variations arose because of the unfamiliarity of the procedures during the first session and the debriefing procedures during the sixth session.

8. A small portion of the pilot study movement performance was notated. The Labanotation process familiarized the notators with the nature of the particular movement form, and clarified the types of accommodation which were needed in the notation because of the movement form and the video tape medium of the data. The data of this study involved manipulative movement as associated with the games form of movement. The notation of manipulative movement differs from the notation of dance in three ways.

The manipulative movement requires that the notator be alert to the actions of the ball as well as the actions of the child. The combination of the moving ball and the moving child was more complex than either of the notators had encountered in their previous notation experiences.

Second, the open dynamic nature of the movement performance was unpredictable and therefore difficult to notate. The notation of most dance forms is facilitated by the repetitive nature of dance movement. In games movement, the movement responses are not easily predicted and are more spontaneous.

The third difference between the notation of dance and the data in this study was the effect of the video tape medium. The video tape provided a two-dimensional image of the movement responses. The notation process records the multidimensional nature of movement. The notators had to adjust to the video tape medium. Most dance notation is completed from a live image; such a procedure in this particular study would have been impossible because of the complexity of the movement and its unpredictable nature.

Collection of Data

The data collection process involved seven steps: (a) selection of the children, (b) desensitizing process, (c) equipment, (d) data collection format, (e) debriefing process, (f) selection of the child for the Case Study, and (g) Labanotation recording process.

Selection of the Children

On April 17, 1978, a letter was sent to Ms. Mary Hoyle, Director of Psychological Services in the Greensboro City School system, Greensboro, North Carolina, stating the nature of the study and requesting permission to conduct the study in the school system. A copy of this letter is presented in Appendix B.

Ms. Hoyle consented by phone and contacted the principal of the elementary school used in the study. The principal designated a fourth-grade class. Eight children were randomly selected from the enrollment list of this class using a table of random numbers. The initial sample was balanced by race and by sex.

A letter explaining the purpose of the study and a Parental Informed Consent form were sent to the parents of the selected children. The classroom teacher distributed the letters to the children. The children returned the signed Parental Informed Consent forms to their teacher.

The four children who participated in the study represented those whose parents signed the Consent form. This sample contained one female and three males. One of the children was black and three were white. The one female child was eventually dropped from the study because of an acute illness. No replacement was made because of time limitations. The movement performances of all three children were video taped; then the movement performances of one child were selected for analysis. All consent forms and letters used in the study are presented in Appendix B.

The movement task used in the study was unfamiliar to the children participating in the study. The physical education background of these children consisted of a variety of activities. The units in which the children participated during 1977-1978 were listening games, physical fitness, folk and square dance, body awareness, small equipment, lead-up games, and team games. The children participated in physical education approximately 2 days a week throughout the school year.

Desensitizing Process

The fourth-grade children were desensitized on May 26, 1978. This was done to acquaint the children with the apparatus and the procedures to be used in the data collection process. In addition, this procedure was intended to minimize the effects that the recording equipment might have on the movement performances of the children.

The children were brought to the multipurpose room at the elementary school where the video-and-audio recording equipment was set up. The function of each piece of equipment was explained to the children as were the purpose of the study and the data-collection format.

As a group, the children were asked to play with a plastic ball. A video tape recording was made of the play activity. The children then viewed the video recording of their play and were instructed in the operation of the video camera. Each child then recorded the play activity of the other children. The brief recordings of the play activity were again shown to the group of children.

Equipment

The video-recording equipment was borrowed from the School of Health, Physical Education, and Recreation at the University of North Carolina at Greensboro.

An AV 3400 Sonymatic Portable Videorecorder and a 9-inch Sony monitor were used to display the visual model of the movement task.

An AV 3400 Sonymatic Portable Videorecorder and an AV 3450 Sony Video Camera were used to record the movement performances of the children. The camera was placed on a Sony Elevator Tripod (VCT-20A) during the video-taping process. Scotch Brand one-half inch 30 minute video tapes were used to record the movement performances of the children. A General Electric Audio Recorder, Model 3510 5-C, was used to record the verbal comments of the children.

Data Collection Format

Each of the four children (individually) came to the multipurpose room where the audio and video equipment had been set up. Pretaped audio instructions directed the child to view the movement task on the monitor. The instructions also informed the child that the movement task could be viewed any number of times and whenever they asked. A transcript of the instructions appears in Appendix E.

The children were informed that they were going to learn a new play activity. They were told to perform the kind of movement they saw the children on the tape performing. The children were asked prior to each activity session if they wanted to view the model tape.

Ten minutes of actual movement activity for each child were recorded on 6 separate days. The total time recorded for each child was approximately 1 hour. The 6 data collection days were organized in a Monday, Wednesday, Friday, Monday, Wednesday, and Friday (two weeks) sequence. All of the data collection sessions occurred between 8:15 and 11:45 a.m. There was, however, some variation in the pattern for certain children because of school absences.

The 6-day data collection time was deemed to be an adequate length for the children to make observable progress in performing the movement task. This

decision was based on three factors: (a) previous experience in teaching similar tasks to children, (b) Craig's (1976) study using similar content, and (c) the progress made in this time period by the child in the pilot study.

At the end of the final data-collection session, the children were asked to view the visual model for the final time. During this viewing session the children were debriefed.

Debriefing Process

The three children were debriefed individually after the sixth day of data collection. They viewed a brief portion of their own taped movement performance on the monitor. Then they were asked to compare their movement to the movement they had observed in the visual model. Their verbalizations are part of the verbal behavior data discussed in the data analysis section of this chapter.

The children were also asked to draw a picture of their own movement performance, and then to talk about their picture. The children were reassured that none of their classmates would see their video tapes. Transcripts of the desensitizing results, the taped instructions, and the debriefing discussion appear in Appendix E.

Selection of the Child for the Case Study

Because this study was designed as a case study, data were analyzed for only one of the three children involved in the data collection procedures. The criteria used to select the one child to be used in this case study were (a) the data collection schedule, (b) the academic level of the child, and (c) the movement performances of the child.

The movement performances of a white male were selected to be analyzed in detail. His data collection schedule conformed to the 6 -day data collection

schedule proposed in the study. The academic level of the child was reported by his teacher to be slightly above the average of the class. The child's movement performances were judged by the investigator to be the most consistent and complex when compared to the other children.

Labanotation Recording Process

Ms. Virginia Moomaw, Certified Teacher of Labanotation, worked with the two notators during the notation process and verified the notation. The notators were instructed to record the Body, Space, Time, and Effort aspects of the movement performances and to notate only the sections of the movement performances in which the child was actively working with the ball. In order to facilitiate the process, the investigator dubbed audio cues on the appropriate sections of the video tapes after the data-collection sessions. The audio cues which served as transcription aids consisted of a metronome and the verbal counting of eight beat measures. The verbal counting stopped whenever the child lost control of the ball and began again when the child regained control of the object.

Ms. Moomaw and one notator were used to notate the data. A second notator was also trained in the unique aspects of the particular notation and was the back-up person to be used only if needed. The one notator, with Ms. Moomaw as a verifier, notated five separate 10-minute segments of movement performance data from days 2 through 6 . Ms. Moomaw and the investigator notated the first day of movement performance data.

The notator and Ms. Moomaw used a Sony 3650 recording deck and a 24-inch monitor during the notating process. This particular recording deck was selected because it had slow motion capability. This feature was necessary to notate more accurately the movement performances of the child.

Approximately 700 hours were required to notate the 1 hour of movement performance data from the video tapes. The average time required to notate each

day, or 10-minute segment of data, was 116 hours. After the first draft of notation was completed for each segment, Ms. Moomaw rechecked the notation for accuracy by viewing the video tape and making corrections. This process required an additional 300 hours.

The investigator recopied the notation onto graph paper to prepare the final copy for data analysis. The copying process required approximately 400 hours. During this process the notation was checked a second time for completeness. Any omitted signs or unclear symbols were noted.

The final copy of the notation was given to Ms. Moomaw who then viewed the video tapes for the final time and inserted the omitted signs. This process required a total of approximately 4 hours. The last procedure performed on the final notation copy was proofreading which was done by Ms. Moomaw and required a total of approximately 100 hours. At the end of these procedures, the data were considered ready for analysis.

To increase competency in reading the notation, the investigator worked with Ms. Moomaw as she notated the first 10-minute session of the child's movement performance from the video tape. This process increased the investigator's familiarity with the notation symbols and facilitated the subsequent data analysis process. The final Labanotation copy was read by the investigator during the actual data analysis process. An example of the Labanotation appears in Appendix F.

Data Analysis

The three categories of data in the study were (a) behavior related to the model tape, (b) audio tapes, and (c) video tapes. A flow chart showing the relationship among these data categories is presented in Figure 2.

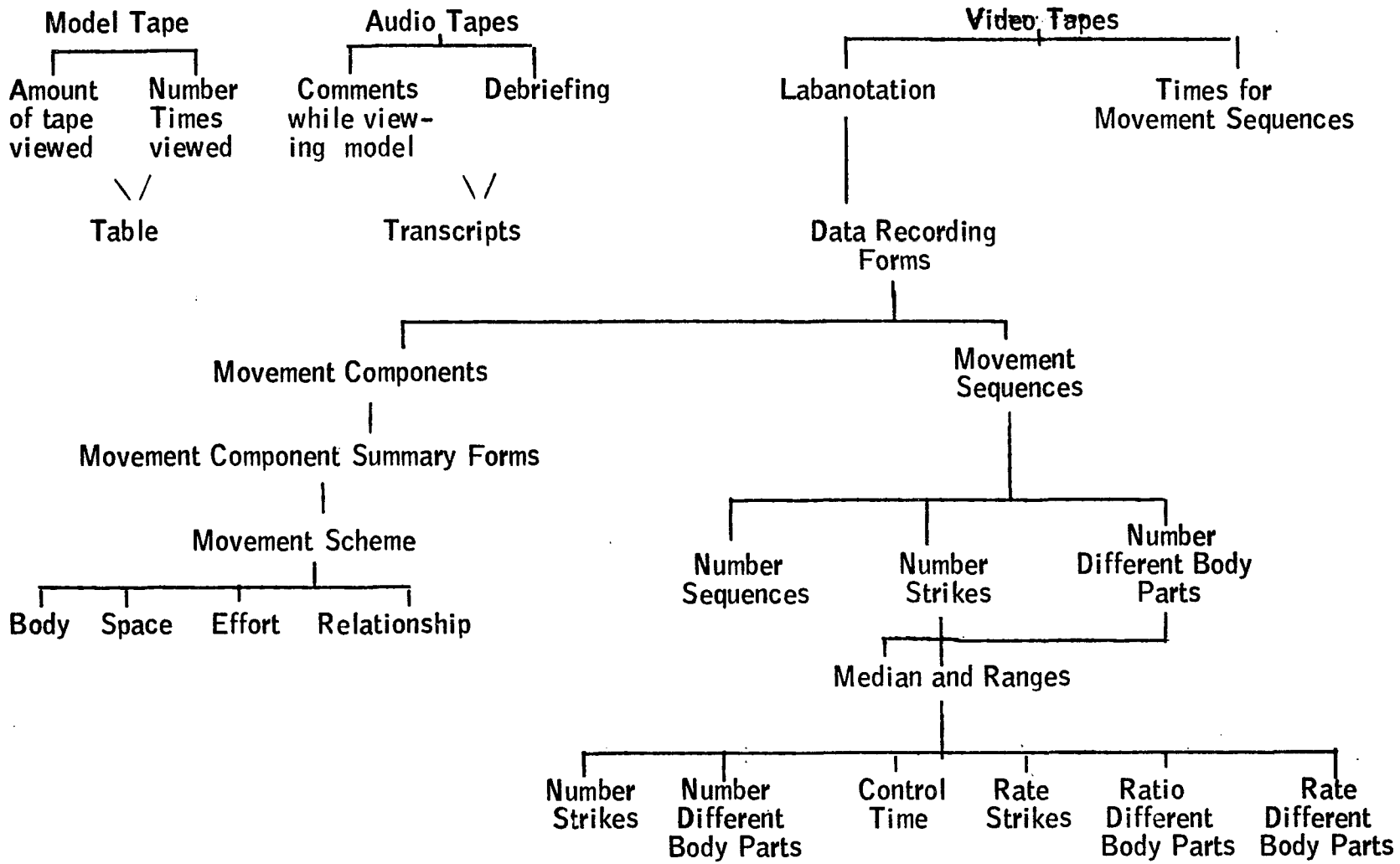


Figure 2 Categories of Data

Model Tape

The behaviors related to the model tape were the amount of the tape actually viewed on each day and the number of times the visual model was viewed. These data were recorded during the actual data collection sessions and are presented in tabular form in the findings chapter.

Audio Tapes

An audio tape recroder was operating throughout each data collection session. The verbal behavior data were divided into three categories: comments while viewing the model tape, verbalization concurrent with movement performances, and comments during the debriefing procedures. Transcripts of these data are presented in Appendix E. The child's comments related to his strategy for accomplishing the task and his perceptions of the visual model are introduced in a summarized form in the findings chapter. The child's concurrent verbal behavior while performing the movement task was too scarce to be considered for analysis.

Video Tapes

The movement performances of the child were video-taped on 6 days. A total of two 30-minute tapes were utilized. Three separate data sessions were recorded on each tape. Two different types of data were derived from the video tapes; (a) the actual times for each movement performance and sequence, and (b) Labanotation of the movement performance.

The time data were determined by use of a stop watch. The investigator timed each day of movement performance and then timed each movement sequence to within the nearest second. A movement sequence was defined as the movement occurrences that began when the child initiated manipulative action and concluded when manipulative action ceased or ball control was lost. Movement sequences

were initially identified when the investigator dubbed the verbal cues onto the video tapes of the movement performances. The notators then indicated these sequences in the notation. The sequences were indicated on the data recording forms and were derived from the movement performances on the video tapes.

Labanotation of the movement performances provided the movement data in the study. Transcription of the notation was the first step in analysis of the movement data. A Data Recording Form was developed for this purpose and an example of the form is provided in Appendix G. The flow chart in Figure 2 illustrates the relationship between the Data-Recording Form and the Labanotation.

Data-Recording Form

The Data-Recording Form was developed to parallel the Labanotation so that pertinent information would not be lost in transcription. The form allowed for the recording of simultaneous movement events. Two types of information not recorded on the form but available from the notation were actions of the torso unless making contact with the ball, and actions of the body parts not involved in the manipulative skill. The transcription provided nine types of information:

1. The movement phrase (sequence) number.
2. The action on the ball or of the ball.
3. The body part acting on the ball.
4. The spatial location of the limb involved with the ball and the actual body part acting on the ball.
5. The effort action utilized in the manipulative skill.
6. The body part involved in locomotion and the type of locomotor pattern.
7. The direction and level of locomotion.
8. Modifers for locomotor activities (time, size, etc.).
9. The floor pathway.

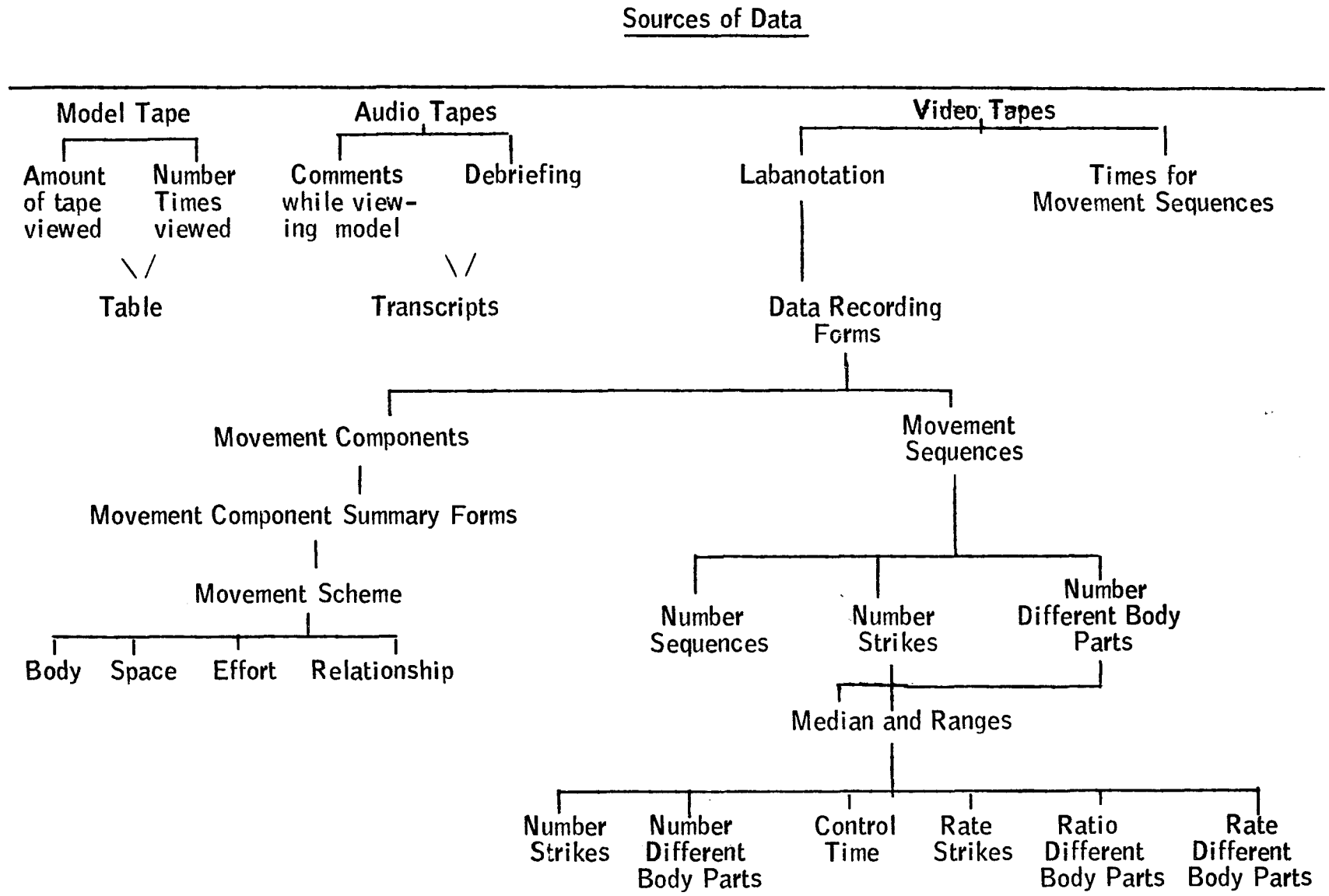

Sources of Data
Model Tape
Amount of tape viewed
Number Times viewed
Audio Tapes
Comments while viewing model
Debriefing
Video Tapes
Labanotation
Times for Movement Sequences
Table
Transcripts
Data Recording Forms
Movement Components
Movement Component Summary Forms
Movement Scheme
Body
Space
Effort
Relationship
Movement Sequences
Number Sequences
Number Strikes
Number Different Body Parts
Median and Ranges
Number Strikes
Number Different Body Parts
Control Time
Rate Strikes
Ratio Different Body Parts
Rate Different Body Parts

Figure 2

The information from the Data Recording Form was utilized to establish frequency counts for movement components and to describe, in detail, each movement sequence.

Movement Components. The movement components considered in the study were derived from the movement performances of the child and were not predetermined. A total of 110 movements components was identified. A movement component was defined as the simplest or most specific part of Laban's framework for human movement. The frequency counts were recorded on a Movement Component Summary Form. A separate form was used for each component. An example of the form is provided in Appendix G. The summary forms were designed so that frequency of component use by spatial referent and day were recorded simultaneously. The day information appeared in vertical columns, and the spatial referent information was in the horizontal rows. This design facilitated subsequent analysis procedures and also allowed for separate day and across-day totals to be established.

Movement Scheme. A scheme to categorize the movement components was developed from Laban's framework for human movement as adapted by Barrett (1977). Laban identified four aspects which were common to all forms of movement. These aspects, Body, Space, Effort, and Relationship, provide the major categories for the classification of the movement components identified in the movement data. Subdivisions of each aspect, labelled dimensions (Logsdon, 1977), were utilized to provide further clarification to the scheme. The movement scheme, outlined in Figure 3, was used for descriptive purposes in this study.

Movement Sequences. A movement sequence was defined as the movement occurrences that began when the child initiated manipulative action and concluded when manipulative action ceased or ball control was lost. The purpose for

Movement Scheme

Laban Framework Classifications

Used in this Study

Body Aspect	Space Aspect
A. Actions of body parts 1. Support of body B. Activities of body 1. Locomotor patterns a. steps b. runs c. basic jumps (1) 1-ft.-to-same (2) 1-ft.-to-opposite (3) 2-ft.-to-2-ft. (4) 1-ft.-to-2-ft. (5) 2-ft.-to-1-ft. d. turns (1) 2 ft. (a) clockwise (b) counterclockwise (2) aerial (a) clockwise (b) counterclockwise (3) right foot (a) clockwise (b) counterclockwise (4) left foot (a) clockwise (b) counterclockwise 2. Manipulative skills (a) striking - 37 body parts (b) throwing and catching (1) both hands (2) right hand (3) left hand	A. Directions 1. Principle a. forward b. backward c. right d. left 2. Secondary a. forward/right b. forward/left c. backward/right d. backward/left B. Levels 1. High 2. Medium 3. Low C. Compound Directions and Levels D. Pathways 1. Straight 2. Circular a. clockwise b. counterclockwise E. Extensions 1. Bend-degrees 1 to 6 2. Stretch-degrees 1 to 7 3. Short 4. Long

Figure 3

Movement Scheme

Laban Framework Classifications

Used in this Study

Effort Aspect	Relationship Aspect
A. Dimensions 1. Time a. quick or sudden b. slow 2. Flow a. bound or b. free	A. Apparatus and Equipment 1. Work with objects (ball) a. contact b. pass c. roll d. bounce
B. Effort Actions 1. Punch - firm, sudden, direct 2. Dab - fine, sudden, direct 3. Flick - fine, sudden, flexible 4. Slash - firm, sudden, flexible 5. Press - firm, sustained, direct 6. Glide - fine, sustained, direct 7. Float - fine, sustained, direct 8. Wring - firm, sustained, flexible	

Figure 3(continued)

analyzing movement sequences was to provide a broader perspective of the child's performance than was available from the identification of movement components. Four separate pieces of information were identified for the movement sequences across the 6 days. The total number of sequences was counted. Then each sequence was examined to determine its control time, the number of strikes involved, and the number of different body parts utilized within the sequence. These three variables were then combined to examine the rate of striking, the rate of different body part use, and the ratio of different body parts to strikes. A Statistical Package for Social Sciences (SPSSV 6) was utilized with a computer to determine the medians and ranges for these six variables. The decision to report medians and ranges was based on the ordinal nature of the data in the study. These data are reported in graph form in the findings chapter.

CHAPTER IV

PRESENTATION AND DISCUSSION OF FINDINGS

GUIDE TO CONTENTS

Presentation of Movement Component Data
- Body Aspect
  - Locomotor Patterns
  - Manipulative Skills
- Space Aspect
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  - Compound Directions and Levels
  - Pathways
  - Extensions
- Effort Aspect
  - Time and Flow
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- Relationship Aspect

Movement Component Data Discussion
- Locomotor Patterns
- Manipulative Skills
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Movement Sequence Data and Discussion
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- Summary

CHAPTER IV
PRESENTATION AND DISCUSSION OF FINDINGS

The purpose of the study was to examine the observable movement behavior of a child attempting to perform a complex movement task from a visual model. A secondary focus in the study concerned the usefulness of Labanotation as a method for recording data of complex manipulative movement.

The movement task was presented as a visual, nonverbal video-taped movement performance. The investigator asked the child to view a movement task which involved throwing and catching, and striking a 7-inch plastic ball with different body parts. The use of all the spaces around the body, varying amounts of effort, and moving in relation to the ball were also considered parts of the task. The movement was an open, complex, dynamic manipulative skill.

Video-taping of the movement performances of this 10-year-old boy proceeded on 6 separate days during a 2-week period. Approximately 10 minutes of movement activity were recorded on each of the 6 days. The movement performances were Labanotated from the video tapes, then transcribed and analyzed.

There were three categories of data in the study. The first category included the number of times the child viewed the visual model during each data-collection session, as well as any specific segments of the visual model he viewed. Table 4 provides a record of these data.

The figures in Table 4 indicate that the child exercised his option to not view the tape on 2 of the 6 days of data collection. Since a weekend had intervened between Days 3 and 4, the investigator encouraged the child to view a portion of the tape on the fourth day. He viewed the tape on the sixth day during

Table 4

Viewing Behavior Related

to Model Tape

Day	Number of Viewings	Segments Viewed
1	2	(1) Complete Tape (2) First Segment
2	1	Five seconds of the first segment
3	0	
4	1	Complete Tape
5	0	
6	1	Complete Tape

the debriefing session after the movement performance behavior had been completed.

The second data category consisted of the child's verbal behavior in viewing the model tape and during the debriefing discussion. These comments related to the child's perceptions of the visual model and to the child's strategy for accomplishing the movement task.

During the first viewing of the visual model, the child inquired if he was to do a chorus of the movement. When asked what he meant by a chorus, he responded, "Like, your arm, leg, then shoulder and then repeat." The investigator replied that he could perform the movement in any order. The child was also curious about the identity of the children who performed in the visual model.

During the second day, the child asked to rest and then spontaneously stated, "I had it going. It was neat!" On the third day during a rest, the child said, "I think I had better rest. I'm doing worse this time. I can't keep it going." He made no concurrent comments regarding his strategy during the last 3 days of data collection. Consequently no analysis of the verbal aspect of Question 2 was possible.

In the debriefing discussion, the investigator asked the child if he had a specific plan for accomplishing the task. The child responded, "Just to keep it (the ball) up in the air longer." The debriefing discussion also revealed that the child had thought that the girl on the visual model was a boy. He had perceived the girl as the most skilled and it was her performance on the segments of the tape which he viewed most often.

During the debriefing session, the investigator asked the child to talk about what he saw on the visual model. He insisted that the tape was going faster than it had on the other days. The child also perceived his own movement as depicted on the tape as occurring more quickly than he had remembered. These data are discussed in relation to other movement data at a later time. Complete transcripts of the child's verbal behavior are provided in Appendix E.

The final and primary data category consisted of the video tapes of the movement performances. These data are presented in the form of frequency counts for movement components and medians and ranges for movement sequence variables. The movement component data relate directly to the first question posed in the study, i.e., what components of movement did the child demonstrate in his movement performance? The movement sequence data provide a broader perspective of the child's movement performances and relate to the characterization of the child's performance. Separate sections of this chapter present and discuss the movement component and movement sequence data in relation to Laban's movement framework and to each other. The Guide to Contents will show the overall coverage of the chapter and its organization, as well as the subsections which are presented to detail the child's performance.

Presentation of Movement Component Data

Rudolf Laban is credited with the development of a comprehensive framework for movement description. He organized the movement framework by four aspects: Body Awareness, Space Awareness, Effort and Relationship. These four aspects are integral parts of Laban's complex theory of movement, of which the framework is but one portion. Each movement aspect is broken down into several dimensions (Logsdon, 1977), which are further subdivided into components serving as the vehicles for specific movement description. Table 5 illustrates the child's movement performance for the 6 days as categorized by movement aspect, by dimension, and by component. The dimensions and components for each movement aspect are discussed separately. The discussion of components is especially crucial since it relates directly to the primary question of the study and since it is the components that provide the greatest detail in the analysis of the movement performance over the 6-day period.

Table 5

Movement Performance Summary Chart

for Six Days

Framework Category	Days 1 M	2 W	3 F	4 M	5 W	6 F
Body Aspect						
Dimension: Actions of Body Parts						
Component: Support of Body	1	1	1	1	1	1
Dimension: Activities of Body						
Components:						
Locomotor Patterns	4	4	4	4	4	4
Manipulative Skills	3	3	3	3	3	3
Space Aspect						
Dimension: Areas	1	1	1	1	1	1
Components:						
General						
Personal						
Dimensions: Directions						
Components:						
Principal	5	5	5	5	5	5
Secondary	4	4	4	4	4	4
Dimension: Levels	3	3	3	3	3	3
Dimension: Compound Directions and Levels						
Components: (As Used In)						
Locomotor Patterns	25	23	26	23	23	25
Manipulative Skills	19	21	22	19	22	21
Dimension: Pathways						
Components:						
Straight	1	1	1	1	1	1
Circular	5	6	7	6	5	6
Dimension: Extension						
Components:						
Bend	5	4	6	3	4	6
Stretch	1	2	2	1	2	1
Length of Step	2	2	2	2	2	2

Table 5 (Continued)

Movement Performance Summary Chart

for Six Days

Framework Category	Days 1 M	2 W	3 F	4 M	5 W	6 F
Effort Aspect						
Dimension: Time Components: Quick/Slow						
Dimension: Flow Components: Free/Bound						
Dimension: Effort Actions	5	7	7	6	6	5
Relationship Aspect						
Dimension: Objects Implements & Equipment Arrangements Components: Object	I	I	I	I	I	I

Body Aspect

The body is the instrument of movement expression: it is the structure with which movement activity is performed (Russell, 1965). A detailed description of movement necessitates an examination of the dimensions and components that relate to the body aspect. The body aspect, or what the body does, contains four dimensions which relate to: (a) actions of the whole body, (b) actions of the body parts, (c) activities of the body, and (d) shapes of the body. Actions of the whole body and shapes of the body were considered secondary to the movement task presented. Therefore, this study considered only the dimensions labeled (b) actions of the body parts, and (c) activities of the body.

Actions of the body parts refers to the exact role each body part plays in the execution of a movement(Logsdon, 1977). One of the components in this dimension is support of the body. Throughout the 6 days of data collection, the child used only his feet as his base of support. That is why the 'l' appears consistently, with actions of the body parts, on Table 5. Two other components within this dimension are application of force and reception of force. The concepts involved in these components are integral parts of certain ball-handling skills like striking and catching. No attempt was made to notate the exact role each body part played in the execution of manipulative skills. Therefore, no specific data were collected in relation to these components.

Two components in the dimension activities of the body are locomotor patterns and manipulative skills. The child subject utilized four different locomotor patterns during the 6 days of movement performance. These patterns included steps, runs, the five basic jumps, and turns. Although more patterns were available, the child performed the same four patterns. A percentage of use of these patterns is presented in Figure 4. Examination of Figure 4 reveals that steps

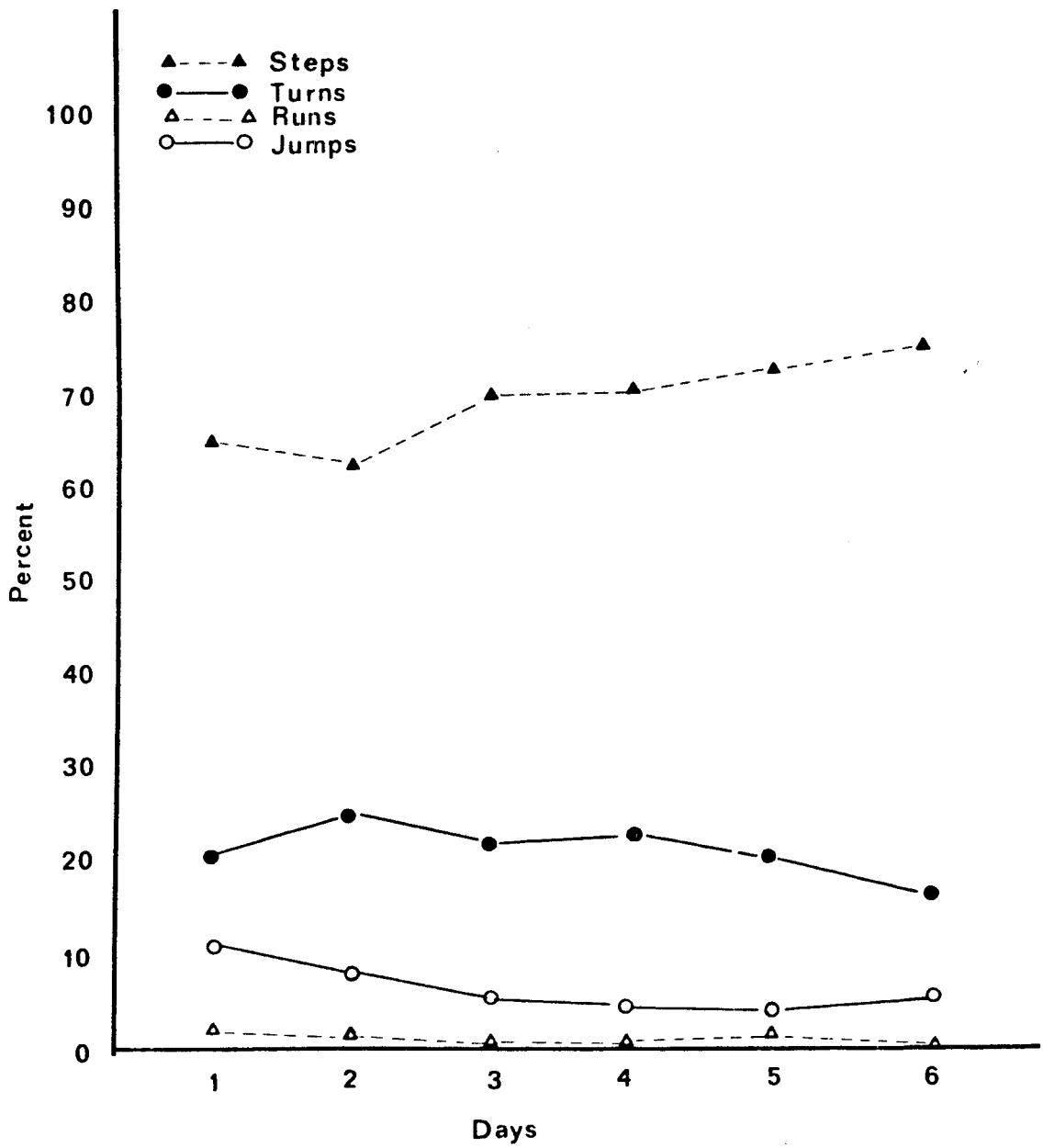

Figure 4 Summary of Locomotor Patterns by Percentage

accounted for 65% of the activity, turns represented 21%, jumps made up 12%, and runs accounted for 2% of all locomotor activity on Day 1.

Table 6 provides the specific frequency data for each locomotor pattern. Turns and the five basic jumps have been expanded to add clarity to the variety of actions within each of these patterns. These data are presented for each day and for across the 6 days.

Locomotor Patterns

Day 1. Steps, the most frequently used locomotor pattern, accounted for 65% (828 of 1273) of all locomotor activity. The run (28 of 1273) was the least used pattern and accounted for 2% of all locomotor activity.

Turns (270 of 1273) of all kinds comprised 21% of the locomotor activity. Among the turns, one-footed turning occurred most frequently and included pivot turns, nonswivel turns, and turns while stepping. The right foot was used slightly more times (119) in turning than was the left foot (117). Counterclockwise turning was more dominant in one-footed turns (137 to 99), but not in aerial and two-feet turning. Approximately 56% of all turns were counterclockwise in direction.

The five basic jumps accounted for 12% (147 of 1273) of the locomotor activity. Jumping from one foot to the opposite foot was used 79 times and made up 54% of all jumping. The next most frequent jump pattern, jumping from one foot to the same foot, appeared 46 times or 31%. Jumping from one foot to two feet and from two feet to one foot were both used nine times. The two-feet-to-two-feet jump was the least used jump form. About 21% of all jumps involved an aerial turn of some sort.

Table 6

Frequency of Locomotor Patterns

for Six Days

Patterns	Day 1 M	2 W	3 F	4 M	5 W	6 F
1. Step	828	903	964	1041	1079	1269
2. Run	28	41	22	20	24	15
3. Five Basic Jumps						
One-foot-to-same	46	39	22	11	23	46
One-to-opposite	79	74	56	56	36	7
Two-feet-to-two	4	5	1	2	1	1
One-foot-to-two	9	6	2	3	3	5
Two-feet-to-one	9	2	2	1	3	1
TOTAL	147	126	83	73	66	100
4. Turns						
Two Feet Turns						
Clockwise	3	2	0	0	0	2
Counterclockwise	0	1	1	0	0	0
Subtotal	3	3	1	0	0	2
Aerial						
Clockwise	18	21	11	8	13	14
Counterclockwise	13	17	5	4	7	10
Subtotal	31	38	16	12	20	24
Right Foot Turns						
Clockwise	52	79	63	60	64	65
Counterclockwise	67	70	72	83	62	72
Subtotal	119	149	135	143	126	137
Left Foot Turns						
Clockwise	47	106	88	96	91	60
Counterclockwise	70	68	77	83	75	59
Subtotal	117	174	165	179	166	119
TOTAL	270	364	317	334	312	282
Total Number of Locomotor Patterns	1273	1434	1285	1468	1481	1666

Day 2. Steps were again the most frequent locomotor pattern. There was an increase in the actual number of steps, from 828 to 903. The run was the least used locomotor pattern, but its occurrence increased by 46% as compared to 2% recorded on the first day.

There were 94 more turns (the second most frequent locomotor pattern) on the second day than on the first, with the majority of these additional turns being one-footed turns. Turning on the left foot, the dominant foot, increased more than any other type of turn. The clockwise direction dominated turning of all kinds.

The five basic jumps were third in frequency of use. There was, however, a decrease in the actual number of jumps executed as reflected in Table 6. Approximately 30% of all jumps involved an aerial turn.

Day 3. Except for steps, which increased about 7% in use, all locomotor patterns decreased in frequency. Runs decreased 46%, remaining the least used pattern. Turning, especially on the left foot, remained the second most used pattern in spite of a 13% decrease in use. Aerial turns declined from 38 to 16, a decrease of 58%. Although there was no dominant turning direction for the one-footed turn, there were more turns of all kinds executed in a clockwise direction.

There was a 34% decrease in the use of the five basic jumps. The only jump pattern not decreasing in frequency was the two-feet-to-one-foot form which remained at 2. The jump forms accounting for most of the decrease were one-foot-to-the-same-foot and one-foot-to-the-opposite-foot. Table 6 reflects the actual numbers for these decreases

Day 4. Steps increased 8% in use and turns increased by 5% on this day. The use of the five basic jumps decreased by 12%. The largest part of this decrease can be accounted for by the drop in one-foot-to-the-same-foot jumps. The actual frequencies for locomotor patterns are presented in Table 6.

Day 5. Steps and runs increased, while the five basic jumps and turns decreased. Within the five basic jumps, the one-foot-to-the-same-foot form increased slightly more than 50%; the one-foot-to-the-opposite-foot pattern decreased 36%.

Among the turns, one-footed turning decreased for both the right and left feet. The number of aerial turns increased from 12 to 20. There were no turns executed on both feet. Clockwise was the dominant direction for all turns.

Day 6. Steps increased a total of 18% on this day. The five basic jumps increased by 52%. Both runs and turns decreased on Day 6. The total number of runs, 15, was the lowest recorded since the first day. Clockwise and counterclockwise turning was almost equal on this day. The right foot was the dominant foot for turns. The turns on two feet reappeared for the first time in 3 days.

Summary of Locomotor Patterns Across the Six Days. There was a gradual increase in the number of steps executed across the 6 days. The dominant direction for turns alternated among the 6 data collection days. Approximately 51% of all turns, however, were executed in a clockwise direction across the time span researched. One-footed turns were the most frequent form of turning. The right foot was used for more turns on Days 1 and 6, and the left foot was dominant the other 4 days.

The greatest number of jumps were performed on the first day and the least number were executed on the fifth day. Jumping from one foot to the opposite foot was consistently the most frequent form for all 6 days. Jumping from two feet to one foot and from one foot to two feet decreased from 9 on the first day to 1 and 5 on the sixth day.

Runs were the least used locomotor pattern on all days. The most runs were recorded on the second day, while the fewest were performed on the sixth day.

Manipulative Skills

Three different manipulative skills were identified in the child's movement performance: (a) striking, (b) throwing, and (c) catching. All three skills were used on each of the 6 days as recorded on Table 5. The actual frequency numbers for manipulative skills are presented below in Table 7. A percentage of frequency use for manipulative skills is illustrated in Figure 5. Examination of Figure 5 reveals that strikes accounted for 90% of all manipulative skills. Throws and catches each represented 5% of the manipulative skills on Day 1. Striking accounted for 95% of the manipulative skills executed during the 6 days.

Table 7

Frequencies for Manipulative Skills

	Day					
Skill	1 M	2 W	3 F	4 M	5 W	6 F
Strike	364	464	465	430	476	536
Throw	19	23	8	5	4	3
Catch	20	26	10	7	7	6
Totals	403	513	483	442	487	545

Striking. Striking with different body parts was the predominant manipulative skill in the child's performance. The movement task emphasized the use of a variety of body parts in striking, and the child responded with 37 different body parts throughout the 6 days. Table 8 provides a summary of the body parts used in

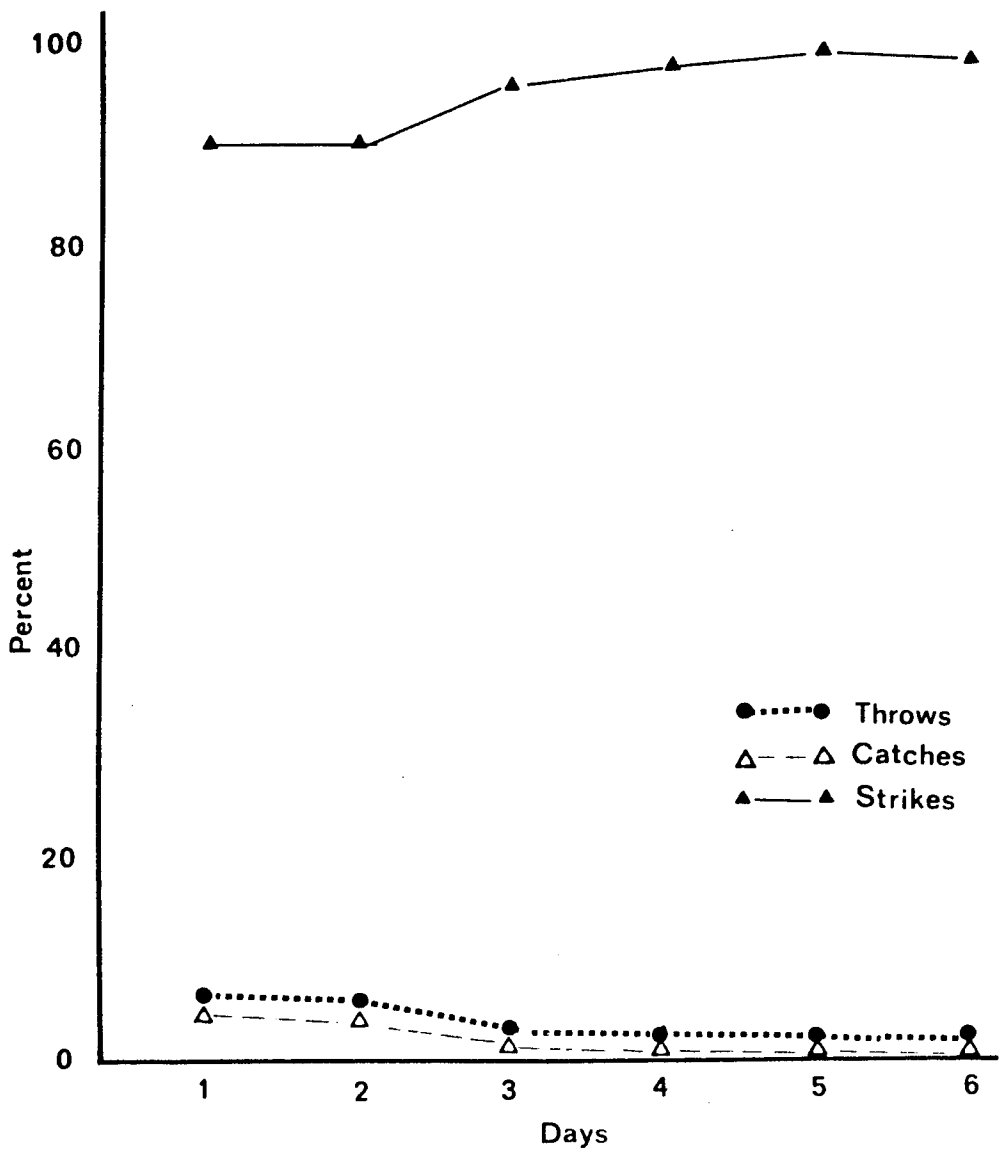

Figure 5 Summary of Manipulative Skills by Percentage

striking, and reflects in more detail the great variety of body parts involved. These data are presented for each day and across the 6 days.

Day 1. Twenty-eight different body parts were utilized in striking on this day. These body parts were located along the full-length of the body from the top of the head to the toes on the right foot. The right palm (70 of 364) and the right hand (60 of 364) were used most frequently; the second most frequently used body part was the right foot (39 of 364). The forehead (31 of 364) and the top of the head (29 of 364) were the third and fourth most frequently used body parts. Only six body parts from the left side were involved in striking on this day. The most unusual body part used was the chest.

Day 2. Twenty-seven different body parts were involved in striking on the second day when the total number of strikes increased by 28%. Five of these body parts were not used on Day 1. Six of the body parts used on the first day were not used on the second.

The use of the right hand increased by 119%, and the use of the right palm decreased by 49%. The left hand increased in use by 66%, while the right wrist evinced an increase from 3 strikes to 19 strikes, with the use of the right elbow increasing by more than 50%. The actual numbers for this increase are presented in Table 8. Three new body parts from the left side were used on this day, and three left-side body parts used on the first day were not used on the second day. The chest was involved in three strikes on Day 2.

Table 8

Frequency of Body Part

Usage for Striking

Body Part	Day 1 M	2 W	3 F	4 M	5 W	6 F	Total	PerCent
Top of Head	29	34	30	39	35	53	220	8.04
Forehead	31	19	8	4	0	3	65	2.40
Back of Head	4	2	0	5	0	0	11	.40
Left Side Head	1	3	1	3	3	5	16	.60
Right Side Head	3	6	4	3	1	2	19	.70
Chest	1	3	0	0	0	0	4	.14
Two Hands	2	0	1	0	0	1	4	.14
Right Shoulder	5	2	1	1	0	2	11	.40
Right Elbow	13	29	19	15	22	22	120	4.40
Top Right Wrist	0	5	15	1	2	0	23	.84
Right Wrist	3	19	70	12	27	16	147	5.40
Bottom Right Wrist	0	7	0	0	0	0	7	.25
Right Fist	2	0	1	1	0	4	8	.30
Right Back Hand	4	8	15	7	34	68	136	5.00
Right Hand	60	138	138	169	173	176	854	31.22
Right Palm	70	34	6	2	1	1	114	4.16
Right Fingers	4	7	1	4	6	2	24	.87
Left Elbow	1	4	1	0	1	1	8	.30
Top Left Wrist	0	1	7	0	0	0	8	.30
Left Wrist	2	1	13	2	0	1	19	.70
Bottom Left Wrist	0	2	0	0	0	0	2	.07
Left Fist	0	0	0	0	1	3	4	.14
Left Back Hand	0	0	6	0	5	16	27	.98
Left Hand	25	73	68	78	95	121	460	16.80
Left Palm	1	0	2	0	0	1	4	.14
Left Fingers	2	2	2	2	2	3	13	.50
Right Leg	2	0	0	0	0	0	2	.07
Right Knee	19	7	11	11	9	18	75	2.74
Right Shin	3	0	0	0	0	0	3	.10
Top Right Ankle	0	0	0	2	2	0	4	.14
Right Ankle	10	13	11	6	0	1	41	1.40
Right Foot	39	34	31	52	45	13	214	7.82
Top Right Foot	18	6	3	2	1	2	32	1.17
Right Toes	9	4	0	0	0	0	13	.50
Left Knee	0	0	0	2	0	0	2	.07
Left Ankle	0	1	0	2	0	0	3	.10
Left Foot	1	0	0	5	11	1	18	.70
Total Number Strikes	364	464	465	430	476	536	2735	100.00
Different Body Parts	28	27	25	25	20	25		

Day 3. The total number of strikes increased slightly, while the total number of body parts used in striking decreased from 27 to 25. The back of the left hand was involved in striking for the first time on this day. The right wrist (70) and the left wrist (13) were used more frequently on Day 3 than on any other. Use of the right palm decreased dramatically from 34 to 6, and involvement of the forehead in striking evinced a marked reduction from the 31 strikes of the first day to only 8 strikes on the third.

Day 4. The total number of strikes decreased on Day 4 following a weekend interval. The same number of body parts was used in striking on Days 3 and 4. The right hand, left hand, top of the head, and right foot were the only body parts to demonstrate large increases in use. The right and left wrists dropped in use. Three body parts from the left lower extremity were used in striking more than once. Day 4 also marked the initial use of the left knee and the top of the right ankle.

Day 5. There were 46 additional strikes on this day, up from 430 to 476, and 26 different body parts were involved in the act of striking. Use of the hands, both right and left, also increased. Only one new body part was introduced on the fifth day; the left fist struck the ball once. The use of the right foot dropped, while the use of the left foot increased to 11 times, the highest ever. The back of the right hand more than tripled in use on this day. Only three parts of the head were used for striking, and the total number of strikes for the head was the lowest recorded for all 6 data collection days. Use of the right elbow and wrist increased.

Day 6. There was a 13% increase in the total number of strikes made on this day, with the majority of these being executed by parts of the right and left hands and the top of the head. The backs of both hands demonstrated increases in usage. There was a 34% increase in the use of the head for striking at this time. Eleven previously used body parts were not used on the sixth day. Usage of the right foot showed a dramatic decline while the use of the right knee increased. Use of the left foot declined from 11 times on Day 5 to only 1 time on Day 6.

Striking Across the Six Days. Striking was the predominant manipulative skill for all 6 data collection days. There was a gradual increase in the total number of strikes across the 6 days, except between Days 3 and 4 when a weekend intervened. The greatest percentage of increase, 28%, came between Days 1 and 2. There was a 13% increase between Days 5 and 6.

Thirty-seven different body parts were involved in striking for the 6 days. The largest number of different body parts were used on the first day. There were 10 different body parts utilized on only one or two of the 6 days. Thirteen different body parts were used on each of the 6 days. The remaining body parts were used on three or more days.

The right and left hands were the predominant body parts used in striking for all days. Striking with hands, both right and left, demonstrated a gradual increase in use across the data collection period. Thirty-one percent of all striking was executed by the right hand. Seventeen percent of all striking was performed with the left hand.

Striking with the top of the head as well as with the right foot each totaled 8%. The right palm, which was one of the most frequently used body parts

on the first day, decreased in use across the 6 days; on the sixth day, the right palm was used only in one striking action.

Throwing and Catching. The manipulative skills of throwing and catching were also identified in the child's movement performance. Table 9 illustrates the body parts used in throwing and catching during the movement performance. These data are presented separately for each of the 6 days.

Day 1. Most of the throwing and catching was executed by both hands (31 of 39). When one hand was used, the right hand was dominant (5 of 39).

Day 2. There was an increase in throwing and catching, and both hands were used for the additional attempts. The right hand was not used for throwing on this day, but was used in three catches.

Day 3. There was a great decrease (from 49 to 18) in throwing and catching. The right hand was never used alone for either throwing or catching, and the left hand was used only once for each skill.

Day 4. Throwing and catching again decreased in frequency. The left hand was not used for either throwing or catching. The right hand was used in one throw.

Day 5. The frequency of throwing and catching with both hands remained the same as on Day 4. Neither the right nor left hand was used alone for throwing or catching.

Table 9

Frequency of Body Part

Usage for Throwing/Catching

Body Part	Days 1 M	2 W	3 F	4 M	5 W	6 F
Two Hands						
Throws	15	22	7	4	4	3
Catches	16	22	9	7	7	6
Right Hand						
Throws	3	0	0	1	0	0
Catches	2	3	0	0	0	0
Left Hand						
Throws	1	1	1	0	0	0
Catches	2	1	1	0	0	0
TOTALS	39	49	18	12	11	9

Day 6. There was a slight decrease in throwing and catching for two hands. Neither right nor left hand was used alone.

Space Aspect

> Movement is,... living architecture - living in the sense of changing emplacements as well as changing cohesion. This architecture is created by human movements and is made up of pathways tracing shapes in space, and these we may call 'trace forms.' (Laban, 1976, p. 5)

As this quotation suggests, Laban conceptualized a complex theory of space harmony which is described in detail in Choreutics (1976). To Laban, "space is a hidden feature of movement and movement is a visible aspect of space " (Laban, 1976, p. 4). Yet, he included only the rudiments of this theory of space in his movement framework. The Space aspect, or where the body moves, contains six dimensions: (a) areas, (b) directions, (c) levels, (d) pathways, (e) extensions, and (f) planes. An analysis of the movement data revealed examples of components within five of these dimensions. Therefore, in this study, only the dimensions labeled (a) areas, (b) directions, (c) levels, (d) pathways, and (e) extensions are considered. Table 10 provides a summary of the movement performance in relation to the Space aspect.

There are two components of the space dimension areas: general and personal. General refers to the working space available for movement. Personal refers to the spatial limits of the body without taking steps. The movement data in this study reveals that the child utilized general space throughout the 6 data collection days. This finding is based on the locomotor data presented in Table 6. Further discussion of this component is presented later in this Chapter.

Table 10

Space Aspect Summary Chart

for Six Days

Framework Category	Day 1 M	2 W	3 F	4 M	5 W	6 F
Space Aspect						
Dimension : Areas	1	1	1	1	1	1
Components:						
General						
Personal						
Dimension: Directions						
Components:						
Principal	5	5	5	5	5	5
Secondary	4	4	4	4	4	4
Dimension: Level	3	3	3	3	3	3
Dimension: Compound Directions and Levels						
Components: (As Used In)						
Locomotor Patterns	25	23	26	23	23	25
Manipulative Skills	19	21	22	19	22	21
Dimension: Pathway						
Components:						
Straight	1	1	1	1	1	1
Circular	5	6	7	6	5	6
Dimension: Extension						
Components:						
Bend	5	4	6	3	4	6
Straight	1	2	2	1	2	1
Length of Step	2	2	2	2	2	2

Directions

The dimension of direction relates to both locomotor patterns and manipulative skills. There are four principle directions: forward, backward, right and left. There are also four secondary directions which are combinations of the principle directions. These secondary directions are termed diagonals and consist of: (a) forward right, (b) forward left, (c) backward right, and (d) backward left.

A ninth component of the direction dimension is called place. On Table 10 place is listed as a principal direction. Place refers to the area directly below the base of support. All nine of these direction components were identified in the child's movement performance on each of the 6 days as shown in Table 10. Table 11 provides a summary of the use frequency for the direction components during locomotion.

Direction Use for Locomotion.

Day 1. All of the principal directions, forward (728), backward (99), right (93), and left (63), were used more frequently than were the secondary directions. Forward (728) was the most frequently used direction for locomotion, and movement in place (190) was second. The forward right diagonal (42) was the most frequently used secondary direction, while the least used were the backward diagonals.

Day 2. The principal directions were again used more frequently than were the secondary directions. All directions, with the exception of place, demonstrated an increase in use. As indicated on Table 11, place dropped from 190 to 104. The greatest increases occurred in those of forward, left, forward left, and backward left.

Table 11

Direction Use in Locomotion

Direction	Day 1 M	2 W	3 F	4 M	5 W	6 F
Principal						
Forward	728	800	799	846	879	1021
Backward	99	120	95	153	117	121
Right	93	113	123	129	113	117
Left	63	102	119	119	117	109
Secondary (Diagonals)						
Forward Right	42	63	74	66	58	95
Forward Left	17	44	59	31	56	53
Backward Right	6	17	15	4	9	23
Backward Left	4	33	35	20	26	28
Place	190	104	50	100	86	75

Day 3. Forward was again the most frequently used direction. Right was the second, and left was the third most frequently used directions. Backward was the only principal direction that declined in use. All of the diagonals, with the exception of backward right, showed an increase in use. Place dropped more than 50% in use.

Day 4. Forward was the most frequently used direction. There was an increased use of all the principal directions with the exception of left, which remained the same. All the diagonals decreased in frequency. Place demonstrated a large increase in use.

Day 5. Forward was the most frequently used direction and was also the only principal direction to increase in use. All of the diagonals increased in frequency, with the exception of forward right. Place decreased in use on this day.

Day 6. Forward was again the most frequently used directional pattern, and its increase was the greatest for the 6 days. The frequency in backward movement also increased. The frequency of the forward right diagonal and the backward right diagonal reached the highest level for the study. Movement in place declined in frequency.

Summary of Direction Use for Locomotion Across Six Days. Forward was the only direction which showed a fairly consistent increase in use across the 6 data collection days. There was an increase of 293 movements in the forward direction from Day 1 to Day 6.

The backward direction was used most on the fourth day. The lowest frequency for backward came on Day 3. The right and left directions reached their highest usage on Day 4 and their lowest on Day 1.

The four diagonal directions were used less frequently than any of the principle directions. Backward diagonal right was consistently the least used direction.

Place was used most frequently on Day 1 and least frequently on Day 3. The fifth and sixth days both showed decreases in the use of place.

Direction Use of Manipulative Skills. All nine direction components were used in the manipulative skills of striking, throwing, and catching. Table 12 is a summary of direction use for manipulative skills

Day 1. Forward (251) was the most frequently used direction for the execution of manipulative skills. The next most used direction was place (76), and the third most frequently used space was forward right (30). The backward left diagonal was not used for any manipulative skill on this day.

Day 2. Most of the manipulative skills were executed in the forward direction which produced an increase in the frequency of use in the forward direction. The use of both the right and the left directions also increased. The backward right direction was not used at all and backward left was used only one time.

Day 3. Forward was used most frequently in manipulative skills. There was, however, a decrease in actual use. Backward was used more frequently than on any other day. The backward right direction was used twice, and the backward left direction was used only one time.

Day 4. Forward was again the most frequently used direction for manipulative skill and slightly increased in actual use. Forward right also showed

Table 12

Frequency For Direction Use In

Manipulative Skills

Direction	Day 1 M	2 W	3 F	4 M	5 W	6 F
Principal						
Forward	251	289	263	270	297	306
Backward	7	17	27	9	18	13
Right	16	42	39	29	47	43
Left	5	22	21	20	20	24
Secondary (Diagonals)						
Forward Right	30	25	25	35	21	27
Forward Left	11	17	16	9	18	26
Backward Right	2	0	2	1	2	1
Backward Left	0	1	1	1	1	0
Place	76	96	87	69	59	104
Not Indicated*	5	4	0	1	6	3

*Refers to those manipulative skills for which no spatial location was notated.

an increase in use. All other directions demonstrated lower frequencies except backward left, which remained at 1. Use of the backward direction demonstrated a dramatic drop.

Day 5. The most frequently used direction for manipulative skills was forward. The backward and right directions demonstrated increases in usage from the previous day. Forward right decreased in use, while forward left increased. Place continued to decline in use.

Day 6. The forward direction was the most used space for manipulative skills and increased in actual frequency. Place demonstrated a large increase in use on this day. Left, forward right, and forward left all showed slight increases in use. The three backward directions demonstrated decreases in use.

Direction Use for Manipulative Skills Across Six Days. Forward was consistently the most used direction for manipulative skills. There were gradual increases in actual use except between Days 2 and 3. The highest frequencies were on Days 5 and 6.

Place was the second most frequently used directional component for all 6 days. During the first 5 days, its use decreased gradually. On the sixth day, however, its use was at its highest. The third most frequently used direction was the right direction, and the highest use of this component came on Days 5 and 6.

Forward right was the fourth most frequently used direction and its peak appearance occurred on the fourth day. The two backward diagonals were the

least used directions for all 6 days. The frequency of use for these directions ranged from 0 to 2 for the data collection period.

Level

Laban identified three levels of movement: high, medium, and low. These three levels are considered components in this study. Examples of all of these levels were identified in the movement data on each of the 6 recording days. The use of levels for locomotor patterns and for manipulative skills is presented separately for each day.

Level Use for Locomotor Patterns. All three levels were identified in the locomotor patterns. Table 13 presents the actual frequencies of level use for locomotor patterns.

Table 13

Level Use in Locomotion

	Day					
Level	1 M	2 W	3 F	4 M	5 W	6 F
High	32	24	18	35	26	46
Medium	708	782	831	814	711	834
Low	502	590	520	619	724	762

Day 1. Medium (708) was the most frequently used level for locomotor patterns. Low level (502) was the second most used level.

Day 2. There was an increase in the actual use of medium level. However, low level demonstrated the largest increase in usage.

Day 3. Medium remained the most used level. Actual frequencies of both low and high levels declined.

Day 4. Medium level dropped in actual use. Both high and low levels increased in use. Low level use increased by 91 tallies.

Day 5. Low was the most frequently used level and increased by 113 actual occurrences. Medium level was the second most frequently used level despite a decrease in the occurrence of frequencies from 810 to 711.

Day 6. All the levels increased in use. Medium was the most frequent level utilized, and its appearance increased by 121 occurrences.

Level Use for Manipulative Skills. The manipulative skills of striking, throwing, and catching were executed at all three levels. Table 14 provides the actual frequencies for level use in manipulative skills.

Table 14

Frequency for Level Use in

Manipulative Skills

	Day					
Level	1 M	2 W	3 F	4 M	5 W	6 F
High	124	147	170	179	177	228
Medium	187	233	180	153	145	185
Low	87	129	131	111	161	131
Not Indicated*	5	4	0	1	6	3

*Refers to those manipulative skills for which no spatial location was notated.

Day 1. A majority of the manipulative skills were executed a medium level (187). High was the second most used level (124).

Day 2. There was an increase in the use of all levels. Medium and low levels both increased more than 4 actual tallies.

Day 3. High level increased the most in actual tallies. Medium level dropped in use by 53 tallies.

Day 4. High was the most frequently used level. Both medium and low levels dropped in use.

Day 5. Low level increased, while medium level continued to drop in use.

Day 6. High and medium levels both increased in use. More manipulative skills were executed in high level than on any other day.

Compound Directions and Levels

Movement occurs in directions and levels simultaneously. In real life, when these components are combined, 27 different directions are possible. The compound directions are abbreviated on the following Tables illustrating the frequency of compound direction and level use in locomotion. The first letter indicates direction and the second letter indicates level for principle and place compounds, e.g., RH is right high. For diagonals, the first two letters indicate directions and the third indicates level, e.g., FLL is forward left low. Compound directions and levels used for locomotor patterns and for manipulative skills are presented separately. Table 15 shows the frequency of use for compound direction and level in locomotor patterns. The numbers in Table 15 do not include a spatial component for aerial turns.

Table 15

Frequency of Compound Directions

and Level Use in Locomotion

Compound Direction	Day 1 M	2 W	3 F	4 M	5 W	6 F
Principal						
FH	4	13	4	18	9	18
FM	428	475	495	496	466	548
FL	296	312	300	332	424	455
BH	5	1	4	2	3	2
BM	59	74	57	73	37	50
BL	35	45	34	78	77	69
RH	1	0	1	2	6	16
RM	54	62	72	71	50	55
RL	38	51	50	56	57	46
LH	2	2	5	7	2	0
LM	44	42	62	51	59	54
LL	17	58	52	61	56	55
Diagonals						
FRH	5	5	1	2	0	1
FRM	24	39	43	30	29	58
FRL	13	19	30	34	29	36
FLH	1	0	0	0	0	2
FLM	13	26	35	13	31	21

Table 15 (continued)

Frequency of Compound Direction

and Level Use in Locomotion

Compound Direction	Days					
	1 M	2 W	3 F	4 M	5 W	6 F
Diagonals (continued)						
FLL	3	18	24	18	25	30
BRH	0	0	1	0	0	0
BRM	2	8	9	4	5	6
BRL	4	9	5	0	4	17
BLH	0	0	1	0	0	2
BLM	1	14	32	17	13	8
BLL	3	19	2	3	13	18
Place						
PH	14	3	1	4	6	5
PM	83	42	26	59	41	32
PL	93	59	23	33	39	36
Totals (Directions)	25	23	26	23	23	25

Compound Directions and Levels for Locomotor Patterns. All of the 27 compound directions were identified in the movement data. Table 15 shows actual frequencies for compound directions and levels in locomotor patterns.

Day 1. Twenty-five different compound directions were utilized in locomotion. Forward medium (FM, 428) and forward low (FL, 296) were the most commonly used directions. Movement in place low (PL) and medium (PM) were the next most frequently used directions. The two directions which were not used were both diagonals; backward right high (BRH) and backward left high (BLH).

Day 2. On this day, 23 directions were used in the locomotor patterns. The four directions which were not utilized included three diagonals and were all at high level. All of the place directions showed decreased usage.

Day 3. The total number of directions used in locmotor patterns increased from 23 to 26. The only direction not used was forward right high. Forward medium increased in use and was the most commonly used direction. Movement in place again dropped in use.

Day 4. The total number of directions used in locomotor patterns dropped back to 23. The four directions which were not used were all diagonals. Forward medium decreased in actual use, but was still the most frequently used direction. Forward low increased in use and ranked second. Backward low, backward medium, and right medium were the next most commonly used directions.

Day 5. Twenty-three different directions were again used in locomotor patterns. The use of forward low increased more than any other direction.

Right medium and low, and left medium and low were all used about equally on this day. The forward right and left diagonals for medium and low were also approximately equal in use.

Day 6. Twenty-five different directions were utilized in the locomotor patterns. There was an increase in both forward medium and forward low. The increase in backward right low as the largest for the 6 days. Movement in place continued to decrease.

Compound Direction and Level Use for Manipulative Skills. Twenty-five of the 27 compound directions were identified in the movement data. Table 16 provides the actual frequencies for compound directions and levels when performing manipulative skills.

Day 1. Manipulative skills were executed in 19 different directions. Forward medium (FM, 150) was used twice as much as any other direction. Forward low (FL) and place high (PH) were used about equally and were the next two most frequently used directions.

Day 2. Manipulative skills were performed in 21 different directions. Three directions were utilized for the first time. Forward low demonstrated the largest increase.

Day 3. The manipulative skills were performed in 22 different directions on this particular day of the study. Forward low was the most frequently used direction for manipulative skills. Forward medium demonstrated the largest decrease in usage. The use of backward medium increased four-fold, while forward high more than doubled in use.

Table 16

Frequency of Compound Direction and Level Use for Manipulative Skills

Compound Direction	Day 1 M	2 W	3 F	4 M	5 W	6 F
Principle						
FH	31	17	38	59	53	63
FM	150	162	107	113	107	131
FL	70	110	116	98	138	112
BH	5	10	8	7	12	11
BM	2	4	16	0	4	1
BL	0	3	3	2	2	1
RH	7	15	22	18	27	22
RM	5	24	15	9	14	17
RL	4	3	2	2	6	4
LH	3	7	9	9	10	11
LM	2	13	9	10	7	10
LL	0	2	3	1	3	3
Diagonals						
FRH	4	5	6	16	9	10
FRM	23	17	17	16	8	14
FRL	3	3	2	3	4	3
FLH	3	3	0	1	9	11
FLM	3	13	12	4	5	10

Table 16 (continued)

Frequency of Compound Direction and Level

Use for Manipulative Skills

Compound Direction	Day 1 M	2 W	3 F	4 M	5 W	6 F
Diagonals						
FLL	5	1	4	4	4	5
BRH	0	0	1	0	2	1
BRM	2	0	1	1	0	0
BRL	0	0	0	0	0	0
BLH	0	1	0	0	0	0
BLM	0	0	1	0	0	0
BLL	0	0	0	1	1	0
PH	71	89	86	69	55	99
PM	0	0	0	0	0	0
PL	5	7	1	0	3	1
N I*	5	4	0	1	6	2
Total Directions and Levels Used	9	21	22	19	22	21

*Refers to those manipulative skills for which no spatial location was indicated.

Day 4. The manipulative skills were executed in only 19 different directions, thus demonstrating a decline from the previous day. Forward medium regained the position as the most used direction for manipulative skills. The number of manipulative skills executed inforward high continued to increase.

Day 5. There was an increase (from 19 to 22) in the directions utilized for manipulative skills. Forward low surpassed forward medium in actual use. Manipulative skills executed in place high continued to decline.

Day 6. There was a slight decrease (from 22 to 21) in the number of directions used for manipulative skills. Forward medium increased in use and was the most commonly used direction for manipulative skills. Forward high continued to increase in use. Place high demonstrated increased use for the first time in 3 days. Backward right high was the only backward diagonal utilized for manipulative skills. Place medium and backward right low were the two directions which were never utilized in manipulative skills on any of the 6 days.

Pathways

There are two types of floor pathways: straight and circular. Examples of each type of pathway were identified in the movement data in this study. Table 17 is a summary of the frequency of straight and circular pathway use in the movement performances. These data are summarized into weekly periods.

As indicated in Table 17, straight pathways outnumbered circular pathways on Days 1(55 to 15), 2(48 to 34), and 4(34 to 31). There was a gradual

decrease in the use of straight pathways and a gradual increase in the use of circular pathways within each 3-day (weekly) data collection period.

Table 17

Frequency of Straight

and Circular Pathways

	Day					
Pathway	1 M	2 W	3 F	4 M	5 W	6 F
Straight	55	48	31	34	31	37
Circular	15	34	38	31	32	40

On the following page, Table 18 illustrates the actual direction and degree for circular pathways. The degree of circularity is indicated by the fractions on Table 18. The student ranged in use of circular pathways from 5 to 7 during the 6 days, never using all 8 degrees of circularity on any single day. Table 10 provides a summary of the number of different pathways used during the data collection period.

Most of the pathways occurred in a counterclockwsie direction for the 6 days. Only on Days 4 and 6 were clockwise pathways more frequent. Pathways with 1/8 degree of circularity were more common for both directions. One exception occurred on Day 2 when there were slightly more 2/8 degree pathways in a counterclockwise direction.

Extension

Four components within the dimension extension (bend, stretch, short, and long) were identified in the movement data. Bend and stretch refer to the

Table 18

Frequency of Specific Circular

Pathway Directions

	Day					
Direction/Degree	1 M	2 W	3 F	4 M	5 W	6 F
Clockwise						
1/8	3	8	13	13	8	16
2/8	3	4	2	5	4	3
3/8	1	2	0	2	2	0
4/8	0	0	2	1	0	1
Subtotals	7	14	17	21	14	20
Counterclockwise						
1/8	7	8	12	8	14	12
2/8	1	9	4	2	4	5
3/8	0	3	3	0	0	3
4/8	0	0	2	0	0	0
Subtotals	8	20	21	10	18	20

distance between a body part in action and the torso. The distance is identified in the framework as either near or far. The degrees of bend (near) and stretch (far) are the vehicles by which Labanotation allows for the notation of points between these extremes. The notation system allows 6 degrees of bend and 7 degrees of stretch to be indicated, and 3 degrees of bend, for example, constitute a 90 degree angle. Table 19 provides a summary of the bend and stretch components by degree for each of the 6 days. The bend and stretch components of extension refer to the actions of body parts which were acting on the ball in the manipulative skills.

Bend and Stretch.

Day 1. As illustrated in Table 19, more manipulative skills were executed near (bend, 136) to the body than far (stretch, 11) from the body. The most frequently occurring degree of bend was 3 (62). The only degree of stretch identified was 1.

Day 2. There was a large increase in the use of 3-degree bends, and an increase in the use of 1-degree bends also occurred. Four degrees of stretch was used for the first time.

Day 3. One degree of bend was used most often for manipulative skills. There was a large decrease in the use of 3-degree of bends. There was a slight increased use of stretch.

Day 4. There was a decrease in the use of both bends and stretches. One degree of bend was again the most commonly used position for manipulative skills.

Table 19

Frequency of Bend and Stretch

for Manipulative Skills

Component/Degree	Day 1 M	2 W	3 F	4 M	5 W	6 F
Bend						
1 small (rounded)	40	56	85	72	87	123
2	27	13	15	8	9	1
3 (right angle)	62	141	66	60	65	60
4 very small (bent)	5	3	1	0	1	2
5	2	0	1	0	0	1
6 (totally flexed)	0	0	1	0	0	1
Stretch						
1 Long (limb straight)	11	8	10	5	13	10
2 (limb extra-stretched)	0	0	0	0	0	0
3	0	0	0	0	0	0
4 very long	0	1	4	0	2	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0

Day 5. The use of bend and stretch components increased on this day. The highest number of stretches occurred.

Day 6. All 6 degrees of bend were used. One degree of bend was used twice as much as any other degree. Stretches decreased in use.

Short and Long. Short and long indicate the relative length of locomotor patterns. These two components are also considered within the extension dimension and provide other interpretations of the near and far components as listed on the framework. Table 20 provides a summary of the locomotor pattern length components for the 6 days. These data are presented in the summarized form below.

Table 20

Short and Long (size) Locomotor

Patterns for Six Days

	Day					
	1	2	3	4	5	6
Size	M	W	F	M	W	F
Short	60	35	45	56	52	19
Long	2	47	30	22	15	8
Normal	1211	1352	1310	1385	1414	1637

The notation system provides a systematic way of indicating relative step length: short, very short, etc. Due to the infrequent occurrance, data were collapsed to compute just short and long categories.

Effort Aspect

Effort analysis is one of Laban's most significant and complex contributions to the study of human movement. The motion factors, or elements (Weight, Time, Space, Flow), are the foundation of Laban's effort analysis system which has been applied in industrial, therapeutic, and educational situations. "Effort is manifested in bodily actions through Weight, Time, Space, Flow elements" (Laban, 1971, p. 74).

The term element refers to an attitude toward each motion factor. Laban used the terms elements and attitudes interchangeably. According to Laban, "the moving person adopts a definite attitude toward each motion factor" (1971, p. 76). In general, an individual can adopt a 'fighting' or a 'yielding' attitude toward each motion factor. Table 21 illustrates the motion factors and the corresponding attitudes for each.

Attitude refers to quality statements about movement, but these are of little use to the researcher. In addition to attitudes, Laban designated a second factor with which to describe movement; that "which is operative and objectively measureable." In other words, movement can be described either qualitatively or quantitatively, but only the latter is sufficiently objective to allow enumeration to occur.

Time and Flow. Examples of the motion factors, time and flow, were identified as data in the movement performances of the child. These data are presented separately for each day in Table 22. Time implies that the locomotor patterns were performed in either a quick or slow manner. Flow relates to the fluency of movement. The more stops involved, the less fluid the movement. Such movement has a bound quality. Fewer stops in movement imply more fluid or freer movement. The movement data utilized to determine the flow of movement were

Table 21

Motion Factors and Attitudes*

Motion Factor	Attitude		Component	
	Fighting	Yielding	Measurable	Classifiable
Time	shortening	prolonging	quick/slow	sudden/ sustained
Space	lineal	pliant	direct/in-direct	straight/ flexible
Weight	forceful	relaxed	strong/ light	firm/fine
Flow	withhold-ing	liberat-ing	bound/free	stoppable/ ongoing

*Modified from Mastery of Movement (Laban, 1971, p. 85)

'holds'. Holds are a notation symbol which indicates stops or pauses in movement. The data presented in Table 22 (Bound) are the actual frequencies for 'holds' which occurred on each day. These data are presented in a daily summary and discussed from a weekly perspective.

Table 22

Frequencies for Time and Flow

for Locomotor Patterns

	Day					
	1 M	2 W	3 F	4 M	5 W	6 F
Time						
Quick	244	390	137	228	243	239
Slow	8	15	5	3	1	0
Normal	1021	1029	1243	1232	1237	1425
Flow						
Bound	143	95	78	96	92	39

An examination of Table 22 reveals that there were more quick locomotor patterns than slow patterns for all 6 days of the data collection period. The largest numbers of both quick (390) and slow (15) patterns occurred on Day 2. It should be noted, however, that the majority of locomotor patterns (normal) were not categorized as either quick or slow. The numbers reveal that, on the second day of each week, more quick patterns occurred. No other trends seem apparent in these data.

The data for flow reveal a weekly trend of decreasing stops or pauses in the movement. On Days 1 through 3, holds decreased from 143 to 78, with a further decrease from 96 to 39 occurring on Days 4 through 6. The most stops occurred on Day 1 (143) and the least (39) on Day 6. These data indicate that the movement became more fluid across the 6-day period.

Effort Actions. Laban identified eight basic effort actions. These actions are termed basic because " all movement contains them, or variations of them" (Preston, 1963, p. 44). These actions are the heart of Laban's effort analysis system. "When the three motion factors of weight, time, and space are clarified within the same movement an articulate action results" (Preston, 1963, p. 44).

The eight basic effort actions are: punch (firm, sudden, direct); dab (fine, sudden, direct); flick (fine, sudden, flexible); slash (firm, sudden, flexible); press (firm, sustained, direct); glide (fine, sustained, direct); float (fine, sustained, direct); and wring (firm, sustained, flexible). A chart of these actions is provided in Appendix A.

When the effort actions are used for objective purposes, as is the case in this study, the appropriateness of an action is determined by its efficiency. "It is the sense for the proportion between the degrees of these motion factors which determines the degree of the economy of effort used" (Laban & Lawrence, 1975, p. 11). Laban believed that individuals have the potential for experiencing all the effort actions; however, certain actions are naturally more preferable. It is only through training that an individual can develop the ability to utilize the entire range of effort actions at will. According to Laban, the ability to utilize the range of effort actions not only enables the individual to perform movement more efficiently, but also enables the individual to realize the full potential of personal movement (Laban & Lawrence, 1974). Within this study, effort

actions are considered in relation to control of the ball. Strong, quick actions would send the ball far from the body, while light, quick motions would probably keep the ball close to the body. Therefore, light, quick actions would be considered more appropriate for striking than would strong, quick actions.

Examples of the effort actions were identified in the movement data. The frequency of usage of these actions for manipulative skills is presented in Table 23. The miscellaneous category on Table 23 includes all actions which could not be classified as any particular effort action. The category contains those actions which were too light to be considered complete actions, as well as those which were not clear enough on the video tape to be identified. These data are presented separately for each day.

Day 1. A total of five different effort actions was utilized on this day. Punch was the most frequently used action, accounting for 202 or 50% of the total effort actions performed on Day 1. Therefore, most of the manipulative skills were executed in a firm, sudden, and direct manner.

Day 2. Seven of the eight different effort actions were utilized on this day. Slash and glide were the effort actions added this day. Most of the manipulative skills were performed with a dab. The great increase in floats indicated that 63 of the manipulative skills were executed in a fine, sustained, and direct manner.

Day 3. The dab was the most frequent effort action. The use of the punch decreased more than 50% over the first day. Flick gradually increased over the first 3 days. Floats demonstrated a large decrease.

Table 23

Frequency of Effort Action Usage

For Throwing and Striking

	Day					
Effort Action	1 M	2 W	3 F	4 M	5 W	6 F
Punch	202	140	92	128	133	132
Dab	135	201	255	227	275	192
Flick	26	63	87	63	59	175
Slash	0	4	5	0	0	0
Float	6	63	3	1	3	2
Glide	0	1	5	2	2	0
Press	2	2	6	5	5	3
Wring	0	0	0	0	0	0
Subtotal	371	474	453	426	477	504
Miscellaneous	12	13	20	9	3	35
Total	383	487	473	435	480	539

Day 4. A total of six effort actions were used on this day. Dabs and flicks decreased, while punches increased.

Day 5. Dabs increased by 48 actions. There was a slight increase in the use of punches.

Day 6. Dabs, flicks, and punches were the most frequent effort actions. Flick was, for the first time, more common than punches. Only five different effort actions were utilized on this day.

Relationship Aspect

> When moving we create changing relationsips with something. This something can be an object, a person, or even parts of our own body, and physical contact can be established with any of these. (Laban, 1971, p. 73)

The relationship aspect, as identified in the movement framework contains four dimensions: (a) body parts; (b) individuals and groups; (c) apparatus and equipment; and (d) other types. The movement task presented in this study involved only one of these components. The dimension labeled (a) body parts refers to the changing relationships between and among body parts. An example of body parts relating to each other is the hands meeting and parting. This type of relationship was not a part of the movement task. The child in the study worked alone. Therefore, the dimension labeled (b) individuals and groups was not appropriate. The fourth dimension, labeled (d) other types, referring to boundaries, music, rules, etc., was also inappropriate. Therefore, only the dimension labeled (c) apparatus and equipment was considered in the analysis.

One of the components of apparatus and equipment is "work with objects". An example of this component, identified in the child's movement performances,

was the child working in relation to a 7-inch plastic ball. The three manipulative skills discussed under the Body Aspect are obvious examples of working with the object component. Other examples of this component are labeled: contact, pass, roll and bounce. It should be noted that the components (contact, pass, roll, and bounce) were developed specifically for this study. These labels were derived from the actions of the object and from the Labanotation system in order to accommodate the movement data. Table 24 provides the actual frequencies of contact, pass, roll, and bounce across the 6 days. Trends for these data are explained briefly on the following page.

Contact was defined as those incidences in which the child moved to the ball and allowed the ball to make contact with a body part without actively giving impetus to the ball. Pass indicated those times when the child moved a body part into a position as if to make contact with the object, but in fact, the object passed by without contacting the body. Roll included those incidences when the ball rolled down, on, or off various body parts. Bounce indicated the number of times the ball contacted the floor, walls, ceilings and other environmental obstacles.

Table 24

Frequency for Contact, Pass, Roll, and Bounce

	Day					
Type	1 M	2 W	3 F	4 M	5 W	6 F
Contact	10	6	11	12	1	4
Pass	3	9	6	3	2	2
Roll	6	1	3	2	5	2
Bounce	127	113	113	180	208	139

Bounce was the most frequently occurring relationship component other than the manipulative skills performed on each of the 6 days. Contact was the second most used component and there was a gradual decrease across the 6 days from 10 on Day 1 to 4 on Day 6. Pass and roll were consistently the least used components except on Day 2 for pass and Day 5 for roll.

Discussion of Movement Component Data

The findings in this study are diverse and multifaceted. One hundred and ten movement components were identified in the movement data derived from the child's movement performances. These components were categorized under Laban's aspects of movement: Body, Space, Effort, and Relationship. For discussion purposes, the movement component data were reorganized as they related to the Body Aspect components, locomotor patterns, and manipulative skills. Such a reorganization was necessary to provide a conceptual description of the child's movement performance. These discussions are subsequently summarized into four tenable or logical assertions.

Locomotor Patterns

The same four locomotor patterns were identified in the movement data for all 6 days of the data collection period. The rank order, by frequency of steps, turns, the five basic jumps, and runs, was established on the first day and never varied for the remaining five days. All patterns increased in use from Day 1 to Day 2, with the exception of the five basic jumps. Craig (1976), in a related study, identified three locomotor patterns: steps, turns, and jumps. Only two of these patterns were identified in all six lessons. Jumps only occurred in lessons 1 and 2. The findings for each patterns are discussed separately.

Steps. Steps increased in use across the 6 days; there were 441 more steps on Day 6 than on Day 1. Referral to Table 6 provides the actual frequencies for this pattern. Steps are a common daily locomotor pattern, so therefore, the predominance of this pattern was not surprising. The factors assumed to contribute to the increased occurrence of the pattern were examined. Figure 6 illustrates the patterns for steps, size of locomotor patterns, quickness of locomotor patterns, and stops in movement.

The lowest number of steps (828) and the highest number of holds (143) occurred on Day 1. The graph also illustrates that 60 locomotor patterns were identified as short, and 244 quick locomotor actions were recorded on Day 1. These data are shown in Tables 6, 20, and 22. Figure 6 was constructed with two vertical axes so that the frequencies for steps, size of locomotor patterns, quickness of locomotor patterns, and stops could be illustrated on the same graph. The separate scales are indicated on the graph.

The inverse slant and the similar shape of the step and hold lines on the graph are interpreted to mean that a major factor that influenced the increased step pattern was the decrease in stops or pauses in movement. Size of locomotor patterns (short) follows the same general curve as does holds. The small number of patterns identified as short limits the potential influence this factor might have on the overall increase in actual steps. Examination of the line for quick reveals little similarity in shape to the step line. In fact, on Day 6 when the largest increase in steps occurred, the frequency of quickness declined. The increase in actual steps is, therefore, attributed to the decreased number of pauses and stops in the child's performance. The decrease in locomotor pattern size and the increase in locomotor pattern quickness are considered as minor factors. The overall effect of more steps and fewer pauses is interpreted as meaning that the child

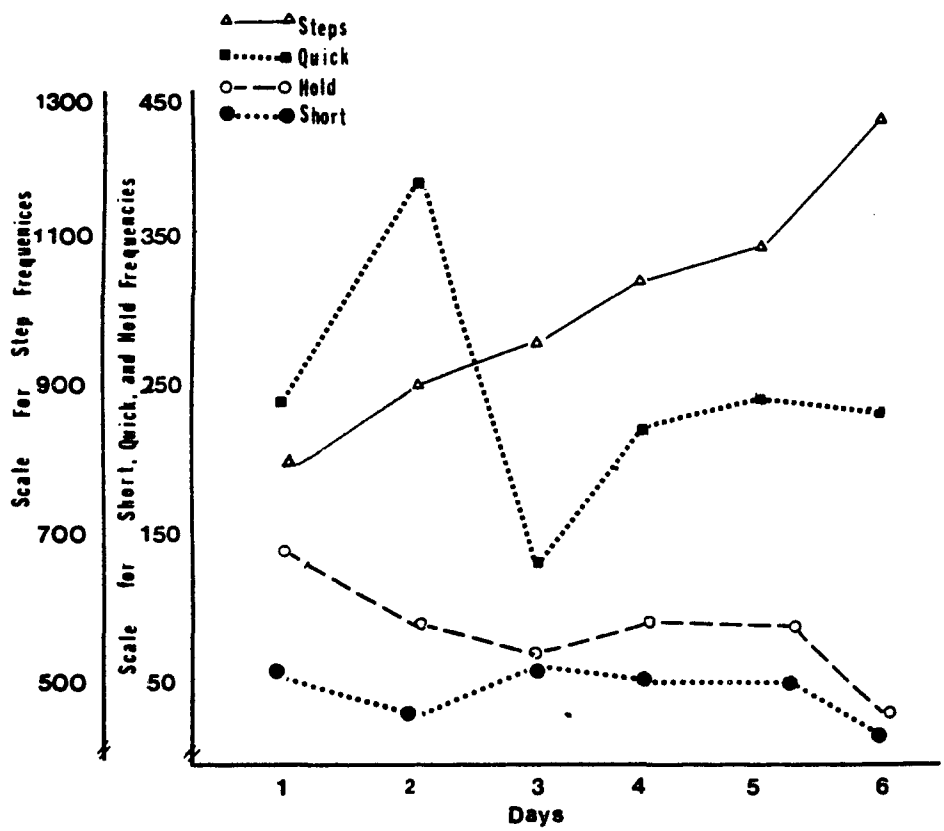

Figure 6 Patterns for Steps, Short, Quick and Holds

developed a more fluid (free) quality to his movement across the 6 days.

A spatial description of steps is more difficult because space usage was summarized for all locomotor patterns rather than for separate patterns. Table 11 provides the actual frequencies for direction use in locomotion and Table 13 provides this information for levels. The predominance of step frequency, however, allows for certain speculations to be stated. Figure 7 illustrates the pattern for steps, directions, and levels. The lowest number of steps (828) occurred along with the highest number of place (190) on Day 1. Figure 7 also illustrates that the lowest frequencies for forward (787), sideward (156), backward (109), medium (708), and low (502) occurred on Day 1. The actual data for these components are presented in Tables 6, 11, and 13.

The most apparent similarity is between steps and forward direction. On this figure, forward direction includes the two forward diagonals, and backward includes the backward diagonals. The dominance of forward was expected as it is the most natural direction for movement. The higher frequencies for sideward movement than for backward movement is somewhat surprising in that lateral movement is considered developmentally more difficult than backward movement (Roberton & Halverson, 1977). This finding must, however, be considered in relation to the fact that the child was working with a moving object. The more frequent occurrence of lateral movement could be related to the child's attempts to align himself with the ball. Another consideration to be made regarding the frequency of lateral movement notated is that, although Roberton and Halverson did not indicate a specific age for their developmental hypothesis, it could be that the child in this study had already developed the ability to move in sideward directions.

The gradual decrease in movement in place follows a curve similar to the decrease in holds (see Figure 6) and, therefore, is interpreted as additional

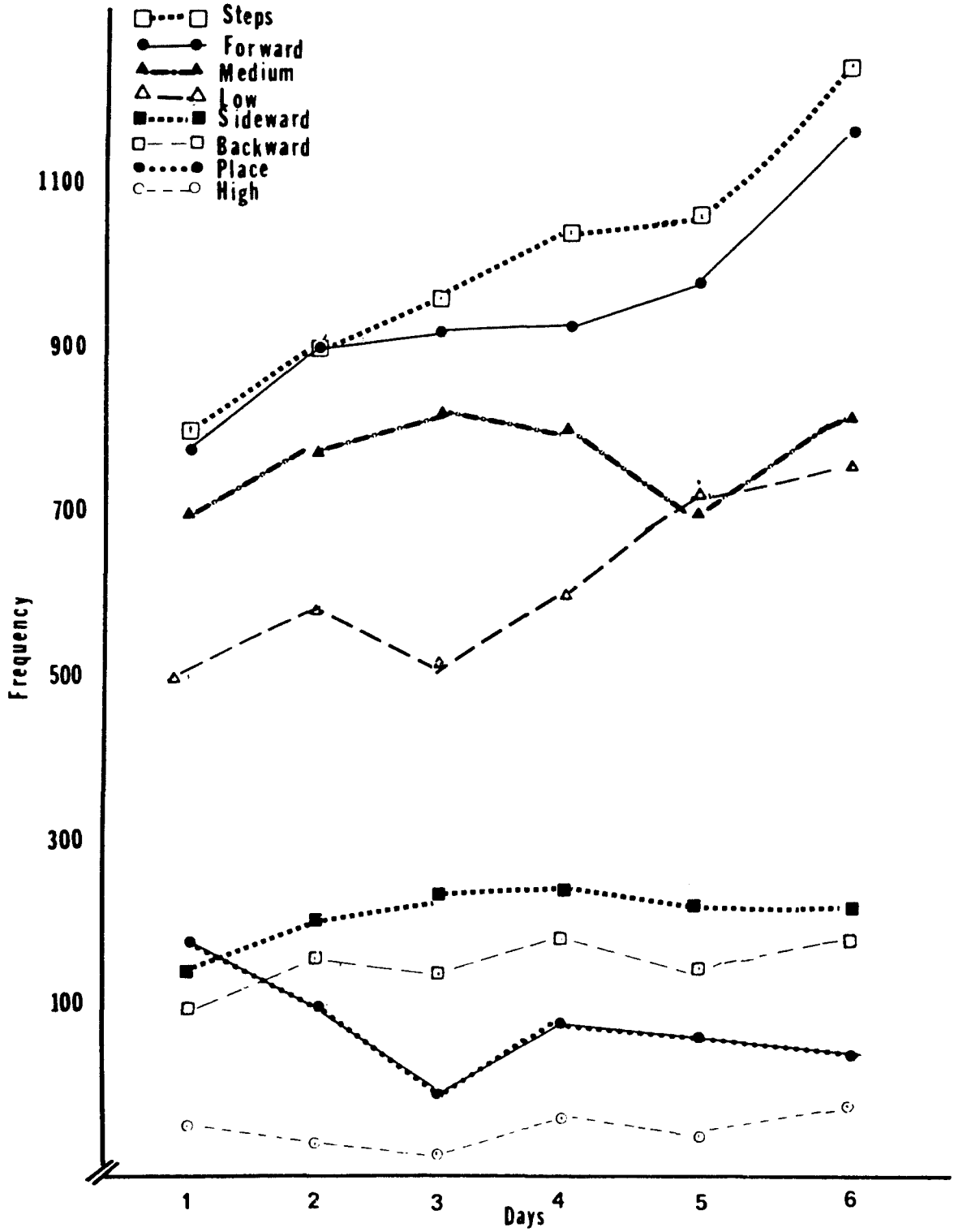

Figure 7 Relationships Among Steps, Directions, Levels

evidence that the child developed a free-flowing quality to his movement across the 6 days. An additional speculation related to the decrease of movement in place is that the child gradually increased his use of general space. This speculation is more difficult to support because no specific attempt was made to analyze the movement data in regard to this dimension and further, no precise measurement of the actual space utilized was made.

The patterns for steps and levels depicted on Figure 7 are interesting. Medium level is the natural level for steps (Mauldon & Layson, 1965; Preston, 1963; Roberton & Halverson, 1977), and this was the predominant level for locomotor movement on 5 of the 6 days. There was, however, a great increase in low level across the 6 days, and on Day 5 low was more frequent than medium level. This finding might again be related to the child's attempts to align himself with the ball. The speculation is that the child began to move in a low level so that he could position body parts under the ball for striking. Other evidence related to this speculation is discussed at a later time.

Turns. Turns were the second most frequently used locomotor pattern on all days. Three types of turns were examined; turns on two feet, aerial turns, and one-footed turns. The one-footed category included pivot turns, non-swivel turns, and turns while stepping. The lowest number of turns (270) occurred on Day 1 and the highest (364) on Day 2. Referral to Table 6 will provide the reader with the remaining frequencies. The most apparent explanation for the frequency of turns is that the child utilized this locomotor pattern to react to the moving ball and, therefore, to regain alignment with the ball. If this explanation is accurate, then, as the child gained more control over the ball, the amount of turning needed would decrease. Frequencies for turns decreased between Days 2 and 3, and on Days 4, 5, and 6.

One-footed turns were the dominant type of turning for all days. The left foot was the dominant foot on Days 2 through 5, while the right foot dominated on Days 1 and 6. Table 6 provides a complete record of the frequencies for turning across the 6-day data collection period. The child was right-handed; this fact, coupled with the left-foot dominance, might indicate that the child was not only working in opposition, but also further supports the use of turning as a body alignment skill. Clockwise was the dominant direction for footed turning on Days 2 through 5, the same days that the left foot was the dominant foot. Note the similarities between the lines for left-footed turning and left-foot clockwise turning on Figure 8.

Other patterns for foot dominance and turning direction are also illustrated on Figure 8. Counterclockwise was the dominant direction for right-footed turning on Days 1, 3, 4, and 6. A speculation related to this finding is that counterclockwise turning on the right foot was influenced by use of left-side body parts for striking and was, therefore, a function of attempts at body alignment. This speculation is examined further when body part use is discussed.

Aerial turns were the second most frequent type of turning. Referral to Table 6 provides the reader with the actual frequencies for this component. Two general findings were noted. First, clockwise was the dominant direction on all days. This finding could be related to the dominance of the left foot and to the use of the right side of the body for striking. The second finding related to the gradual increase in occurrence of aerial turns on Days 4, 5, and 6. Between Days 2 and 3, a 58% decrease occurred, with the lowest number of aerials occurring on Day 4. The increases on Days 5 and 6 might be related to changes which occurred in body part use for striking. This speculation is addressed again later in the discussion.

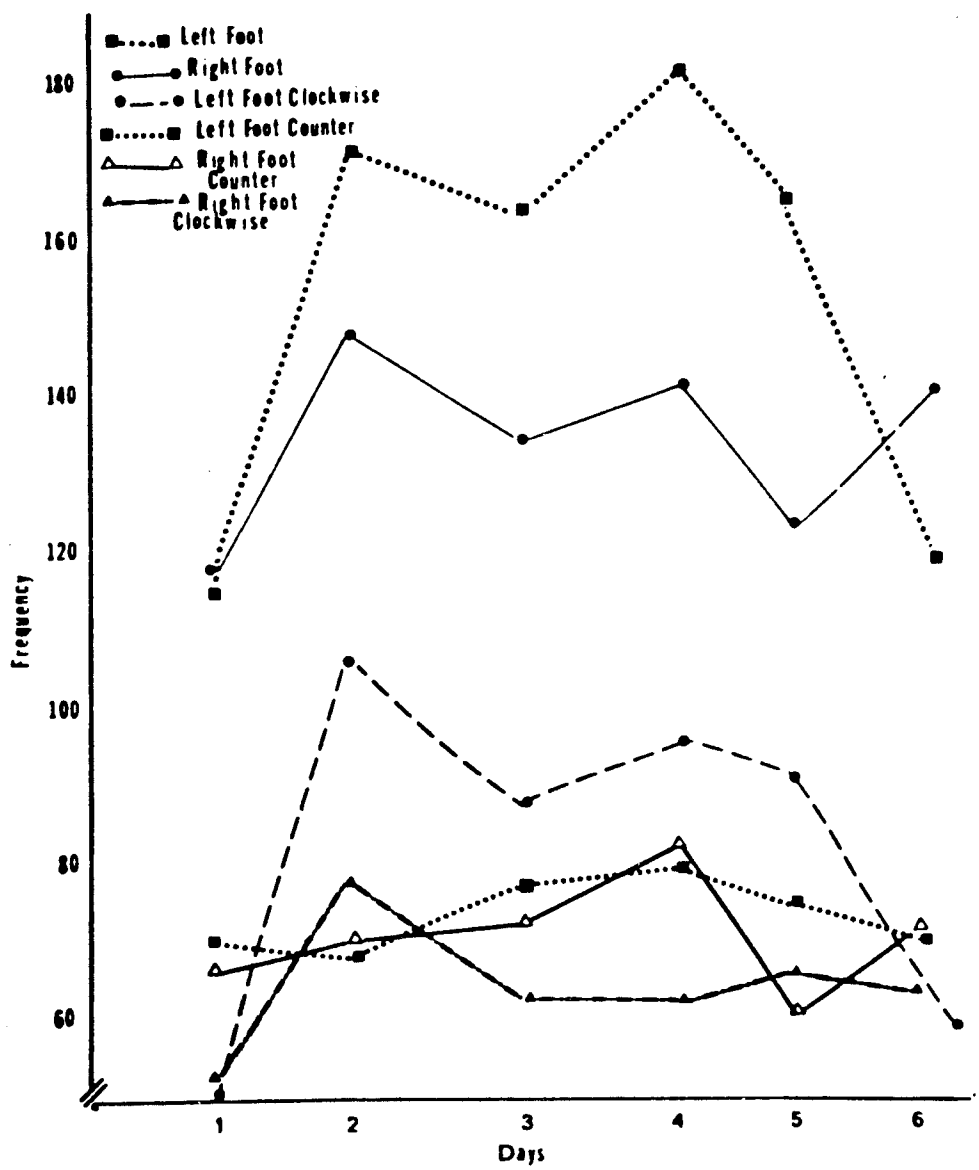

Figure 8. One-Footed Turning and Directions

Turns on two feet were the least used type of turning. The frequencies for two-footed turns ranged from 0 to 3; no two-footed turns were executed on Days 4 and 5. Due to the scarcity of data related to this type of turning, no further discussion seems appropriate.

The connections among turns and floor patterns (pathways) were examined. Figure 9 illustrates a complicated pattern among turns, circular, and straight pathways. Straight pathways gradually decreased from Day 1 to 3 as illustrated by the negatively sloped line on Figure 9. There was also a slight decrease from Day 4 to Day 5, and then an increase on Day 6. There appears to be no connection between turns and straight pathways. On Day 1 the lowest frequency of turns (270) occurred. The highest number of straight pathways (55) were also recorded. This pattern is not consistent across the 6 days however, as on Day 3 decreased frequencies were recorded for each of these components. The actual frequencies for turns are recorded on Table 6 and the frequencies for pathways are recorded on Table 17. Circular pathways demonstrated a gradual increase from Days 1 through 3, and then again from Days 4 through 6. These two sets of increases are illustrated in graphic form on Figure 9. The graphs for turns and circular pathways show very little similarity for Days 1 through 3, and demonstrate an inverse pattern on Days 4 through 6. Based on these data, it is apparent that turns as a single component are not sufficient to explain the changes in floor pathway frequency.

In a further attempt to explain the changes in floor pathways, the diagonal and side direction frequencies were examined. Diagonal directions include both forward and backward; side directions include both right and left. Figure 10 provides a graphic illustration of the connections among pathways, diagonals, and side direction frequencies. Figure 10 was constructed with two separate

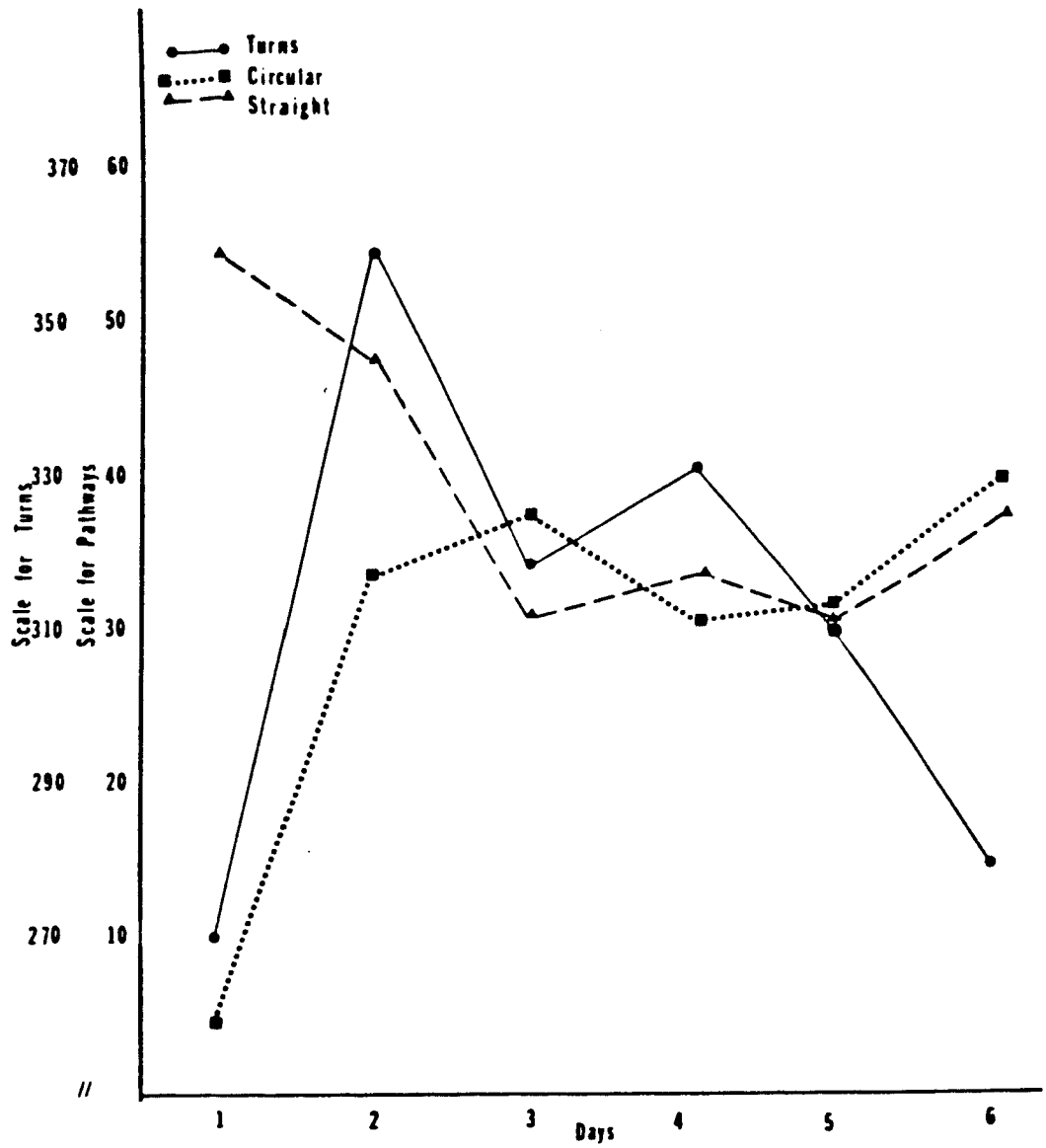

Figure 9. Turns and Pathways

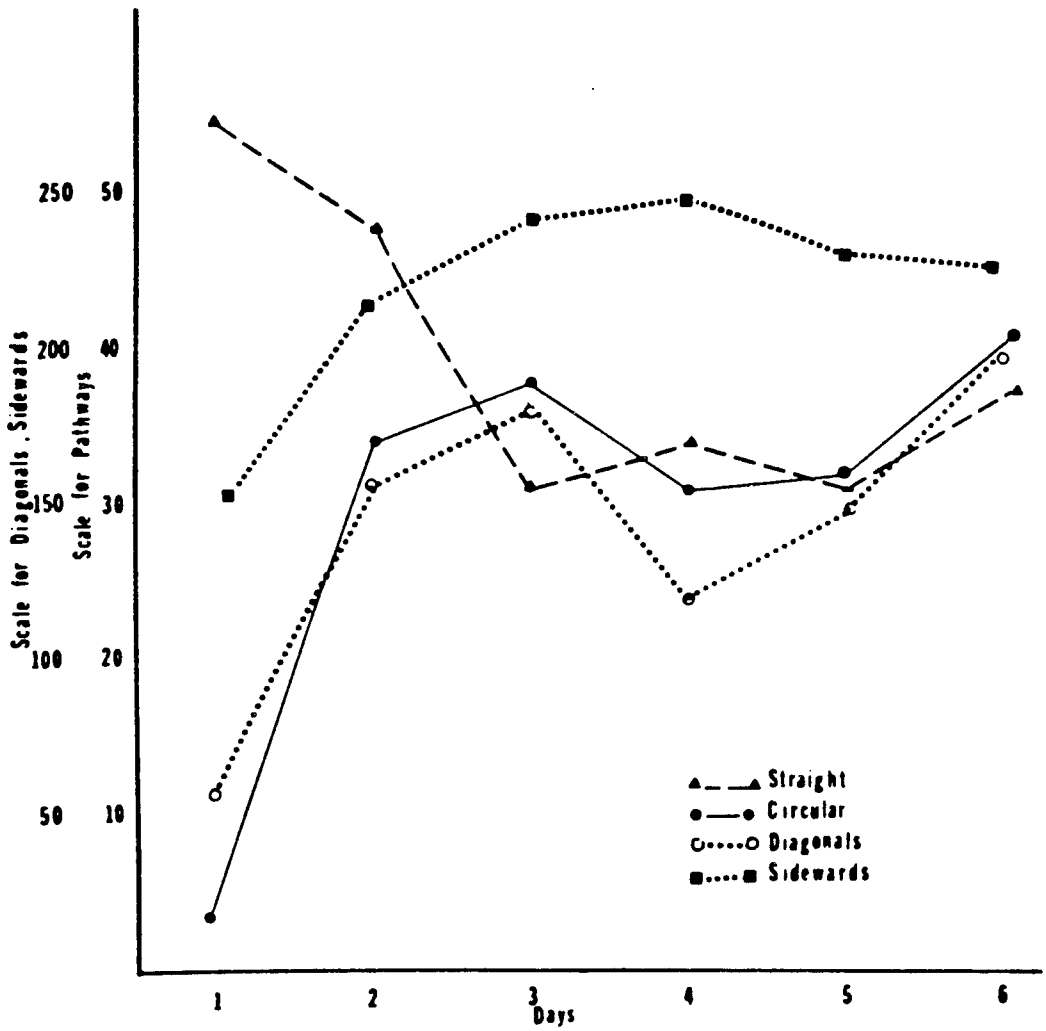

Figure 10. Pathways, Diagonals, Sidewards

scales, one for pathways (inside) and one for diagonals and sidewards. Separate scales were necessary to demonstrate the change patterns for these components because of numeric differences. Examination of Figure 10 reveals that straight pathways recorded the highest frequency (55) on Day 1, while circular pathways (15), diagonals (69), and sidewards (156) all recorded their lowest frequencies on Day 1. The actual data for these components are recorded on Tables 17 and 11. The lines for circular pathways and diagonal directions are essentially identical in shape. Based on this finding, there appears to be a positive connection between the increase in diagonal direction use and the increase in frequency of circular pathways. Both diagonal direction use and circular pathway use are considered developmentally more advanced than principal direction use and straight pathways (Roberton & Halverson, 1977). This finding further supports the conclusion that the child became increasingly more skillful across the 6 data collection days.

Other findings related to pathways were that more counterclockwise pathways occurred than clockwise, and that the majority of all pathways were identified as having 1/8 degree of circularity. Table 18 provides the actual frequencies for pathway direction and degree of circularity. Both counterclockwise and clockwise pathways demonstrated a consistent increase for Days 1 through 3, and counterclockwise pathways increased consistently on Days 4 through 6. Figure 11 illustrates the change patterns for pathway direction, diagonal right and left, and side right and left. Examination of this Figure reveals that the lowest frequencies for all components were recorded on Day 1. The lines reveal a similar pattern for increases in diagonal left movement and increases in counterclockwise pathways. A similar pattern of increases and decreases is noted

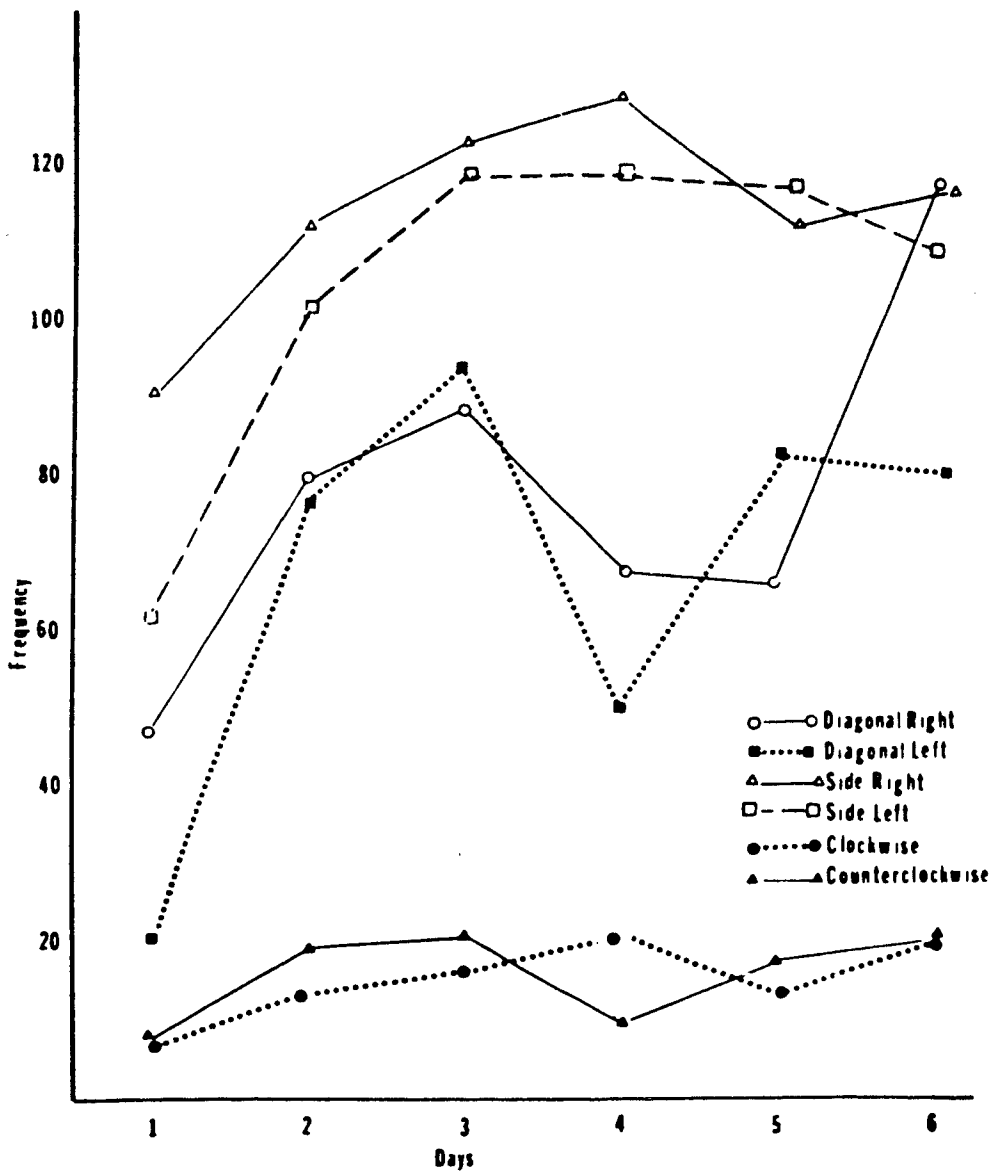

Figure 11. Pathways Directions, Diagonals (Right and Left), Sides, (Right and Left)

between diagonal right movement and clockwise pathways. Side movement to the left follows a similar line as counterclockwise paths and diagonals for Days 1 through 3. However, for Days 4 through 6, side left demonstrated an opposite pattern. This finding might support the idea that the child was becoming more skillful in controlling the object, and therefore, there was less need for sharp direction changes. In addition, the gradual shift from sideward to diagonal movement in a pathway would result in a smoother curve and therefore add clarity to the floor pattern. This added clarity would lend further evidence to the increasing skillfulness of the child.

Sideward movement to the right follows an identical line to that of clockwise pathways. Referral to Figure 11 provides the reader with a graphic illustration of this pattern. The match between side right and clockwise lines is closer than the pattern shape of diagonal right and clockwise. This finding can be interpreted to indicate that the child was less advanced developmentally in clockwise directions. Another, and possibly more accurate speculation, is that sharper direction changes to the right were needed to maintain control of the object when the child was moving to the right. If the object were struck by body parts on the right side, and the child were moving in a clockwise pathway, a miss-hit would most likely result in loss of the object because no other body parts could recover control. Therefore, sideward movement could be used to realign the body with the object. If the child were moving in a counterclockwise direction, the body parts on the left side of the body could be utilized to regain control over the object: Less obvious direction changes would be necessary.

The Five Basic Jumps. The five basic jumps were consistently the third most frequent locomotor pattern. The actual frequencies for jump form were presented in Table 6. This was the only pattern to demonstrate gradual decreases

across the 6 days, with the exception of Day 6. The most frequent form of jumping was from one foot to the opposite foot. This form of weight transfer appears early in development and allows for increased speed and distance in movement (Roberton & Halverson, 1977). Jumping from one foot to the same foot was the second most frequently used form of jumping for all days. Transferring weight in this manner requires more balance and strength than does jumping from one foot to the opposite, and is, therefore, developmentally more advanced (Roberton & Halverson, 1977). It is interesting to note that jumps from one foot to the opposite foot demonstrated gradual decreases across the 6 days, with the exception of Day 6; and that jumps from one foot to the same foot demonstrated decreases from Days 1 through 3, and then increases from Days 4 through 6. The use of these jump forms might also be factors that influenced the gradual increase in step frequency across the 6 days. Both of these jump forms allow for momentum to continue. The increased occurrence of jumps from one foot to the same foot on the last 3 days might indicate that the child was more successful with this pattern than he was earlier and, therefore, developed confidence in its use.

The other jump forms were used minimally across the data collection period as shown in Table 6. Jumps from one foot to two feet and from two feet to one foot both began at nine occurrences and then showed a fairly gradual decrease across the remaining days. Jumps from two feet to two feet also demonstrated fairly gradual decreases across the 6 days. The use of these jump forms would not have been beneficial to show increased skillfulness in the movement task; the decreases were considered appropriate. Jumps from two feet to two feet, and from one foot to two feet both break the momentum of movement. As indicated in the discussion on steps, there was an increase in the fluidity of

movement. It is, therefore, logical to conclude that patterns which interrupted momentum were gradually lessened or eliminated.

Runs. Runs were the least used locomotor pattern on all days of the study. The occurrence of runs fluctuated from day to day as shown on Table 6. The highest frequency came on Day 2 and the lowest on Day 6. It could be speculated that runs would not be compatible with control of the object; the more control the child had over the ball, the fewer runs would occur. Referral again to Figure 6 allows the reader to note that on Day 2 the highest frequency of quick movements were recorded. There is most probably a connection between runs and quick movement. The connection between runs and control time is discussed at a later time.

Manipulative Skills

Three manipulative skills were identified in the movement data for all 6 days of movement performance. The rank order of occurrence for strike, catch, and throw remained the same throughout the study. Craig (1976) identified these same manipulative skills in a related study. In Craig's study, strikes accounted for 50% of all manipulative skills. In the present study, strikes accounted for 95% of all manipulative skills. Table 7 provided the frequency data for these skills. There was a fairly gradual increase in manipulative skills across the 6 days due to the increased number of strikes. Decreased use was evident for both catches and throws, with the exception of Day 2. The increased number of strikes, and the decreased number of catches and throws relates directly to the child's goal of keeping the ball in the air longer.

Several changes occurred in the space and effort aspects across the 6 days which provide information related to the gradual increases in manipulative skills,

especially strikes. The most obvious factor that would influence the number of manipulative skills performed is control over the object. Control, for purposes of this study, was described in relation to the eight Effort Actions. Table 23 provides the exact frequencies for Effort Actions across the data collection period. The three major effort actions utilized in the execution of manipulative skills were punch, dab, and flick. All of these efforts have a time element of sudden. The weight element for punch is firm; whereas fine is the weight element for both dab and flick. Dab and punch share direct as their space element; indirect is the space element for flick. Figure 12 provides a graphic illustration of the changes which occurred among the effort actions and the manipulative skills.

Figure 12 provides effort frequencies and manipulative skill frequencies as related to the 6 days of movement performance. For example, on Day 1 as indicated by 1 on the graph, 202 punches occurred and 403 manipulative skills were executed. On Day 2, the occurrence of punches dropped to 140 and the occurrence of dabs increased to 201. This shift in effort use is illustrated on Figure 12 by the crossing of graph lines for these effort actions. The most obvious finding is the inverse pattern between the number of punches and the number of manipulative skills executed. Since all three efforts share sudden as a time element and direct is the space element for both punch and dab, it is apparent that the weight element was the most influencial element in relation to object control. Referring again to Table 23, it is noted that in actual frequencies punch and dab were almost identically reversed on Days 1 and 2. This finding lends support to a developmental hypotheses postulated by Halverson and Roberton that "strong, forceful movement developmentally precede fine, light

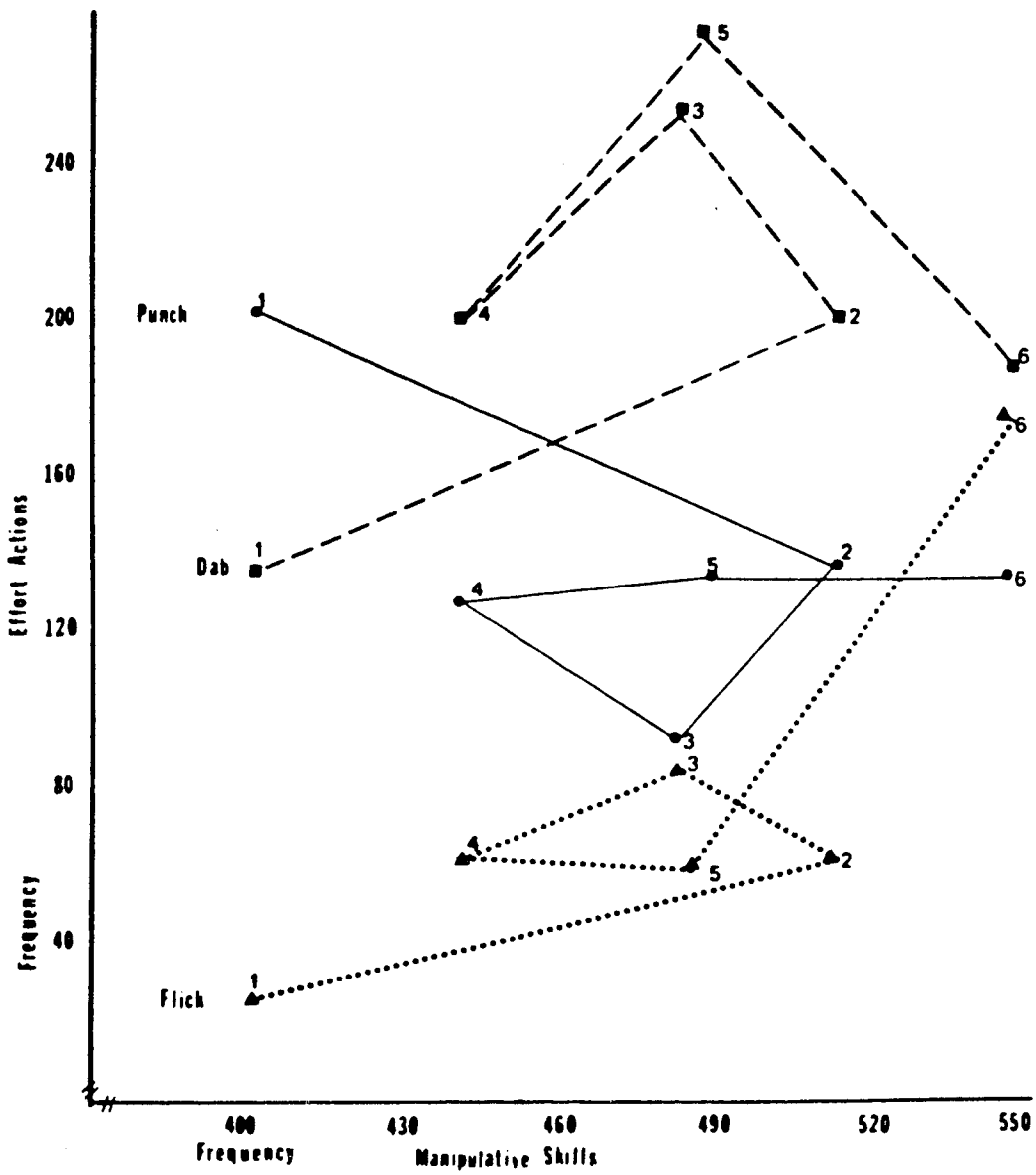

Figure 12. Manipulative Skills, Effort Actions by Day

Note: Striking was the manipulative skill used predominantly over the 6 days ranging from 92% to 99% as shown in Figure 6.

movement" (1977, p. 59). The rapidity of this change, however, may indicate advancement due to learning rather than to development.

The second finding is more subtle and more difficult to explain. Examination of Figure 12 reveals an additional trade-off; between Days 5 and 6 a reversal pattern is noted for dab and flick. These efforts have only one different element which is space; dab is direct, whereas flick is indirect. One plausible explanation for this change is that the shift in space quality was purely accidental. A more feasible rationale is that the child had achieved sufficient skill to actually begin directing the object at will. The second explanation appears more feasible given the increase in actual strikes on this day. This finding might also relate to the increased occurrence of circular pathways.

The occurrence of slash on Days 2 and 3was interesting in that the qualities involved are firm, sudden and flexible. These qualities are not necessarily beneficial to control of an object. In order to explain these efforts, the investigator referred to the notation copy and found that these efforts were used by the child to strike the ball to the floor. He then moved under the ball for a strike with the head. It is concluded that within the present movement context the use of the slash was therefore appropriate. The appearance of press actions was even more unlikely because the qualities involved are sustained, firm, and direct. Referral to the notation copy revealed that these efforts were attributed to strikes by the chest, the right elbow, and the right shoulder. The low frequencies of press efforts might indicate that the child was not successful with these, and therefore did not use them often.

The changes in effort use appeared to be the most obvious factor related to increased control over the object. There were, however, several changes in the Space Aspect as related to manipulative skills.

The majority of the manipulative skills were executed in a forward direction, or in front of the body. Table 12 provides the frequencies for direction use in manipulative skills. The fact that forward was the dominant direction for all days was not unexpected; forward is the easiest location to make visual contact with the object. This finding is supported by a similar finding in Craig's study (1976). Place was the second most frequent location for occurrence of manipulative skills. Place refers to the spatial area directly above or below the point of attachment of the body part. The high frequencies for place can be somewhat accounted for by strikes executed with various parts of the head, the wrists, the knees, and the feet. The dominant use of side right, and diagonal right forward are apparent when these frequencies are compared to the other frequencies. The child was right-handed and, as illustrated in Figure 13, utilized body parts from the right body side (225) more frequently than left-side (32) body parts. The finding that more skills occurred in forward, forward right, and right side indicate that the child did not cross the midline of the body frequently for manipulative skill execution. It should be noted that the movement task being performed did not require a crossing of the midline. Backward was the least used principal direction for manipulative skills, and the diagonal backward directions were hardly used on any of the 6 days. These findings are again not unexpected due to the difficulties related to performing manipulative skills in these locations, and the fact that these locations are incompatible with his goal of keeping the ball in the air.

Spatial changes related to level use for manipulative skills demonstrate some interesting trends. Table 14 provided the actual frequencies for level use in manipulative skills. Medium level was the dominant level on Days 1, 2, and 3. High level was the dominant level on Days 4 through 6. On Day 5, low

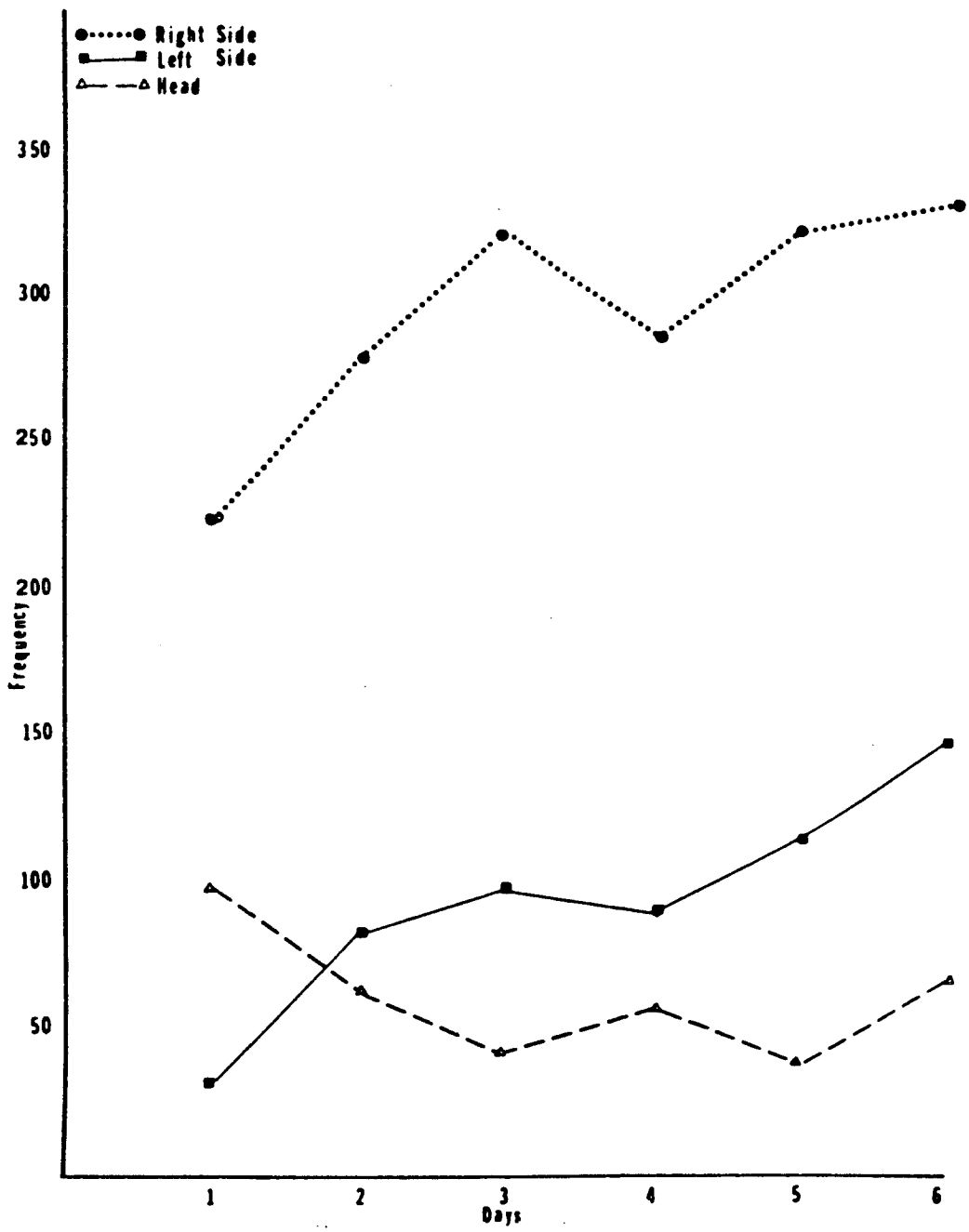

Figure 13. Right and Left Body Sides and Head (Striking)

level had a higher frequency than medium. Low was the least used level on all other days. The reversal of frequencies between medium and high levels was an interesting finding. Medium level is the more natural level for manipulation of objects. The increased occurrence of high levels coupled with the increased control time medians implies that the child was becoming more skillful in his space usage across the 6 days. It could also be related to the specific body parts used in striking. This factor will be discussed later. Performing manipulative skills at a low level is also more difficult than medium level which adds to the speculation that across the 6 days the skillfulness of the child increased. Referral to Figure 7 presented earlier in this Chapter reveals that locomotion at low level was greater than at medium level on Day 5. The fact that the child was moving more often at a low level is probably directly related to the occurrence of more manipulative skills in a low level. These two findings might indicate that the child was using a change of level to align himself with the object for manipulation purposes.

Changes in extensions were also considered in relation to manipulative skills. Frequencies for bend and stretch were presented in Table 19. It is obvious from the frequencies that more manipulative skills were executed while the body parts were in bend positions, close to the body, than while in stretch, far from the body. An apparent trend is that frequencies for 1 degree of bend gradually increased from Day 1 to Day 3 and again from Day 4 to 6. This finding indicates that there was a gradual increase in distance from the body for execution of manipulative skills. The large number of skill executions with 3 degrees of bend on Day 2 is probably related to the great increase in quick steps on this day. As speculated earlier, the increased speed of locomotor activities would not only allow for more strikes in a given time period, but would also result in close proximity with the

object. Adjustment of body part length would, therefore, be necessary to perform manipulative skills effectively. The frequency for manipulative skills with 3 degrees of bend on all other days was relatively constant.

The infrequent use of stretch components was not surprising as these are considered developmentally more advanced. "The extremes of movement size are not experienced until after the middle range" (Roberton & Halverson, 1977, p. 59). Given that 3 degrees of bend is the middle range for bend, it is interesting to note that 1 degree of bend and 1 degree of stretch occurred more frequently than any of the other possible degrees within each component. One degree of bend represents the lower extreme of bend, and 1 degree of stretch the lower limit of stretch. One speculation to be drawn from these data is that, in relation to manipulative skills, the use of the lower extremes might be experienced prior to the upper limits for bend and stretch components. An additional way to interpret these data is to consider the extremes of bend and stretch as opposite ends of a continuum; and therefore, 1 degree of bend and 1 degree of stretch are, in fact, in the middle of the continuum range. In light of this interpretation these data would therefore support the developmental hypothesis as stated by Roberton and Halverson.

Striking with Different Body Parts. Thirty-seven different body parts were used for striking over the 6-day period. Fourteen of these body parts were used on all 6 days, twelve body parts were used on 3 or more days, and six parts were used on 2 days and five parts on only 1 day. Table 8 provides the frequencies for the use of body parts used in striking. The total number of different body parts used is located at the bottom of Table 8. From these numbers, it can be ascertained that the most variety in body parts occurred on Day 1 and the least variety occurred on Day 5. When these data are organized into right and

left side categories, it becomes obvious that the right side of the body was the dominant side for striking. This finding was illustrated in Figure 13. Both right and left sides demonstrate gradual increases from Days 1 - 3 and for Days 4 - 6. Across the 6 days the right side was involved in 67% of all strikes. Craig's (1976) findings indicate that the right side was used on 65%of all strikes. The shape of the lines indicate a slight difference between the two sides for the last day. The line for right side appears to be leveling off while the line for left side body parts appears to be accelerating. The graphic line for strikes with the head demonstrates a gradual decrease from Day 1 through 3. The uneven use of the head during the last three days is interesting when compared with the frequencies for right and left sides. On Day 4, when the use of both sides of the body was decreasing, the use of the head increased. On Day 5, when the body sides demonstrated increased use, the use of head decreased and then on Day 6, head use increased. The decreased use of the head on Day 5could be related to the two findings related to level use on this day. On Day 5 both locomotor activities and manipulative skill execution demonstrated large increases in low level location. If one can speculate that the object was in fact being controlled at a low level, then it is logical that the ball would not be in a position for strikes with the head as often on this day.

Reorganization of these data in another format, upper body versus lower body, provides additional information related to the changes which occurred in relation to body part usage. Figure 14 provides a graphic illustration of these data as organized by head, upper right and left, and lower right and left body parts. An examination of Figure 14 reveals that the upper body on the right side was the dominant location for striking body parts on all days. The right lower body was involved in more strikes on Day 1 than the left upper body; this trend is quickly

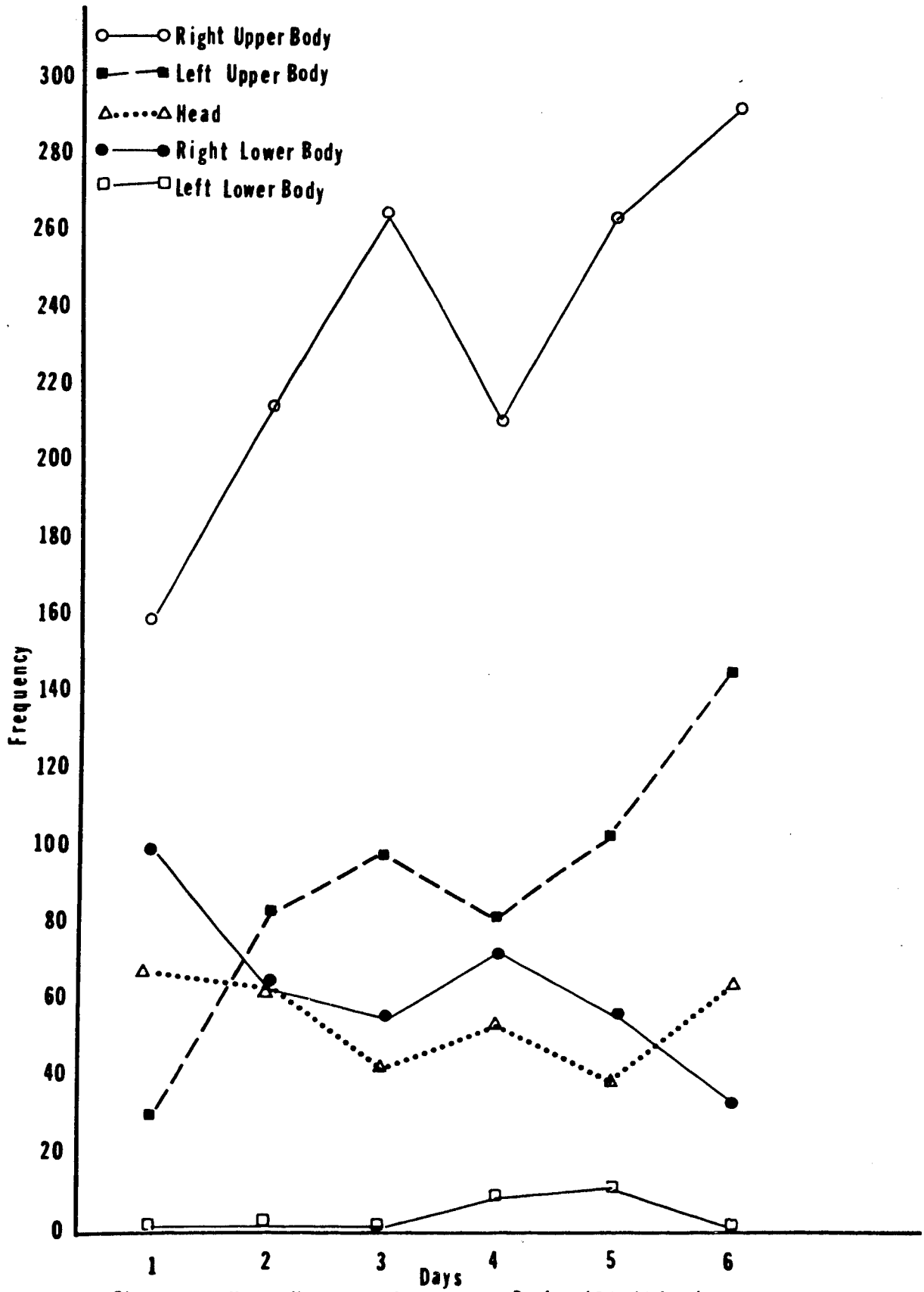

Figure 14 Head, Upper and Lower Body Parts (Striking)

reversed on Day 2 and for the remaining days. The leveling off of use for the right side in striking (Figure 13) can now be explained when the frequency of right lower body parts is examined. Beginning on Day 4, there was a gradual decrease in use of the lower right body for striking. The sharp increases for upper body, both right and left sides, is apparent in Figure 14. Based on these data, it can be speculated that the child was more comfortable with the right hand and the right foot. The use of the left lower extremity reached 11 hits on Day 5; this was the highest frequency for all 6 days.

Trends for Specific Body Parts. Changes in frequency for specific body parts provided some interesting findings. The right palm, which was involved in 70 strikes on Day 1, demonstrated sharp decreases across the days and was used in only one strike on Day 6. The numbers on Table 8 indicate that the frequency for right palm dropped approximately 49% between Days 1 and 2, and 18% between Days 2 and 3. No other body part demonstrated such drastic changes in use as the right palm. The frequencies for right hand steadily increased across the 6 days and accounted for 31% of all strikes over the time period studied. Hands, right and left, accounted for 57% of all strikes in Craig's (1976) study and 48% in the present study. The right hand is distinguished from the right palm as being the heel of the hand versus the fleshy palm portion. One speculation which might explain the decreased palm use and increased hand use is that the heel of the hand provided a better rebound surface for striking. The heel of the hand is naturally more firm and this would facilitate light efforts; whereas the palm, being more pliable, would require stronger hits to maintain the height of the object. This explanation would appear somewhat supported by the weight changes in effort actions, as illustrated in Figure 12, by the shifts in use of punches and dabs.

Examination of frequencies for the left palm and hand reveal that the left palm was never used more than twice on any day and was not used on 3 of the 6 days. The hand, however, demonstrated increased involvement in striking across the data collection period and accounted for approximately 17% of all strikes. The left hand accounted for 81% of all strikes with the left side of the body. This finding would seem to indicate that the left hand was the only body part on the left side that provided sufficient control for successful strikes. The finding would also support the idea that voluntary control over the hands develops prior to control over the lower extremities in manipulative skills. The child demonstrated similar variety of use for both upper extremities. Ten different parts of the right upper extremity were involved in striking over the 6 days and nine different parts were involved from the left upper extremity. The right shoulder was used for striking whereas the left shoulder was not. This was the only difference between the right and left upper extremities other than numeric differences.

Comparisons of the right and left lower extremities reveal a different trend. Eight different parts of the right lower extremity were involved in striking for the 6 days; only three parts from the left lower extremity were used. In addition to the difference in variety of body parts used, the numeric difference between the right and left lower extremities was great.

Referral to Table 8 provides the reader with a listing of specific body part use in striking. This finding lends support to the speculation that the child had a definite preference for the right side of the body in relation to manipulative skills. An additional speculation is that control over manipulative skills develop last in the non-perferred lower extremity as related to the movement task in this study. In order to develop control in manipulation with the non-perferred lower

extremity, the child would be required to develop balance and postural control over the nonpreferred supporting leg. In this case, the child would have to develop confidence in balancing on the right leg in order to execute strikes with the left lower extremity. On Day 5, 11 strikes with the left foot occurred. This is evidence that the child was, in fact, experimenting with the use of this body part for manipulative purposes. The fact that on Day 6 the frequency for the same body part was one might imply that the use of this part had not become an established part of the child's performance. An examination of the frequencies for the right foot on Table 8 reveals that this body part was an established part of the child's motor habits. The drop in use on Day 6 for the right foot is dramatic, but appears atypical when frequencies on other days are considered. A speculation related to the two sets of decreases for the right foot, Days 1 through 3 and Days 4 through 6, is that the child was experimenting with new body parts and not, therefore, relying on more familiar parts. The increase between Days 3 and 4 should be considered in relation to the fact that a weekend had intervened between these performances and that possibly the child was again returning to familiar body parts for striking until he had gained sufficient confidence to begin experimenting again with unfamiliar body parts.

The variety and frequency of use of the head and its various parts were a surprising finding. Examination of Figures 13 and 14 reveals that on Day 1 the head and its parts were used more often in striking than were the lower extremities and the entire left side of the body. On Day 2, strikes with the head were still more frequent than the left lower extremity and were equal to the right lower extremity. The dominance of the head over both lower extremities was reestablished on Day 6. The most feasible explanation for the high frequencies for striking with the head is that the child had had experiences with this type of

striking prior to the study. In the debriefing session after data collection was completed, the child revealed that he was a participant in organized youth soccer. This information might also explain the competence displayed in striking with the right foot. It should be noted, however, that striking with the head and foot in soccer and involvement of these parts in the movement task of this study have one major difference. In soccer, striking is utilized to project the ball away from the body. In the task for this study, and in relation to the stated goal, the child had to direct the ball upward rather than outward. This adjustment in object projection would require a different type of body alignment. The child's experiences in soccer might also be related to the variety of parts of the head used to strike the ball. The drop in the use of the forehead across the 6 days lends partial support to the speculation that the child had to readjust his soccer heading skills to match the requirements of the movement task in this study.

The involvement of the right wrist in striking demonstrated some interesting changes across the 6 days. The frequency for strikes with the right wrist more than tripled between Days 2 and 3, and then dropped drastically on Day 4 as shown in Table 8. The left wrist frequency was also the highest ever on Day 3 and then dropped to just two strikes on Day 4. There was a gradual increase in use for the right and left wrists from Day 1 to Day 3 and then great decreases on Day 4. One apparent explanation for these changes is that the gradual increases across the first three days represent learning and gains in confidence in use of these body parts. If the wrist was used intentionally, the speculation is that the wrist was an unfamiliar body part for striking at the beginning of the study and the increased frequencies across the first three days were the result of practice. The decrease on Day 4 could represent forgetting as a weekend intervened between Days 3 and 4. A counterspeculation is that the use of the wrist was an error

and that the child intended to strike the ball with the hand. Examination of the frequencies for the right wrist on Table 8 indicate that, despite the decrease, the involvement of the right wrist was more than it had been on the initial day of the study.

Relationship Aspect Components. Four relationship components (contact, pass, roll, and bounce) were identified in the child's movement performance. The occurrence of these components is presented in tabular form on Table 24. Bounce was the most frequent component and demonstrated an uneven pattern of occurrence. Bounce was used to designate the times when the ball contacted environmental surfaces, i.e., walls, floor, ceiling, etc. In the movement task performed in the study, the bounce was an acceptable way to gain or regain alignment with the object. The child could allow the ball to bounce between strikes with different body parts. The frequencies on Table 24 indicate that the occurrences for bounce were highest on Day 5 and lowest on Days 2 and 3. A speculation related to these findings is presented in relation to findings for locomotor patterns and manipulative skills. On Day 5, bounce occurrences were high and locomotor and manipulative activities were performed in low levels (Tables 13 and 14). It is possible that there is a connection among these factors. The child could have been using the bounce to set up specific body parts for striking purposes. Examination of Figure 14 partially supports this speculation. The use of the left lower extremity increased on Day 5; there was, however, a decrease in use of the right lower extremity. It is possible that either the child allowed the ball to bounce more often prior to strikes with the left foot or that, as a result of strikes with the left foot, the ball bounced more often.

Contacts were the second most frequent relationship component. A contact was defined as those incidences when the child made contact with the ball but did

not give impetus to the object. The occurrence of contacts declined over the 6 days. It can be speculated that, across the 6 days, the child became more active in initiating action on the ball rather than simply placing a body part in line with the object and allowing the object to hit the body part. The occurrences of pass and roll were so infrequent that no discussion was considered appropriate for these components.

Summary of Findings for Movement Component Data

The specific findings for locomotor patterns and manipulative skills were collapsed into four tenable assertions which summarize the behavioral changes identified in the child's movement performances. Each assertion is supported by trends identified for specific movement components.

Assertion Number One. The increased fluidness in the child's movement was evidenced by changes in several movement components. Fluid movement has a free-flowing quality. Free-flowing movement is not easily stopped, but does imply a control quality which allows the mover to determine direction, speed, and relationship changes. Across the 6 days there was an increased number of steps and a decreased number of holds; more mobility would result from these changes. Decreased occurrence of movements in place was an additional factor which supported the idea of increased mobility. The predominant use of two jump patterns (one-foot-to-the-same, and one-foot-to-the-opposite) also contributed to fluidness of movement. These two forms of weight transfer allow for increased speed and distance in movement. They also allow momentum to continue. The increased number of strikes within the movement performances across the 6 days is additional evidence of increased continuity.

Assertion Number Two. Alignment of the body with the object implied that the child employed various locomotor patterns and levels to gain or maintain an

advantageous position for striking the object. Support for the idea that certain locomotor patterns with corresponding changes in spatial components were utilized for body alignment purposes is speculative. One-footed turns were the predominant form of turning for all days. It was speculated that turns were used to gain and maintain alignment with the ball. With the exception of Day 2, there were opposite patterns for turns and strikes. The opposite patterns do not refute the use of turns to gain control. The speculation was that turns were initially used to react to the flight of the ball and later were used in a more intentional manner to maintain alignment with the object. The increase in diagonal direction use and circular pathways, coupled with the decrease in turns, were changes which led to the idea that these factors were related to body alignment. The gradual increase in strikes across the 6 days and the gradual increase in fluid movement lend evidence to support the logical conclusion that the child improved his alignment with the object. An additional movement component identified as an alignment mechanism was level. On Day 5 low level was the predominant level for locomotor activity and, in manipulative skills, was used more often than medium level. The interpretation of these findings was that on this day the child used level for alignment purposes.

Assertion Number Three. The child's changes in weight and space elements were major factors in gradual gains in control over the object. Control of the object increased across the 6 days as evidenced by the increased frequency of strikes. The major factor related to increased control was the changes in effort action use. There was a dramatic shift from quick, direct, strong strikes to hits which had quick, direct, and light qualities. This shift occurred between Day 1 and Day 2. There was a gradual increase in quick, direct, light striking movements for the remaining 4 days. On Day 6, a shift from direct to indirect space

quality was noted. This shift, in addition to the increase in circular pathways, was interpreted to indicate increased control over the object. This interpretation implies that the child was intentionally directing the flight of the object rather than reacting to the flight of the ball.

Assertion Number Four. The child demonstrated upper body and right-side body dominance in his striking behavior. The movement task in this study involved striking a ball with different body parts. The child employed 28 different body parts on Day 1 and 20 body parts on Day 5; these figures represent the highest and lowest number of body parts used for the 6 days. Two obvious trends were noted in body parts usage. The right side of the body was involved in more striking than was the left side on all days, and the upper body was used more than the lower body on all days. The right and left hands were the dominant body parts for striking and accounted for approximately 48% of all strikes for the study period. The dominance of the hands was particularly obvious on Days 5 and 6. The changes in body part usage supported the speculation that the child developed control over the right upper body, the left upper body, the right lower body, the head, and the left lower body. Control in striking for left lower body parts was never confirmed in the present study, but frequency tallies on Day 5 were indicative of attempts to perform strikes with these body parts.

These four assertions provide a general summary of the findings revealed in the movement component data. The specific findings for each component were discussed in previous sections. These summary descriptions were further examined in relation to the general movement sequence variables to ascertain if such assertions could be supported or refuted.

Movement Sequence Data and Discussion

A second level of analysis concerned the movement sequences which were identified within the movement performances. A movement sequence was defined as the movement occurrences that began when the child initiated a manipulative action of the ball and ended when the child concluded manipulative action and lost control of the ball. The actual number of sequences within each day is presented in Figure 15.

Organization of Data

The medians and ranges were calculated for six variables: (a) control time per sequence, (b) number of strikes per sequence, (c) number of different body parts per sequence, (d) rate of strikes, (e) ratio of strikes to different body parts, and (f) the rate of different body parts. The actual numbers for variables (a), (b), and (c) are provided in Appendix H.

Control Time per Sequence. The control time, to the nearest second, for each movement sequence was determined by use of a stop watch. The medians and ranges for each day are presented in Figure 16. These data, as represented by medians and ranges, reveal two general trends. Days 1 through 3 contain the highest (23) and lowest (6) medians for all days. Days 4 through 6 are more similar in medians; however, the ranges are the largest that occurred for all days. The highest median was 23 seconds and the lowest was 6 seconds. The longest actual sequence time was 2 minutes and 26 seconds. This sequence occurred on the sixth day.

Control time was defined as the period of time (in seconds and minutes) that the child manipulated the object. Figure 16 provides an illustration of the medians and ranges for control time across the 6 days. The most apparent change indicated in this Figure is the increase in both medians and ranges across the 6 days. The

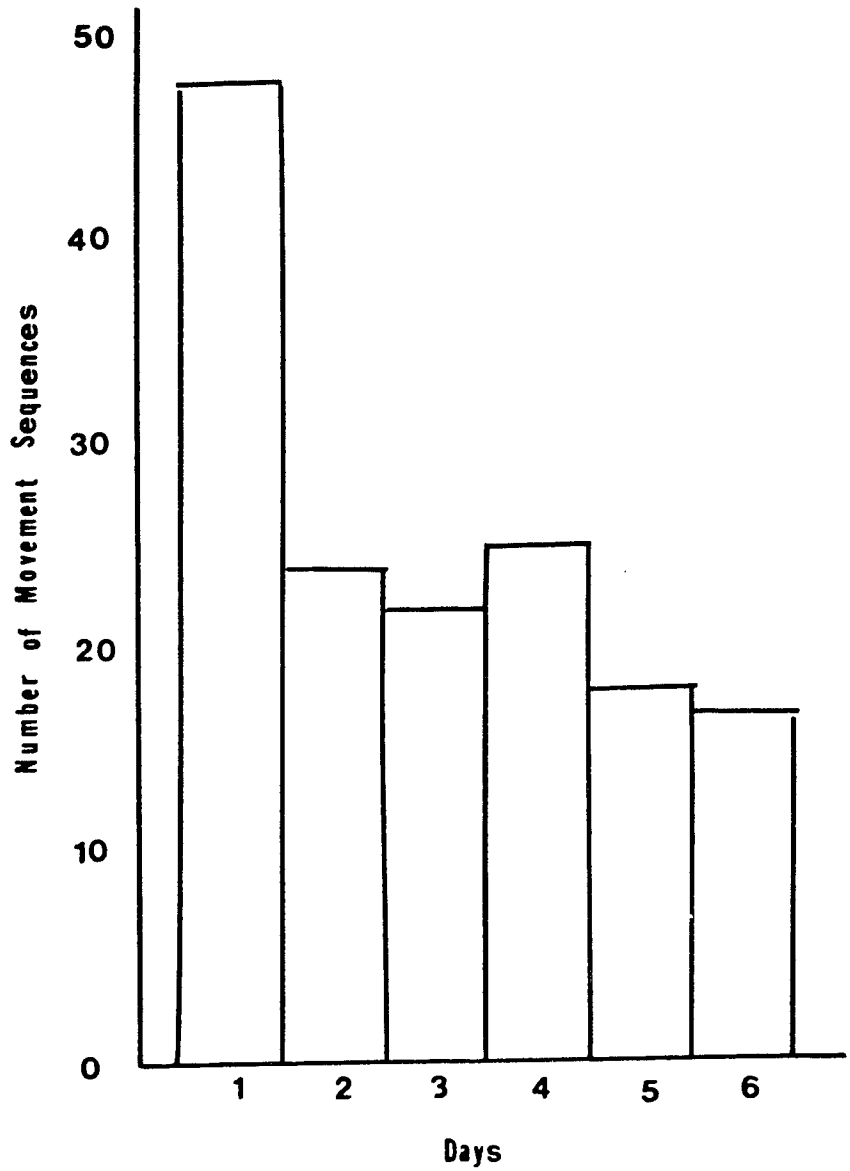

Figure 15 Movement Sequences Across Days

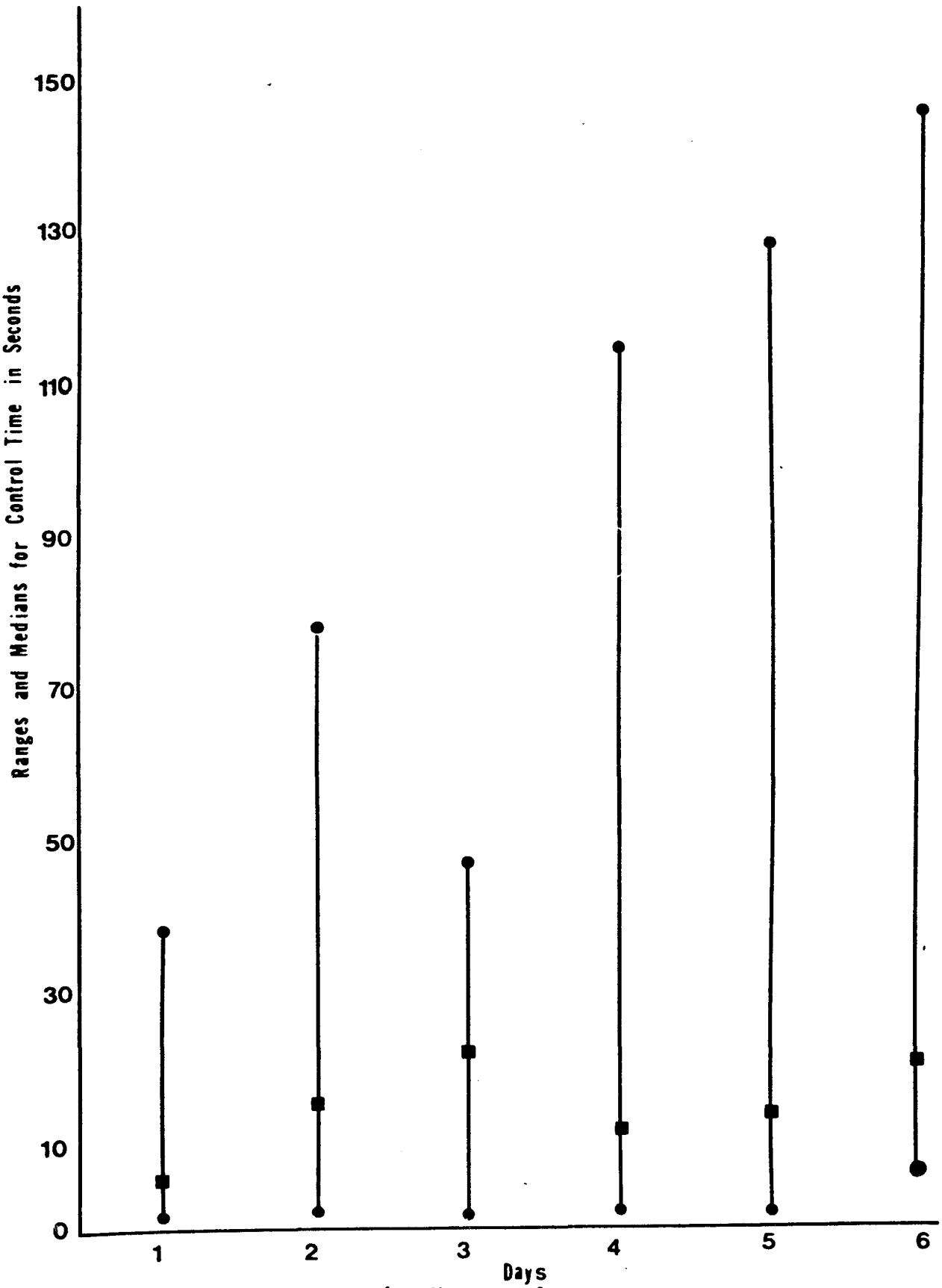

Figure 16 Control Time for Movement Sequences

lower end of the range on Day 6 is in fact equal to the median for the first day. The length of time the child maintained control of the object was an additional factor in fluidness of movement, in particular for striking. The child stated his goal for accomplishment of the task in relation to a time factor. A speculation stated earlier in relation to runs was that as runs decreased control time might increase. Examination of Table 6 and Figure 16 reveal that the pattern of change for runs and control time are not similar. In fact, on Day 6 when the second highest median (22 seconds) for control time was recorded, the fewest (15) runs occurred. These data support the idea that the child accomplished his goal. They also indicate that there was extreme variability in performance, which implies lack of consistency. In the movement context of the task executed in this study, lack of consistency should not be interpreted as ineptness. The range for Day 1 is narrow in comparison to the range on Day 6; however, on Day 1 48 movement sequences were identified and only 17 were identified on Day 6. The apparent consistency on Day 1 conceals the fact that 24 sequences were 6 seconds or less in length. Sequences of this length have been eliminated in the Day 6 movement performance. The child became more skillful in the task as indicated by the increase in sequence length.

The increased skillfulness of the child was also demonstrated by the increased locomotor and manipulative activity. Figure 17 illustrates the connection between control time and the effort actions. Examination of Figure 17 reveals that, as the occurrences of punch decreased from Days 1, 2, and 3, the length of control time increased. The opposite pattern for dabs and control time can also be identified, i.e., as dabs increased control time also increased.

Strikes per Movement Sequence. The number of strikes that occurred within each sequence was counted. The medians and ranges for each day are presented

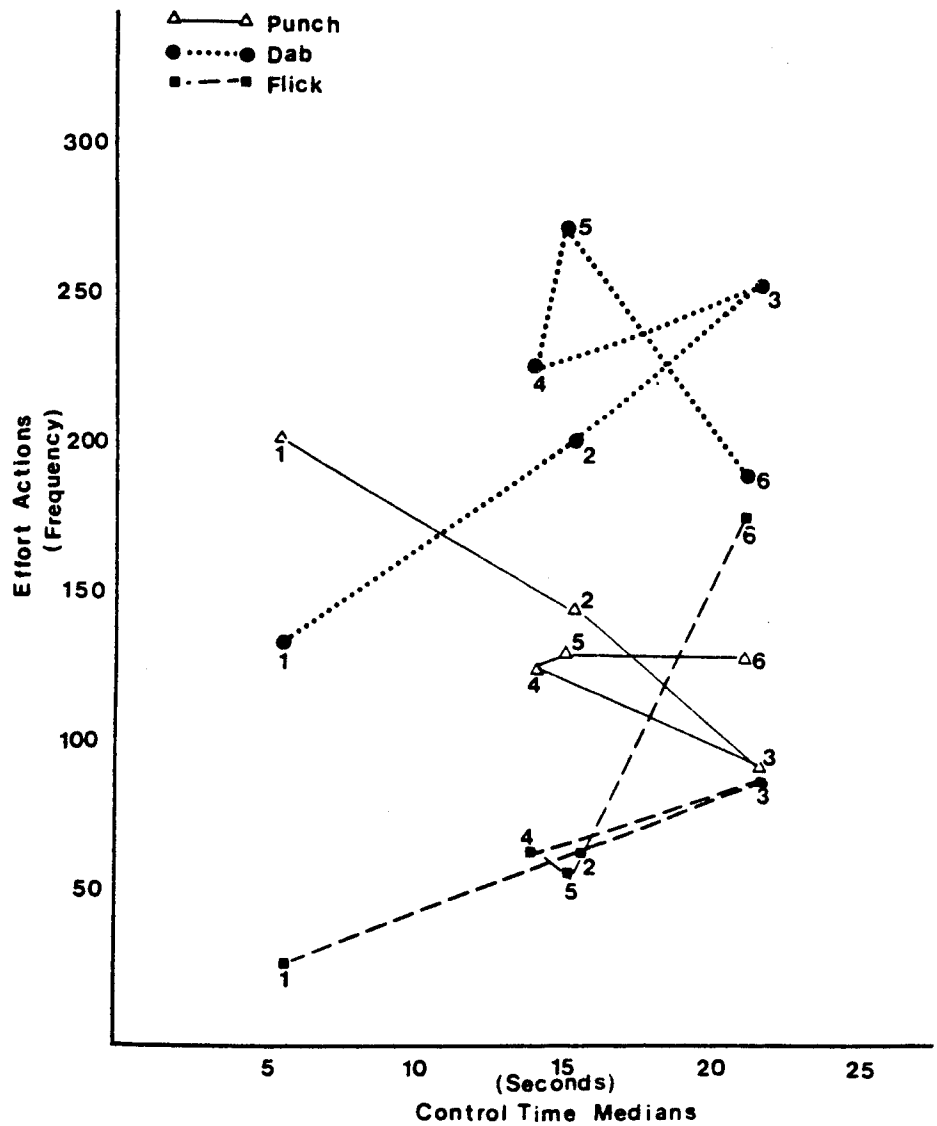

Figure 17 Control Time Medians and Effort Actions by Day

in Figure 18. The number of strikes per sequence tended to increase from Day 1 to Day 6. The highest median occurred on Day 6.

Strikes per sequence followed a similar trend as did control time, with the exception of Day 5. The drop in strikes per sequence on this day, coupled with the increased control time, were difficult to explain until the frequencies for bounces were considered. The speculation is that the child employed more bounces on this day to maintain control of the object. Low was the most frequent level for locomotor activities and more manipulative skills occurred in low level than in medium on this day. The changes in level use were interpreted to be additional support for the child's use of bounce within sequences to maintain control of the object.

Different Body Parts per Movement Sequence. The actual number of different body parts utilized within each movement sequence were counted. The medians and ranges for these findings are presented in Figure 19. These data reveal very little change across the 6 days. The lowest median (4) occurred on the first day, and the highest (9) came on the second day. The ranges for Days 4 through 6 were wider than the ranges for the first three days.

The different body parts variable is an index of variety for the movement task executed. Figure 19 illustrates the medians and ranges for these data. Although very little changes in medians were discovered, the increased ranges on Days 4 through 6 indicate an increased variability. In relation to different body part use this variability is considered a positive factor. This finding was interpreted to mean that the child in fact experimented with the use of different body parts while the control time and the number of strikes per sequence increased. These three factors together support the contention that the child became more skillful across the 6 days. This finding, coupled with the movement component data

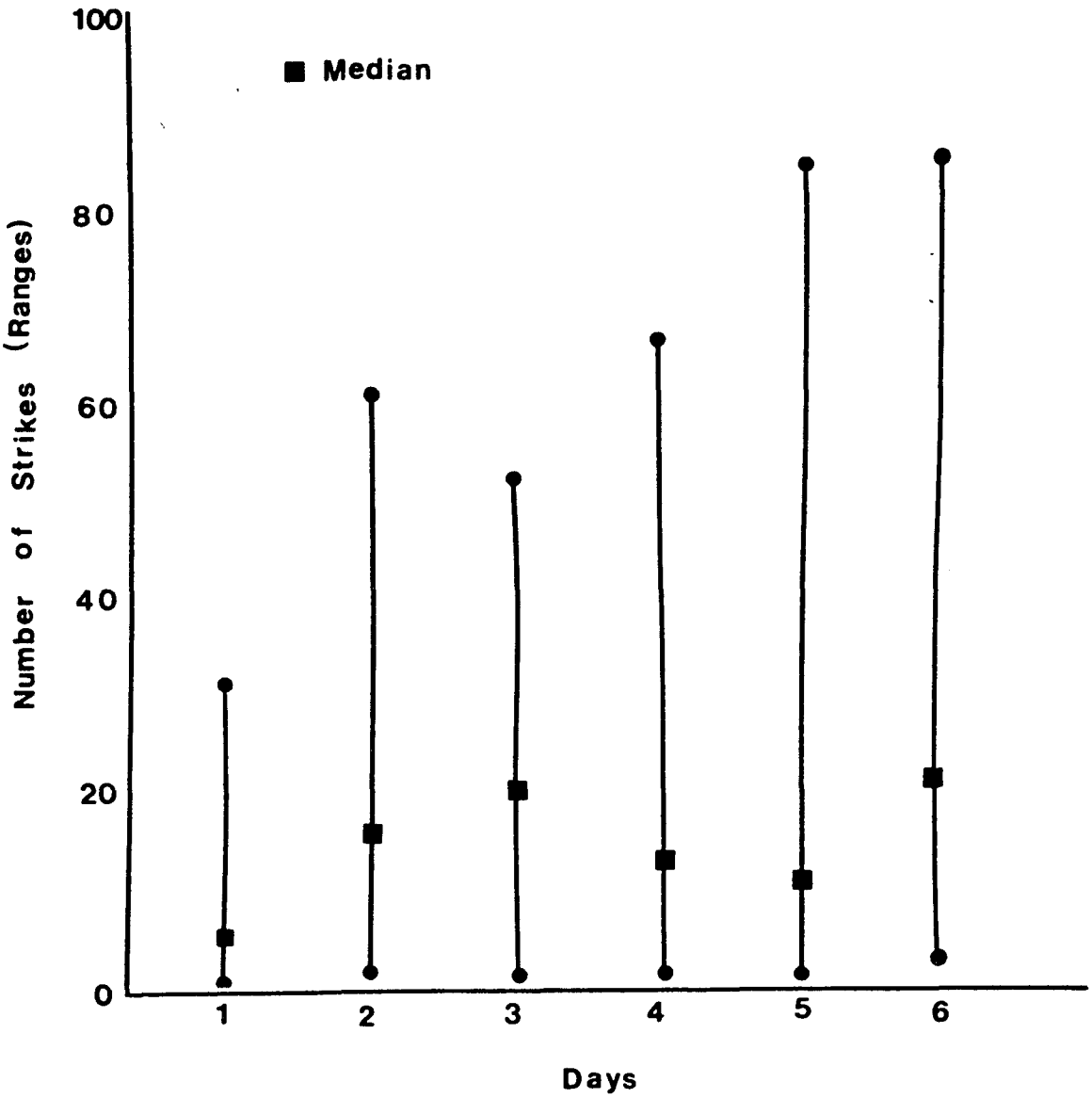

Figure 18 Strikes per Movement Sequence

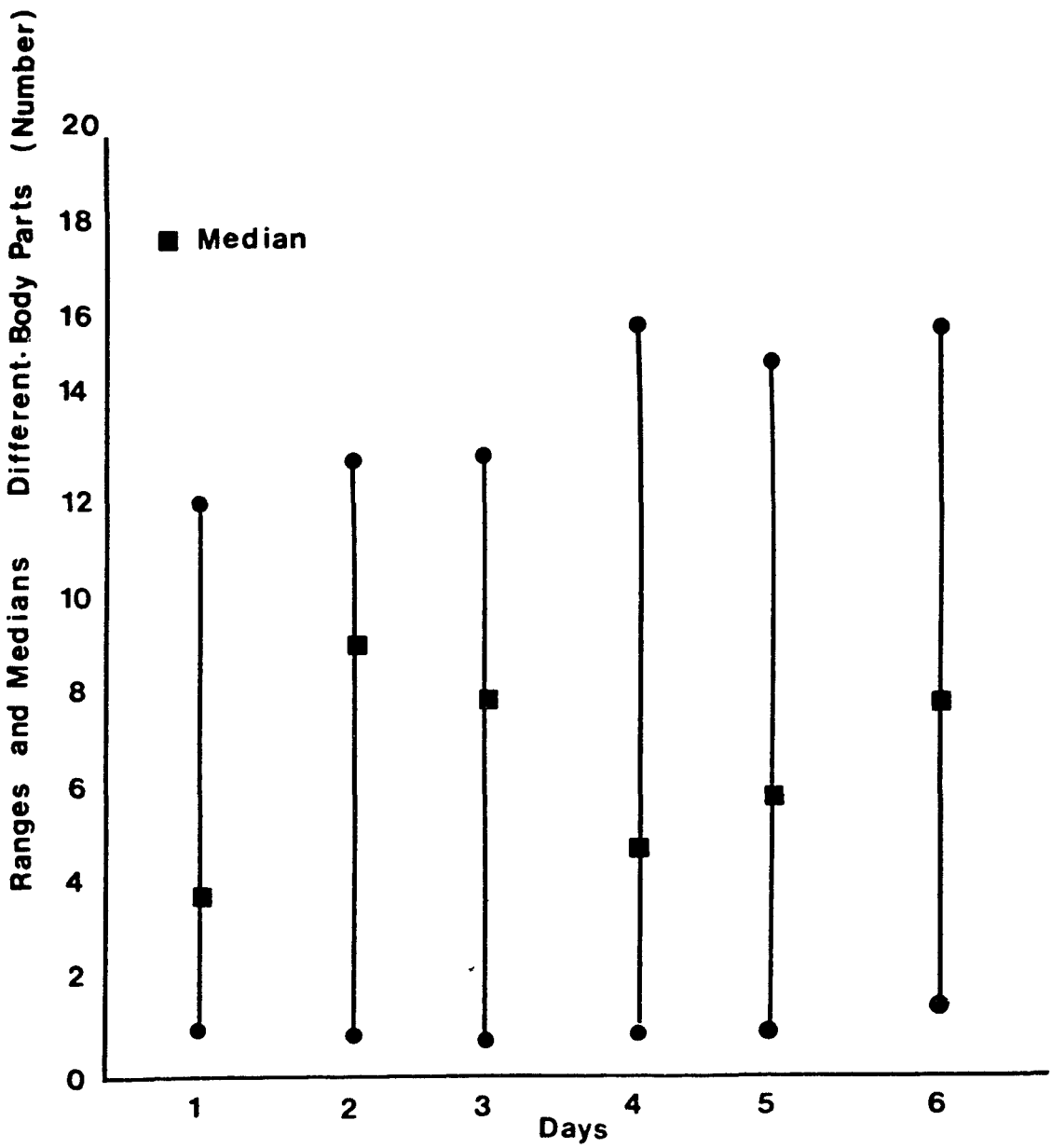

Figure 19 Different Body Parts per Movement Sequence

for specific body parts implies that inspite of the right and left hand dominance within the sequences, the child achieved variety in striking.

Rate of Striking. The rate of striking was calculated by determining the ratio between strikes and control time. The medians and ranges are presented in Figure 20. Two findings are apparent in the data: the decrease in ranges across the days and the increase in the medians across the data collection days. The exception to these statements is between Days 3 and 4.

Rate of striking indicates the number of strikes executed within a specific time unit. Figure 20 illustrates the medians and range for these data. The increase in medians across the 6 days and the decrease in ranges indicate that the child achieved consistency on this variable. These findings were interpreted to mean that the child was able to execute more strikes per each movement sequence. In fact, on Day 6, the child executed approximately one strike per second. The rapidity of striking supports the speculation of increased fluency of movement.

Ratio of Strikes to Different Body Parts. The ratio of strikes to different body parts was calculated by dividing the number of strikes within each movement sequence into the number of body parts used for striking. These data are presented in Figure 21. Examination of the medians reveals only slight changes. The lowest median appeared on Day 1 and the highest on Day 6. There is some indication of a gradual increase in ranges across the 6 days.

Ratio of different body parts to strikes provides an index of variety within movement sequences. Although there were only slight changes in medians, the ranges on the last 3 days indicate that the child still experimented with different body parts. The variability in ranges on this variable was a positive factor, as variability implies experimentation with different body parts. Within movement sequences the child achieved variety.

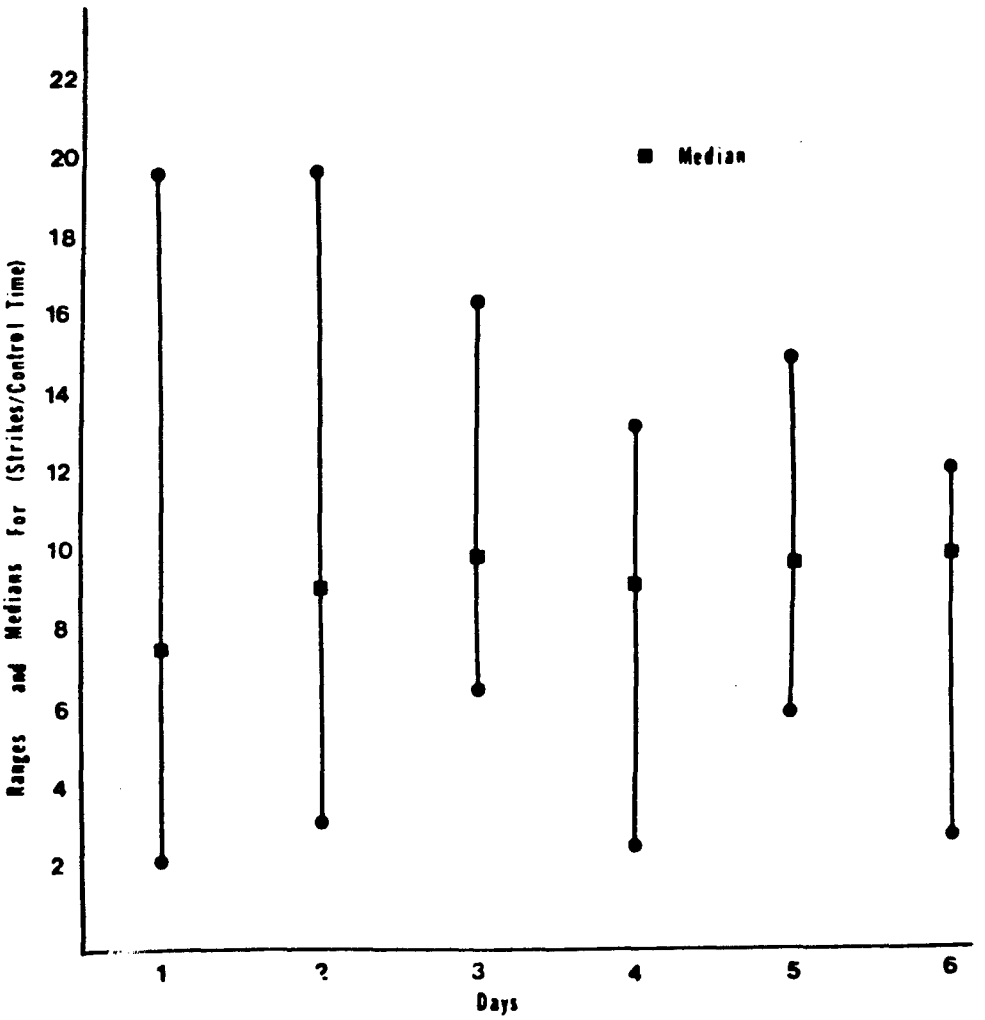

Figure 20. Rate of Strikes

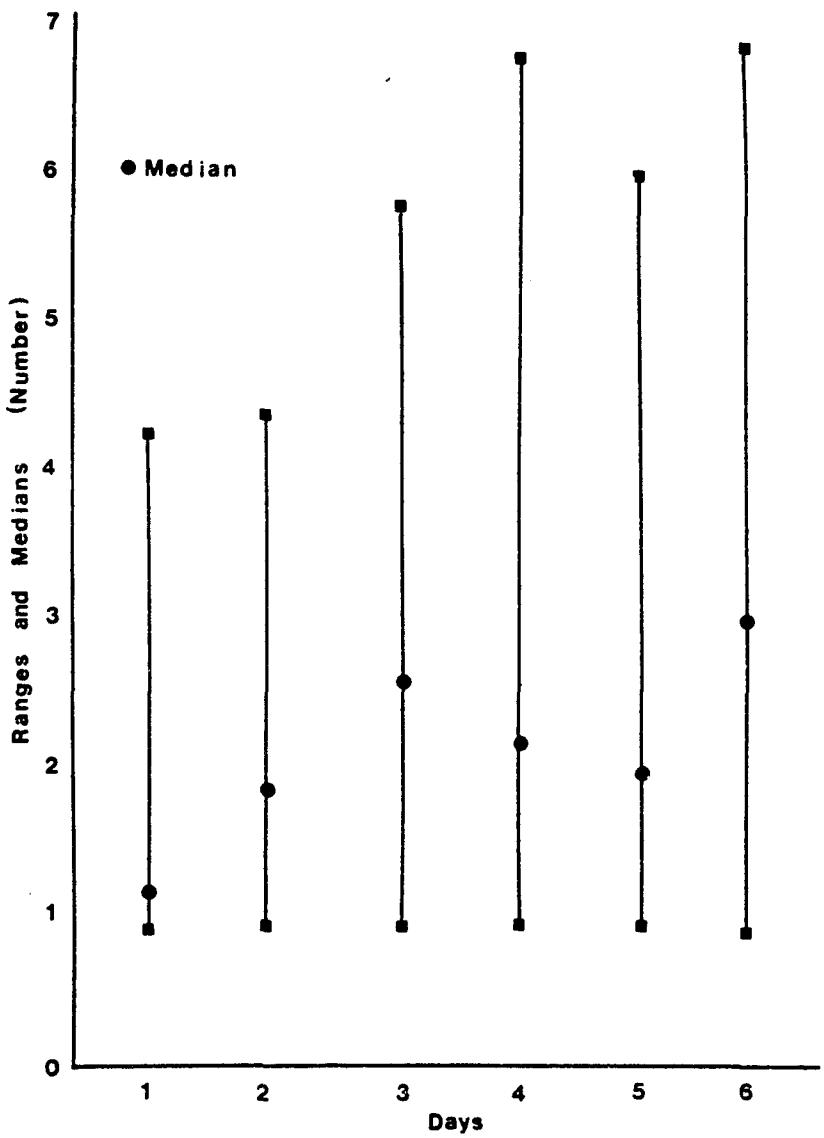

Figure 21 Ratio of Strikes to Different Body Parts

Rate of Different Body Parts. The rate of different body parts within each sequence was calculated by dividing the number of different body parts utilized within each control time. Figure 22 illustrates these findings. Examination of the medians and ranges reveals a decrease across the 6 days. The widest ranges occurred on Day 1 and Day 2. The highest median also occurred on Day 1. The lowest median occurred on Day 6. The decrease in medians indicates that very few different body parts were used within each control time unit. The interpretation of this finding is that although the child was experimenting with different body parts across the 6 days, he was using the same body parts for consecutive hits more often than he was mixing body parts within specific time periods. This is the single variable which demonstrates the effect of the hand dominance for striking. The overall effect of hand dominance was decreased variety within sequences. Gradually over the 6 days, the child sacrificed variety for increased control time.

Summary

The movement component data were categorized and presented in relation to Laban's framework for human movement. These data were subsequently discussed in a combined format so as to present a conceptual description of the child's movement performance. Four tenable assertions were posed which summarized the movement component findings. The movement sequence data were presented in the form of medians and ranges. The four assertions were then examined in relation to the movement sequence data. More specifically, the findings for this study are summarized in the series of statements which follow.

Within the limitations of this investigation and based on the findings set forth in the discussion of data, the following statements seem appropriate. These

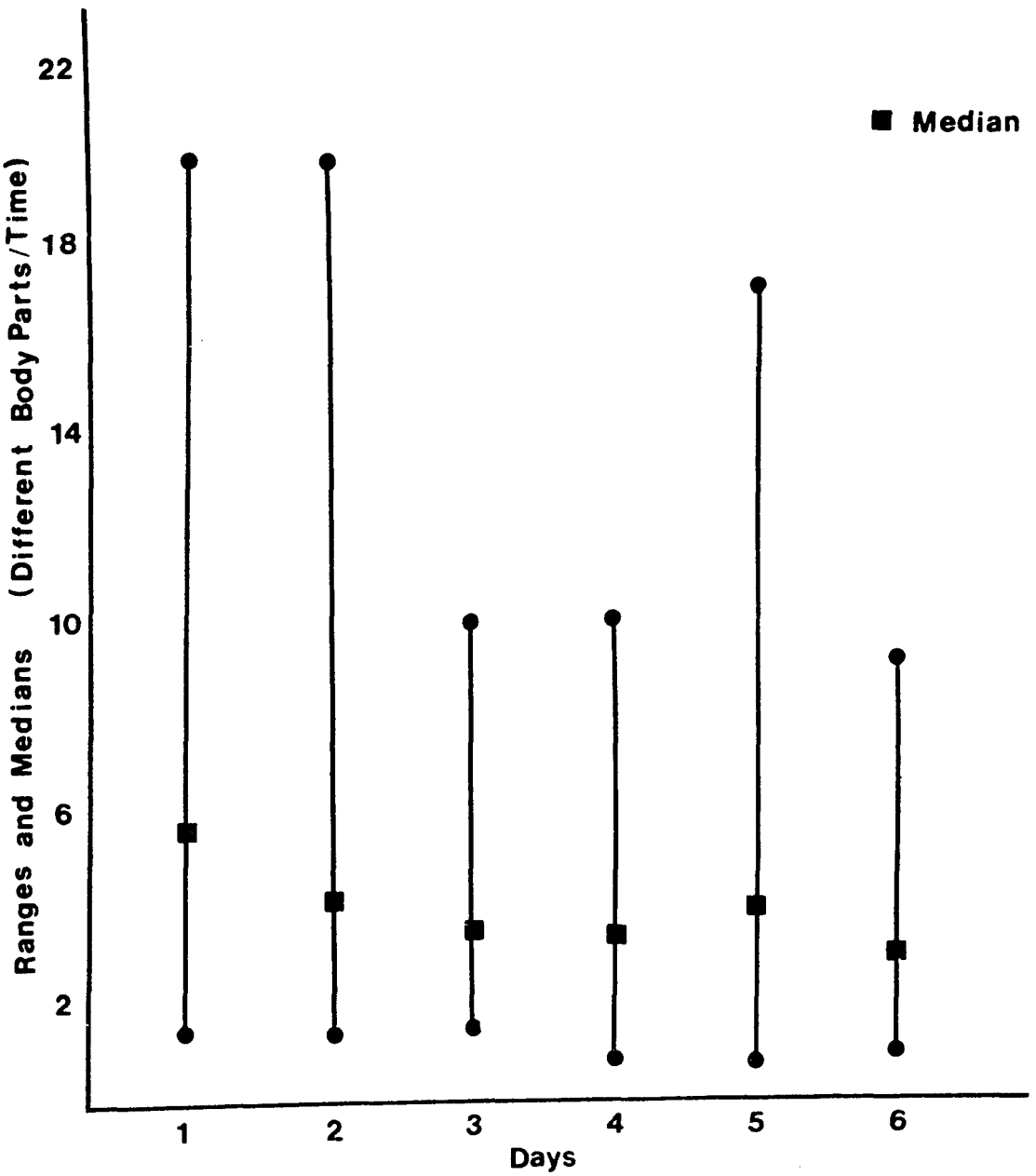

Figure 22 Rate of Different Body Parts

statements should be considered in light of the following: "The case study, however, proliferates rather than narrows. One is left with more to pay attention to rather than less" (Stake, 1978, p. 7).

Body Aspect

1. Locomotor activity increased in direct proportion to decreases in holds and movement in place.

2. Steps are the most appropriate locomotor pattern as related to success in skillful performance of the task.

3. Turning behavior is negatively related to increased skillfulness in the movement task.

4. In relation to the movement task presented, throws and catches gradually decreased as striking behavior increased.

5. The dominant hand body side was also the dominant side for striking with different body parts regardless of location on upper or lower body.

6. The upper body, including the head, was used more frequently for striking.

7. The nondominant upper body side became more proficient in striking prior to to the nondominant lower body parts.

8. The hands, both right and left, were the dominant body parts for striking, especially when the goal was related to increased movement sequence length.

9. More variety of body parts for striking was made in the upper body prior to demonstration of variety in use of lower body parts, and dominant side variety was displayed prior to nondominant side.

10. A core of body parts used in striking was established on the first day and then other body parts were added to this core on subsequent days. The

core body parts were not necessarily used any more frequently than other body parts. Core implies usage on all 6 days.

11. The greatest experimentation with different body part use for striking occurred during the first two movement performances.

Space Aspect

1. Forward was the dominant direction for performance in both locomotor activity and manipulative skills.

2. Forward diagonal movement was positively related to increased frequency in strikes and to the occurrence of circular pathways.

3. Backward diagonal directions were the least used. This might be related to the difficulty of these locations for execution of locomotor patterns and manipulative skills.

4. Medium level was the most common level for performance of locomotor activities.

5. As the skill level increased there was more variety in level use.

6. The progression for level use development in relation to striking with different body parts was from medium to high and to low.

7. The greatest experimentation for compound direction and level use in both locomotor patterns and manipulative skills occurred in the third movement performance.

8. There was a similar pattern between increased occurrence of circular pathways and increased skillfulness in striking.

9. There was a similar pattern between use of moderate extensions and increased skillfulness.

Effort Aspect

1. The shift from strong to light weight usage in striking was most crucial in the acquisition of control over the object.

2. Sudden (as a time quality) was important in the skill of striking with different body parts.

3. The quality of flexible space was related to skillful striking with different body parts as it was related to directing the object.

4. Free flow was gradually achieved by the child in both locomotor and striking activity.

5. The greatest experimentation with effort actions for striking the ball occurred in the second movement performance.

6. Bound movement as demonstrated by holds and movements in place decreased as striking and locomotor activity increased.

Relationship Aspect

1. The child interpreted work with the object in the movement task as a striking activity rather than a throwing, catching, and striking activity.

2. Body alignment mechanisms were examples of the child moving in relation to the object. These mechanisms were identified as:

a. changes in locomotor level use as related to changes in manipulative skill level use.

b. decrease in one-footed turn occurrence.

c. increase in forward diagonal direction use.

d. increase in circular pathways.

e. flexible space use in striking.

3. The ball bouncing on the floor or walls was used by the child to maintain control of the object and therefore increase movement sequence length.

Movement Sequences

1. There was a gradual decrease in the actual number of movement sequences performed on each day.

2. There was a gradual increase in movement sequence length within each of the two sets of three consecutive movement performances.

3. There was a gradual increase in the number of strikes per movement sequence.

4. There was evidence of decreased use of different body parts within movement sequences.

5. There was evidence that the child continued to experiment with the use of different body parts for striking when increased ranges were used as the index for variety.

CHAPTER V

CHARACTERIZATION, USEFULNESS OF LABANOTATION, CONCLUSIONS, RECOMMENDATIONS

The purpose of the study was to examine, in detail, the observable movement behavior in the performance of a child attempting to perform a complex movement task from a visual model. A secondary focus in the study concerned the usefulness of Labanotation as a method for recording data in the study of complex manipulative movement. Three specific questions were posed which formed a framework for data analysis and discussion:

1. What components of movement does the child demonstrate in his performance?

2. In what ways do the child's performance and concurrent verbal behavior characterize his movement in reference to Laban's framework for movement analysis?

3. What are the advantages and disadvantages of the utilization of Labanotation for recording data of children's movement performances?

Question one was addressed in detail in Chapter IV and therefore will not be reiterated at this time. The present chapter focuses on the characterization of the child's performance and on the usefulness of Labanotation for recording data. These topics are discussed separately in the following sections. The final sections delineates the conclusions which were drawn from the conduct of this study and recommendations for further study.

Characterization

The characterization of the child's performance and concurrent verbal behavior is discussed with reference to Laban's framework for movement analysis. Such a

characterization is by definition "a description or representation of a person's qualities or peculiarities" (Morris, 1977).

Experimenter is a one-word description of the child in this study. He actively experimented with various body parts for striking, various effort actions, and spatial locations for striking. He was active and seldom rested during any of the data collection sessions. He was curious about the purpose of the study, his performance, and the children on the model tape.

As an experimenter, the child utilized 37 different body parts for striking within the six movement performances. He continued to add new body parts for striking on each day with the exception of the last day. The largest number of different body parts involved in striking was 28 and occurred on the first day. The child was right handed and the right side of the body was the primary location for body parts used in striking on all days. The head was also involved in a large number of strikes and a variety of head parts were utilized in striking. He also tended to strike with the upper body parts versus striking with lower body parts. The child greatly improved his ability to strike with the left hand across the six movement performances.

Effort was the second movement aspect with which the child experimented. The second day of movement performance data revealed that seven of the eight effort actions were utilized in striking. Day 3 movement data revealed the identical seven effort actions. The child's use of effort actions indicated that he had a wide variety of efforts within his movement repertoire. Laban indicated in his discussion of effort analysis that a wide range of efforts were a prerequisite to becoming a skillful mover and a well-balanced personality (Laban, 1974). Sudden movements were the consistent element which characterized the child's striking on all days and the child's locomotor patterns on Day 2. The predominant

spatial quality of the child's striking behavior was direct. The movement data on Day 6 indicated that an increased use of flexible space was developing in the child's striking behavior. There was a gradual increase in free flow quality in both locomotor patterns and striking behavior across the six movement performances.

Space was the third movement aspect with which the child appeared to experiment. The greatest number of compound directions was used in both locomotor patterns and manipulative skills on the third movement performance. In locomotor patterns, 26 of the 27 possible directions were utilized on Day 3 and 22 different directions were used in manipulative skills. It is interesting to note that his order of experimentation in the use of body, effort and space is identical to Laban's ordering of his first three movement themes for teaching modern educational dance (Laban, 1963). The child's manipulative skill behavior did not demonstrate an extensive use of either stretch or bend components. He did demonstrate the development of circular pathway use rather than straight pathways across the six days. The child's use of level was interesting in that there was an obvious shift from performance of manipulative skills in a medium level to a high level across the 6 days. The use of low level was particularly interesting on Day 5 when low was the dominant level for locomotor activities and was more frequently used in manipulative skills than was medium level.

The child responded to the open, dynamic movement task in an open and dynamic manner. His movements gradually appeared more purposeful and therefore more skillful. The perceived skillfulness was collaborated by the findings presented in previous chapters. One of the more subtle examples of increased skillfulness was the various movement responses which allowed the child to maintain a working relationship with the plastic ball.

Usefulness of Labanotation

The third and final question posed in the study was: What are the advantages and disadvantages of the utilization of Labanotation for recording data of children's movement performances? For purposes of this study, Labanotation was used for "structural description." Labanotation was developed as a movement language to develop and preserve dance literature and to study the structure of movement (Laban, 1956). Although Labanotation is used extensively in dance choreography, its use in other forms of movement is limited. Based on the experience of this study, the advantages and disadvantages of Labanotation are discussed.

Advantages

A major advantage of Labanotation is its availability as a complete system for recording all forms of movement. The fact that the system has existed in its present form for over 25 years is indicative of its value in dance choreography. Relatively few adjustments in the system were necessary for purposes of this study. Such flexibility is therefore an additional value of Labanotation applied to other forms of movement.

Labanotation is such a complete system that it has the capability to record minute and gross movements. This completeness results in an objective record of the movements so observed. Objectivity in this sense relates to the fact that the notator needs not make decisions about which movements need to be recorded. Rather, the decisions about which movements are included in the data analysis are left to the investigator.

The structure of the notation system simultaneously records time, direction, level, and body part information in one symbol. This structure along with the column format of the system allows for the simultaneous recording of relational information. This is a definite advantage when the study of complex manipulative

movement is attempted. The summary of findings as listed in the previous chapter demonstrates this value of Labanotation. It should be noted that only simple relationships were fully explored in the present study.

Two examples of more complex relationships are presented as further advantages of the notation system. These examples were derived from the movement data in the present study, but were considered too complex for consideration at this time.

1. Movement sequence analysis can be conducted in great detail. Table 25 provides an example of one movement sequence from the sixth movement performance. The actual notation and Data Recording Form for this sequence is described in Appendix G . From this example of specific data in movement sequence form, it is obvious that an investigation could compare sequences in several ways. Sequences could be examined to determine if the child utilized body parts for striking in any specific order; in early sequences versus later sequences, in short sequences versus long sequences, within specific time lapses, and from one movement performance to the next. Such analyses would provide relational information about body part use, spatial location and effort action usage across and within movement performances as illustrated in Table 25. It should be noted, however, that this information is not as minute as is possible with the amount of detail available from the notation. Examination of the sample Data Recording Form presented in Appendix H provides a more realistic picture of the amount of data available for each movement sequence.

2. Floor patterns analysis is an additional way this movement sequence data might be presented. Figure 23 is an example of a floor pattern analysis. Such analyses provide an illustration of the relationships between pathways, locomotor patterns, and manipulative skills. The idea for floor pattern analyses

Table 25

Movement Sequence Analysis

Day 6 - Movement Sequence I

Action	Body Part	Spatial Referent	Effort Action
Strike	Back Right Hand	FDRM	Dab
Strike	Right Elbow	RM	Flick
Strike	Right Hand	FL	Dab
Strike	Left Hand	FDLM	Flick
Strike	Back Right Hand	FDLH	Punch
Strike	Top Head	PH	Punch
Strike	Right Hand	PH	Punch
Bounce on floor			
Strike	Right Knee	FM	Dab
Strike	Top Head	PH	Punch
Bounce on ceiling			
Strike	Left Fingers	LH	Punch
Strike	Right Hand	BL	Flick
Strike	Top Head	PH	Punch
Strike	Right Shoulder	PH	Punch
Strike	Back Right Hand	FM	Punch
Strike	Right Hand	PH	Flick
Strike	Top Head	PH	Punch
Strike	Right Knee	FM	Punch
Bounce on floor			

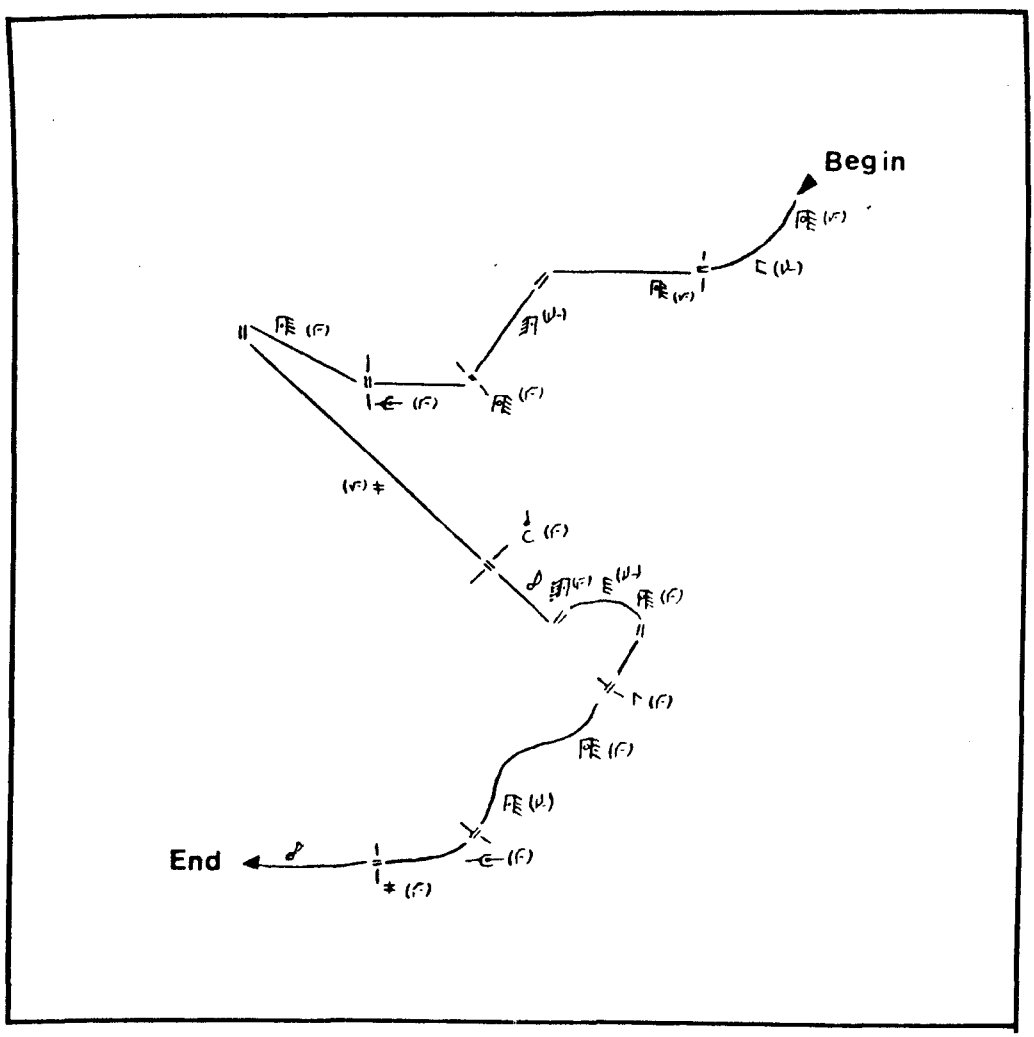

Figure 23. Pattern Analysis

Key

- Male
- Aerial
- Turn
- Aerial Turn
- R. Palm
- R. Elbow
- R. Hand
- L. Hand
- Top Head
- R. Knee
- L. Fingers
- R. Hand (toward fingers)
- R. Shoulder
- Forehead
- Dab
- Punch
- Flick
- Bounce

came from the concept of "staging" as presented in the Labanotation handbook. Although these patterns have considerable value in the movement analysis of one child, such analyses would have great value in movement experiences involving more than one child.

Labanotation when used as a "structural description" provides a ready-made tool for the study of complex movement like those taught in physical education classes. Its inventor, believing in the individuality of movements, created a movement language system which preserves this individuality. Preservation of movement is a necessity in studies which inquire into personalized learning. The completeness and the complexity of Labanotation are also necessary characteristics of a recording system if complex movement is to be described as a totality. The systematic organization of Labanotation also provides a format which can be adapted to computer programs. This undeveloped potential, if developed, would provide a solution to some of the present disadvantages to Labanotation.

Disadvantages

The aforementioned advantages of Labanotation must be considered in relation to certain disadvantages which are briefly enumerated. The most obvious disadvantage of Labanotation is the amount of time required to complete the notation process. As previously discussed in the procedures of this study, 700 hours were required to notate 1 hour of actual movement performance. Such time requirements would be prohibitive if several movement performances were to be analyzed.

A second disadvantage of Labanotation is the lack of trained notators available to researchers in physical education. Most notators are dancers and are, therefore, more likely to utilize their notation skills in choreography rather than

research endeavors. Very few researchers in physical education have acquired skills in either writing or reading Labanotation.

The third disadvantage of this notation system is like the others, more a disadvantage of its implementation than a flaw in the actual system. The employment of a trained notator is expensive as the fee is usually based on an hourly rate.

The decision to employ Labanotation as a research tool remains with the investigator and the underlying purposes of the individual study. In regard to the present study, the utilization of Labanotation as a recording tool provided a wealth of data which allowed the investigator to examine complex manipulative movement. The detailed data derived from the notation were not possible through any other available recording system. These data allowed the investigator to examine movement relationships in a new and meaningful way.

Conclusions

The boundaries of this study permit the following conclusions to be stated in relation to the three specific questions posed.

Question 1.

The child demonstrated 110 movement components in his performance. These components represented subdivisions under each of the four aspects of movement: Body, Space, Effort, and Relationships. The changes which occurred within these components across the 6 days were considered examples of the child's progress in relation to the movement task.

Question 2.

The child was characterized as an experimenter in relation to the changes in movement components use and movement sequence variables. The child's verbal behavior indicated that his goal was to increase the length of time he kept the ball in the air. Analysis of the movement sequence variables indicated that the child had achieved this goal over the 6-day period.

Question 3.

In light of the results of this study, Labanotation proved to be versatile enough to record movement data in complex manipulative tasks. The major advantages of Labanotation were its potential for revealing relational information, detailed information about the completeness of movement, and its respect for individuality in movement performance. The system's disadvantages are related to implementation difficulties in relation to time and expense.

Recommendations

Based on the findings in this study, the following recommendations should be considered:

1. Additional studies should be conducted which examine in more detail some of the specific findings in this study. Such studies could examine:

a. The possible relationship between turning behavior and skillfulness in the same or in similar movement tasks.

b. The possible relationships among flexible space in striking, circular pathways, and skillfulness in the same or in similar tasks.

c. The progression of level use in striking tasks of a similar nature.

d. The relationships of use among forward diagonal directions, sideward directions, and circular pathways.

2. Further studies could examine the order that movement components are used as indications of learning strategies in complex movement tasks in similar test environments.

3. A system to objectify the effort action component should be developed for use in manipulated skill movement studies.

4. Studies could be developed which focus on complex movement sequence analysis to examine the similarities across and within movement sequences.

5. Similar studies could be conducted in which more accurate time measurements were made and in which measures of the child's perceptual abilities were included.

6. Research is needed which explores the possibility of computerizing the data recording process either prior to or after the notation procedure.

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APPENDIX A

Laban Framework for Human Movement (as Modified by Barrett, 1977)

Effort Elements

Labanotation Staff

Glossary Labanotation Symbols

Laban Framework for Human Movement (as Modified by Barrett, 1977)

BODY ASPECT···

Basic Body ACTIONS
- curl
- stretch
- twist

Actions of BODY PARTS
- support body
- lead action
- apply force
- receive force-weight

ACTIVITIES of Body

- locomotor
  - walking
  - running
  - jumping (elevation)
  - sliding
  - sidestepping
- non-locomotor
  - bending
  - stretching
  - twisting
  - pushing
  - pulling
- manipulative with equipment or body parts
  - sending object away
    - kicking
    - striking
    - throwing
  - gaining possession of object
    - catching
    - collecting
  - maintaining possession of object
    - carrying
    - propelling
  - avoiding contact with object
    - dodging
    - jumping

SPACE ASPECT···

Areas
- general
- personal

Directions
- forward
- backward
- sideward
- up
- down

Levels
- high
- medium
- low

Pathways
- air
  - straight
  - curved
- floor
  - straight
  - curved

Planes
- sagittal-wheel
- frontal-door
- horizontal-table

Extensions
- small-large
- near-far

Laban Framework for Human Movement (as modified by Barrett, 1977-continued)

BODY ASPECT (continued)

SHAPES of Body	straight-angular wide round twisted

EFFORT ASPECT···

Time	fast-slow accelerating-decelerating sudden-sustained
Weight	firm-fine touch strong-light
Space	direct-indirect straight-flexible
Flow	bound-free stoppable-ongoing successive-jerky

RELATIONSHIP ASPECT ···

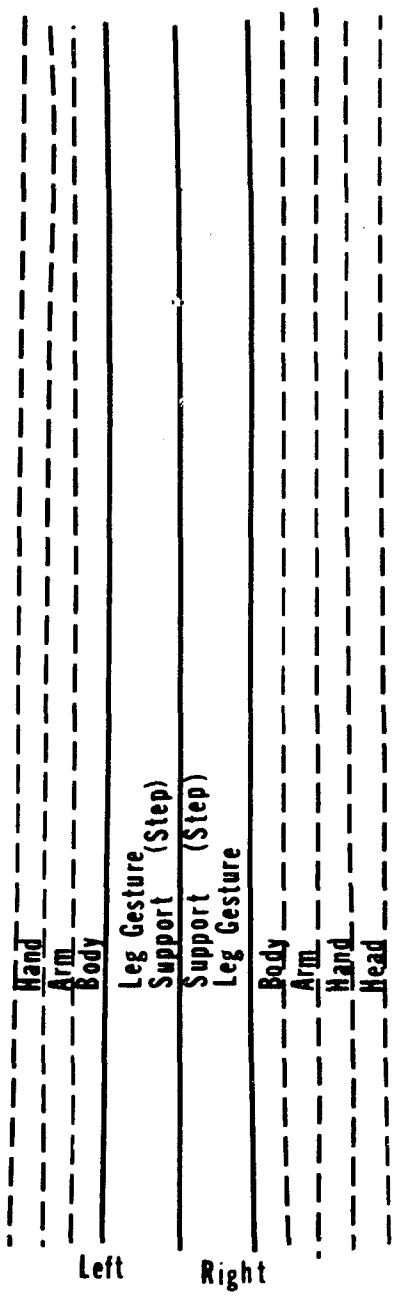
	above-below behind-in front of on-alongside
Individuals and Groups Individual-Individual Individual-Group Group-Group	together-apart over-under above-below behind-in front of-alongside near-far cooperative-collaborative-competitive
Objects, Implements and Equipment Arrangements	above-below behind-in front of-alongside near-far
Other Types	rules boundaries goals

Note. From "Educational Games" by K. R. Barrett, Physical Education for Children: A Focus on the Teaching Process. Philadelphia: Lea & Febiger, 1977, 166-167. Copyright 1977 by Lea & Febiger. Reprinted by permission.

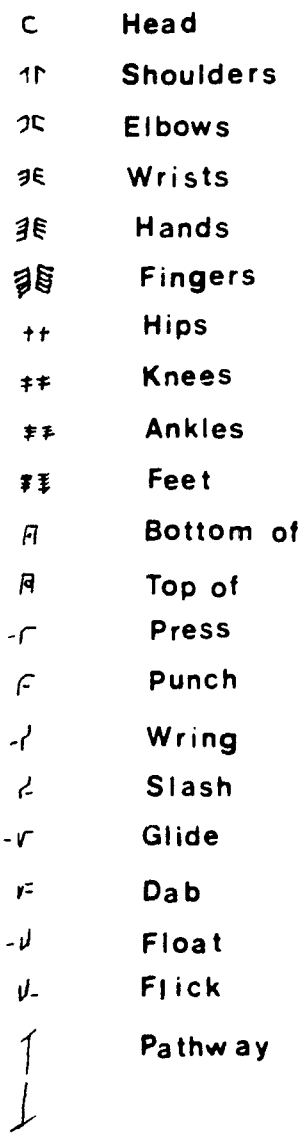
Effort Elements

Effort Elements	Factors	
Time	Sudden	Sustained
Weight	Firm	Fine
Space	Direct	Indirect
Flow	Bound	Free

The staff represents the body. Placement of movement indications on the staff shows which part of the body executes the movement.



Standard Staff Labanotation



Selected Notation Symbols

APPENDIX B

Parental Informed Consent Forms

Letter to Ms. Mary Hoyle, Greensboro City Schools

Letter to Parents for Model Tape

Letter to Subject's Parents

PARENTAL INFORMED CONSENT FORM

I understand that the purpose of this study is to obtain a video tape of my child.

I confirm that my child's participation is entirely voluntary. No coercion of any kind has been used to obtain either my or my child's cooperation.

I understand that I may withdraw my consent and terminate my child's participation at any time during this project.

I have been informed of the procedures that will be used in the project and understand what will be required of my child as a subject.

I understand that all of my child's responses, physical performances, will be anonymous.

I understand that a summary of the results of the project will be made available to me at the completion of the study if I so request.

I understand that the procedures and the purposes of the study will be fully explained to my child.

I understand that my child may withdraw from this study on his/her own volition.

I wish to give my voluntary cooperation for my child to participate in this study.

_____

Signature

_____

Address

_____

Date

THE UNIVERSITY OF NORTH CAROLINA
AT GREENSBORO

School of Health, Physical Education
and Recreation

506 Willowbrook Road
Greensboro, N.C. 27403

April 17, 1978

Ms. Mary Hoyle, Director
of Psychological Services
Greensboro City Schools
Draw V
Greensboro, N.C. 27402

Dear Ms. Hoyle:

This is a request to involve elementary school children from the Greensboro City Schools in a research study. The study is part of my doctoral requirements at the University of North Carolina at Greensboro.

The purpose of the study is to gather information about individual children's progressions while they are solving a movement problem. The children will be asked to view a pre-taped movement performance. After viewing the video tape, the children will be asked to practice the kind of movement that they have observed.

The movement responses of each child will be video taped. Ten children will be taped individually for six times, on a Monday, Wednesday, Friday, Monday, Wednesday, Friday schedule. Approximately 40 minutes will be needed for each session. Five male and five female children will be selected from one fourth-grade classroom. The children in the study should attend an elementary school which does not have a regular physical education specialist. The names of the children will remain anonymous in the study.

The investigator will execute all the procedures during the study, and the classroom teacher will not be required to perform any duties related to the study.

I would like to collect data for four consecutive weeks beginning April 24, 1978.

Thank you for your attention to this request.

Sincerely,

Kathryn L. Kisabeth

THE UNIVERSITY OF NORTH CAROLINA
AT GREENSBORO

School of Health, Physical Education
and Recreation

March 7, 1978

Dear

I am engaged in work on my doctoral dissertation in physical education at the University of North Carolina at Greensboro. As part of my assistantship at UNC-G, I have taught physical education at Vandalia Elementary School.

The purpose of this letter is to request your permission to video tape your child Pauleze . Pauleze will be asked to perform a motor skill which she knows quite well. The video tape will be edited to show the best sections of your child's performance. You are welcome to view the video tape upon its completion.

Later, as part of my doctoral study, the edited video tape will be shown to fourth grade children in the Greensboro City Schools. This group of ten children will be asked to duplicate what they see the child on the tape doing. Your child will not be identified by name or by school in the study. Because a video tape is being used, it is possible that your child might be recognized visually.

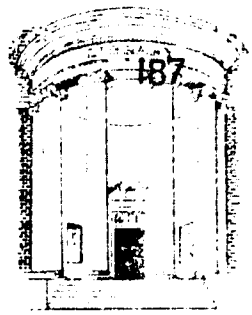
Attached to this letter is a parental permission form. If you are willing to grant permission for your child to be video taped and for the tape to be used for the indicated purpose, please sign the form.

Thank you for your assistance in this request.

Sincerely,

Kathryn L. Kisabeth

THE UNIVERSITY OF NORTH CAROLINA
AT GREENSBORO



School of Health, Physical Education
and Recreation

May 15, 1978

Dear Mr. and Mrs. _____:

I am working on my doctoral dissertation in physical education at the University of North Carolina at Greensboro. One of my main areas of study is physical education for elementary school age children.

The purpose of this letter is to request your permission to video tape your child _____. _____ will be asked to learn a motor skill which she/he does not know. Your child will be shown a video tape of the skill being performed by elementary school age children. After viewing the video tape, _____ be asked to practice the kind of movement the children on the tape are doing. A video tape will be made as your child practices the motor skill. Permission has been obtained from your child's teacher and the school principal to complete this study during normal school hours.

Later, as part of my dissertation, the video tapes of your child's performances will be analyzed and described. Your child will not be identified by name or by school in the write up of the study. Because a video tape is being used, it is possible that your child might be recognized visually.

Enclosed with this letter is a parental permission form. If you are willing to grant permission for your child to be video taped and for the tape to be used for the purpose indicated, please sign and return the form.

If possible, please return the parental permission form by May 26, 1978. You can send the form to school with your child. I will collect them during the school day.

Thank you for your assistance in this request.

Sincerely,

Kathryn L. Kisabeth

APPENDIX C

Discarded Data Analysis Form

Discarded Data Summary Forms

Data Analysis Form

Child _____ Day _____ Notation_____ Page _____

Action	Body Part	Space	Effort	Direction	Pathway	Body Activity	Comments

Data Analysis Summary Form

Child _____

Demension	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Strike							
Throw							
Catch							
Bounce							
Roll							
Contact							
Upper Body							
Two Hands							
Right Palm							
Left Palm							
R. Fingers							
L. Fingers							
R. Wrist							
L. Wrist							
R. Forearm							
L. Forearm							
R. Elbow							
L. Elbow							
R. Up. Arm							
L. Up. Arm							
R. Shoulder							
L. Shoulder							

Data Analysis Summary Form (continued)

Child _____

Demension	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Top Head							
Back Head							
R. Head							
L. Head							
Forehead							
Chest							
Back							
Lower Body							
R. Toes							
L. Toes							
R. Top Ft.							
L. Top Ft.							
R. Ft.							
L. Ft.							
R. Shin							
L. Shin							
R. Knee							
L. Knee							
R. Thigh							
L. Thigh							
Space For. H.							

Data Analysis Summary Form (continued)

Child _____

Demension	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
For. M							
For. L							
RFD H							
RFD M							
RFD L							
LFD H							
LFD M							
LFD L							
RS H							
RS M							
RS L							
LS H							
LS M							
LS L							
RBD H							
RBD M							
RBD L							
LBD H							
LBD M							
LBD L							
Extensions							
Near							
Far							

Data Analysis Summary Form (continued)

Child _____

Demension	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Effort Actions							
Press							
Punch							
Wring							
Slash							
Glide							
Dab							
Float							
Flick							
Directions							
Forward							
Backward							
Right							
Left							
RFD							
RBD							
LFD							
LBD							
Body Actions							
Step							
Run							
Slide							

Data Analysis Summary Form (continued)

Child _____

Demension	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Hop							
Leap							
2 - 1							
1 - 2							
Jump							
Pivot							
Nonswivel							
Jump-Turn							
Aerial							

APPENDIX D

Data Recoding Form

Data Summary Form

Data Recording Form

Day _____

Movement Phase No. Event No.	Action	Body	Spatial Referent: Limb Location	Spatial Referent: B. P. Location	Effort	Body Activity: Part	Body Activity: Direction	Body Activity: Med.	Pathway

Data Summary Form

Component X Space

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Totals
FH							
FM							
FL							
BH							
BM							
BL							
RSH							
RSM							
RSL							
LSH							
LSM							
LSL							
FDRH							
FDRM							
FDRL							
FDLH							
FDLM							
FDLL							
BDRH							
BDRM							
BDRL							
BDLH							
BDLM							
BDLL							
PH							
PM							
PL							
NI							
TOTALS							

APPENDIX E

Directions for Model Tape

Model Tape Behavior

Concurrent Behavior

Debriefing Behavior

DIRECTIONS FOR ALL CHILDREN

(Model Tape Viewing)

These are the directions. They will tell you what to do. You are going to learn a new play activity. Watch the movement of the children on the tape. Try to do the kind of movement you see the children on the tape doing. You may begin practicing the movement when you are ready. You may ask to see the movement on the tape whenever you would like. Do you have any questions?

MODEL TAPE BEHAVIOR

(While Viewing Tape)

Day 1

Child: (Not clear on audio tape)

Investigator: "Watch the movement of the children, and you can ask me any questions during it that you would like. And remember that you can see this again whenever you want to."

Child: "Do we do a chorus? Or do we just use our hands and stuff?"

Investigator: "Explain what you mean by a chorus."

Child: "Like your arm, leg, then shoulder and repeat."

Investigator: "You can do it in any order you would like to do it. The idea is to do that kind of movement. Not exactly what they do."

Child: "Who's that?"

Investigator: "A student in one of the elementary schools that I taught."

Child: "I think I'll do it."

Day 2

Child: "Is it a different one?"

Investigator: "No, it's the same one, and if you don't want to watch it all, you don't have to. You just tell me when and how much you want to see."

Child: "Oh. This is enough now 'cause it's the same thing."

Day 3

No viewing.

Day 4

Child: "Do we get to see our own film?"

Investigator: "Yes, on Friday after you have finished."

Child: "Oh, yes. I asked that question before."

Child: "I'm ready."

Day 5

No Viewing

Day 6

No Viewing

CONCURRENT BEHAVIOR

Day I

Investigator: "Are you all right?" (The child tripped over a tire in the corner of the room.)

Child: "I didn't see that. I was looking at the ball."

Child: "Will you tell me when to stop?"

Investigator: "Yes, I will tell you, but you can rest when you need it."

Child: "I think I better rest."

Investigator: "All right. Do you want to see the tape?"

Child: "Sure, I'll see the tape."

Child: "That's enough."

Investigator: "Ready to start again?"

Child: "Yes."

Child: (Unclear on tape)

Investigator: (Unclear on tape)

Child: "Can you do this?"

Investigator: "Yes."

Child: "Who started this?"

Investigator: "I did."

Child: "Who started doing the children on this? The ones on the tape."

Investigator: "I did. I taught them."

Child: "I think I better rest. The ball keeps coming back from the ceiling."

Investigator: "Do you want to see the tape or just rest?"

Child: "Rest."

Investigator: "You have about two minutes to go."

Child: "I'm ready."

Investigator: "Okay, that's it for today. Wednesday you are going to do the same kind of thing."

Child: "Do we do different things?"

Investigator: "You may do different things, but you will be practicing the same movement."

Day 2

Child: "This can tire you fast."

Investigator: "Yes, you are right."

Child: "I had it going. It was neat!"

Investigator: "Yes, you did."

Child: "I need to rest."

Investigator: "Okay."

Child: "I don't need to see the tape."

Investigator: "Yes, you did have it going for a while."

Child: "Do other people come different days?"

Investigator: "No. I always come on the same days."

Child: "Different days for different schools, or just this school?"

Investigator: "No, just this school. Just people in this school. Are you going to be in the field day tomorrow?"

Child: "Yes, the whole thing."

Investigator: "You have about three minutes left."

Child: "I do! I got to tie my shoes."

Investigator: "All right."

Investigator: "All right, that's all for today."

Child: "I had it going, didn't I?"

Investigator: "Yes, you did."

Child: "Bye!"

Investigator: "Okay, bye. See you on Friday."

Day 3

Child: "Okay, I'll begin."

Child: "I think I had better rest. I'm doing worse this time. I can't keep it going."

Child: "What is that noise in here?"

Investigator: "I don't know. I don't think it's an air conditioner."

Child: "I'm ready."

Child: "It's hard. It's better if you can keep it in the air, then let it touch the floor."

Investigator: "Okay, that's it for today."

Child: "Bye."

Investigator: "See you on Monday."

Day 4

Investigator: "Go ahead."

Child: "I need to rest."

Investigator: "Okay. Do you want to see the tape?"

Child: "No."

Child: "How long? I mean, is it a half an hour?"

Investigator: "You mean how long is the tape or how long did I tape you?"

Child: (Nodded yes)

Investigator: "No, I tape you 10 minutes each day so at the end of six days I will have almost an hour of tape."

Child: "I'll begin again."

Child: "I can't get under it at the right time to do that."

Child: "This ball can sure go the wrong direction."

Investigator: "Okay, that's it."

Child: "Bye."

Investigator: " See you on Wednesday."

Day 5

Child: "Why have you moved things?"

Investigator: "I couldn't get that plug over there to work."

Investigator: "Okay, ready to go?"

Child: "Whew ! I need to rest."

Investigator: "Okay. Are you getting excited about school being almost over?"

Child: "Yes, but we have lots of things to do before it's over. Did you hear the thunder and lightning last night ?"

Investigator: "Yes."

Child: "We have a pond near our place. We are going to put fish in it."

Investigator: "That's good. Okay, that's it."

Child: "I'm finished."

Investigator: "Yes. See you on Friday. On Friday, you'll get to see your own tape."

Child: "Do I do this?"

Investigator: "Yes, and you will see your tape."

Day 6

Child: "Just go ahead?"

Investigator: "Yes."

Child: "I have to tie my shoe."

Investigator: "Okay."

Child: "I've got to tie my other shoe. I hate these shoe strings."

Investigator: "Are you ready?"

Child: "Does the film tape make sound too?"

Investigator: "Yes."

Child: "How many minutes left?"

Investigator: "A little over three."

Child: "All right, I'm ready."

Investigator: "All right, that's it."

Child: "I wish I hadn't dropped it there."

Investigator: "You did a job on keeping that ball moving."

Child: (Smile)

DEBRIEFING

Investigator: "Now, I am going to ask you to do something that you have not done before. I am going to play the tape again--the one you have been watching. I want you to tell me about what you see on the tape."

Child: "I'll try to. You mean now?"

Investigator: "Yes."

Child: "Well, it's hard. I can see the ball coming right down on the head and shoulder. Just tell you what I see?"

Investigator: "Yes, just like you are doing."

Child: "Well, I'd rather see my tape!"

Investigator: "Yes, I know that. But, I'm going to show you your tape next. I want you to talk about this one first."

Child: "Well, it goes so fast it's hard. I can't tell you much it's going so fast."

Investigator: "It's the same speed you watched before."

Child: "I'm hitting with my head, looking up. The ball is coming straight down. Going in a circle like. Just going around in circles. Trying to keep the ball up in the air. Trying to keep the ball up in the air."

Investigator: "Now, you came down here six different days."

Child: "Right."

Investigator: "Did you have a plan in mind each day that you were going to try?"

Child: "Keep it up in the air longer. Try to keep it up in the air longer."

Investigator: "Did you think about that from the first?"

Child: "Just thinking what it would be like. That's about it, really."

Investigator: "How do you think you look in comparison to them?"

Child: "I don't really know."

Investigator: "Are there any new movements on this part of the tape?"

Child: "Yes. That there."

Investigator: "What is that called?"

Child: "A hook shot?"

Investigator: "Throwing and catching."

Child: "Is that what they were doing?"

Investigator: "Yes, just a throw and a catch that she did."

Child: "She?"

Investigator: "Yes. How many girls were on that tape besides the last one?"

Child: "One more."

Investigator: "What about the first person? Was that a boy or a girl?"

Child: "Was that a girl?"

Investigator: "Yes. The same girl performed all the way through. She just wore different clothes."

Child: "Was it the same boy all the way through?"

Investigator: "Yes."

End of Model Tape

Begin Child's Tape

Child: "It's quicker! It looks so much quicker."

Investigator: "Yes, but that's you."

Child: "Well, I did something different from them. (The child did not explain this comment.)

Investigator: "Now I am going to ask you to draw a picture that tells me something about what you were doing."

Child: "I can't do that. I'm not good at drawing."

Investigator: "Did you enjoy this activity?"

Child: "In a shy way?"

Investigator: "In a what way?"

Child: "Well, I mean I kinda enjoyed it."

Investigator: "Was there anything about it that you didn't like?"

Child: "Not really."

Investigator: "Was there anything that I could have done to make it more fun?"

Child: "No. I don't think so."

Investigator: "Had you ever done this kind of movement before?"

Child: "No. I never saw it before."

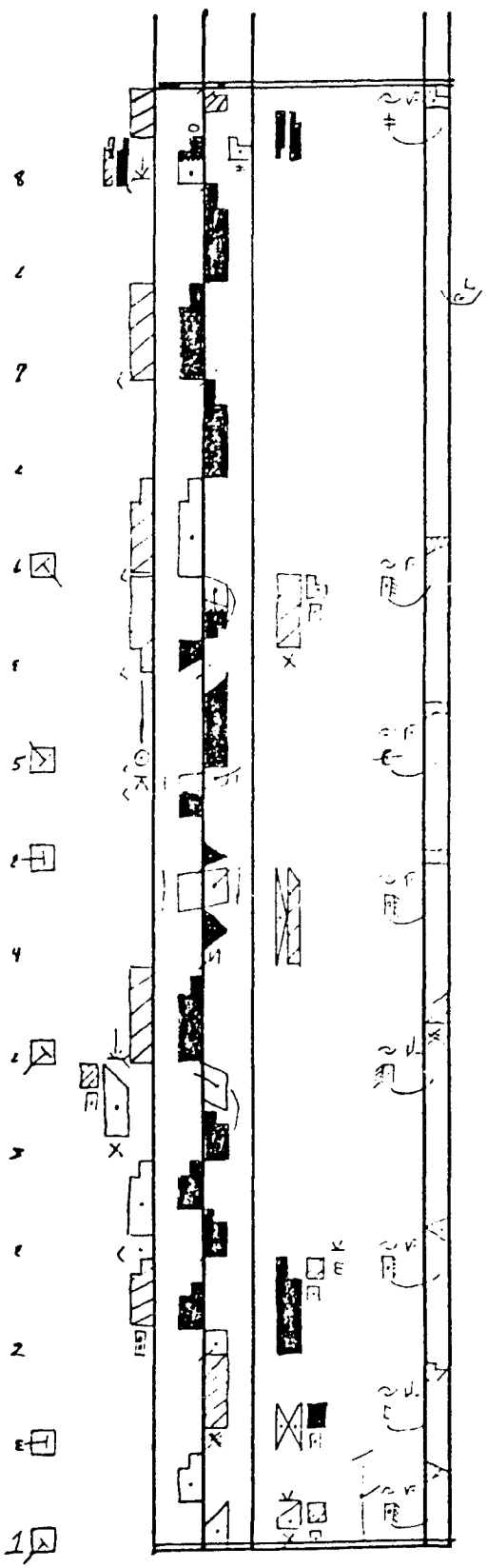
Investigator: "I thank you very much."

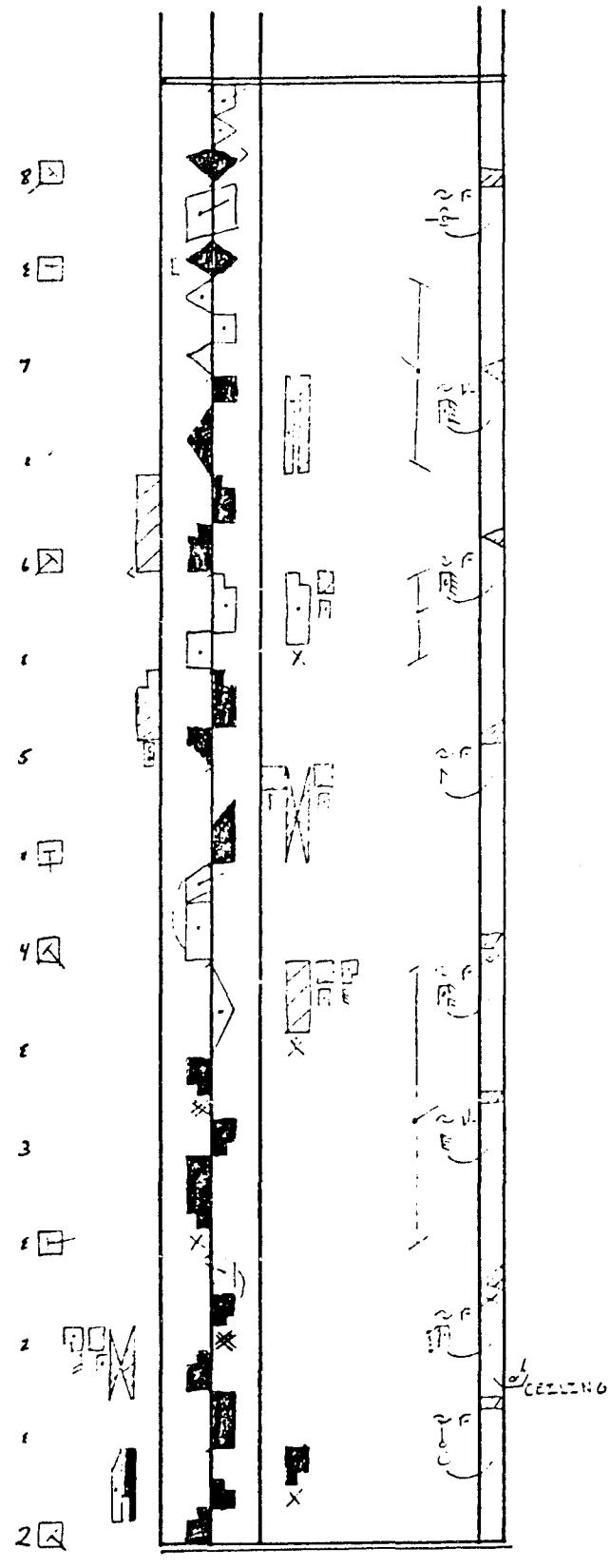
Child: "I've enjoyed it. Bye."

Investigator: "Bye."

APPENDIX F

Sample Labanotation

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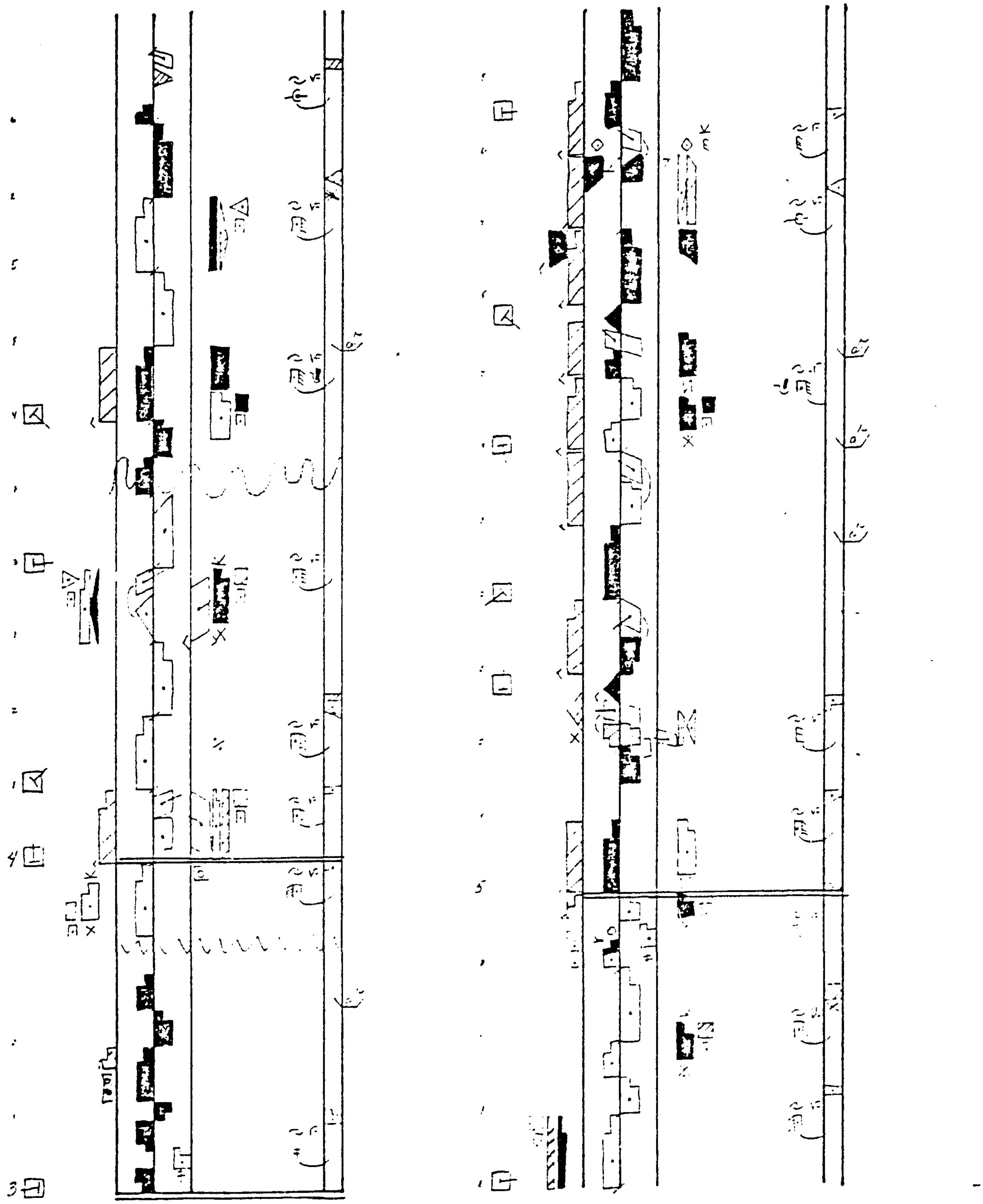


APPENDIX G

Movement Component Summary Form

Data Recording Form

Labanotation

Data Recording Form

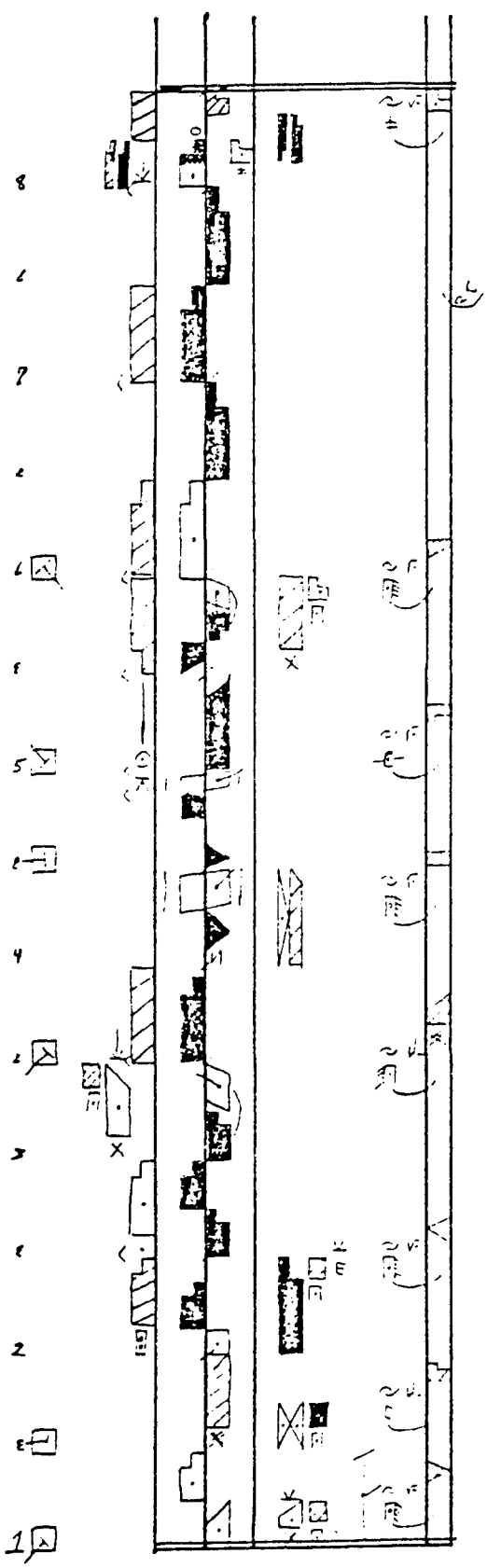
Day 6

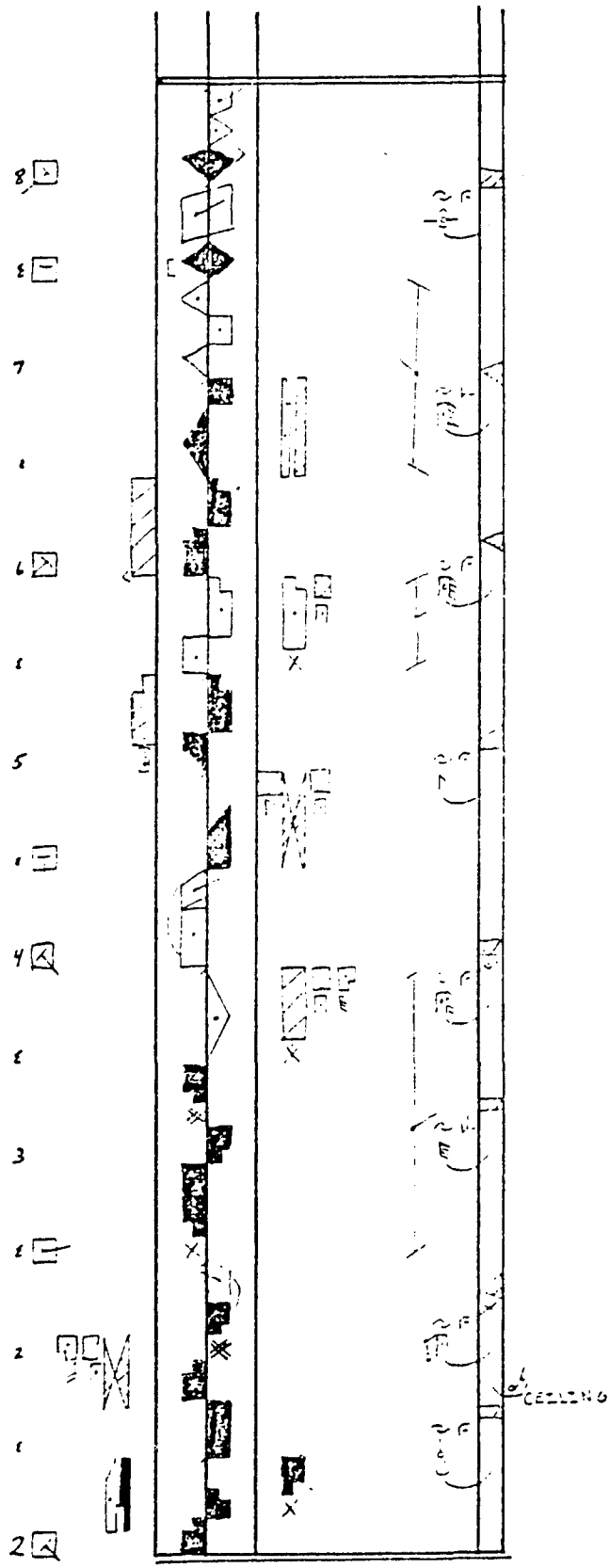
Movement Phase No. / Event No.	Action	Spatial Referent: Body	Spatial Referent: Limb Location	Spatial Referent: B. P. Location	Effort	Body Activity: Part	Body Activity: Direction	Med.	Pathway
1 / 1	Strike	B.R. Hand	FDRM 1°	FDRM	Dab	R.F Step	FDRM		Circular path ¼C
	Strike	R. Elbow	RSM/LSM	RSM	Flick	LF Step	FM	Very Small	
						RF Step	PH		
2	Strike	R. Hand	FL	FL	Dab	RF w Skip	PM		End
						LF Step Leap	FL		
						RF Step	FL		
						LF Step	FL		
3	Strike	L Hand	FDLM 10	FDLM	Flick	RF Step Turn ½ cc	FL		
						LF Step	FL		
4	Strike	B.R. Hand	RSM/FDLH	FDLH	Punch	RF Step Aerial ¼C	RSL	Long	
						RF Step	RSL		
						LF Step Aerial ¼C	PL		
5	Strike	Top Head	PH	PH	Punch	RF Step	FDRL		
						LF Step	BDLL		
						RF Step Turn ¼cc	BL		
6	Strike	R. Hand	PH 10	PH	Punch	LF Step	FM		
						RF Step	FL		
7	Bounce on floor					LF Step	FL		
						RF Step	FL		
8	Strike	R. Knee	FM	FM	Dab	LF Step	FM-L		
						RF Step	FH		
2	Strike Bounce on Ceiling	Top Head	PH	PH	Punch	LF Step	FL		
						RF Step Hop	FL		
						RF Step	BL		
						LF Step	FL		
2	Strike	L. Fingers	RSH/LSH	LSH	Punch	RF Step Turn ¼cc	BL	Very Small	Circular Path ¼C
						LF Step	BL	Small	
3	Strike	R. Hand Head	BL 10	BL	Flick	RF Step	BL		
	Strike	Top [illegible]	PH 2°	PH	Punch	LF Step	BL	Very Sm.	End
4						RF Step	RSM		
						LF Step Turn ¼C	PM		
5	Strike	R. Shoulder	PH	PH	Punch	RF Step Leap	FDRL		
						LF Step	BDRL		
						RF Step	FL		
						LF Step	PM		circular path ¼C
6	Strike	Back R Hand	FM 10	FM	Punch	RF Step	FM		
						LF Step	FL		
						RF Step	FL		
						LF Step	LSL		Circular path ¾CC
7	Strike	Top Head	PH	PH	Punch	RF Step	PL		
						LF Step	LSL		
						RF Step	PM		
						LF Step	LSM		
8						Two Feet	R-L-L		
						Turn-Ice			
						Two Feet	R-L-L		
						RF Step ¼C	RSM		
3	Strike	R. Knee	FM	FM	Punch	LF Step Hop	BL		
						LF Step	BL		
						RF Step	BL		
						LF Step	FL		
2	Bounce on floor					RF Step	FL		
						LF Step	FL		
				BREAK					

Data Summary Form

Component X Space

Rt. Elbow	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Totals
FH		1		2			3
FM	2	4	2	1	1		10
FL	1	2	1				4
BH							
BM							
BL							
RSH	1	5	3	5	12	8	34
RSM	1	5	5	4	6	7	28
RSL						2	2
LSH				1		1	2
LSM		1	1	1			3
LSL					1		1
FDRH		4	1	1			6
FDRM	5	2	3		1	1	12
FDRL	1		1				2
FDLH					1		1
FDLM	1	5				2	8
FDLL	1						1
BDRH							
BDRM			1				1
BDRL							
BDLH							
BDLM							
BDLL							
PH			1			1	2
PM							
PL							
NI							
TOTALS	13	29	19	15	22	22	120

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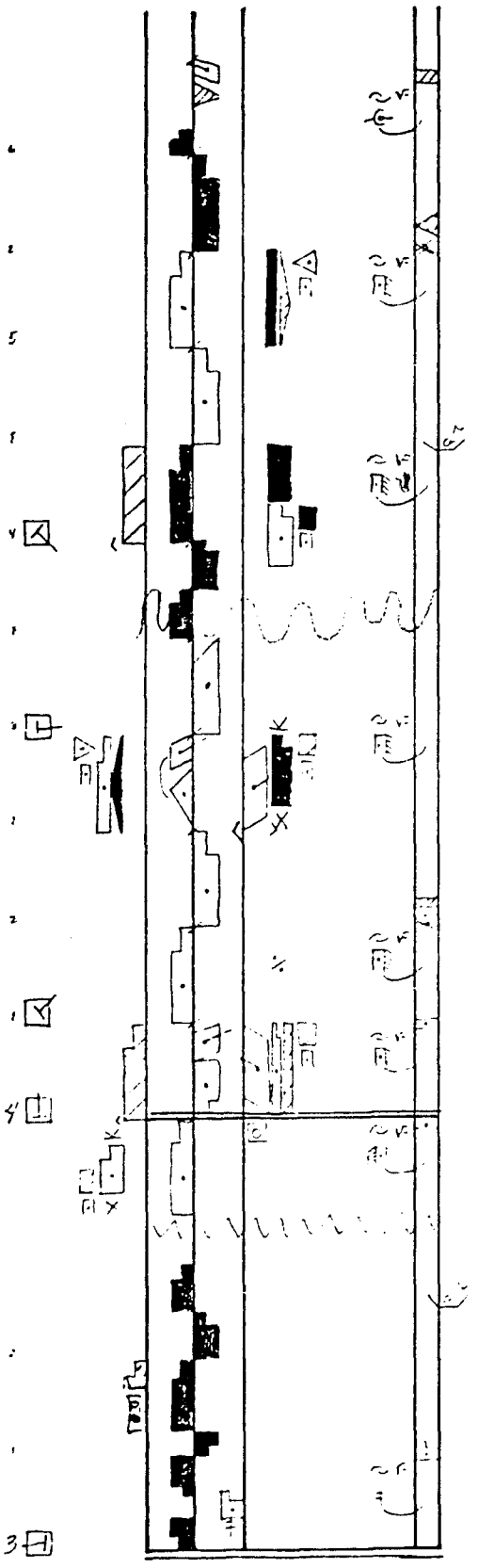

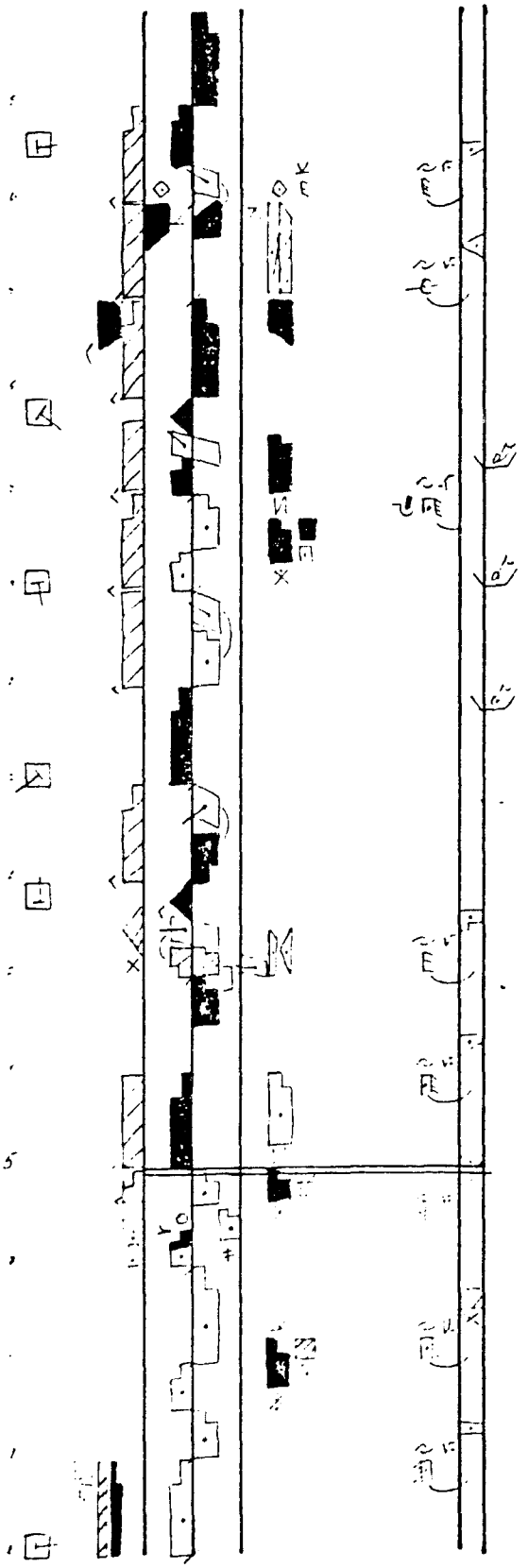

APPENDIX H

Data for Movement Sequences

Actual Data for Movement Sequences

	DAY					
Sequence No.	1 M Times/Strikes/DBP	2 W T/S/DBP	3 F T/S/DBP	4 M T/S/DBP	5 W T/S/DBP	6 F T/S/DBP
1.	013/10/07	022/23/09	022/18/09	009/11/01	081/54/11	016/17/08
2.	040/18/06	009/07/04	011/12/07	040/38/12	005/05/05	041/45/08
3.	015/14/09	013/09/08	048/52/09	043/40/12	002/03/03	016/17/08
4.	014/09/06	016/12/09	005/04/04	001/01/01	007/07/05	039/38/10
5.	005/03/03	079/62/13	001/01/01	008/04/02	074/65/12	013/11/04
6.	005/05/04	032/30/11	024/27/09	024/17/08	014/14/04	021/24/07
7.	011/08/07	025/23/10	030/31/10	007/08/05	009/08/05	061/63/14
8.	002/08/08	007/06/04	043/50/13	006/04/03	006/04/04	010/08/07
9.	004/02/01	038/44/11	042/50/11	003/03/02	129/86/15	010/09/06
10.	007/07/05	042/42/12	023/20/07	073/68/10	009/10/03	035/36/08
11.	027/16/10	017/13/09	017/15/07	006/08/05	015/10/06	006/02/02
12.	005/04/04	003/01/01	035/36/13	004/02/02	063/47/11	009/11/04
13.	005/03/02	015/17/09	001/01/01	019/19/06	074/50/09	146/86/16
14.	010/07/06	037/34/13	028/22/12	115/33/11	016/16/09	017/07/05

Actual Data for Movement Sequences

	DAY					
	1 M	2 W	3 F	4 M	5 W	6 F
Sequence No.	Times/Strikes/DBP	T/S/DBP	T/S/DBP	T/S/DBP	T/S/DBP	T/S/DBP
15.	006/05/03	021/23/09	023/23/09	012/14/06	004/04/02	027/22/07
16.	004/01/01	015/15/09	022/21/06	032/21/06	061/67/11	071/85/12
17.	005/04/03	002/03/03	003/05/03	014/07/03	001/01/01	089/55/12
18.	008/03/03	001/01/01	007/04/04	031/24/07	022/25/09	
19.	006/05/04	002/04/04	027/24/08	013/11/06		
20.	016/08/06	004/05/05	004/02/01	003/02/02		
21.	023/14/08	021/19/11	014/17/25	013/16/06		
22.	006/06/05	031/30/09	029/30/11	022/17/08		
23.	007/05/03	005/06/04		102/38/16		
24.	001/01/01	038/35/10		001/01/01		
25.	005/06/05			014/16/05		
26.	006/06/03					
27.	009/07/07					
28.	004/03/03					

Actual Data for Movement Sequences

	DAY					
	1 [illegible]	2 W	3 F	4 M	5 W	6 F
Sequence No.	Time/Strikes/DBP	T/S/SBP	T/S/DBP	T/S/SBP	T/S/DBP	T/S/DBP
29.	002/02/01					
30.	007/06/05					
31.	004/04/04					
32.	008/06/05					
33.	001/02/02					
34.	001/01/01					
35.	041/32/07					
36.	025/22/12					
37.	006/08/05					
38.	002/01/01					
39.	003/03/03					
40.	021/25/11					
41.	016/16/09					
42.	004/04/04					

Actual Data for Movement Sequences

Sequence No.	DAY 1 M	2 W	3 F	4 M	5 W	6 F
43.	002/02/02					
44.	005/03/03					
45.	023/18/07					
46.	019/14/07					
47.	015/09/08					
48.	005/03/03					