THE EFFECT OF MUSIC TEMPO ON MOVEMENT RESPONSES OF PRESCHOOL CHILDREN

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Music

in

The School of Music

by

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B.M.E., Louisiana State University, 2002
August 2006

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Abstract

The purpose of this study was to examine the effect of tempo on movement responses of children ages one to three. For two weeks, 17 children between the ages of 22 and 36 months were videotaped twice per week to observe and measure their movement responses to fast and slow musical stimuli. During these sessions, the children were videotaped in their classrooms, engaged in either free play or in a quiet group activity. The videotaped sessions were then analyzed using a Motor Observation Form. Once all of the tapes had been viewed and scored, overall percentages of movement and no movement were calculated for the fast and slow selections. Within the movement category, overall percentages for locomotor, axial, and small motor movements were calculated as well.

Results indicated no significant difference overall due to the main effect of tempo ($p > .05$). A significant difference was found among the age groups in means for overall movement ($p = .0001$). Children in the middle age group (26-29 mos.) exhibited more movement responses than those in the youngest group (22-26 mos.) and the oldest group (29-36 mos.). Comparing the three movement categories also indicated a significant difference among the categories ($p < .0001$). Small motor movements were exhibited more frequently than axial and locomotor movements by a margin of 4:1. Results suggested a relationship between age and music tempo ($p = .0196$). The youngest and middle groups moved more during the slow selections, but the oldest group moved the most during the fast selections.

Review of Literature

Introduction

Movement activities are an integral part of any early childhood curriculum. These activities provide children with opportunities to manipulate their bodies in space, strengthen muscles, and improve coordination. From a musical standpoint they also help to develop a repertoire of movements that can be used spontaneously when creative movement is appropriate. Every stage of a child's development involves acquiring new motor skills and improving existing skills (Poole, Miller, and Church, 2005), necessitating many and varied practice environments. Therefore, early childhood music education curricula should reflect the importance of movement activities during the infant and toddler years. Both directed and creative movement should be a well-planned and integral part of any music class in early childhood.

Motor Development from Birth to Age Three

During early childhood, developmental processes in the skeletal system and the nervous system contribute to the acquisition of motor skills. In these years, children gain increased control of their movements and begin to develop fine motor skills (Larson and Zaichowsky, 1995). As children get older, their motor skills improve, both in general and in relation to music activities (Gilbert, 1980). Music and movement programs should be aligned with the steadily changing processes of motor skill development.

During the first year of life, infants generally gain control of their bodies and develop motor skills in cephalocaudal and proximodistal patterns (McDevitt and Ormrod, 2004). That is, motor development progresses from the head downward and from the inside to the outside. One-month-old infants have enough muscle control to move their heads from side to side and can briefly hold their heads erect. Gradually, the neck muscles become stronger and by around three months of age, they are able to hold their heads upright when held in a sitting position (Charlesworth, 2004). By about four months, an infant can support himself on his forearms and

lift the head and chest while lying prone. After this milestone has been achieved, infants are now strong enough to roll over from chest to back. It is also at this stage that infants develop the ability to hold an object and bring it to the mouth.

By about six months, many infants have the strength in their upper bodies to sit unsupported for a brief period of time. This increased muscle control also allows an infant to roll from back to stomach. At this age, infants can also transfer objects from hand to hand and reach for objects nearby. Seven-month-olds have gained enough strength to sit upright, unassisted. By eight months of age, some infants can pull themselves up to standing position and stand briefly with support.

As muscle development progresses down the body and outward from the center, the ability to walk a few steps with support develops. This usually happens between nine and ten months of age. One important fine motor skill that appears during this phase is the pincer grasp, the ability to pick up small objects with the thumb and forefinger. As balance and coordination improve, eleven-month-olds are usually able to stand alone. They also begin to use their increased fine motor control to feed themselves. Infants of this age can generally hold their own bottle and bring pieces of food to their mouths. The most important infant milestone, walking, usually happens around twelve or thirteen months, but can appear anytime between ten and 15 months (Meece, 1997).

During the second year of life, toddlers practice and improve on motor skills learned during the infant years and acquire new skills as well. The beginning of the second year usually involves a toddler learning to walk. As stated previously, this milestone may be achieved as early as ten months or as late as 15 months. Between 13 and 18 months, toddlers gain the ability to navigate stairs, climbing up and down on their hands and knees. During this period, they are also able to move from a sitting to a standing position without help (Charlesworth, 2004). By 15 months of age, a child can imitate the movements of another child (Flohr, 2005). As toddlers become more confident walkers, they develop another means of moving from place

to place – running. By the end of the second year, a toddler can run well, but not quickly, without falling (Flohr, 2005).

Increased coordination and balance during the third year of life mean marked improvement in skills already learned. The gait of the two-year-old child has become less jerky and begins to resemble adult walking. Running becomes the preferred mode of locomotion, gradually increasing in speed and efficiency during this year (Gallahue, 1976). Most two-year-olds begin to jump up with both feet off the floor during this year (Flohr, 2005). By about thirty months of age, balance and coordination have developed sufficiently enough to balance on one foot for about one or two seconds (Eisenberg, Murkoff, and Hathaway, 1996). Before children reach their third birthday, fine motor control is refined enough to allow removing clothes, eating and drinking without spilling, and turning the pages of a book without help (Charlesworth, 2004).

Just as infants pass through various stages of motor and cognitive development, they react differently to music and sounds in their environment based on their age. Beginning at about 29 weeks gestation, the hearing mechanism is complete and fetuses can hear and react to sounds in their environment (Standley, 2003). Even premature infants are capable of responding physiologically and behaviorally to musical stimuli. Cevasco and Grant (2005) used the Pacifier Assisted Lullaby (PAL) to help increase sucking patterns in premature infants. The PAL is a specially designed pacifier that, when sucked, starts a 10-second interval of music. The music stops after 10 seconds and will not resume until the infant begins to suck again. Over the course of this study, the infants increased their music listening time steadily over several trials by sucking more vigorously on the pacifier. This behavioral response did more than just reward the infants with music. Infants with vigorous sucking patterns fed better and consequently gained weight faster. Increased weight gain is an important health issue, as it means that the infants can be discharged from the hospital sooner. Standley et al. (in press) found similar results. In this study, infants at 34 weeks adjusted gestational age (AGA) who participated in multiple PAL trials were fed less frequently through a nasogastric or orogastric

tube than those who participated in only one trial. This meant that the 34-week AGA infants were able to be fed by mouth sooner, thus fulfilling one requirement for hospital discharge.

Young infants (2 to 3 months) can distinguish the human voice from other sounds. Infants as young as one month old can distinguish their mother's voice from other voices (Greata, 2006). Around six months of age, infants begin to make sounds with their own voices. They engage in vocal play by imitating sounds they hear around them and making up vocalizations of their own (Pound and Harrison, 2003). At eight months, infants can respond to music by moving their hands (Flohr, 2005). They can also intentionally make sounds of their own by banging on objects (Greata, 2006). By the time infants reach twelve months of age, they can bounce and rock to music while in a standing position.

As infants enter the second year of life, they become more participatory in music activities (Greata, 2006). They can remember and imitate portions of songs that they have heard (Pound and Harrison, 2003). Their increased mobility means that they have a greater variety of motor responses to music at their disposal. Toddlers can sway, bounce, twist, and clap to the beat of their favorite song (Pound and Harrison, 2003). If musical instruments or toys are near, one-year-olds will explore them in a variety of ways.

The third year of life brings increased refinement of cognitive and motor skills. In turn, musical skills improve as well. After toddlers reach their second birthday, they become more advanced in their singing abilities. Singing short phrases and groups of notes gradually gives way to singing parts of songs (Flohr, 2005). Two-year-olds are also more aware of the capabilities of their own voices. They explore the many ways their voices can be manipulated and begin to understand the difference between speaking and singing. They may even begin to improvise their own songs (Greata, 2006). Children of this age can rarely be completely still, so when music is played they almost always move in some way. Sometimes, their movements are synchronized with the beat or show some sort of awareness of tempo (Greata, 2006).

Movement in Early Childhood Music Curricula

A prominent music teaching approach that includes movement activities is the Dalcroze method, created by Swiss music educator Emile Jacques-Dalcroze (1865-1950). Dalcroze believed that vocal exercises and singing, paired with purposeful movements, were an ideal way to present musical concepts to students. Regarded by many as a core teaching methodology in early childhood music education, Dalcroze's method was not originally intended for children. Through the study of psychology, he recognized the great potential that his method held for music instruction at this age (Mark, 1996).

The Dalcroze method consists of three branches: eurythmics, solfege, and improvisation. At its core is the concept of experience before theory, where musical ideas are experienced through listening and performance exercises before presenting notation or written representations (Dale, 1998). The branch of eurythmics trains the body in rhythm and dynamics through kinesthetic exercises (www.dalcrozeusa.org). While the teacher or a student improvises at the piano, students use their bodies to creatively express what they hear in the improvised music. Use of solfege provides experiences in pitch, rhythm, and dynamics, later linking these experiences to music theory and notation (Dale, 1998). In this stage, ear training exercises in various keys help students develop "inner hearing" (Mark, 1996). Improvisation is a synthesis of the experiences in eurythmics and solfege. Students improvise on instruments, using their bodies and their voices (Dale, 1998). Allowing students to engage in these activities provides opportunities for transfer of information learned, rather than simply repeating facts. Although the Dalcroze method is divided into these three branches, some concepts are common to all three stages and experience gained in one area can carry over to the other two areas.

Like the Dalcroze method, the Orff approach to music teaching also uses movement to nurture musical development. Developed by Carl Orff, its central principle is the inseparability of music, movement, and speech (Landis and Carder, 1990). Children's natural speaking, singing, and movement patterns are used as the basis for music learning. Teachers use speech patterns

from children's chants and games to teach rhythmic concepts (Mark, 1996). Rhythms from these patterns are often performed on the body and then transferred to pitched and unpitched percussion instruments (Frazee and Kreuter, 1987). The falling third, a natural melodic pattern found in many children's games, is the first melodic interval introduced to children (Mark, 1996). Intervals are gradually added until the entire pentatonic scale has been learned (Frazee and Kreuter, 1987). True to the approach's central principle, movement is used to teach musical concepts in other areas. Children use their bodies to show pitch relationships and to physically experience musical pulse. After a basic foundation in singing, moving, and playing instruments has been formed, children begin to improvise. When given guidelines and a specific context, children can create original vocal and instrumental compositions (Frazee and Kreuter, 1987).

Another prominent music education program, Kindermusik®, is a music and movement-based curriculum for children from birth to age seven. It began in the 1960s in Germany as a program called *Musikalische Fruherziehung*, which means "music for the young child" (www.kindermusik.com/parents/about.asp). The program moved to the United States during the 1970s and adopted the name Kindermusik®. In a Kindermusik® class, parents and children engage in structured musical play. Children participate in music-making and music listening as a means to develop other important childhood skills, like creative thinking and problem solving (www.kindermusik.com/parents/about.asp). Movement and dance are used extensively throughout the Kindermusik® program. Children learn body awareness through songs and chants which label various body parts. Through synchronized movements, children develop beat awareness and the ability to match their internal steady beat with the steady beat of others. Expressive movement allows children to use their bodies to convey moods, actions, or even animals. As body awareness and movement repertoire increase, children become more imaginative and creative when moving expressively (C. Boles, personal communication, May 22, 2006).

Similar to Kindermusik®, Music Together® is a parent-child centered music and movement curriculum for children from birth to age four. Founded in 1987, the heart of the Music Together® curriculum is the belief that all children are musical and have the capacity to participate meaningfully in various types of music activities (www.musictogether.com/Public/AboutUs/aboutus.html). Music Together® classrooms take advantage of children's natural desire to imitate their parents, encouraging parents or caregivers to actively participate in music activities. Movement is an integral part of all classroom activities. Almost every activity is accompanied by some sort of movement. Fingerplays and other small motor movements accompany singing. Children move creatively to both live and recorded music with very little interference. Brief rhythmic interludes, performed on the body, are often echoed from the teacher. During instrumental activities, children are allowed to freely explore the sound-making capabilities of instruments without instruction on proper holding or hand position. The Music Together® curriculum is mainly focused on experience rather than performance, with the encouragement of the children's curiosity and creativity being the primary focus (S. Feres-Lloyd, personal communication, May 18, 2006).

Related Research in Early Childhood Music

Studies have shown that participation in music activities can have a positive effect on the development of other skills in early childhood. Jordan-DeCarbo and Galliford (2001) tested preschool children labeled as "at-risk" to determine whether participation in a ten-week music program improved their scores on the Preschool Evaluation Scale (PES). The PES is a test designed to identify children "who deviate enough from the norm to require either special services or a modified program in order to reach their maximum capacity" (p. 35). All of the children were given the PES at the beginning of the study. The experimental group received 45 minutes of music instruction every week for ten weeks, while the control group received no music instruction outside of regular classroom activities. At the conclusion of the study, the

participants took the PES for a second time. The children who received music instruction did better than those who did not on the Preschool Evaluation Scale.

Zachopoulou, Tsapakidou, and Derri (2004) investigated the effects of a developmentally appropriate music and movement program on motor development in 90 children ages four to six. As a pretest, all of the participants were assessed using the *Motoriktest fuer vier-bis sechsjaehrige kinder* (MOT). This test measured their level of development on jumping and dynamic balance. Fifty of the 90 participants followed a two-month music and movement curriculum based on principles of the Orff approach to music teaching. These children received 35-40 minutes of music instruction two times per week. The rest of the participants received physical education instruction that focused on the jumping and balancing tasks. At the end of the study, the participants were assessed again using the MOT. The children in the control group did not improve significantly from pretest to posttest. However, the experimental group showed greater improvement than the control group. This study found that the music and movement curriculum was more effective than the physical education program, positively impacting the development of jumping and dynamic balance in participants.

Based on age and developmental ability, children respond differently to musical stimuli. Infants as young as seven months old respond to musical characteristics by moving their bodies (Trehub, Thorpe, and Trainor, 1990). In this study, infants from seven to ten months of age were tested on their ability to distinguish a semitone change to the fourth note in three 5-note melodies. The three melodies used were a “good” Western melody, a “bad” Western melody, and a non-Western melody. If the infants were able to detect the change and turn their heads toward the sound source for the melody, they were reinforced by a mechanical toy. The results indicated that the infants were more capable of distinguishing the change in the “good” Western melody than in the other two melodies.

Generally, older children tend to exhibit more frequent responses to music than do younger children. In a study by Alford (1971), preschool twins and singletons were observed

responding to and interacting with various types of musical stimuli. Across all musical interactions, older children responded more frequently to the music than younger children. As the children matured, they sang more, performed more complex rhythms on instruments, imitated musical sounds more, and displayed more overt responses to music. In this instance, the children's musical development was connected to their cognitive and physical development.

Sims (1988) studied the differences in movement responses among preschool children, primary grade children, and college students. These three groups of participants were asked to listen to a short excerpt from the "Kangaroo" section of Camille Saint-Saens' *Carnival of the Animals*. The stimulus music was comprised of three phrases from the "Kangaroo" section: two short, similar phrases with different cadential chords followed by one longer phrase which began like the two shorter phrases. The participants were asked to "hop when the music sounds like the kangaroo is hopping" and stop "when the music sounds like the kangaroo has stopped hopping" (p. 111). Music for the experimental group was presented in its original form, while music for the control group was presented with the longer phrase first, followed by the two shorter phrases. The participants' responses were observed individually to determine whether prior experience with the longest phrase affected their movements. In general, the age of the participant affected the response to the longer phrase. As age increased, the number of incorrect responses to the extended phrase decreased. Fifty percent of preschoolers responded incorrectly to the extended phrase, meaning that they stopped hopping at the same point during the longer phrase as they did during the shorter phrase. None of the college students responded incorrectly for the entire extended phrase. A small percentage of the college students stopped hopping during the extended phrase, but they soon realized their error and resumed.

Suthers (1997) examined the movement responses of one-year-olds engaged in play with various sound-making devices. During outdoor free play time, sound makers were available to the children, as were other nonmusical toys. These instruments were either suspended on a

“sound line” above the children’s heads or attached to a mat. For two months, the researcher observed the children’s interactions with the instruments, noting the various types of sounds that the children made and how the children moved while playing with the instruments. Field notes taken during the observation period indicated a great variety of movement responses to the instruments, both gross motor and fine motor. Suthers also stressed the usefulness of exploratory activities such as these in examining the spontaneous reactions of children to their musical environment. Often, these spontaneous reactions give educators insight into new ways to incorporate music and movement activities into the daily classroom routine.

In some cases, movement responses are easier for children than verbal responses, as demonstrated by Van Zee (1976). One aspect of this study involved assessing kindergarteners’ ability to identify and describe musical concepts. Some of the concepts tested were pitch (high or low), melodic contour, note duration, and rhythmic patterns. The researcher discovered that the children seemed to be more capable of physically demonstrating their understanding of a musical concept, either through performance on an instrument or through body movements, than communicating their understanding verbally.

Cassidy (1992) found that pairing verbal instruction with either pictures or gestures significantly affected the ability to label certain music characteristics. In this study, 24 preschool children with speech and/or language difficulties and 24 children with typical language ability were randomly assigned to one of three treatment groups: verbal-only, verbal/visual, and verbal/gestural. Children in the verbal-only group were asked whether a musical excerpt was loud or soft, or if it was fast or slow. Children in the verbal/visual group were asked the same questions but were shown pictures representing the possible answers. Children in the verbal/gestural group were asked the same questions and shown physical gestures representing possible answers. Results indicated that the verbal/visual and verbal/gestural groups correctly identified more music characteristics that the verbal-only group.

Kerchner (2000) interviewed twelve students, six in second grade and six in fifth grade, for two 30-minute sessions. During these sessions, the students listened to a piece of music and were asked to respond to the excerpt in three different ways: verbally, visually, and kinesthetically. After examining the interview data, the researcher found that age was a major factor in the depth, linearity, and type of response. However, kinesthetic responses “best captured children’s linear thinking patterns” in both age groups (p. 32).

Environmental factors can have a direct impact on the responses of children to musical stimuli. Teacher interactions, along with peer influence, can elicit movement responses to music (Metz, 1989). This study examined the movement responses of 2-, 3-, and 4-year-olds to music during free play periods. Teacher modeling influenced movement responses in participants, with older students responding more favorably to adult models. Peer modeling also made up a large part of movement responses and was most effective when coupled with teacher reinforcement. The researcher concluded that describing, suggesting, and modeling behaviors not only promoted responses, but also functioned as reinforcement. Reinforcement, in turn, would lead to heightened musical perception and greater responses to music.

The connection between peer influence and expressive movement has also been examined. Flohr and Brown (1979) conducted two separate investigations, one with kindergarten children and one with preschool children. The research method was the same in both experiments. The participants were seated in a circle and were asked by the researcher to move their hands, arms, and head to show how the music moved. This procedure was done twice – once with the students wearing blindfolds and again with the blindfolds removed. In both age groups, peer imitation was higher with the blindfolds removed. The influence of peers significantly affected movement responses to the music stimuli.

Sims (1985a) also investigated the impact of outside influence on children’s movement responses to music. In this study, children between the ages of 2.7 and 5.1 years were asked to move to a 96-second audio stimulus before or after viewing a clip of three people dancing on a

television program. A portion of the music used in the television program served as the audio stimulus. The children were assigned to one of four groups: Group 1 watched the television clip first and then moved to the audio stimulus; Group 2 moved for 32 seconds, watched the television clip, and moved for 64 seconds; Group 3 moved for 64 seconds, watched the television clip, and moved for 64 seconds; Group 4, the control group, moved to the entire audio stimulus and then viewed the television clip. Data regarding participants' television viewing habits at home were also collected through parent questionnaires. Across all experimental groups, none of the participants attempted to imitate the movements of the persons on the television clip. Also, only nine of the participants moved in response to the television stimulus. In this case, outside influence did not seem to affect the children's spontaneous responses to the music.

Research has been conducted to evaluate children's movement responses to music in an isolated setting, removing the influence of peers and teachers. Sims (1985b) examined the creative movements of 22 children between the ages of three and five. The children, who performed the task with only the researcher present, listened to the stimulus music and moved in any way that they felt like moving. The researcher provided only encouragement to the participants. The children's performances were videotaped and analyzed, yielding results similar to those of previous research. Older children, in general, responded physically for a greater percentage of the recording interval than younger children. The researcher also found that the tempo of the stimulus music affected the rhythmic movements of the children. The selection in the stimulus music with the slowest tempo elicited the fewest number of rhythmic responses by the children.

Early childhood is a critical time for the development of motor skills. Because of this, movement activities are a primary focus in most early childhood music curricula. In addition to developmental considerations, teachers must also decide what type of music best stimulates movement in children of this age. The studies mentioned are a part of the body of literature on movement responses of young children to musical stimuli. However, few studies have examined

the movement responses of children under the age of three. There has also been very little research examining the role of tempo on the frequency and type of movement response. Therefore, the primary purpose of this study was to examine the effect of tempo on movement responses of children ages one to three.

Method

Participants were 17 children drawn from the population of a childcare center in a large southern metropolitan city. All children between the ages of one and three attending the center were eligible for inclusion. After submitting the research proposal to the Louisiana State University Institutional Review Board, “exemption from oversight” was granted for this study. The signed exemption form can be found in Appendix A. Since the children were observed in their classrooms, their group assignment was based on which classroom they were in. The youngest group (6 children) ranged in age from 22 months to 26 months; the middle group (5 children), ages 26 months to 29 months; and the oldest group (6 children), ages 29 months to 36 months. Although all of the children in the three classrooms were videotaped, data were collected only for those who returned parental consent forms for this study. A general video release form had been signed by all parents as a regular part of the application process at this university-sponsored childcare facility.

In order to determine whether tempo affected the natural physical reactions of children to music, fast and slow music was played in a free operant environment in the children’s classroom. The stimulus music was comprised of eight different musical selections; two slow vocal selections, two fast vocal selections, two slow instrumental selections, and two fast instrumental selections. Vocal selections that contained cues for movements (i.e. “wiggle,” “rock,” “sway,” etc.) were excluded from consideration. Excerpts were taken from each of the selections, each lasting between 70 and 95 seconds. All of the excerpts began at the beginning of the selection and ended at a musically logical point in the selection within the specified time guidelines. Excerpts played are shown in Table 1.

The excerpts were recorded on an audio compact disc, with a small (3-5 s) pause between excerpts, and played on a Durabrand model CD-2036 compact disc player at volume level 5. The stimulus music for the first week included the four vocal selections. The order of the selections during the first session was fast-slow-fast-slow. During the second session, the order

Table 1. Stimulus Music

Title	Type	Tempo	Duration
I Met A Bear (2002)	Vocal	MM = 120	1:27
It's Silly Time (2002)	Vocal	MM = 137	1:21
The Baby and the Moon (2002)	Vocal	MM = 71	1:34
All the Pretty Horses (2002)	Vocal	MM = 78	1:34
Brazilian Folk Dance Suite: Fiesta Quickstep! (Rhoads, 1986)	Instrumental	MM = 124	1:26
Suite from Bohemia: Tournament (Nelhybel, 1969)	Instrumental	MM = 134	1:16
They Led My Lord Away (Gordon/Allen, 1990)	Instrumental	MM = 60	1:27
Americana Folk Suite: Sweet Nelly (Kopetz, 1997)	Instrumental	MM = 78	1:14

was reversed. The same procedure was followed the second week with the four instrumental selections. Week 1 sessions lasted ten minutes, 14 seconds, and Week 2 sessions lasted nine minutes, 38 seconds. Two minutes of silence were videotaped at both the beginning and the end of each session. The silence at the beginning of the session was used to get the children accustomed to the camera being in the room. At the end of the session, the silence was used to transition from the experimental condition to regular classroom activities.

While the music was played, children were engaged in a variety of quiet activities, such as playing with toys, painting, or drawing. The youngest and oldest groups were engaged in arts and crafts activities during all four sessions. All of the sessions for the middle age group were recorded during free play time. The classroom teachers were instructed not to give feedback or encouragement to the children related to their motor responses. During videotaping, the

researcher did not talk or interact with the children except to keep them away from the video equipment. The participants were videotaped so that their physical responses could be quantified, as recommended by Sims (1987). Two Canon NTSC ZR40 digital video cameras were positioned in each classroom to ensure that all participants were in the sight of the camera. Since the cameras were not able to capture all areas of the classroom, they were placed near the outer edge of the children's play area and adjusted as needed by the researcher. This allowed the children to be captured "up close" from multiple angles. The classroom teachers assisted the researcher by keeping the children in the primary play area so that they could be in the view of at least one of the cameras. The videotaped sessions were burned onto a CD so that they could be viewed for analysis purposes.

Data from the videotaped sessions were transcribed using a Motor Observation Form adapted from Sims (1985b), shown in figure 1. The children's responses were categorized in one of four categories of movement: locomotor, axial, small motor, and no movement (Sims, 1985b). Locomotor movements were considered the "projection of the body into external space by altering its location in either a vertical or horizontal plane" (Gallahue, 1976, p. 4). This category included movements such as jumping, running, skipping, or lying down on the floor. Axial movements were non-locomotor movements that involved the whole body, such as bouncing or swaying (Sims, 1985b). Small motor movements were non-locomotor movements in which a single body part, such as an arm or a leg, was moved (Sims, 1985b). No movement meant that the child was completely still for the entire interval. A fifth category, out of view, was added to denote when a child moved out of the view of both cameras.

A partial interval time-sampling procedure with 10 second "observe" and 5 second "record" intervals was used for data transcription, cued by an audio CD. Data for each child were recorded on four observation forms, one for each session. Multiple categories of movement could be recorded within an interval, but if "no movement" was marked, no other categories of motor response could be recorded. In addition to the researcher, a second trained

Time (Minutes)	Observe 1	Record 2	Observe 3	Record 4	Observe 5	Record 6	Observe 7	Record 8
1		L A S N O		L A S N O		L A S N O		L A S N O
2		L A S N O		L A S N O		L A S N O		L A S N O
3		L A S N O		L A S N O		L A S N O		L A S N O
4		L A S N O		L A S N O		L A S N O		L A S N O
5		L A S N O		L A S N O		L A S N O		L A S N O
6		L A S N O		L A S N O		L A S N O		L A S N O
7		L A S N O		L A S N O		L A S N O		L A S N O
8		L A S N O		L A S N O		L A S N O		L A S N O
9		L A S N O		L A S N O		L A S N O		L A S N O
10		L A S N O		L A S N O		L A S N O		L A S N O

Figure 1. Motor Observation Form

observer viewed 20% of the tapes and performed an independent analysis for reliability. Reliability for the three movement categories was as follows: locomotor, r = .97; axial, r = .92; small motor; r = .95. Reliability for the no movement and out of view categories combined was r =.99.

For each session, the totals for each movement category were converted into percentages. The percentages were then averaged to obtain an overall percentage for locomotor, axial, and small motor movements. Percentages of movement during the fast and slow selections were calculated by counting the number of intervals in which movement occurred and dividing by the number of recording intervals in each selection. These percentages were averaged to obtain four overall percentages for movement and no movement,

two for the fast selections and two for the slow selections. The data were also divided by age group to determine whether age affected the type or quantity of movement responses.

Results

For two weeks, 17 children between the ages of 22 and 36 months were videotaped twice per week to observe and quantify their movement responses to fast and slow musical stimuli. During these sessions, the children were videotaped in their classrooms, engaged in either free play or in a quiet group activity. The videotaped sessions were then analyzed using a Motor Observation Form. Once all of the tapes had been viewed and scored, percentages were calculated by age across tempo and movement categories.

Typical of children of this age, all of the participants were perpetually in motion. Overall, the participants moved for 94.18 percent of the time that music was played. During the remaining 5.82 percent, the participants either did not move or were out of the view of both cameras.

In order to determine whether tempo or age affected the type of movement responses ~~of~~ among the participants, further analysis was completed on the intervals during which participants moved. Percentages were calculated of the intervals coded as locomotor, axial, and small motor movements in both fast and slow excerpts across the three age groups. This resulted in six averages for each subject (tempo by movement type). Raw data are displayed in Appendix C. A Three-Way Analysis of Variance (ANOVA) with Repeated Measures (Age X Tempo X Movement Type) was performed on these data. Results are presented in Table 2.

As presented in Table 2 and displayed in Figure 2, results indicated a significant difference among the age groups in means for the main effect of movement [$F(2, 14) = 18.08$, ($p = .0001$)]. The middle age group ($M = 55.29$, $SD = 27.26$) had higher mean percentages across the movement categories than the oldest group ($M = 36.37$, $SD = 41.92$) and the youngest group ($M = 39.94$, $SD = 37.82$). The oldest group had the lowest mean for overall movement. A significant difference was also observed among the types of movement most frequently exhibited by the participants [$F(2, 28) = 335.62$, ($p < .0001$)]. As displayed in Figure 3, the mean percentage of small motor movements observed was 90.45 ($SD = 10.89$), over four

Table 2. Source Table for Analysis of Variance for Tempo and Category of Movement by Age

	df	Sum of Squares	Mean Square	F-Value	P-Value
Age	2	6448.68	3224.34	18.08	.0001
Subject (Group)	14	2496.81	178.34		
Tempo	1	119.78	119.78	2.62	.1277
Tempo x Age	2	481.88	240.94	5.27	.0196
Tempo x Subject (Group)	14	639.72	45.69		
Type of Movement	2	109073.66	54536.83	335.62	<.0001
Type of Movement x Age	4	8746.90	2186.73	13.46	<.0001
Type of Movement x Subject (Group)	28	4549.89	162.5		
Tempo x Type of Movement	2	59.84	29.92	.59	.5598
Tempo x Type of Movement x Age	4	721.64	180.41	3.57	.0178
Tempo x Type of Movement x Subject	28	1414.25	50.51		

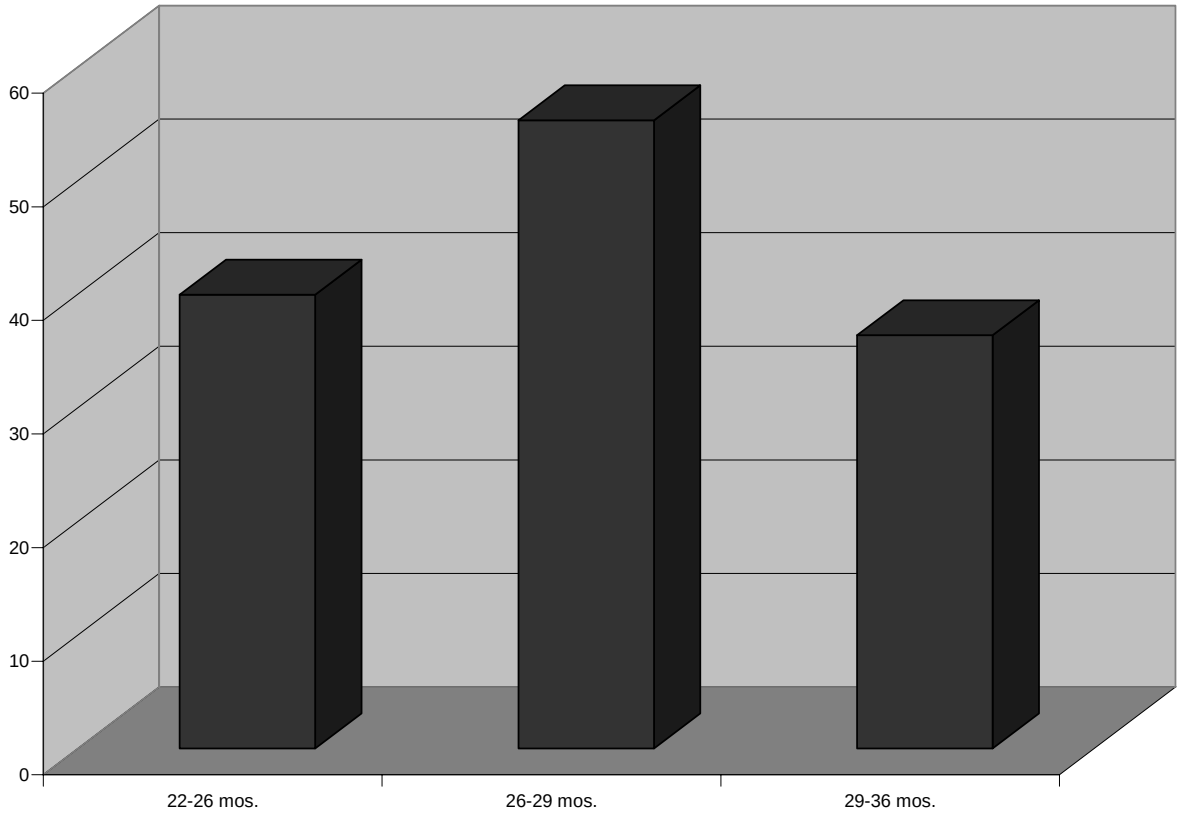

Figure 2. Mean Percentages of Overall Movement by Age

times the mean percentages of both the axial (*M* = 18.95, *SD* = 11.25) and locomotor (*M* = 20.19, *SD* = 23.09) categories. There was no significant difference found due to the main effect of tempo ($p > .05$).

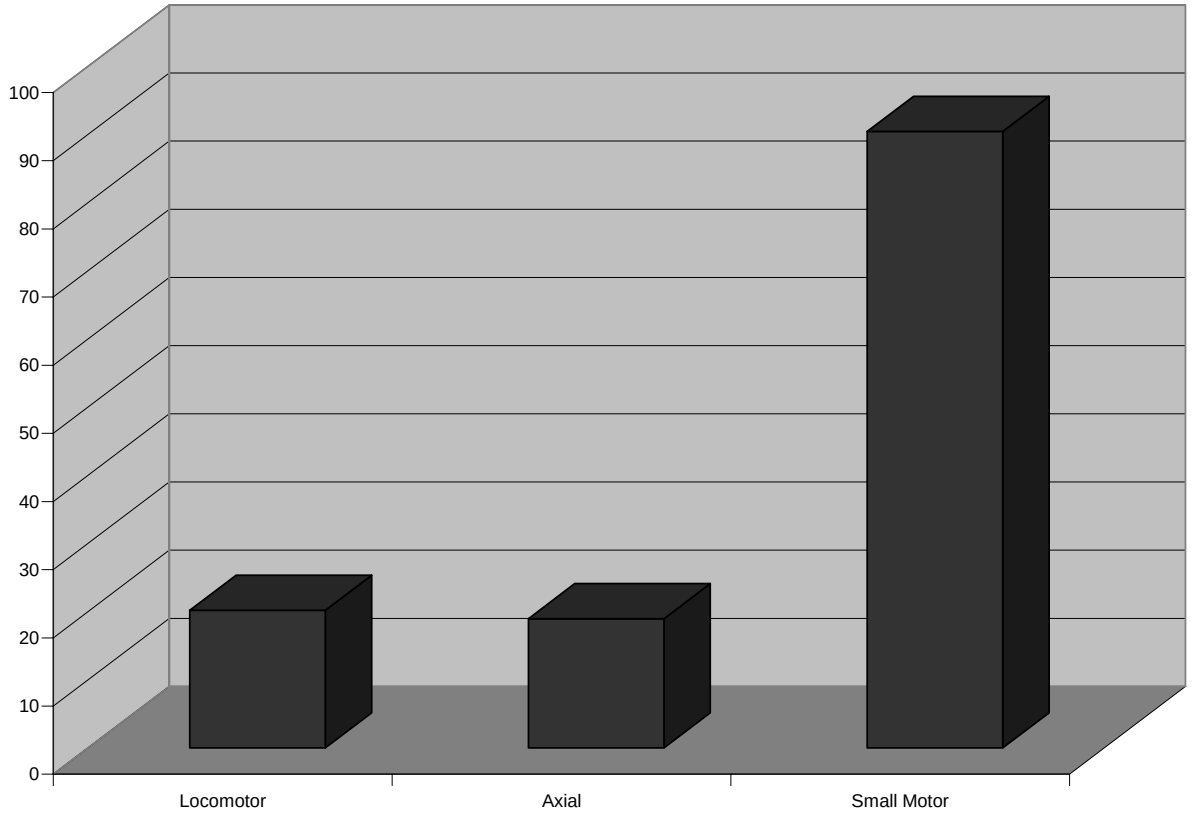

Figure 3. Overall Mean Percentages by Category of Movement

Results also indicated a significant interaction between age and tempo of excerpts [$F(2, 14) = 5.27$, ($p = .0196$)]. Data are displayed in Figure 4. Both the youngest and middle age groups tended to move more during the slow selections. Means for movements during slow selections for the youngest and middle groups were 41.78 (*SD* = 40.30) and 58.59 (*SD* = 26.23) respectively. Means for movements during fast selections for the youngest and middle groups were 38.1 (*SD* = 36.26) and 51.99 (*SD* = 28.78) respectively. The oldest group showed slightly

more movement responses during the fast selections (*M* = 38.25, *SD* = 42.08) than slow selections (*M* = 34.5, *SD* = 42.9).

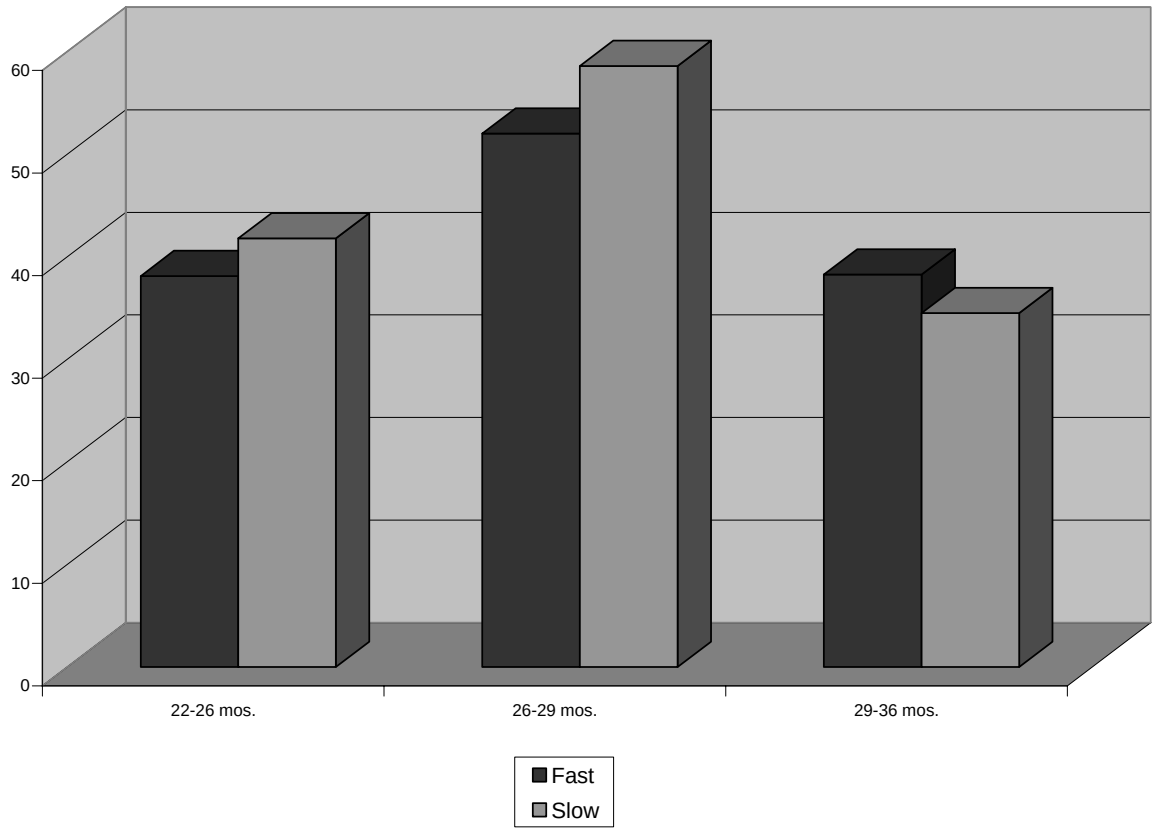

Figure 4. Mean Percentages of Movement by Age and Tempo

Figure 5 illustrates the significant interaction between age and type of movement response [$F(94, 28) = 13.46$, ($p < .0001$)]. Means are presented in Table 3. The middle age group exhibited more locomotor and axial movements than the other two groups. The youngest and oldest groups responded more frequently with axial movements than locomotor movements. The amount of small motor movement responses was fairly similar across the three age groups. There was no significant interaction between tempo and movement type ($p > .05$).

Table 3. Category Means by Age Group

	Youngest (22-26 mos.)		Middle (26-29 mos.)		Oldest (29-36 mos.)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Locomotor	11.29	12.68	50.41	16.50	3.89	3.07
Axial	19.01	9.25	28.36	9.78	11.06	8.20
Small Motor	89.51	15.86	87.11	8.35	94.17	4.57

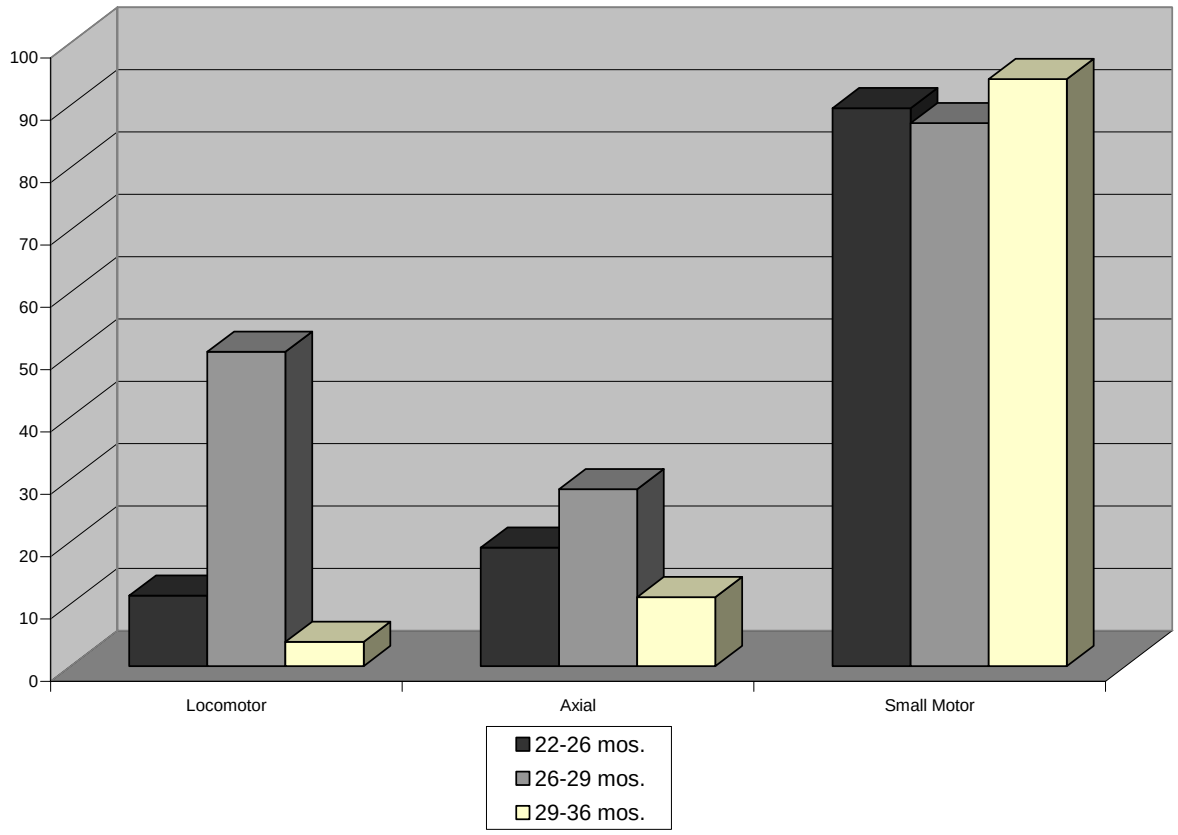

Figure 5. Category Means by Age Group

Comparing age, type of movement, and tempo revealed a significant three way interaction across the variables [$F(4, 28) = 3.57$, ($p = .0178$)], as seen in Figure 6. Means are presented in Table 4. The middle age group had the most locomotor and axial movements in both the slow and fast selections. The oldest group had the most small motor movements during the fast selections and the youngest children had the most small motor movements during the slow selections.

Table 4. Category Means by Age Group and Tempo

	Youngest (22-26 mos.)		Middle (26-29 mos.)		Oldest (29-36 mos.)	
	Fast	Slow	Fast	Slow	Fast	Slow
Locomotor	*M* = 15.37 *SD* = 15.04	*M* = 7.21 *SD* = 9.36	*M* = 44.12 *SD* = 16.64	*M* = 56.71 *SD* = 15.38	*M* = 6.00 *SD* = 2.671	*M* = 1.78 *SD* = 1.69
Axial	*M* = 15.34 *SD* = 7.62	*M* = 22.68 *SD* = 9.89	*M* = 25.76 *SD* = 10.35	*M* = 30.96 *SD* = 9.55	*M* = 13.19 *SD* = 7.90	*M* = 8.92 *SD* = 8.64
Small Motor	*M* = 83.59 *SD* = 21.46	*M* = 95.44 *SD* = 2.99	*M* = 86.1 *SD* = 11.07	*M* = 88.11 *SD* = 5.64	*M* = 95.55 *SD* = 2.82	*M* = 92.79 *SD* = 5.77

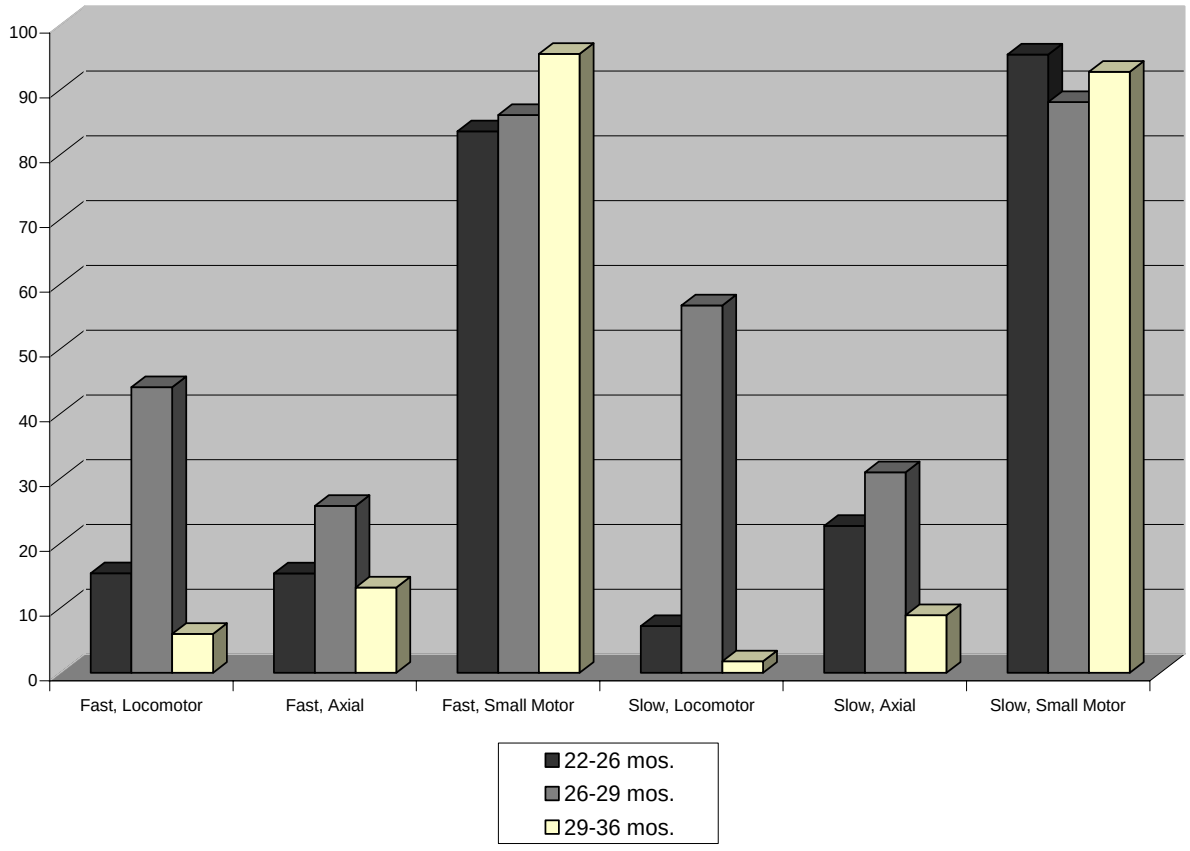

Figure 6. Category Means by Age Group and Tempo

Discussion

The primary purpose of this study was to examine the effect of tempo on movement responses of children ages one to three. Since this period is so critical to motor development, music and movement activities must be developmentally appropriate and well-structured in order to reap maximum benefits. Through these activities, children have the opportunity to gain strength and coordination, develop a repertoire of creative movement responses, and experience new ways of moving their bodies in space. The results of this research can help both preschool educators and preschool music educators coordinate effective music and movement activities that have a positive effect on their students' motor development.

In overall movement, the middle age group (26-29 mos.) exhibited more movement responses to the musical stimuli than the youngest (22-26 mos.) and oldest (29-36 mos.) groups. This is somewhat consistent with past research. In Sims' (1985b) study, the oldest group of children (5-year-olds) moved the most and the youngest children (3-year-olds) moved the least. In the present study, the children closest to three years of age exhibited the fewest movement responses but were not the youngest group to participate. Alford (1971) found that as children grew older, they responded more frequently to musical stimuli. Perhaps the reason the middle age group outscored the other two groups is because of the activity in which they were engaged. The youngest and oldest groups were involved in activities during which most of the children were seated; the middle group was observed while participating in free play time, during which most of the children were not seated. Since attention span tends to lengthen with age, the oldest children may have been too preoccupied with their activity to pay attention to the music. Future research should control the setting in which the musical stimuli are presented. In the music classroom, teachers should plan activities in which the students are actively engaged in music making. Instead of simply playing music and having the students move however they wish, teachers can give guidelines for students' responses to the music. For instance, a teacher

could ask the students to move only one body part in as many different ways as possible. Teacher guidance can provide structure without completely limiting the students' creativity.

Examining overall movement by category revealed an extremely high frequency of small motor responses compared to locomotor and axial responses. This was especially noticeable in the youngest and oldest age groups. This was to be expected given the type of activity in which these two groups were engaged. Painting, drawing, and using modeling clay require lots of small motor movements. The youngest and oldest groups were engaged in one of these activities during all four sessions. Future researchers may wish to have all of the children engaged in some sort of non-directed activity, but this will make keeping the children's attention more difficult.

Both the middle and oldest groups exhibited a somewhat predictable pattern across type of movement and tempo. In the middle group, axial movements were exhibited the least and small motor movements were exhibited the most in both the fast and the slow selections. In the oldest group, locomotor movements were exhibited the least and small motor movements were exhibited the most in both the fast and slow selections. The pattern of the middle group is consistent with the three-year-olds in Sims' (1985b) study.

Peer imitation may have had an impact on the results of this study. During the process of analyzing the tapes, peer imitation was noticed frequently, especially in the youngest and middle groups. For instance, during one session a participant in the middle group walked over to the window and began to jump up and down while holding on to the window sill. Within seconds, about five other children joined the first child. This continued for about 15-20 seconds. During another session, children in the middle group reacted physically to one of the slow selections. In the corner of the classroom, there were three pillows placed on the floor. After listening to a few seconds of the music, one of the participants went to the corner to lay on one of the pillows. Another child came over a few seconds later and began rubbing the first child's back, as if to soothe her to sleep. The form used during analysis was designed to quantify and categorize the

children's movement responses and was not capable of specifically describing how the children reacted to the music. A qualitative approach may have been more useful in this situation.

In the youngest group, one child began to beat their paint roller on the table in time with one of the fast selections. Soon, all of the children in the classroom joined in. This is similar to the research of Flohr and Brown (1979), which found a great deal of peer imitation during creative movement activities. Future research might explore the effect of isolation on the frequency of movement responses in children of this age. As suggested in the aforementioned study, teachers can use imitation to their advantage. In the classroom, teachers can model movements for students or designate a child to serve as a model. Through modeling, children can discover new ways of moving their bodies, adding to their repertoire of movement responses to music.

In this childcare facility, music is played as an accompaniment to classroom activities every day. These children are used to being in a musical environment, possibly contributing to the participants' tendency to tune out the stimulus music. During pilot testing, the researcher attempted to choose a volume for the stimulus music that would make it louder than the ambient noise in the classroom and more noticeable than the background music they were accustomed to. After examining the videotapes of the sessions, it was apparent that the volume of the stimulus music had little or no effect on the frequency of movement responses. The stimulus music was of secondary importance to the activities in which the participants were engaged in. Also, the children in this study do not have the benefit of music instruction by a qualified music specialist. All music activities are coordinated by the classroom teachers. Had a music teacher been present, the children may have developed a repertoire of purposeful movements to music. Instead of being passive listeners, the children may have been active participants in this musical experience.

In early childhood, music and movement activities are necessary to help develop basic skills in both musically and non-musically related pursuits. Balance, self-awareness,

coordination, and a sense of internal rhythm are all developed through movement activities. Since toddlers and preschoolers are constantly growing and changing, teachers must continually assess the progress of their students to determine whether their curriculum is developmentally appropriate. A child's natural curiosity, creativity, and spontaneity can be an impetus to music learning experiences through movement. Teachers should use these qualities to their advantage to create a nurturing environment for music learning and exploration.

References

Alford, D.L. (1971). Emergence and development of music responses in preschool twins and singletons: A comparative study. *Journal of Research in Music Education, 19*(2), 222-227.

All the pretty horses. On *Baby's First Lullabies* [CD]. Armonk, NY: Great American Audio. (2002)

The baby and the moon. On *Baby's First Lullabies* [CD]. Armonk, NY: Great American Audio. (2002)

Cassidy, J.W. (1992). Communication disorders: Effect on children's ability to label music characteristics. *Journal of Music Therapy, 29*(2), 113-124.

Cevasco, A.M. and Grant, R.E. (2005). Effects of the Pacifier Activated Lullaby on weight gain of premature infants. *Journal of Music Therapy, 42*(2), 123-139.

Charlesworth, R. (2004). *Understanding Child Development*. Clifton Park, NY: Delmar Learning.

Dale, M. (1998). The Dalcroze method. Retrieved 6 March 2006 from http://www.musicstaff.com/lounge/article15.asp.

Eisenberg, A., Murkoff, H.E., & Hathaway, S.E. (1996). *What to expect the toddler years*. New York: Workman Publishing.

Flohr, J.W. and Brown, J. (1979). The influence of peer imitation on expressive movement to music. *Journal of Research in Music Education, 27*(3), 143-148.

Flohr, J.W. (2005). *The musical lives of young children*. Upper Saddle River, NJ: Pearson Education, Inc.

Frazee, J. and Kreuter, K. (1987). *Discovering Orff: A curriculum for music teachers*. New York: Schott Music Corporation.

Gallahue, D.L. (1976). *Motor development and movement experiences for young children.* New York: John Wiley & Sons.

Gilbert, J.P. (1980). An assessment of motor skill development in young children. *Journal of Research in Music Education*, 28, 167-175.

Gordon, A. J., arr. Fred J. Allen (1990). They led my Lord away [Recorded by North Texas Wind Symphony, Eugene Corporon, conductor]. *Teaching Music through Performance in Band: Resource Recordings, Volume 2* [CD]. Chicago: GIA Publications. (1999)

Greata, J. (2006). *An introduction to music in early childhood education*. Clifton Park, NY: Thomson Delmar Learning.

I met a bear. On *102 Full-length Children's Songs: Volume 1* [CD]. Akron, OH: Twin Sisters Productions. (2002)

It's silly time. On *102 Full-length Children's Songs: Volume 2* [CD]. Akron, OH: Twin Sisters Productions. (2002)

Jordan-DeCarbo, J. and Galliford, J. (2001). The effects of a sequential music program on the motor, cognitive, expressive language, social/emotional, and musical movement abilities of preschool disadvantaged children. *Early Childhood Connections*, 7, 30-42.

Kerchner, J.L. (2000). Children's verbal, visual, and kinesthetic responses: Insight into their music listening experience. *Bulletin of the Council for Research in Music Education, 146*, 31-50.

Kindermusik®. Retrieved 6 March 2006 from http://www.kindermusik.com/parents/about.asp.

Kopetz, B. (1997). Americana folk suite: Sweet Nelly. [Recorded by North Texas Wind Symphony, Eugene Corporon, conductor]. *Teaching Music through Performance in Band: Resource Recordings, Volume 2* [CD]. Chicago: GIA Publications. (1999)

Landis, B. & Carder, C. (1990). The Orff approach. In P. Carder (Ed.) *The eclectic curriculum in American music education: Contributions of Dalcroze, Kodály, and Orff*. Reston, VA: Music Educators National Conference.

Larson, G.A. & Zaichkowsky, L.D. (1995). Physical, motor, and fitness development in children and adolescents. *Journal of Education*, *177*(2), 55-79.

Mark, M.L. (1996). *Contemporary music education*. New York: Schirmer.

McDevitt, T.M. & Ormrod, J.E. (2004). *Child development: Educating and working with children and adolescents*. Upper Saddle River, NJ: Prentice Hall.

Meece, J.L. (1997). *Child and adolescent development for educators.* New York: McGraw Hill.

Metz, E. (1989). Movement as a musical response among preschool children. *Journal of Research in Music Education*, 37(1), 48-60.

Music Together®. Retrieved 6 March 2006 from http://www.musictogether.com/Public/AboutUs/default.html.

Nelhybel, V. (1969). Suite from Bohemia: Tournament. [Recorded by North Texas Wind Symphony, Eugene Corporon, conductor]. *Teaching Music through Performance in Band: Resource Recordings, Volume 2* [CD]. Chicago: GIA Publications. (1999)

Poole, C., Miller, S.A., & Church, E.B. (2005). How children develop motor skills. *Early Childhood Today, 19*(7), 22-25.

Pound, L. & Harrison, C. (2003). *Supporting musical development in the early years.* Philadelphia, PA: Open University Press.

Rhoads, W. E. (1986). Brazilian folk dance suite: Fiesta quickstep! [Recorded by North Texas Wind Symphony, Eugene Corporon, conductor]. *Teaching Music through Performance in Band: Resource Recordings, Volume 2* [CD]. Chicago: GIA Publications. (1999)

Sims, W.L. (1985a). Television, creative movement, and the preschool child. *ISME Yearbook,* 12, 103-109.

Sims, W.L. (1985b). Young children's creative movement to music: Categories of movement, rhythmic characteristics, and reactions to changes. *Contributions to Music Education*, 12, 42-50.

Sims, W.L. (1987). The use of videotape in conjunction with systematic observation of children's overt, physical responses to music: a research model for early childhood music education. *ISME Yearbook*, 14, 61-67.

Sims, W.L. (1988). Movement responses of pre-school children, primary grade children, and pre-service classroom teachers to characteristics of musical phrases. *Psychology of Music, 16*, 110-127.

Standley, J.M. (2003). *Music therapy with premature infants: Research and developmental interventions*. Silver Spring, MD: The American Music Therapy Association.

Standley, J.M., Cassidy, J.W., Grant, R., Cevasco, A., Szuch, C., Nguyen, J., et al. (in press). The effect of music reinforcement for non-nutritive sucking via the PAL (Pacifier-Activated Lullabies Apparatus) on achievement of oral feeding by premature infants in the NICU. *Journal of Pediatric Nursing*.

Suthers, L. (1997). Infant and toddler movement responses to sound making. *Early Childhood Connections: Journal of Music- and Movement-Based Learning*, 3, 19-24.

Trehub, S.E., Thorpe, L.A., & Trainor, L.J. (1990). Infants perception of good and bad melodies. *Psychomusicology, 9*(1), 5-19.

Van Zee, N. (1976). Responses of Kindergarten Children to Musical Stimuli and Terminology. *Journal of Research in Music Education,* 24 (1), 14-21.

Zachopoulou, E., Aggeliki, T., & Derri, V. (2004). The effects of a developmentally appropriate music and movement program on motor performance. *Early Childhood Research Quarterly*, 19, 631-642.

Appendix A
Exemption from Institutional Oversight

IRB #: 3201 LSU Proposal #:_____ **Revised:** 04/15/2005

LSU INSTITUTIONAL REVIEW BOARD (IRB) for HUMAN RESEARCH SUBJECT PROTECTION

578-8692 FAX 6792
Office:203 B-1 David Boyd Hall

APPLICATION FOR EXEMPTION FROM INSTITUTIONAL OVERSIGHT

Study exempted by Louisiana State University Institutional Review Board 203 B-1 David Boyd Hall 225-578-8692 Robert C. Mathews, Chair

Unless they are qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/projects using living humans as subjects, or samples or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

Instructions: Complete this form.

Exemption Applicant: If it appears that your study qualifies for exemption send:

(A) Two copies of this completed form,
(B) a brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts A & B),
(C) copies of all instruments to be used. If this proposal is part of a grant proposal include a copy of the proposal and all recruitment material.
(D) the consent form that you will use in the study. **A Waiver of Written Informed Consent is attached and must be completed only if you do not intend to have a signed consent form.**
(E) Certificate of Completion of Human Subjects Protection Training at http://cme.cancer.gov/clinicaltrials/learning/humanparticipant-protections.asp. (Unless already on file with the IRB.)

to: ONE screening committee member (listed at the end of this form)in the most closely related department/discipline or to IRB office.

If exemption seems likely, submit it. If not, submit regular IRB application. Help is available from Dr. Robert Mathews, 578-8692, irb@lsu.edu or any screening committee member.

Principal Investigator Melanie W. Alexander **Student?** Y Y/N

Ph: (225) 252-2785 **E-mail** mwoods3@lsu.edu **Dept/Unit** College of Music and Dramatic Arts

If Student, name supervising professor Jane Cassidy Ph: 578-3258
Mailing Address 352 Hatcher Hall Ph
Project Title The Effect of Music Tempo on Movement Responses of Preschool Children

Agency expected to fund project N/A
Subject pool (e.g. Psychology Students) Children ages 1-3 attending the LSU Child Care Center
Circle any **"vulnerable populations" to be used**: (children <18; the mentally impaired, pregnant women, the aged, other). Projects with incarcerated persons cannot be exempted.
I certify my responses are accurate and complete. If the project scope or design is later changed I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted.

PI Signature Melanie W. Alexander **Date** 12/1/05 (no per signatures)

Screening Committee Action: Exempted X Not Exempted ____ Category/Paragraph _____

Reviewer S. Kim MacGregor Signature S. Kim MacGregor Date 12/6/05

Part A: DETERMINATION OF "RESEARCH" and POTENTIAL FOR RISK

This section determines whether the project meets the Department of Health and Human Services (HSS) definition of research involving human subjects, and if not, whether it nevertheless presents more than "minimal risk" to human subjects that makes IRB review prudent and necessary.

1. **Is the project involving human subjects a systematic investigation, including research, development, testing, or evaluation, designed to develop or contribute to generalizable knowledge?**

(Note some instructional development and service programs will include a "research" component that may fall within HSS' definition of human subject research).

☒ **YES**

☐ **NO**

2. **Does the project present physical, psychological, social or legal risks to the participants reasonably expected to exceed those risks normally experienced in daily life or in routine diagnostic physical or psychological examination or testing?** You must consider the consequences if individual data inadvertently become public.

☐ **YES Stop.** This research cannot be exempted--**submit application for IRB review.**

☒ **Continue** to see if research can be exempted from IRB oversight

3. **Are any of your participants incarcerated?**

☐ **YES Stop.** This research cannot be exempted--**submit application for IRB review.**

☒ **Continue** to see if research can be exempted from IRB oversight.

4. **Are you obtaining any health information from a health care provider that contains any of the identifiers listed below?**

A. Names

B. Address: street address, city, county, precinct, ZIP code, and their equivalent geocodes. Exception for ZIP codes: The initial three digits of the ZIP Code may be used, if according to current publicly available data from the Bureau of the Census: (1) The geographic unit formed by combining all ZIP codes with the same three initial digits contains more than 20,000 people; and (2) the initial three digits of a ZIP code for all such geographic units containing 20,000 or fewer people is changed to '000'. (Note: The 17 currently restricted 3-digit ZIP codes to be replaced with '000' include: 036, 059, 063, 102, 203, 556, 692, 790, 821, 823, 830, 831, 878, 879, 884, 890, and 893.)

C. Dates related to individuals

i. Birth date

ii. Admission date

iii. Discharge date

iv. Date of death

v. And all ages over 89 and all elements of dates (including year) indicative of such age. Such ages and elements may be aggregated into a single category of age 90 or older.

D. Telephone numbers;

E. Fax numbers;

F. Electronic mail addresses;

G. Social security numbers;
H. Medical record numbers; (including prescription numbers and clinical trial numbers)
I. Health plan beneficiary numbers;
J. Account numbers;
K. Certificate/license numbers;
L. Vehicle identifiers and serial numbers including license plate numbers;
M. Device identifiers and serial numbers;
N. Web Universal Resource Locators (URLs);
O. Internet Protocol (IP) address numbers;
P. Biometric identifiers, including finger and voice prints;
Q. Full face photographic images and any comparable images; and
R. Any other unique identifying number, characteristic, or code; except a code used for re-identification purposes; and
S. The facility does not have actual knowledge that the information could be used alone or in combination with other information to identify an individual who is the subject of the information.

☐ **YES Stop.** This research cannot be exempted--**submit application for IRB review.**

☒ **Continue** to see if research can be exempted from IRB oversight.

Part B: EXEMPTION CRITERIA FOR RESEARCH PROJECTS

Research is exemptable when all research methods are one or more of the following five categories. Check statements that apply to your study:

☒ **1. In education setting, research to evaluate normal educational practices.**

☐ ---

2. For research not involving vulnerable people [prisoner, fetus, pregnancy, children, or mentally impaired]: observe public behavior (including participatory observation), or do interviews or surveys or educational tests:

The research must also comply with one of the following:
either that

☐ a) the **participants cannot be identified**, directly or statistically;

or that

☐ b) the **responses/observations could not harm participants if made public**;

or that

☐ c) **federal statute(s) completely protect all participants' confidentiality**;

or that

☐ **3. For research not involving vulnerable people [prisoner, fetus, pregnancy, children, or mentally impaired]: observe public behavior (including participatory observation), or do interviews or surveys or educational tests:**

- **all respondents are elected, appointed, or candidates for public officials.**

☐ **4. Uses only existing data, documents, records, or specimens properly obtained.**

The research must also comply with one of the following:

***either that*:**

☐ **a) subjects cannot be identified** in the research data directly or statistically, and no-one can trace back from research data to identify a participant;

or that

☐ **b) the sources are publicly available**

☐ **5. Research or demonstration service/care programs, e.g. health care delivery.**

The research must also comply with all of the following:

☐ **a)** It is directly **conducted or approved by the head of a US Govt. department** or agency.

and that

☐ **b) it concerns only issues under usual administrative control** (48 Fed Reg 9268-9), e.g., regulations, eligibility, services, or delivery systems;

and that

☐ **c) its research/evaluation methods are also exempt from IRB review.**

☐ **6. For research not involving vulnerable volunteers [see "2 & 3" above], do food research to evaluate quality,taste, or consumer acceptance.**

The research must also comply with one of the following:

either that

☐ **a) the food has no additives;**

or that

☐ **b) the food is certified safe by the USDA, FDA, or EPA.**

NOTE: Copies of your IRB stamped consent form must be used in obtaining consent. Even when exempted, the researcher is required to exercise prudence in protecting the interests of research subjects, obtain informed consent if appropriate, and **must conform to the Ethical Principles and Guidelines for the Protection of Human Subjects (Belmont Report), 45 CFR 46, and LSU Guide to Informed Consent**; (Available from OSP or http://appl022.lsu.edu/osp/osp.nsf/$Content/LSU%20IRB%20Documents)

HUMAN SUBJECTS SCREENING COMMITTEE MEMBERS can assist & review:

Appendix B
Consent Form

Project Title:	The Effect of Music Tempo on Movement Responses of Preschool Children
Performance Site:	Louisiana State University Child Care Center
Investigators:	Melanie W. Alexander, Graduate Student The supervising professor is available for questions, M-F, 8:00 a.m. - 4:30 p.m. Dr. Jane W. Cassidy College of Music and Dramatic Arts, LSU (225) 578-3258
Purpose of the Study:	The purpose of this research project is to determine if preschool children's movement responses to music are affected by the music's tempo.
Inclusion Criteria:	Children 1-3 years of age.
Exclusion Criteria:	Children who do not meet the age requirements.
Description of the Study:	Over a period of two weeks, 2 days per week, the investigator will play music during the children's free play time and videotape their movement responses. The order of the stimulus music during the first week will be fast-slow-fast-slow. During the second week, the order will be reversed.
Benefits:	None.
Risks:	There are no known risks.
Right to Refuse:	Participation is voluntary, and a child will become part of the study only if the parent agrees to the child's participation. At any time, the participant's parent may withdraw the participant from the study without penalty or loss of any benefit to which they might otherwise be entitled.
Privacy:	This is an anonymous study. Videotapes will only be viewed by the investigators.
Financial Information:	There is no cost for participation in the study, nor is there any compensation to the subjects for participation.

Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigator. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, Institutional Review Board, (225) 578-8692. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Parent's Signature _____ Date _____

The parent/guardian has indicated to me that he/she is unable to read. I certify that I have read this consent from to the parent/guardian and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

Signature of Reader _____ Date _____

Study exempted by
Louisiana State University
Institutional Review Board
203 B-1 David Boyd Hall
225-578-8692
Robert C. Mathews, Chair

Appendix C
Table of Raw Data

	Fast			Slow	
	Locomotor	**Axial**	**Small Motor**	**Locomotor**	**Axial**	**Small Motor**
Youngest 1	39.39	23.48	43.18	21.83	21.79	92.67
Youngest 2	14.96	20.45	91.67	15.39	34.67	94.23
Youngest 3	13.64	4.55	77.66	0	18.13	92.31
Youngest 4	24.24	21.21	100	6.06	34.85	97.62
Youngest 5	0	8.71	89.02	0	12.99	95.81
Youngest 6	0	13.64	100	0	13.64	100
Middle 1	43.94	31.56	96.97	70.6	39.87	96.97
Middle 2	61.11	17.68	75.76	72.03	39.66	82.6
Middle 3	57.77	38.26	95.83	56.62	22.98	87.2
Middle 4	19.7	28.41	86.64	35.26	33.19	89.61
Middle 5	38.07	12.88	73.3	49.04	19.09	84.19
Oldest 1	9.09	6.82	100	2.27	4.55	94.16
Oldest 2	2.27	11.36	95.46	0	3.57	89.01
Oldest 3	8.71	11.17	91.1	1.92	7.42	83.11
Oldest 4	4.55	25	95.65	1.92	25.39	97.73
Oldest 5	6.82	20.26	95.46	4.55	10.66	94.51
Oldest 6	4.55	4.55	95.65	0	1.92	98.22

Vita

A native of Thibodaux, Louisiana, Melanie Woods Alexander received a Bachelor of Music Education degree from Louisiana State University in 2002. She has taught general music at both the preschool and elementary level at Country Day School in Baton Rouge, Louisiana. Alexander is a member of MENC: The National Association for Music Education, Pi Kappa Lambda, Omicron Delta Kappa, and Sigma Gamma Rho Sorority, Incorporated. Upon completion of her master's degree, she plans to teach elementary general music in the Zachary Community School System in Zachary, Louisiana.