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**Effects of selected rhythmic teaching strategies on beat
performance skills of kindergarten children**

High, Linda Kaye Rockwell, Ed.D.

The University of North Carolina at Greensboro, 1987

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**EFFECTS OF SELECTED RHYTHMIC TEACHING
STRATEGIES ON BEAT PERFORMANCE
SKILLS OF KINDERGARTEN
CHILDREN**

by

Linda Kaye Rockwell High

**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
Doctor of Education**

**Greensboro
1987**

Approved by

A handwritten signature in cursive script, appearing to read "Patricia F. Smith", written over a horizontal line.

Dissertation Adviser

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.

Dissertation Adviser Patricia F. Sipe

Committee Members William B. Kaper
Balena B. Bai
James W. Nelson

June 5, 1987
Date of Acceptance by Committee

June 5, 1987
Date of Final Oral Examination

HIGH, LINDA KAYE ROCKWELL. Ed.D. Effects of Selected Rhythmic Teaching Strategies on Beat Performance Skills of Kindergarten Children. (1987) Directed by Dr. Patricia E. Sink. 87 pp.

The purpose of this study was to investigate effects of rhythmic teaching strategies on the development of beat performance skills of kindergarten children. Two teaching strategies were examined: using bodily movement to beat experiences (as suggested by Weikart, 1982c) and using bodily movement to rhythmic phrase pattern experiences (as found in a traditional approach). For this study, traditional approach was defined operationally as musical instruction including rhythmic phrase pattern performance via speaking, singing, moving, and playing instruments. Weikart suggested a sequential approach for developing beat performance skills and beat competency. She initially emphasized basic beat experiences and total avoidance of employing bodily movement to rhythmic phrase patterns until the child is able to maintain steady beats.

Two groups of kindergarten children served as subjects. An experimental group ($n = 50$) received the Weikart approach. A control group ($n = 50$) received the traditional approach. The subjects received instruction for 30 minutes, once a week, for 14 weeks. Subjects were pretested and posttested using Weikart's Rhythmic Competency Analysis Test (RCAT, 1982b).

Analyses of the data were conducted to determine effects of instructional treatment, gender, and motor task

alteration on kindergarten children's beat performance skills. Descriptive statistics and a 2 (instructional treatment) by 2 (gender) by 2 (motor task alteration) factorial analysis of covariance were used to analyze the post-RCAT data. The pre-RCAT data served as the covariate to control for subjects' entrance level behaviors. Pre-RCAT scores were similar for both treatment groups. Patting was slightly easier than walking and males were slightly less successful than females. Both treatment groups improved on the post-RCAT scores. Males improved more than females across both treatment groups. However, within each treatment group, males' and females' post-RCAT scores were similar. Patting was slightly easier than walking for the experimental group, but for the control group, patting and walking scores were similar. On the post-RCAT scores, the effect of treatment on beat performance skills was significant ($p = .0001$): the experimental group improved significantly more than the control group. Effects of gender, motor task alteration, and interactions among these variables were not significant.

ACKNOWLEDGMENTS

Grateful acknowledgment is extended to Dr. Patricia E. Sink, dissertation adviser, Mrs. Barbara B. Bair, Dr. Barbara Hill, Dr. William Karper, and Dr. James W. Sherbon, members of the committee, for their assistance and encouragement in this study. Appreciation is also extended to Phyllis Weikart, whose ideas and assistance made this study possible. Appreciation is also given to Konnie Saliba, Shirley McRae, and Dr. Doug Lemmon, faculty members at Memphis State University who first suggested and encouraged the study. Grateful appreciation is extended to the Memphis Public School system for their assistance. Finally, extreme gratitude is extended to my family and friends for their understanding, patience, and encouragement, and to Glenda Hensley and Judy Penny, my typists, for their endurance and assistance.

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CHAPTER I
INTRODUCTION

The Problem

Justification of Early Childhood Music Education

Motivated by changes in circumstances and knowledge, music educators continually seek new ways to improve instruction. Therefore, all education is in a constant process of invention (Bruner, 1966). It is common knowledge that between infancy and age 9, a child's physical, emotional, and intellectual growth rates are rapid. Educational specialists suggest that early childhood may be the most important period in a person's life (e.g., Bloom, 1964; Bruner, 1970; Piaget, 1964; Weikart & Lambie, 1970). Bloom (1964) maintains that when cognitive development in the first 17 years of life is measured, approximately 50% of a child's intellectual ability is developed by age 4.

Since the 1960s there has been much interest among researchers and music educators in early childhood musical behaviors. Examination of research, curriculum publications and various school music programs indicates that formal music education, in a classroom setting, generally does not begin until age 5 or 6. Music educators stress the importance of providing quality

musical experiences for early musical learning (Andress, Heimann, Rinehart, & Talbert, 1973; Gordon, 1979; Simons, 1978, 1983; Weikart, 1982c, 1984). Mankin (1969) stated, "A child's preschool musical experiences can shape his attitudes toward music for the rest of his life" (p. 36). Shuter (1968) maintains that there is a tendency for musical ability to emerge at an early age, and Simons (1983) indicated that this ability must be nurtured. These researchers have determined, therefore, that intervention with effective musical experiences in early childhood is important for maximum learning to occur.

Beat Competency

The literature supports the premise that an important musical skill is overtly demonstrated by performing steady musical beats with the body. Music educators and physical educators agree that the steady beat provides a foundation for rhythm and the development of future rhythmic skills (Gordon, 1979; Mursell, 1956; Weikart, 1984). Beat performance skills and beat competency are fundamental to rhythmic learning in music (Weikart, 1982c). For this study, beat competency is defined operationally as the ability to feel a steady repetitious beat and to perform simple physical movements to the beat. Mursell stated that there are two attributes of musical rhythm: the underlying beat (true pulse) and the phrase rhythm (patterns created by the arrangement of the melody and/or

words). Mursell's definition identifies the same two basic elements of rhythm as suggested by Weikart.

Beat and Early Childhood Musical Experiences

Weikart (1984) maintains that early childhood musical activities should stress feeling the beat, and that developing this ability is one of the most important skill acquisitions in early childhood. Rhythmic phrase patterns are identified as patterns created by subdivisions of the beat, frequently of unequal durations; they are patterns created by the arrangement of the melody and/or words. Weikart recommended that rhythmic phrase patterns should not be taught to kindergarten children without the development of beat competency; that is, the ability to feel a steady repetitious beat and sequence simple movements to the beat. If the child learns and bonds to the rhythmic phrase pattern before developing beat competency, such learning may interfere with future rhythmic development.

Many music education programs such as Silver Burdett and Orff-Schulwerk employ rhythmic phrase pattern instruction with young children in their music programs (e.g., Andress & Boardman, 1982; Aubin et al., 1981; Orff & Keetman, 1960; Richards, 1964). Weikart argued that rhythmic phrase pattern instruction, employing bodily movement to the phrase pattern, should not be taught to

children until second grade and then only if children have developed beat competency.

There appears to be a controversy in the literature between the use of bodily movement to activities emphasizing only the beat, as suggested by Weikart, 1982c, and the use of bodily movement to activities emphasizing rhythmic patterns with young children, as found in other prominent music programs such as Silver Burdett (1981) and Orff-Schulwerk (1960). Therefore, research obviously is needed to determine whether Weikart's approach is a viable way to develop young children's beat competency. The present study investigates kindergarten children's beat competency and teachers' instructional strategies for developing this competency.

Rhythm and Early Childhood Musical Learning

Importance of Rhythm

Rhythm is considered an essential element of all music (Cooper & Meyer, 1960; Gaston, 1968; Mursell, 1956; Radocy & Boyle, 1981). The Harvard Dictionary of Music defines rhythm as "everything pertaining to the temporal quality (duration) of the musical sound" (Apel, 1944, p. 640). The main function of rhythm in music is to give order (Radocy & Boyle, 1979). Gaston (1968) stated:

When the musics of all cultures of the world are considered, it is rhythm that stands out as most fundamental. Rhythm is the organizer and the energizer. Without rhythm, there would be no music

whereas there is much music that has
neither melody nor harmony. (p. 7)

Mursell (1956, pp. 254-257) listed the following functions
of rhythm to stress the significance of rhythm in music.

1. Rhythm gives life, sparkle, reality, and
expressiveness to the performance of music.
2. A grasp of and feeling for rhythm adds
immensely to the pleasure of listening.
3. A sense of rhythm can carry one over
technical hurdles in performing music.
4. A live feeling for rhythm facilitates
music reading.
5. Rhythm is the best and most natural
starting point for musical creation.

There is little consensus as to the attributes of
rhythm. Mursell (1956, p. 262) identified two elements of
musical rhythm: the rhythm of the underlying beat and the
rhythm of the phrase. Cooper and Meyer (1960) identified
three basic modes of temporal structure: pulse, meter,
and rhythm. Gordon (1971) suggested that rhythm is
composed of three basic elements: tempo beats, meter
beats, and melodic rhythms. In contrast, Creston (1964)
identified four basic elements of rhythm: meter, pace,
accent, and pattern. Therefore, it is obvious that the
various interpretations complicate an attempt to arrive at
a single definition of the attributes of rhythm.

In view of contrasting opinions regarding the
elements of rhythm, an operational definition by Mursell
(1956) is used in this study: rhythm is composed of the

underlying beat and the rhythm of the phrase (or rhythmic pattern). Mursell's definition essentially identifies the same two basic elements of rhythm as those suggested by Weikart.

Developing Beat Competency

The ability to feel musical beats and to sequence simple movements to those beats (beat competency) is necessary to perform successfully any activity that involves movement (Weikart, 1984). Weikart maintains that attainment of beat competency (a) helps children to master physical skills used in sports and games, (b) enhances children's abilities in music, (c) helps children acquire readiness skills in reading and language, and (d) enhances children's general well-being, self-concept, and enjoyment of life (Weikart, 1982c). In a similar manner, Mursell (1956) suggested that a music program should emphasize personal enjoyment and successful individual achievement through musical activities. In fact, the Music Educators National Conference (MENC, 1984) supports the idea that one of the main goals of music education is to provide students with enjoyment and appreciation of music for use throughout life, thus enhancing the quality of life. Developing beat competency is fundamental to facilitating the development of independent, life-long learning skills.

Radocy and Boyle (1979) maintain that rhythm is one of the most vital factors in music. Mursell stated, "If a

person fails to develop a grasp of rhythm, his musical growth is sure to be stunted and crippled" (1956, p. 258). Mursell also stated that bodily movement is the first and most essential way to teach rhythm. Music educators emphasize the importance of rhythmic development and the use of movement with young children (Carabo-Cone, 1969; Gordon, 1979; Jacques-Dalcroze, 1967; Orff, 1978; Zimmerman, 1971). The importance of early childhood movement experiences also is supported by currently accepted learning theorists. Both Piaget (1964) and Bruner (1970) recommended involving young children in movement activities. During the preoperational developmental stage, ages 2-7, Piaget theorized that children learn through their senses, with visual and tactile senses having prominent roles. In similar ways, Bruner (1970) advocated that during the enactive mode of perceptual development children learn through movement and interaction with their environment.

Simons (1984) suggested that children's natural responsiveness to rhythm is confirmed in research.

Teaching approaches (Orff and others) that rely heavily on rhythm, appeal to a natural sense that can be the basis for expansion of music expression and understanding. The widespread use of body movement in music teaching and research is evidence that this activity is generally accepted as a good way to teach certain aesthetic concepts and increased enjoyment of music. (p. 15)

Weikart (1984) maintains that rhythmic phrase patterns should not be taught to kindergarten children without development of beat competency. She has theorized that rhythmic phrase pattern instruction should be delayed until a child has developed beat awareness and beat performance skills (Weikart, 1984). Weikart (1982c) also suggested that music programs for young children emphasizing performance of rhythmic phrase patterns prior to development of beat competencies interfere with the acquisition of rhythmic skills. She maintains it is imperative that education for young children include beat competency development. This beat competency will not always occur naturally; it may require special training (Mursell, 1956; Weikart, 1984).

Weikart recommended that children should not receive training in rhythmic phrase patterns without association with musical beats (i.e., until approximately the 2nd-grade level). Her recommendation is based on the hypothesis that durations of rhythmic phrase patterns in music are associated with similar patterns in language. Thus, this one-to-one association between rhythmic organization in music is familiar and attracts a young child's attention. According to Weikart, this is referred to as rhythmic or language bonding. Other researchers offer some explanations of this phenomenon. Miller (1956) found that one of the ways human beings remember and

process verbal information is by organizing it into subjective chunks. Dowling (1973) maintains that the rhythmic grouping of tonal sequences is stored in memory much the same way as in memory for verbal materials. The rhythmic patterns are grouped (chunked) in memory and are easier to recall than the steady beat. Therefore, a child comprehends and responds to rhythmic phrase patterning with greater ease than to musical beats. When rhythmic phrase patterning is presented too soon, before a child has developed beat competency, bonding to the rhythmic phrase patterns occurs. Rhythmic bonding can become very strong and can weaken a child's beat competency, making it difficult to establish a mastery of beat (Weikart, 1984).

Weikart (1982c) maintains that the lack of beat competency is a serious problem among young children and that this problem may impair their abilities to succeed in musical activities. Her research shows that approximately 20% of the children in kindergarten enter school beat competent. Mursell (1956) emphasized the importance of feeling the beat. He stated, "A firm and certain grasp of the beat is of the highest importance. Unless the beat is grasped, sensed, and brought out, the music will never sound satisfactory" (p. 264). If the development of young children's beat competencies is as important as implied above, what are effective teaching techniques for

developing these skills? The current study addresses this question.

Purpose of the Study

The purpose of this study was to investigate effects of rhythmic teaching strategies on the development of beat performance skills of kindergarten children. Two teaching strategies are examined: using bodily movement to beat experiences (as suggested by Weikart, 1982c) and using bodily movement to rhythmic phrase pattern experiences (as included in a traditional teaching approach). For this study, traditional approach is defined operationally as musical instruction emphasizing rhythmic phrase pattern performance via speaking, singing, moving, and playing instruments.

Weikart has suggested a sequential approach for developing beat performance skills and beat competency. She initially emphasized basic beat experiences and recommended total avoidance of employing bodily movement to rhythmic phrase patterns until a child is able to maintain steady beats. Ultimately, Weikart's approach requires a child to maintain steady beats by matching an externally presented stimulus at various motoric levels. Therefore, the two approaches as defined above were compared.

Weikart (1982c) found that gender significantly affects beat performance skills and beat competency

development. Her research shows that females generally perform beats better than males. Weikart (1982c) also has found that motor task alteration significantly affects beat performance skills and beat competency development. She found patting to the beat to be easier than walking to the beat regardless of gender. For this study, motor task alteration is defined operationally as patting to the beat and then walking to the beat. Effects of gender and motor task alteration on kindergarten children's beat performance skills also were examined within this study.

Implications for Music Education

Many children and adults lack beat competency and therefore, are unable to maintain a steady beat (Weikart, 1982c). The literature supports the premise that males generally have more difficulty with beat activities than females. Rhythmic phrase pattern activities are obviously a major component of many music programs; therefore, if such experiences are detrimental to a young child's development of beat competency, then, perhaps these rhythmic phrase pattern experiences should be delayed. Little objective evidence exists relating to development of beat competency, especially relative to young children. Findings from this study should be of value to music educators in planning music curricula and developing teaching strategies for young children.

CHAPTER II

REVIEW OF LITERATURE

Rhythm is an essential element of all music, providing structure and dynamic energizing force (Radocy & Boyle, 1979). An awareness of rhythm and the development of beat competency are fundamental to musical learning and should begin in early childhood. The period of early childhood has been considered an important period for musical development and for the acquisition of basic musical skills. This chapter includes a review of research on early childhood rhythmic development and musical learning experiences. Few published research results are available regarding beat competencies of young children. The wide range of developmental skills and the lack of appropriate and reliable assessment techniques have discouraged research on young children's musical behaviors (Simons, 1983).

Rhythmic Development

Several researchers have found that a child's natural responsiveness to movement and rhythm begins at birth, or before. Spiegler (1967/1968) conducted studies on newborn infants and found that the prenatal exposure to the mother's heartbeat enabled them to be born with a certain beat awareness. When observed and evaluated after birth,

these infants were able to discriminate minute fluctuations in the stimulus pattern they had heard and been habituated to prenatally. A Stabilimeter counter apparatus was used to measure activity level.

Moog (1981) studied the development of musical experiences of children. He observed movements to music of 500 children, ages 6 months to 6 years. His observational records provided detailed descriptions of these children. He stated:

There is a natural relationship between music and movement. Before any child utters musical sounds he performs movements with sounds. His own rhythmic motor activity transforms a phenomenon which has a temporarily constituted shape of sounds into some objective activity. (p. 59)

Simons (1983) has examined extensively findings of other researchers relative to young children's rhythmic development. He concluded that a child naturally responds to rhythm and movement. Blatt (1964) found that spontaneous rhythmic responsiveness diminishes as the child grows older. He investigated the developmental differences in the rhythmic responsiveness of children, ages 5 through 12, to rhythmic stimuli in contrast to musical stimuli. He stated that diminution of spontaneous rhythmic responses with increased age was probably due to peer pressure and social awareness, not physiology nor maturation.

Weikart (1982c) indicated that feeling and understanding of musical beats were fundamental to rhythmic learning. She stated that appropriate teaching strategies enhanced the development of beat competency. She defined beat as the underlying pulse in a song, poem, or rhythmic phrase.

Weikart conducted numerous studies of the rhythmic skills of adults and children. Generally, she found that many children and adults lacked basic rhythmic coordination. They were unable to (a) identify and walk in synchrony to beats of music, (b) decode movement sequences, and (c) translate verbal directions into directed movements (Weikart, 1982c). Weikart's studies included tests administered to 464 children in grades 1 through 6 and to 90 teenagers, ages 13 to 18. Results of these studies are included in Tables 1 and 2. Results demonstrated that fewer than two-thirds of the 1st and 2nd graders identified the beat and only about one-third walked to the beat. Rhythmic competency scores improved with age. Females generally scored higher than males. This was due to females' experiences with rhythmic coordination activities (such as jumping rope, hand-jive, and dancing).

During a conference on motor development of young children sponsored by the National Association for the Education of Young Children, Halverson (1978) stated that

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Table 1

Results of Rhythmic Competency Analysis Test Administered to Children in Grades 1-3

GRADE	NUMBER	TASK 1 ^a			TASK 2 ^b			TASK 3 ^c		
		Total %	M %	F %	Total %	M %	F %	Total %	M %	F %
1	186	61	60	63	43	37	49	34	26	43
2	165	59	57	61	55	55	56	37	41	33
3	113	74	72	76	70	67	73	51	45	58

^a Task 1: Child identifies underlying steady beat and matches that beat by patting the top of the head with both hands.

^b Task 2: Child identifies underlying steady beat and matches that beat by patting the top of the head and then the tops of the shoulders with both hands (one pat to each body part in a double coordinated motion).

^c Task 3: Child walks to the underlying steady beat.

Table 2
Results of Modified^a
Rhythmic Competency Analysis Test
Administered to Children in Grades 4-6
and Teenagers

GRADE	NUMBER	TASK 1 ^b			TASK 3 ^c		
		Total %	M %	F %	Total %	M %	F %
4	78	73	64	82	73	59	88
5	119	84	78	90	78	69	87
6	104	81	77	86	76	72	80
Teens #1 ^d	45	96	92	100	71	62	81
Teens #2 ^e	45	97	94	100	75	66	85

^aTask 2 was eliminated for this age group.

^bTask 1: Child identifies underlying steady beat and matches that beat by patting the legs with both hands.

^cTask 3: Child walks to the underlying beat.

^dParticipants in four-week camp program, May.

^eParticipants in seven-week camp program, June-August.

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not all motor development occurs naturally for all children at the appropriate maturational time. She suggested that rhythmic readiness results from a combination of maturation and experience. Weikart (1982c) concurred with Halverson's conclusions. Within Weikart's studies age and gender affected beat performance skills. However, she stated that teaching methods contribute significantly to developing or not developing rhythmic competency (beat competency) according to developmental stages.

Foley (1974/1975) investigated effects of training on abilities of 2nd-grade children to conserve tonal patterns combined with rhythmic pattern alterations, and to conserve rhythmic patterns combined with tonal pattern alterations. She found that improvement in conservation of rhythmic and tonal patterns can be affected by training.

Moore (1984) investigated effects of training on musical development. She used some of Weikart's ideas in her study on rhythm and movement (i.e., Weikart's four-step language/movement process; see Appendix A). Group lessons were administered to 2nd- and 3rd-grade children to investigate effects of special instruction on their rhythmic aptitude and musical aptitude. Moore found that training did improve rhythmic skills and aptitude.

Burnett (1983) investigated effects of instruction on rhythmic development. She used Weikart's four-step language/movement process and a modified form of Weikart's Rhythmic Competency Analysis Test (see Appendix B). In her study, Burnett found that handicapped preschool children demonstrated a significant increase in rhythmic competency after four months of rhythmic training compared to a group of handicapped preschool children not receiving training.

Conflicting results were found in the literature relevant to effects of instruction on rhythmic development. Some researchers indicated that instruction could improve rhythmic development (Burnett, 1983; Foley, 1974/1975; Halverson, 1978; Moore, 1984; Weikart, 1982c). However, several researchers disputed the value of training for the development of rhythmic skills (De Yarmin & Schleuter, 1977; Groves, 1969; Wang, 1984). Piaget presented a 4-stage development theory consisting of a sensorimotor stage (ages 0-2), preoperational stage (ages 2-7), concrete operational stage (ages 7-11), and formal operational stage (ages 11-16). Piaget (1964) suggested that training does not affect significantly a child's movement through developmental stages. He (1969) stated that experiences may be provided for a child, but until the proper level of development has been reached, a child cannot understand nor accommodate certain concepts.

Weikart has theorized that music educators often begin rhythmic pattern experiences before the proper level of child development has been reached.

Zimmerman (1971) studied Piaget's theories relative to young children's musical development. She found that kindergarten children possessed basic locomotor skills. She also found that musical concepts were developed in children in the following sequence: volume, timbre, tempo, duration, pitch, and harmony. Hufstader (1977) also investigated musical learning sequence. In a study involving 596 children in grades 1, 3, 5, and 7, he found musical learning to occur in the following order: timbre, rhythm, melody, and harmony.

Groves (1969), in a study of 131 children in grades 1 through 3, found that rhythmic ability was more dependent upon age, maturation, and motor ability than rhythmic training. Other researchers found that performance of musical tasks related to conservation of meter improved with age (Jones, 1971; Petzold, 1963; Pflederer, 1964; Zimmerman & Sechrest, 1968). Petzold (1963), however, found that rhythmic performance patterns did not change significantly after 2nd grade.

Studies conducted by Rainbow (1981) and Rainbow and Owen (1978) regarding the rhythmic abilities of 3- and 4-year-old children found a substantial correlation between age and rhythmic performance ability. Only 10% to 14% of

the 3-year-old children could clap a rhythmic pattern or a steady beat to recorded music. Marching was less successful than rhythmic tasks which could be chanted or played using fine muscle coordination.

Gilbert (1980, 1981) conducted studies on the motoric development of primary-age children. She measured motoric skills via her Motoric Music Skills Test (MMST) for young children. Motoric music skills were defined as facilities in the performance of specific musical tasks, defined further to emphasize striking skills used in an instrumental music context. The test included 44 items in the following subtests: (a) motor pattern coordination, (b) eye-hand coordination, (c) speed of movement, (d) range of movement, and (e) compound factors (combinations of all subtests). Gilbert (1980) administered her test to 806 children, 3 to 6 years of age, and found the following:

1. Mean performance scores increased with age.
2. The youngest children either did or did not have motoric pattern task ability; there were few moderate performances.
3. Motoric coordination skills were mastered at an earlier age than eye-hand coordination skills.
4. Girls performed significantly better than boys on motoric pattern coordination, eye-hand coordination, and compound factors.

Gilbert (1981) found that motoric performances of primary-age children can be used to predict motoric music skills.

Some research suggested that rhythmic development might be related to verbal development. If there is a relationship, then performance on verbal tasks might be an indicator of performance on rhythmic tasks. Piaget and Inhelder (1966) suggested that there was a positive relationship between verbal ability and performance of various tasks across developmental levels. Perney (1976) found that performance on musical tasks appeared to be more closely related to verbal ability than to age. In Perney's study 2nd- and 3rd-grade children were presented musical tasks related to conserving metric time. Students also were given form W of the Stanford Diagnostic Reading Tests (SDRT). The reading comprehension scores from the SDRT were used as a measure of students' verbal abilities. Those children who performed well on the musical tasks tended to do well on the reading tests, regardless of gender or age.

Other researchers connected rhythmic development to verbal development. One way human beings remembered and processed verbal information was by organizing it into subjective chunks (Miller, 1956). Recognition of this information was facilitated if similar grouping of this information was repeated (Bower, 1970; Bower & Winzenz, 1969). Dowling (1973) found that rhythmic grouping was perceived in memory for tonal sequences in much the same way as in memory for verbal materials. This research

helped to support Weikart's assumption regarding rhythmic bonding. Weikart (1984) stated that because rhythmic durations were concrete, each note or syllable of a phrase could have a one-to-one correspondence; therefore, it was easier for a child to grasp the rhythmic phrase than the beat. A child bonded to the rhythmic phrase, making it difficult to learn or to feel the beat.

Dowling (1973) also found that a slow presentation of rhythmic materials was easier to learn than a fast presentation. This indicated that a longer time period allowed for assimilation of information (encoding). Dowling (1973) further suggested that experiences with materials at various rates led to learning encoding strategies for those rates. Encoding activities were an important part of Weikart's strategies. She recommended initially presenting some experiences visually or aurally. If both mediums were used together, at first, children could become confused, often finding it difficult to understand and assimilate information.

De Yarman (1971), in a study involving 271 kindergarten and 1st-grade children, found that instruction in mixed and unusual meters improved children's performance of usual meters. Dittmore (1969), in a study of 29 students in grades 1 through 6, found that primary-school children learned to perform various

meters in the order of duple and triple meters, mixed meters, then unusual meters.

Some researchers also found that rhythmic characteristics are the most salient features in music, both physically and perceptually. In a study involving children ages 5 to 7, Abel-Struth (1981) found that children's strongest musical responses were to rhythm. He also found that children preferred music with a strong beat. Dowling (1971) found that rhythm was the most disruptive musical element. Rieber (1965) found that children's activity levels increased with stimulative music (music that elicits physical action). Zimny and Weidenfeller (1962) found that exciting music produced reactions and calming music quieted children. Anshel and Marisi (1978) found that physical endurance might be enhanced if movements were rhythmically coordinated with a musical stimulus. Weikart recommended the use of stimulative music for the development of beat competency.

According to the preceding research on rhythmic development, natural responses to rhythm and movement occurred very early in the preschool years. These rhythmic responses were affected by age, gender, and motor ability. However, some researchers speculated that both motor ability and beat competency could be improved significantly with the use of appropriate music and effective teaching techniques (Foley, 1974/1975; Gordon,

1979; Halverson, 1978; Weikart, 1982c). Weikart (1982c) developed a sequence of activities for developing beat competency. This study investigated effects of Weikart's rhythmic teaching strategies on beat performance skills of kindergarten children.

Early Musical Learning

Because early childhood is a period of accelerated physical, emotional, and intellectual growth, early childhood specialists have identified this period as one of the most critical periods in a person's life (Bloom, 1964; Bruner, 1970; Freeburg & Payne, 1968; Piaget, 1964; Weikart & Lambie, 1970; Berrueta-Clement et al., 1984). However, this growth can be enhanced significantly by an enriched environment and effective teaching strategies (Bloom, 1964; Bruner, 1970).

Experts in music education have cited the importance of early musical learning (Andress et al., 1973; Gordon, 1979; Simons, 1975, 1983; Shuter, 1968; Weikart, 1982c, 1984). Musical ability can emerge at an early age but this ability must be nurtured. Indeed, early childhood musical experiences can affect a child's attitudes toward music for a lifetime (Gordon, 1979; Mankin, 1969; Shuter, 1968). Several research studies have shown varied effects of early musical intervention on development of musical abilities and attitudes.

Michael (1973) studied the development of musical talent. He found that if a child was involved in an enriched musical environment, evidence of musical talent occurred very early, in comparison to other learning areas. Michael also found that a peak period for children to reproduce music occurred around the ages of 5 and 6.

Gordon (1979, 1980) developed a musical aptitude theory and supported this theory via studies of young children's musical behaviors. According to Gordon, musical aptitude is in a developmental state during the early years of a child's life and does not stabilize until age 9. Therefore, Gordon stressed the importance of early learning, suggesting that the earlier a child's musical experiences, the higher a child's musical aptitude will be. He stated that:

The importance of quality in classroom formal music instruction particularly through the third grade as it interacts with continued environmental influences inside and outside school, cannot be overstated. (1979, p. 4)

Flohr (1981) supported Gordon's hypothesis with his findings from research on 29 5-year-old children's musical behaviors. Children were assigned randomly to one of three groups. Two groups received music instruction for 12 weeks and a third group received no instruction. Flohr measured the children's musical aptitude via Gordon's

Primary Measures of Music Audiation. He found that short-term musical instruction increased musical aptitude.

Grieshaber (1987) examined research related to tapping. She found that age, gender, and instruction affected tapping abilities. Kindergarten females were generally more successful than males. Even though tapping skills appeared to improve with age, they also improved with practice and instruction.

Relevancy of Research Findings to Present Study

Kindergarten children were selected as subjects for the present study. Reviewed research suggested that formal school music instruction usually began with kindergarten. The physiological development of the kindergarten child appeared to be adequate for rhythmic training. The kindergarten period was described as one of tremendous growth, including intellectual, physical, and emotional growth. Researchers suggested that beginning school musical experiences needed to be success oriented to maximize learning and minimize feelings of failure in a child. Longitudinal studies showed that skills and attitudes formed during early years had long-term effects on a child. The period of early childhood was shown to be a critical period in a person's life. Research suggested that early stimulation of musical abilities maximized development of musical aptitude prior to 9 years of age.

Beat competency was identified as an ability necessary for maximizing future musical development.

The preceding research suggested that gender was an important variable affecting rhythmic skills. Specifically, females appeared to be more successful at rhythmic tasks than males, especially at the kindergarten level. Research also suggested that motor task alteration affected beat performance; walking, involving large muscle responses, may be more difficult than tapping, involving smaller muscle responses.

Restatement of Purpose

The purpose of this study was to investigate effects of rhythmic teaching strategies on the development of beat performance skills of kindergarten children. Two teaching strategies were examined: using bodily movement to beat experiences (as suggested by Weikart, 1982c) and using bodily movement to rhythmic phrase pattern experiences (as included in a traditional teaching approach). Weikart (1982c) and Mursell (1956) stressed the importance of being able to perform a movement activity to an underlying beat of music. Gender and motor task alteration were found to have significant effects on beat performance skills; therefore, they also were examined.

Weikart suggested a sequential approach for developing beat performance skills and beat competency. She initially emphasized basic beat experiences and did

not recommend employing movement to rhythmic phrase patterns until the child is able to maintain a steady beat while matching an externally presented stimulus at various motoric levels (e.g., by patting and by walking).

The Weikart approach was compared to a more traditional approach that employed the use of bodily movement to rhythmic phrase patterns in early childhood musical experiences. This research was concerned with identifying effective teaching strategies for developing kindergarten children's beat performance skills. The two rhythmic teaching strategies examined in this study were defined as the instructional treatment. Secondary concern also was given to gender and motor task alteration.

Therefore, the following null hypotheses were considered:

1. There will be no significant effect of instructional treatment on kindergarten children's beat performance skills.
2. There will be no significant effect of gender on kindergarten children's beat performance skills.
3. There will be no significant effect of motor task alteration on kindergarten children's beat performance skills.
4. There will be no significant effect of interactions among instructional treatment, gender, and motor task alteration on kindergarten children's beat performance skills.

CHAPTER III

PROCEDURE

Introduction

The purpose of this study was to investigate effects of rhythmic teaching strategies on the development of kindergarten children's beat performance skills. Two teaching strategies were examined: using bodily movement to beat experiences and using bodily movement to rhythmic phrase pattern experiences. Effects of the two strategies on beat performance skills were measured via Weikart's (1982b) Rhythmic Competency Analysis Test (RCAT). Weikart's test was designed to assess an individual's ability to perform specific movement tasks to the underlying beats of aurally presented musical excerpts. A description of the test can be found in Appendix B. The Weikart approach for developing beat competency was compared to an approach that employed the use of bodily movement to rhythmic phrase patterns in early childhood musical experiences. Descriptions of both approaches can be found in Appendices A, C, and D. Secondly, effects of gender and motor task alteration (patting and walking) on beat performance skills were examined.

Subjects

Two groups of kindergarten children from the Memphis, Tennessee Public School system served as subjects for this study. Four intact classes from two schools were selected. Two classes from one school served as the control group (n = 50) and were taught via the traditional approach. Two classes from a second school served as the experimental group (n = 50), using the Weikart beat competency approach. The music supervisor from the Memphis Public School system made the necessary arrangements to conduct the study. She secured permission from the administration, selected the schools and subjects, and contacted the principals involved in the study. The researcher made personal contacts with the principals and teachers to insure their cooperation. California Achievement Test scores and demographic data showed that subjects within both groups were of similar socio-economic status and achievement level.

Music Instruction

The control and experimental groups received music instruction for one 30-minute lesson per week (14 lessons) during 1 school semester. The 2 weeks preceding instruction and 2 weeks following instruction were used for testing. The regularly scheduled amount of formal music instruction normally given to kindergarten children in the Memphis Public School system was one 30-minute

lesson per week for only 1 semester of the entire school year.

A music educator from the Memphis Public School System taught the control group, employing the materials and ideas outlined in Appendix D. The teacher had Kodaly and Orff-Schulwerk training and implemented these approaches in her music classes. Singing, moving, dancing, and listening activities were emphasized. The development of rhythmic concepts and behaviors was an important part of the control group instruction; this primarily included moving to rhythmic phrase patterns. When a new song or speech activity was introduced the teacher required the children to clap to the beginning rhythmic pattern of the words, melody, or phrase (i.e., "patti-cake, patti-cake" -- □ | □ |).

The typical lesson plan format for the control group was as follows:

1. Greetings
2. Review song
3. New song
4. Rhythm skill activity (e.g., clapping rhythmic phrase patterns)
5. Review song
6. Movement, dance, or listening activity

A description of the control group approach and list of control group references can be found in Appendix D. It

is important to note that the control group teacher emphasized the use of bodily movement to rhythmic phrase patterns with kindergarten children.

The researcher of this study taught the experimental group, employing instruction that emphasized the basic beat and did not include bodily movement to rhythmic phrase patterns with kindergarten children. The strategy employed with the experimental group was based on Weikart's sequential approach to rhythmic movement as suggested in her book, Teaching Movement and Dance: A Sequential Approach to Rhythmic Movement (1982).

The typical lesson plan format for the experimental group was as follows:

1. Visual decoding activity
2. Aural decoding activity (sometimes with eyes closed)
3. Four-step language/movement "Say and Do" sequence (added later)
4. Pat body parts to music (added later)
5. Movement exploration activity
6. Speaking, singing, listening, and instrumental activities -- as time permitted

During the treatment period, the experimental group spent an average of 15 minutes of each 30-minute music period participating in movement activities based on Weikart's strategies emphasizing beat competency. Many of these beginning movement experiences were not beat

matching, but were free movement experiences designed to prepare students for later, more complicated beat matching activities. The remaining class period included singing, playing, and listening experiences, but did not include moving to rhythmic phrase patterns. A description of the experimental approach can be found in Appendix A and Appendix C.

Data Collection and Analysis

A pretest and posttest design was employed using Weikart's RCAT to measure subjects' beat performance skills before and after treatment. Two prerecorded musical selections, used during testing, were obtained from Weikart. The two selections were "American Patrol," with a tempo of ♩ = 120 beats per minute, and "Yankee Doodle," with a tempo of ♩ = 132 beats per minute. These selections were included on the two-album set entitled, Honor Your Partner Set of Marches, YPII. Weikart recorded these selections on cassette tapes and sent them to the researcher for the administration of the test. The basic tempo range of 120 and 132 represented a natural and comfortable tempo range for young children (Greishaber, 1987). The use of two different tempi was employed to insure that subjects were attending to the beat, and not just moving to their normal body tempi. A pilot test was administered with the RCAT using a class of children not involved in the study. This provided a means

of clarifying and refining test administration skills and techniques. The researcher determined that the method of administering the RCAT, detailed in the test instructions, was effective with kindergarten students and was satisfactory for the formal study. A complete description of the test can be found in Appendix B.

The researcher administered the test to both control and experimental groups. Data were collected for each child individually. The test tapes were played on a Realistic Cassette Tape Player, model 14-827 CTR-21A. Testing was conducted in a quiet, isolated classroom at each school, during the hour following the children's lunch period. Room conditions and time of test administration remained the same throughout testing. During pretesting and posttesting, the RCAT was administered to subjects individually. Each subject patted and walked to each musical selection (♩ = 120 and ♪ = 132, respectively).

Each subject received an RCAT score of 1, 2, or 3 for each of four tasks:

1. Patting to a musical selection with a metronome beat of 120.
2. Walking to a musical selection with a metronome beat of 120.
3. Patting to a musical selection with a metronome beat of 132.
4. Walking to a musical selection with a metronome beat of 132.

A score of 1 was given to subjects who could not perform motor tasks to steady musical beats (i.e., matching beat and moving accurately). A score of 2 was given to subjects who were successful some of the time but were inconsistent in their beat-matching responses. A score of 3 was given to subjects who accurately matched the steady beats throughout a musical selection.

For each motor task (patting or walking) across both musical selections, a subject received a composite score of 2 to 6. Because of the additive nature of the scores, the data were regarded as intervallic. This intervallic characteristic allowed the use of parametric statistics. Harris (1975) recommended the use of parametric techniques with this type of data.

The RCAT data were classified by subjects across independent variables and analyzed statistically via a VAX 8700 computer using Statistical Analysis Systems procedures (SAS, 1985). The dependent variable was beat performance skills as measured by the RCAT. The independent variables were instructional treatment (experimental and control), gender (female and male), and motor task alteration (patting and walking). Descriptive statistics were used to determine general characteristics of the RCAT scores across each independent variable. Percentages of accurate subject beat performance and mean

RCAT scores were calculated. To determine effects of instructional treatment, gender, and motor task alteration on beat competency, a 2 x 2 x 2 factorial analysis of covariance (ANCOVA) was used to treat RCAT posttest scores. RCAT pretest scores served as the covariate, thereby adjusting mean scores to control for variance due to entrance level behaviors. A critical value of F , significant at the .01 level, was established.

CHAPTER IV

RESULTS

Introduction

Data analyses and interpretations are presented in this chapter. Data were collected by administering the Rhythmic Competency Analysis Test (RCAT, Weikart, 1982b) to each subject before and after treatment. Each subject received an RCAT score of 1, 2, or 3 for each of the four tasks. The four RCAT tasks involved patting and walking to two different musical selections. A score of 1 was given to subjects who could not perform the tasks to steady musical beats. A score of 2 was given to subjects who were inconsistent in their beat matching-responses. A score of 3 was given to subjects who accurately matched the steady beats of a musical selection. For each motor task alteration (patting or walking) a subject received a composite score of 2 to 6.

Analyses of Data

Analyses of the data were conducted to determine effects of instructional treatment, gender, and motor task alteration on subjects' beat performance skills. For the raw scores (see Appendix E), accurate beat performance percentages were calculated across subjects by instructional treatment, gender, and motor task

alteration. Only the scores of subjects who received scores of 3 for a beat performance task were defined as accurate and were counted. Means and standard deviations also were calculated. A 2 (instructional treatment) X 2 (gender) X 2 (motor task alteration) factorial analysis of covariance was used to analyze the post-RCAT data. Pre-RCAT data served as the covariate to control for differences due to subjects' entrance level behaviors and for bias due to intact class members serving as subjects (Keppel, 1973; Wildt & Ahtola, 1978).

Descriptive Statistics

Percentages were calculated for the pre-RCAT scores (see Appendix E) and are presented in Table 3. Approximately 22% of the experimental group and 18% of the control group could pat to the beat accurately. Percentages for accurate beat performance were generally less for walking than for patting. Approximately 20% of the experimental group and 14% of the control group could walk to the beat accurately. Males appeared to be less successful than females. For the experimental group, 10% of the males accurately performed the beat by patting and 9.5% by walking. However, 31% of the females accurately performed the beat by patting and 28% by walking. For the control group, 17% of the males accurately performed the beat by patting and 7% by walking. However, 19% of the

females accurately performed the beat by patting and 24% by walking.

Table 3

Pre-RCAT Percentages of Accurate Beat Performance
Across Instructional Treatment, Gender,
and Motor Task Alteration

Treatment	n	Patting			Walking		
		Total	Male	Female	Total	Male	Female
Experi- mental	50	22%	10%	31%	20%	9.5%	28%
Control	50	18%	17%	19%	14%	7%	24%

Percentages for post-RCAT scores were higher for the experimental group across gender and motor task alteration (see Table 4). After treatment, 96% of the experimental group and 42% of the control group patted to the beat accurately, while 84% of the experimental group and 44% of the control group walked to the beat accurately. Patting appeared to be slightly easier than walking for the experimental group. Patting and walking percentages were similar for the control group. Within treatment groups, male and female percentages were similar.

Between the pre-RCAT and post-RCAT, improvement occurred across all variables (see Table 5). Beat performance skills improved within both treatment groups. However, the improvement was greatest with the

experimental group: 74% improvement for patting and 64% improvement for walking. The control group improved only 24% for patting and 30% for walking. Males improved more than females for patting and walking within each treatment group.

Table 4

Post-RCAT Percentages of Accurate Beat Performance
Across Instructional Treatment, Gender,
and Motor Task Alteration

Treatment	n	Patting			Walking		
		Total	Male	Female	Total	Male	Female
Experi- mental	50	96%	90%	100%	84%	81%	86%
Control	50	42%	44%	38%	44%	45%	43%

Table 5

Percentages of Improvement Between Pre-RCAT and
Post-RCAT of Accurate Beat Performance
Across Instructional Treatment,
Gender, and Motor Task
Alteration

Treatment	n	Patting			Walking		
		Total	Male	Female	Total	Male	Female
Experi- mental	50	74%	80%	69%	64%	71.5%	58%
Control	50	24%	27%	19%	30%	38%	19%

Raw score means and standard deviations were calculated to describe pre- and post-RCAT scores. Table 6 presents the pretest and posttest mean scores by instructional treatment.

Table 6
Pre-RCAT and Post-RCAT Mean Scores
by Instructional Treatment

	Experimental Group			Control Group		
	n	Mean	SD	n	Mean	SD
Pretest	50	3.36	1.67	50	3.22	1.54
Posttest	50	5.77	0.75	50	4.25	1.68

For instructional treatment, the pre-RCAT mean scores for both groups were very similar, 3.36 for the experimental group and 3.22 for the control group. The post-RCAT scores, however, were not similar. The experimental group mean, 5.77, was higher than the control group mean, 4.25, with a difference of 1.52. The standard deviation of .75 for the post-RCAT experimental group indicated 68% of the experimental group scores fell between 5.02 and a perfect score of 6.00, whereas for the control group, the standard deviation of 1.68 indicated 68% of the control group scores fell between 2.57 and 5.93.

Table 7

Pre-RCAT and Post-RCAT Mean Scores and Standard Deviations Across Instructional Treatment, Gender, and Motor Task Alteration

	<u>Experimental Group</u>			<u>Control Group</u>		
	n	Mean	SD	n	Mean	SD
<u>Male/Patting</u>						
Pretest	21	2.81	1.44	29	3.00	1.58
Posttest	21	5.81	0.60	29	4.34	1.74
<u>Female/Patting</u>						
Pretest	29	3.83	1.79	21	3.57	1.60
Posttest	29	6.00	0.00	21	4.19	1.60
<u>Male/Walking</u>						
Pretest	21	2.57	1.33	29	2.80	1.30
Posttest	21	5.52	1.08	29	4.10	1.86
<u>Female/Walking</u>						
Pretest	29	3.86	1.64	21	3.81	1.57
Posttest	29	5.69	0.89	21	4.38	1.53

Table 7 illustrates the pre- and post-RCAT mean scores across instructional treatment, gender, and motor task alteration. Pre-RCAT means indicated that females began treatment with higher beat performance skills than males as measured by the RCAT. Even though females received higher post-RCAT scores than males, males within the experimental group improved more than females (female patting difference = 2.17 and male patting difference =

3.00; female walking difference = 1.83 and male walking difference = 2.95). Within the control group males and females had very similar post-RCAT mean scores. According to the mean scores for both groups, motor task alteration (patting and walking) appeared to be at the same level of difficulty.

Statistical Analysis of Covariance

To test the null hypotheses a three-way (2 x 2 x 2) analysis of covariance (ANCOVA) was performed on the post-RCAT data. Post-RCAT data were grouped by instructional treatment, gender, and motor task alteration. Pre-RCAT scores served as the covariate, thereby controlling for differences due to entrance level behaviors. Mean scores were adjusted to least squares means, thereby controlling for effects of the covariate (pre-RCAT scores). Least squares means were calculated across instructional treatment, gender, and motor task alteration (see Table 8). Table 9 presents the results of the analysis of covariance on the post-RCAT scores.

Within each instructional treatment, mean scores were similar for gender and motor task alteration. However, between instructional treatment groups, mean scores were higher for the experimental treatment group than for the control group.

Table 8
 Post-RCAT Least Squares Mean Scores Across
 Instructional Treatment, Gender, and
 Motor Task Alteration

	Experimental	Control
Male/Patting	5.91	4.41
Male/Walking	5.67	4.21
Female/Patting	5.89	4.13
Female/Walking	5.57	4.27

The effect of instructional treatment on kindergarten children's musical beat performance skills was significant ($p = .0001$). The least squares means for the experimental group was 5.76. The least squares means for the control group was 4.25. The difference between the two group means was 1.51. Both groups improved, but the instructional treatment of the experimental group improved beat performance skills significantly more than the instructional treatment of the control group. The null hypothesis that there would be no significant effect of instructional treatment on kindergarten children's beat performance skills was rejected.

The effect of gender on kindergarten children's beat performance skills was not significant ($p = .7761$). The least squares means within each instructional group were similar for males and females (see Table 8). The null hypothesis that there will be no significant effect of

Table 9

Treatment (2) x Gender (2) x Motor Task
Alteration (2) Analysis of Covariance
on Post-RCAT Scores with Pre-RCAT
Scores as the Covariate

Source	df	SS	MS	F	p
<u>Covariate:</u>					
RCAT Pretest Scores	1	2.41			
<u>Between Subjects Factors:</u>					
Treatment	1	110.24	110.24	47.73	.0001
Gender	1	0.19	0.19	0.08	.7761
Treatment X Gender	1	0.02	0.02	0.01	.9184
Subjects within Treatment X Gender	96	221.72	2.31		
<u>Within-Subjects Factors:</u>					
Motor Task	1	1.11	1.11	1.59	.2100
Treatment X Motor Task	1	0.77	0.77	1.11	.2900
Gender X Motor Task	1	0.19	0.19	0.27	.6062
Treatment X Gender X Motor Task	1	0.52	0.52	0.75	.3898
Motor Task X Subjects within Treatment X Gender	95	66.11	0.70		
CORRECTED TOTAL	199	451.98			

gender on kindergarten children's beat performance skills was retained.

The effect of motor task alteration on kindergarten children's beat performance skills was not significant ($p = .2100$). The least squares means within each instructional treatment group were similar for patting and walking (see Table 8). The null hypothesis that there will be no significant effect of motor task alteration on kindergarten children's beat performance skills was retained.

Interactions across gender or motor task alteration within instructional treatment and between gender and motor task alteration were not significant (see Table 9). The interaction effect among instructional treatment, gender and motor task alteration was not significant ($p = .3898$). Least squares means were similar for gender by motor task alteration within each instructional treatment group (see Table 8). The null hypothesis that there will be no significant effect of interactions among instructional treatment, gender, and motor task alteration on kindergarten children's beat performance skills was retained.

Summary of Results

Analyses of the RCAT data included descriptive statistics and a three-way ($2 \times 2 \times 2$) analysis of covariance on the post-RCAT scores, with the pre-RCAT

scores serving as covariate. Pre-RCAT scores were similar for both treatment groups. Patting was slightly easier than walking and males were slightly less successful than females. Both treatment groups improved on the post-RCAT scores. Males improved more than females across both treatment groups. However, within each treatment group, males' and females' post-RCAT scores were similar. Patting was slightly easier than walking for the experimental group, but for the control group, patting and walking scores were similar.

On post-RCAT scores, the effect of treatment on beat performance skills was significant ($p = .0001$). Effects of gender, motor task alteration, and interactions among these variables were not significant. Hypothesis 1 was rejected and hypotheses 2, 3, and 4 were retained.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, FUTURE RESEARCH

Summary

The purpose of this study was to investigate effects of rhythmic teaching strategies on the development of beat performance skills of kindergarten children. Two teaching strategies were examined: using bodily movement to beat experiences (as suggested by Weikart, 1982c) and using bodily movement to rhythmic phrase pattern experiences (as included in a traditional approach). For this study, traditional approach was defined operationally as musical instruction including rhythmic phrase pattern performance via speaking, singing, moving, and playing instruments. Weikart suggested a sequential approach for developing beat-performance skills and beat competency. She initially emphasized basic beat experiences and total avoidance of performing bodily movement to rhythmic phrase patterns until the child is able to maintain steady beats. Ultimately, Weikart's approach requires a child to maintain steady beats by matching an externally presented stimulus to various motoric levels. Therefore, the two approaches, as defined above, were compared.

Two groups of kindergarten children served as subjects. An experimental group ($n = 50$) received the

Weikart approach. A control group ($n = 50$) received the traditional approach. Subjects received 30 minutes of musical instruction, once a week, for 14 weeks. Subjects were pretested and posttested using Weikart's Rhythmic Competency Analysis Test (RCAT, 1982b). The RCAT was used to test subjects' beat performance skills by having each subject pat and walk to the beat of two musical selections (with a metronome beat of ♩ = 120 and ♩ = 132 beats per minute, respectively). A score of 1 was given to subjects who could not perform the tasks to steady musical beats. A score of 2 was given to subjects who were inconsistent in their beat-matching responses. A score of 3 was given to subjects who accurately matched the steady beats of a musical selection. For each motor task alteration (patting or walking) performed to two different musical selections, a subject received a composite score of 2 to 6.

Analyses of the data were conducted to determine effects of instructional treatment, gender, and motor task alteration on kindergarten children's beat performance skills. Percentages for accurate beat performance skills were calculated across subjects by independent variables. Only scores of subjects who received a score of 3 for a beat performance task were defined as accurate and included in percentage calculations. Mean scores and standard deviations also were calculated. A 2

(instructional treatment) x 2 (gender) x 2 (motor task alteration) factorial analysis of covariance was used to analyze the post-RCAT data. Pre-RCAT data served as the covariate to control for differences due to subjects' entrance-level behaviors and for bias due to intact class members serving as subjects (Keppel, 1973; Wildt & Ahtola, 1978).

Pre-RCAT scores were similar for both treatment groups; therefore, similar entrance level skills for both groups were assumed. Patting was slightly easier than walking and males were slightly less successful than females.

Both treatment groups improved on the post-RCAT. Males improved more than females across both treatment groups. However within each treatment group, males' and females' post-RCAT scores were similar. Patting was slightly easier than walking for the experimental group, but for the control group patting and walking scores were similar.

On post-RCAT scores the effect of treatment was significant ($p = .0001$) for the experimental group. Therefore, the null hypothesis that there will be no significant effect of instructional treatment on kindergarten children's beat performance skills was rejected.

The effect of gender was not significant ($p = .7761$). Therefore, the null hypothesis that there will be no significant effect of gender on kindergarten children's beat performance skills was retained.

The effect of motor task alteration was not significant ($p = .2100$). Therefore, the null hypothesis that there will be no significant effect of motor task alteration on kindergarten children's beat performance skills was retained.

The effects of interactions among instructional treatment, gender, and motor task alteration were not significant. Therefore, the null hypothesis that there will be no significant effects of interactions among instructional treatment, gender, and motor task alteration on kindergarten children's beat performance skills was retained.

Conclusions and Implications

Kindergarten children were selected as subjects for the present study because formal school music instruction usually begins with kindergarten. The kindergarten period is a critical time for intellectual, physical, and emotional growth. Beginning experiences in music and school need to be successful to maximize learning and minimize emotional damage or feelings of failure in the child. Skills and attitudes formed during these early years can have long-term effects, both good and bad.

Weikart's strategies appeared to be successful for developing beat competency in kindergarten children, thereby fostering success and positive effects. The researcher of this study realized that there may have been a teacher effect (i.e., strong differences in effectiveness and abilities of teachers). However, results of this study appeared to have been strong enough to exclude this possibility. Both groups did improve, but the experimental group improved significantly more. Additionally, results of the current study replicate findings of earlier research concluding that Weikart's rhythmic teaching strategies compared to other strategies positively affect children's beat-competency development (Weikart, 1982c). Replication of these findings help to minimize the importance of teacher effect on the outcome of the current study.

Results of this study suggest that experiences employing bodily movement to rhythmic phrase patterns should not be used with kindergarten children. Weikart's strategies, employing bodily movement with beat-only experiences for kindergarten children, appeared to be highly successful for developing beat performance skills and beat competency.

The research literature suggested that gender was an important variable affecting rhythmic skills (Gilbert, 1981; Greishaber, 1987; Weikart, 1982c). Specifically,

females appeared to be more successful at rhythmic tasks than males, especially at the kindergarten level. The research literature also suggested that motor task alteration affected beat performance skills; walking, involving large muscle responses, may be more difficult than tapping, involving smaller muscle responses (Greishaber, 1987; Rainbow, 1981; Rainbow & Owen, 1978; Weikart, 1982c). In the current study, however, the effects of gender and motor task alteration on beat-performance skills of kindergarten children were not significant.

Future Research

Music educators have determined that the development of beat competency is fundamental to rhythmic development and that an understanding of rhythm is fundamental to an understanding of music. Indeed, Weikart (1982c) stated that beat competency and rhythmic development affect many areas of learning (e.g., music, sports, and language). Music researchers have further suggested that the period of early childhood is an important time for developing these rhythmic skills and that intervention with effective musical experiences in early childhood is important for maximum learning to occur.

Results of this study have shown that research on beat competency can have important implications for music education. Little objective evidence exists relating to

the development of beat competency, especially relative to early childhood. Therefore, further research is needed to determine an appropriate sequence of beat-competency development and effective music-teaching techniques fostering such development. The following list of research areas warrant further study relative to the effects of music instructional strategies on beat performance skills:

1. Investigate early childhood rhythmic studies via replication.
2. Investigate via a longitudinal study, effects of Weikart's rhythmic teaching strategies on continued musical learning.
3. Retest subjects 1 month and 1 year after treatment to determine long-term effects of selected rhythmic teaching strategies on musical skills.
4. Incorporate only 1 teacher for both experimental and control groups to control for teacher effects on beat competency.
5. Investigate effects of Weikart's rhythmic teaching strategies on different age groups (3 to 8 years of age), thereby spanning the primary-age population.
6. Investigate relationships among beat competency and other learning constructs, such as intelligence and reading aptitude.

Future research as delineated above, may answer questions relative to rhythmic development and instruction. Such research should contribute to music educators' abilities to transform theories into efficient practices. Findings from future research should enable

music educators to plan appropriate music curricula and to develop effective teaching strategies for young children.

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APPENDIX A
FOUR-STEP LANGUAGE PROCESS WITH MOVEMENT

*Relationship Between Language and Movement
in the Four-Step Language Process*

LANGUAGE: BODY-PART IDENTIFICATION		MOVEMENT
SAY	HEAD, HEAD, HEAD, HEAD	No movement
SAY AND DO	HEAD, HEAD, HEAD, HEAD	Tap top of head while SAYING "HEAD"
WHISPER AND DO	Same as SAY AND DO, except whispered	Same as SAY AND DO
THINK AND DO	Language is repeated silently	Same as SAY AND DO
LANGUAGE: ACTION WORDS		MOVEMENT
SAY	TAP, TAP, TAP, TAP	Tap top of head while SAYING "TAP"
SAY AND DO	TAP, TAP, TAP, TAP	Same as SAY AND DO
WHISPER AND DO	Same as SAY AND DO	Same as SAY AND DO
THINK AND DO	Language is repeated silently	Same as SAY AND DO
LANGUAGE: MOVEMENT IDENTIFICATION		MOVEMENT
SAY	WALK, WALK, WALK, WALK	No movement
SAY AND DO	WALK, WALK, WALK, WALK	Walk while SAYING "WALK"
WHISPER AND DO	Same as SAY AND DO	Same as SAY AND DO
THINK AND DO	Language is repeated silently	Same as SAY AND DO
LANGUAGE: DANCE STEP		MOVEMENT
SAY	CROSS, SIDE, BACK, SIDE	No movement
SAY AND DO	CROSS, SIDE, BACK, SIDE	Execute dance steps simultaneously with language
WHISPER AND DO	Same as SAY AND DO	Same as SAY AND DO
THINK AND DO	Language is repeated silently	Same as SAY AND DO

Note. From Teaching Movement and Dance: A Sequential Approach to Rhythmic Movement by Phyllis S. Weikart, 1982, p. 17. Copyright 1982 by the High/Scope Educational Research Foundation. Reprinted with permission from the publisher.

<p style="text-align: center;"><i>Combining the Four-Step Language Process with Movement to Achieve A Basic Level of Rhythmic Competency</i></p>				
FOUR-STEP LANGUAGE PROCESS	RHYTHMIC COMPETENCY ACTIVITY LEVELS			
	LEVEL ONE Single Coordinated Motion	LEVEL TWO Alternating Single Motion	LEVEL THREE Double Coordinated Motion	LEVEL FOUR Combined Double Motions
I SAY	"HEAD, HEAD, HEAD, HEAD" or "PAT, PAT, PAT, PAT"	"HEAD, HEAD, HEAD, HEAD" or "PAT, PAT, PAT, PAT"	"HEAD, SHOULDERS, HEAD, SHOULDERS" or "WAIST, KNEES, WAIST, KNEES"	"HEAD, SHOULDERS, WAIST, KNEES"
II SAY AND DO	Unite language and movement. Both hands or feet used together.	Unite language and movement. Alter- nate hands or feet.	Unite language and movement. Both hands or feet used together.	Unite language and movement. Both hands or feet used together.
III WHISPER AND DO	Continue STEP II using a whisper.	Continue STEP II using a whisper.	Continue STEP II using a whisper.	Continue STEP II using a whisper.
IV THINK AND DO	Think the language and do the movements.	Think the language and do the movements.	Think the language and do the movements.	Think the language and do the movements.

¹Please note that LEVEL FIVE activities are introduced *after* a basic level of rhythmic competency is achieved; they are therefore omitted from this chart.

NOTE: When music is added, begin with STEP III, WHISPER AND DO, matching language and movement. If difficulty is experienced, WHISPER the words to the music *before* adding movement.

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APPENDIX B
RHYTHMIC COMPETENCY ANALYSIS TEST

Rhythmic Competency Analysis Test

The Rhythmic Competency Analysis Test is designed to assess an individual's ability to perform a movement task to an underlying beat of music. The test is presented in three levels of increasing difficulty. The same piece of music is used for each level of the test. Students are tested individually in a location away from other children or adults where the tester and the student will be alone and uninterrupted or distracted.

Use a tape recorder and two cassette tapes of musical selections with a strong steady beat. One musical selection should have a metronome beat of approximately 132 (♩ = 132) and the other selection should have a metronome beat of approximately 120 (♩ = 120). Both the student and the tester should be seated. Put students at ease with friendly, relaxed conversation.

Steps

1. To introduce the test, ask the student to play follow-the-leader with you. Lead the student through a sequence of patting the thighs for a minimum of 8 beats. Use a tempo that is different from the tempo of the musical selections you have chosen for the test.
2. To test the student's understanding of the task, ask him or her to be the leader. Suggest that the student pat the top of the head so you can follow his or her lead. Encourage definite movements, large enough to be easily assessed for beat accuracy.

3. Explain to the student that you are going to play some music and that he or she should listen for the beat and use both hands to pat the top of the head in time to the beat. If necessary, describe beat with a word the students will understand, such as pulse, heartbeat, walking beat, steady beat. Begin the tape of the first musical selection (with the metronome beat of approximately 132) beyond the musical introduction.
4. Ask the student to pat the top of the head and then the tops of the shoulders one after the other ("head, shoulders, head, shoulders. . ."). Be certain the student understands your instructions. (Demonstrate if necessary but not to the same tempo as the music.) Begin the test music again and have the student respond to the beat with this two-movement coordination task.
5. Ask the student to stand up and walk to the beat as you play the music. Again, be certain to begin the tape beyond the musical introduction. (Use the same test music as before.)
6. Play the second musical selection (metronome beat of 120) and have the student walk to this music also. This step is necessary for test accuracy in the event the first tempo matched the student's natural internal tempo.

Scoring

The test is scored on a scale from "1" to "3". A "1" is given to those students who cannot do the task to the steady beat of music (matching beat and movement accurately). A "2" is given to those students who are successful some of the time, but are inconsistent in their matching response. A "3" is given to those students who are totally successful with the task, matching the steady beat accurately.

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APPENDIX C
DISCUSSION OF EXPERIMENTAL GROUP APPROACH
AND SAMPLE ACTIVITIES

Discussion of Experimental Group Approach
and Sample Activities

The following ideas and activities provide examples of materials which were used with the experimental group in this study.

Weikart's (1982) strategy suggests that early childhood music programs should help the young child develop:

1. Basic comfort with movement
2. Rhythmic competency

Basic comfort with music can be developed by:

1. Developing body awareness
2. Using imagery with nonlocomotor movement
3. Introducing nonlocomotor activities to enhance the learner's visual and aural discrimination
4. Introducing locomotor activities with no external beat

Rhythmic competency can be developed by:

1. Beat awareness
2. Rhythmic coordination activities
 - A. Bilateral
 - B. One side (repetitious)
Other side (repetitious)
 - C. Alternating
 - D. Sequence movements
3. Walking to the beat

A four-step language process with movement can be used to achieve a basic level of rhythmic competency. After children have mastered the four-step language

sequence without music, music can be used (at the third step, if necessary).

Use of visual-only and aural-only decoding activities are an important part of the Weikart strategy.

1. Visual-only decoding activity.

The teacher says to the children, "Watch me and do what I do." Silently, with no speaking, the teacher places both hands on shoulders (pauses), places both hands on head (pauses), etc.

2. Aural-only decoding activity.

The teacher says to the children, "Do what I tell you to do." The teacher uses no visual cues, only oral instructions, saying, "Place your hands on your head (pause), shoulders (pause), waist (pause)," etc.

Lesson Plan Format

Lesson plans for the experimental group used the following format.

1. Visual decoding activity.
2. Aural decoding activity (sometimes with eyes closed).
3. Four-step language/movement "Say and Do" sequence (added later).
4. Pat body parts to music (added later -- used Weikart's "Rhythmically Moving Series" of recordings with Weikart's Early Childhood Education Activities: Supplement for Teaching Movement and Dance; designed for the record series).
5. Movement exploration activities (examples follow).

6. Speaking, singing, listening, and instrumental activities -- as time permitted. (These activities included sound stories, sound exploration activities, singing simple sol-mi songs and pitch matching activities, nursery rhymes and poems with simple movements and/or melodies, and listening to recordings or teacher demonstrated folk songs and children's classics).

Examples of Movement Exploration Activities

The following movement exploration experiences are arranged and presented in a sequential order, with much repetition. The first experiences involve non-locomotor movement, with no beat present. Later, the teacher matches the child's beat and eventually the child matches an external beat through locomotor and non-locomotor experiences.

Activity 1: (Name Game)

The children sit in a circle on the floor. Teacher begins by saying, "My name is - and I like" (act out a favorite activity without saying it). Continue around circle with each child.

Activity 2: (Sitting In Chairs)

Teacher says to children, "What can you make your head do? Can you move your head? Can you make it say yes? No? Can you move it in a circle? Can you move your shoulders? Up? Down?" etc.

Activity 3: (Sitting In Chairs)

Teacher says to children, "Can you make your hands walk on your legs? Can you make your heels only walk up and down? Can you make your feet walk in place?" etc. Teacher chooses one child at a time and matches child's walking beat to a hand drum.

Activity 4:

The teacher asks a child to take a walk around the room. The teacher matches the child's walk with a drum. Other children are invited to join in. Then, the drum decides what the children do. They learn to stop when the drum stops and walk when the drum beats.

Activity 5:

Add other instruments and movements to Activity 4. Children are asked to walk with the drum, stop with the triangle, shake with the tambourine, walk backward with the wood block or edge of drum, etc.

Activity 6: (Snowman)

Teacher says that it has been very cold and snowy. Children are to pretend to be snowmen. The sun has come out (teacher plays cymbal) and is very slowly melting the snowmen. Children are to melt very slowly, to the sound of the cymbal. Children become a puddle of water on the ground. Teacher strikes the woodblock and children are to get up with one jerky movement at a time (with each strike of the woodblock).

Activity 7: (Little Seeds)

Teacher tells the children that they are little seeds in the ground (the children curl up in little balls on the floor). Spring comes, with lots of rain, and waters the little seeds. The warm spring sun causes the little seeds to grow (one jerky movement at a time to the wood block). The seeds become beautiful flowers. The flowers smile at the sun and the sun smiles at the flowers. The warm summer breezes blow on the flowers (children gently sway to the glissando of a glockenspiel). Soon the fall winds begin to blow with lots of cold air, rain, thunder, and lightening (children sway and shiver to wind chimes and timpani). As winter comes, the flowers die and return to the ground as little seeds, sleeping all winter until spring comes again.

Activity 8: (Simon Says)

Children immediately echo "Simon says do this" and a motion at the same time. Motions are kept to four repetitions of the same motion. Teacher is leader at first. Later, children become leader.

Activity 9: (Punchinello)

- Verse 1. Look who's here, Punchinello, Punchinello.
Look who's here, Punchinello in the shoe.
- Verse 2. What can you do, Punchinello, Punchinello?
What can you do, Punchinello in the shoe?
- Verse 3. We can do it, too, Punchinello,
Punchinello.
We can do it, too, Punchinello in the shoe.
- Verse 4. Whom do you choose, Punchinello,
Punchinello?
Whom do you choose, Punchinello in the
shoe?

The children sit in a circle. A child is chosen during verse one to go into the center of the circle. During verse two he makes a motion while the others sing and clap. During verse three everyone copies the movements made by the leader. During verse four the leader chooses someone to come into the center and take his place in the circle. Game begins again with a new leader.

Activity 10: (Corn Patch)

Corn patch, corn patch,
Looking for a crow in a corn patch.
Here is one, big and fat.
Get out of here, crow, go scat, scat!

Process:

1. Children sit in a circle on the floor.
2. The children learn words by rote.
3. The teacher pats on legs to the beat while saying the words, asking the children to join in.

4. The teacher then goes around outside of circle while children chant words and pat on legs to beat.
5. Teacher selects a child to be the crow by patting on the child's shoulders to the beat while saying, "Here is one, big and fat. Get out of here crow, go scat, scat!"
6. At end of chant, child jumps up and runs (flys) around outside of circle and returns to place.
7. Chant begins again, teacher selects another child to be the crow.

Activity 11: (Hi! My Name Is Joe)

Hi! My name is Joe. I've got a wife and three kids and I work in a button factory. One day my boss came to me and said, "Joe, are you busy?" I said, "No." He said, "Turn the button with your right hand!" (add motion to beat) -- Repeat adding left hand, right foot, left foot, and head. The next time Joe is asked if he is busy he says, "Yes, Yes!" and falls down.

Process:

The children stand in a circle. The teacher starts the activity and asks the children to join in when they can.

APPENDIX D
DESCRIPTION OF CONTROL GROUP APPROACH
AND REFERENCES

Description of Control Group Approach
and References

A music educator from the Memphis Public School System taught the control group, employing materials and ideas based on traditional methods, using familiar songs and musical experiences. Singing, movement, dance, and listening experiences were emphasized. The development of rhythmic concepts behaviors was an important part of the curriculum; this included both beat experiences and rhythmic phrase pattern experiences with bodily movement. When a new song or speech activity was introduced the teacher frequently had the children clap the beginning rhythmic pattern of the words, melody, or phrase (i.e., "patti-cake, patti-cake" - □ | □ |).

The following rhythmic behaviors were emphasized:

1. The learner will demonstrate the ability to keep a steady beat.
2. The learner will identify the accented beat and demonstrate it.
3. The learner will demonstrate rhythm as "the way the words go."

A sample control group lesson plan included the following:

1. Greetings (i.e., echo singing on sol-mi syllables of children's names or phrases like "good morning").
2. Review song (repeat of familiar experience)
3. New song (introduction of new experience)

4. Rhythm skill activity (i.e., clapping rhythms written on a chart)
5. Review song
6. Movement, dance, or listening activity (i.e., "Circle Round the Zero")

Sample List of Control Group Song Experiences:

New Names
 Little Fingers
 Teddy Bear
 Patti Cake
 See Saw
 Bow Wow Wow
 Autumn Is Here
 Sausages
 Bernie Bee
 Walk and Stop
 Jack and Jill
 Peas Porridge Hot
 Baa Baa Black Sheep
 Bounce High, Bounce Low
 Starlight
 One Two Tie My Shoe
 Hot Cross Buns
 Bye Baby Bunting
 Engine, Engine Number Nine
 A Tisket A Tasket
 Old King Cole
 Oliver Twist
 This Old Man
 Come On Boys
 Goodbyes
 I Had A Dog
 Walk Along John
 Hickory Dickory Dock
 Blue Bird
 Six Little Ducks
 Circle Round the Zero
 Little Miss Mufet
 Rain Rain
 Sally Water
 Billy Bad
 We Are Dancing
 I'm Your Mirror
 Little Sally
 Bye Lo
 Donald Duck

Control Group References

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- Erdie, P. (Ed.). (1974). One hundred fifty American folk songs. Oceanside, NY: Boosey & Hawkes.
- Hall, D. (Ed.). (1961). Orff-Schulwerk: Nursery rhymes and songs. New York: Schott Music Corp.
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APPENDIX E
RAW DATA

RAW DATA

Codes:

Treatment: 1 = Experimental Group
2 = Control Group

Sex: 1 = Male
2 = Female

ID	TRT	SEX	Pretest						Posttest					
			Patting			Walking			Patting			Walking		
			132	120	SUM	132	120	SUM	132	120	SUM	132	120	SUM
1	1	1	3	1	4	1	1	2	2	1	3	1	1	2
2	1	2	2	2	4	2	2	4	3	3	6	1	1	2
3	1	1	2	1	3	2	1	3	3	3	6	3	3	6
4	1	1	1	1	2	1	1	2	3	3	6	1	1	2
5	1	2	2	2	4	2	2	4	3	3	6	3	3	6
6	1	1	1	1	2	1	1	2	1	1	2	2	2	4
7	1	2	3	3	6	3	3	6	3	3	6	3	3	6
8	1	1	1	1	2	1	1	2	1	1	2	1	1	2
9	1	1	1	1	2	1	1	2	1	1	2	1	1	2
10	1	1	2	2	4	2	3	5	3	3	6	3	3	6
11	1	1	1	1	2	1	1	2	1	1	2	1	1	2
12	1	1	3	3	6	1	2	3	3	3	6	2	2	4
13	1	1	1	1	2	1	1	2	1	1	2	1	1	2
14	1	1	2	1	3	1	1	2	2	3	5	1	1	2
15	1	2	1	1	2	1	1	2	1	1	2	1	1	2
16	1	2	2	2	4	2	2	4	3	3	6	3	3	6
17	1	1	1	1	2	1	1	2	1	1	2	2	1	3
18	1	1	3	3	6	3	3	6	3	3	6	3	3	6

ID	TRT	SEX	Pretest						Posttest					
			Patting			Walking			Patting			Walking		
			132	120	SUM	132	120	SUM	132	120	SUM	132	120	SUM
19	1	2	3	2	5	2	2	4	3	3	6	3	3	6
20	1	1	3	2	5	2	2	4	3	1	4	3	3	6
21	1	2	3	3	6	3	3	6	3	3	6	3	3	6
22	1	2	1	1	2	1	1	2	1	1	2	1	2	3
23	1	2	1	2	3	2	2	4	2	2	4	2	2	4
24	1	1	1	1	2	1	1	2	2	2	4	3	3	6
25	1	2	1	1	2	1	1	2	2	2	4	2	2	4
26	1	1	1	1	2	1	1	2	1	3	4	1	3	4
27	1	1	1	1	2	1	1	2	3	3	6	3	3	6
28	1	1	1	1	2	1	1	2	2	1	3	1	1	2
29	1	1	3	3	6	3	2	5	3	2	5	3	3	6
30	1	1	3	3	6	3	3	6	3	3	6	3	3	6
31	1	1	1	1	2	1	3	4	3	3	6	3	3	6
32	1	1	1	1	2	1	1	2	3	3	6	3	3	6
33	1	1	1	1	2	2	2	4	1	3	4	3	3	6
34	1	1	1	1	2	1	1	2	3	3	6	1	1	2
35	1	1	1	1	2	1	1	2	3	3	6	1	3	4
36	1	1	3	3	6	1	1	2	3	3	6	3	3	6
37	1	1	1	1	2	1	1	2	3	3	6	3	3	6
38	1	1	1	1	2	1	1	2	1	1	2	1	1	2
39	1	1	1	1	2	1	1	2	1	1	2	1	1	2
40	1	2	3	3	6	3	3	6	1	2	3	1	2	3
41	1	2	1	1	2	1	1	2	3	1	4	3	1	4
42	1	2	1	1	2	2	2	4	1	3	4	3	3	6

ID	TRT	SEX	Pretest						Posttest					
			Patting			Walking			Patting			Walking		
			132	120	SUM	132	120	SUM	132	120	SUM	132	120	SUM
43	1	2	2	2	4	2	2	4	3	3	6	3	3	6
44	1	2	2	3	5	3	3	6	1	1	2	2	1	3
45	1	2	1	1	2	1	1	2	2	2	4	2	2	4
46	1	2	3	1	4	3	2	5	1	1	2	3	3	6
47	1	2	1	1	2	1	2	3	1	2	3	1	2	3
48	1	2	1	1	2	1	1	2	1	2	3	1	2	3
49	1	2	1	1	2	1	1	2	1	2	3	1	2	3
50	1	2	3	3	6	3	3	6	3	3	6	3	3	6
51	2	1	2	3	5	2	3	5	3	3	6	3	3	6
52	2	1	1	1	2	1	1	2	3	1	4	3	1	4
53	2	1	1	1	2	1	1	2	3	3	6	3	3	6
54	2	1	2	3	5	1	1	2	3	3	6	3	3	6
55	2	1	1	1	2	1	1	2	3	3	6	3	3	6
56	2	1	1	1	2	1	1	2	3	3	6	3	3	6
57	2	1	1	1	2	1	1	2	3	3	6	3	3	6
58	2	1	2	1	3	2	1	3	3	3	6	3	3	6
59	2	1	3	3	6	3	3	6	3	3	6	3	3	6
60	2	1	1	1	2	1	1	2	3	3	6	3	3	6
61	2	2	1	1	2	1	1	2	3	3	6	1	1	2
62	2	2	3	3	6	2	1	3	3	3	6	3	1	4
63	2	2	2	2	4	3	3	6	3	3	6	3	3	6
64	2	2	1	1	2	1	1	2	3	3	6	3	3	6
65	2	2	3	1	4	3	2	5	3	3	6	3	3	6
66	2	2	3	3	6	3	3	6	3	3	6	3	3	6

ID	TRT	SEX	Pretest						Posttest					
			Patting			Walking			Patting			Walking		
			132	120	SUM	132	120	SUM	132	120	SUM	132	120	SUM
67	2	2	3	3	6	3	3	6	3	3	6	3	3	6
68	2	2	1	1	2	2	2	4	3	3	6	3	3	6
69	2	2	3	3	6	2	2	4	3	3	6	3	3	6
70	2	2	3	3	6	2	2	4	3	3	6	3	3	6
71	2	2	2	3	5	3	2	5	3	3	6	3	3	6
72	2	2	2	3	5	3	3	6	3	3	6	3	3	6
73	2	2	1	1	2	3	3	6	3	3	6	3	3	6
74	2	2	1	1	2	1	1	2	3	3	6	3	3	6
75	2	2	1	1	2	1	1	2	3	3	6	3	3	6
76	2	1	1	1	2	1	1	2	3	3	6	2	2	4
77	2	1	3	1	4	1	1	2	3	3	6	3	3	6
78	2	1	1	1	2	1	1	2	3	3	6	3	3	6
79	2	1	1	1	2	1	1	2	3	3	6	3	3	6
80	2	1	1	1	2	1	1	2	3	3	6	3	3	6
81	2	1	3	3	6	3	3	6	3	3	6	3	3	6
82	2	1	1	1	2	1	1	2	3	3	6	3	3	6
83	2	1	1	1	2	1	1	2	3	3	6	2	2	4
84	2	1	1	1	2	1	1	2	3	3	6	3	3	6
85	2	1	1	1	2	1	1	2	3	3	6	3	3	6
86	2	1	1	1	2	1	1	2	2	2	4	1	1	2
87	2	2	3	3	6	3	3	6	3	3	6	3	3	6
88	2	2	1	1	2	1	1	2	3	3	6	3	3	6
89	2	2	2	2	4	2	2	4	3	3	6	3	3	6
90	2	2	1	1	2	1	1	2	3	3	6	3	3	6

ID	TRT	SEX	Pretest						Posttest					
			Patting			Walking			Patting			Walking		
			132	120	SUM	132	120	SUM	132	120	SUM	132	120	SUM
91	2	2	1	1	2	1	1	2	3	3	6	3	3	6
92	2	2	1	1	2	1	1	2	3	3	6	2	3	5
93	2	2	1	1	2	2	2	4	3	3	6	3	3	6
94	2	2	3	3	6	3	3	6	3	3	6	3	3	6
95	2	2	1	1	2	1	1	2	3	3	6	3	3	6
96	2	2	3	3	6	3	3	6	3	3	6	3	3	6
97	2	2	1	1	2	1	1	2	3	3	6	2	2	4
98	2	2	3	3	6	3	1	4	3	3	6	3	3	6
99	2	2	3	1	4	2	1	3	3	3	6	3	3	6
100	2	2	3	2	5	2	2	4	3	3	6	3	3	6