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The effects of different incidental listening experiences on performance achievement and developmental music aptitude of first-grade Suzuki violin and non-violin students

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THE EFFECTS OF DIFFERENT INCIDENTAL LISTENING EXPERIENCES ON PERFORMANCE ACHIEVEMENT AND DEVELOPMENTAL MUSIC APTITUDE OF FIRST-GRADE SUZUKI VIOLIN AND NON-VIOLIN STUDENTS

By

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ABSTRACT

THE EFFECTS OF DIFFERENT INCIDENTAL LISTENING EXPERIENCES ON PERFORMANCE ACHIEVEMENT AND DEVELOPMENTAL MUSIC APTITUDE OF FIRST-GRADE SUZUKI VIOLIN AND NON-VIOLIN STUDENTS

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The purpose of this study was to investigate the effect of incidental listening experiences on the performance achievement of beginning Suzuki violin students and developmental music aptitude of first-grade students. The following specific problems were investigated: (a) the effects of different listening experiences (a wide variety of music, only repeated Suzuki repertoire, none) on the performance achievement of first-grade beginning Suzuki violin students, (b) the effects of these different listening experiences on the developmental music aptitude of first grade students whether receiving Suzuki instruction or not, and (c) the effects of Suzuki violin instruction on the developmental music aptitudes of first-grade beginning Suzuki violin students.

The sample consisted of 170 Taiwanese first-grade students; 66 in three Suzuki groups and 104 in three non-Suzuki groups. The *Primary Measures of Music Audiation* (PMMA) was administered to all subjects as a pretest. Students in the three Suzuki

groups received the same Suzuki violin instruction but different daily listening treatments. The three non-Suzuki groups received the same three listening treatments as the three Suzuki groups. At the end of the 21-week instructional period, PMMA was again administered to all subjects as a posttest. Students in the Suzuki groups were also individually audiotaped performing "Twinkle Variation A" and "Yankee Doodle." Their performances were rated by three independent judges on Intonation, Rhythm, and Tone Quality on a researcher-designed rating scale.

Results suggested that simultaneous incidental listening to the piece studied and a variety of other music is most profitable for performance achievement, although statistical significance was not achieved. The Rhythm aptitude mean gains of non-violin students who received typical Suzuki listening treatment were significantly greater (α=.05) than those who did not receive any listening treatment. In the population with high pre-instruction Tonal aptitude, Suzuki students who did not receive the listening treatment were found to improve significantly (α=.05) in Rhythm and overall music aptitude compared to students who received neither Suzuki violin instruction nor listening treatment. It was also found that the overall music aptitude of first grade students was significantly improved (p=.01) after 21 weeks of beginning Suzuki violin instruction.

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CHAPTER ONE

INTRODUCTION

This study investigates the relationships of incidental listening to recorded music and music instruction to instrumental performance achievement and development of musical aptitude. Incidental listening is an important component of Suzuki pedagogy. Listening to recorded music of pieces they have learned, are learning, or will learn in the near future is a part of Suzuki students' daily duties. Although Suzuki teachers have experienced and anecdotally reported that repeated incidental listening to an audiotape model of pieces students are learning helps them to learn easily and perform well, few controlled studies on this phenomenon exist. Edwin Gordon (1986, p. 72) also affirms the value of incidental listening; however, he suggests that listening to a wide variety of music, rather than repeated listening to a limited repertoire, helps increase children's developmental music aptitude (Levinowitz, 1989, p. 81). Research has not yet been done comparing these two types of listening. The common threads of research that inquire into music listening and musical learning concern the effects of using recorded models in instrumental learning and the identification of environmental factors that influence children's musical response and capabilities.

Gordon purports that music aptitude is developmental in the early years of life. It can be affected during the first nine years not only by the musical environment but also by music instruction. In response to Gordon's views, many studies have been done to examine the concept of developmental music aptitude and to evaluate which instructional

approach is most effective to develop music aptitude. That it may develop as a result of appropriate music instruction is supported by research. However, no definite conclusions have been reached by studies on the effects of Suzuki instruction on the development of music aptitude.

The Role of Listening in the Suzuki Method

The Suzuki method, according to Suzuki himself, should be called the "mother tongue" approach (Starr, 1976). Suzuki believed that every child has the potential to speak his native language and that the process through which a child learns to speak his mother tongue is a marvelous educational process (Suzuki, 1981, p. 5). The newborn baby hears his mother tongue at birth and continues being exposed to this language throughout his or her youth. As long as he is a normal child, he can fluently speak this language at age five or six, no matter how difficult it is. Thus, obviously, there must be listening before speaking. Suzuki believed that "what does not exist in the environment cannot be developed" (Suzuki, 1983, p.12). By repeated stimulation and practice, the child can develop abilities and make them his own (Suzuki, 1973, p.3).

When the concept of the mother tongue is applied to music education, a rich musical environment should be established from birth, rather than waiting for formal lessons to begin, just as the baby has been exposed to his native language from his birth, long before his formal schooling. Suzuki felt that "musical education should start shortly after birth, with the baby being exposed to repeated playings of a single selection of music" (Starr, 1976, p. 7). Rather than listening to various recordings throughout the day or listening to classical music on the radio all day long, Suzuki suggested that repeated

listening to limited repertoire is more effective. He felt that exposure to a wide variety of music may lead the child to assimilate some of the general characteristics of the music, but that repeated exposure to limited repertoire leads the child to memorize the melody (Starr, 1976, p. 7) and also teaches note sequences, pattern recognition, pitch sensitivity, and sensitivity to musical expression (Bigler & Lloyd-Watts, 1979, pp. 24-25). In Suzuki's opinion, having the melody memorized is invaluable to instrumental learning. First, it motivates the child to want to play the music. Second, the child will be able to pay attention to his playing without being distracted by notation. However, repeated limited listening is not the only type of listening suggested by Suzuki; he also encouraged advanced students to listen to a variety of recordings of the same work to learn interpretation (Starr & Starr, 1986; Mills,1974).

Suzuki believed that "man is the product of his environment" (Suzuki, 1983, p. 37) and that the newborn baby naturally has the ability to accustom himself to the environment just as he accustoms himself to the sounds of the "mother tongue." He did not believe in innate ability; in contrast, he believed that "it is a superior environment that has the greatest effect in creating superior abilities" (Suzuki, 1983, p.13) and that "the only superior quality a child can have at birth is the ability to adapt itself with more speed and sensitivity to its environment than others" (Suzuki, 1983, p.13). Therefore, he suggested that babies should listen to famous works and beautiful music from birth, regardless of the difficulty of the music, instead of out-of-tune lullabies sung by a mother (Suzuki, 1981, p. 9). He also believed that students internalize good music by listening to it continuously (Suzuki, 1981, p.25). He said, "From my tests of twenty years, I have found that young children who have been given a chance to listen to good music acquire a good sense of

music -- just like naturally being accustomed to their mother tongue" (Starr, 1976, p. 7). Applying this belief to violin teaching, Suzuki had children listen to the performances of famous violinists like Fritz Kreisler many times, while he taught them the technique of violin playing and tone production. He believed that in this way, the children would internalize the sensitivity of Kreisler, and perhaps even surpass Kreisler. He believed that in some sense, the children would be having a lesson with Kreisler when they listened to Kreisler's performance. Kreisler taught them musical sensitivity, and Suzuki taught them the technique of violin playing. (Suzuki, 1981, p. 25)

Suzuki constantly reiterated the importance of listening for instrumental learning. He told mothers that "the young child's rate of progress is directly dependent upon the amount of listening he does" (Starr, 1976, p. 7). Attentive listening, however, is not required for the young child. He can listen while having breakfast, playing in the sandbox, or riding his bicycle. Suzuki teachers believe that the child can "easily absorb the sounds without seeming to be paying any attention to the music" (Starr, 1976, p.7). However, in addition to unconscious listening, concentrated listening is necessary for the advanced student to distinguish some delicate nuances in the music (Starr, 1976, p.8).

Suzuki teachers usually suggest three phases of listening for their students. First, the student should listen to the piece that he is studying. Second, he should listen to recordings of the pieces that he will study in the near future so that the time to learn new pieces can be shortened. Third, he should listen to the pieces that he has learned earlier to keep them fresh in his memory (Starr, 1976; Slone, 1982).

Although the specific relationship between listening and performance has largely not been researched, there is general agreement among music educators on the value of

inclusion of music listening in instrumental performance instruction. Suzuki is neither the only one nor the first one who held this opinion. Schleuter (1984) offered that listening to recorded models of music helps to develop skill in producing tone quality in instrumental learning. Hartshorn (1953) stated that recordings have great potential value in the development of pitch, tempo, tone quality, phrasing, and dynamics in instrumental learning of elementary school students (as cited in Folts, 1973, p. 6). In the beginning instrumental music program of the Manhattanville Music Curriculum Program (MMCP), listening to tape-recorded models was included in the activities of beginning instrumental music instruction (Thomas, 1970, as cited in Schleuter, 1986, p.82).

Audio recordings may serve as aural models in the learning of performance. The aural model generates in the listeners internal images of performance, which have been recognized by music educators and psychologists as having a strong relationship to performance learning. Steven Keele (1976, p. 126) believed that the detailed music templates that are established in the brain by listening provide children models to compare with their own performances and to recognize their own errors. Wickes (1982, p. 23) suggested that a clear mental image of the music to be learned would make music practice easier. Schleuter (1986) concluded that "there is little doubt that efficient practice depends upon the development of internalized models of performance" (p.82). In the performance pedagogy NLP, which stands for Natural Learning Process, programming the brain with good musical images is listed as the first step of performance learning (Kohut, 1985, p. 18). Most studies that have investigated the relationship of the aural model to performance achievement have made positive comments on the effects of the aural model.

Listening and the Development of Music Aptitude

Music aptitude is defined by Edwin Gordon as the potential to learn music (Gordon, 1986, p. 3). In contrast to the belief that music aptitude is hereditary, Gordon purports that music aptitude is a product of both nature and environment (Gordon, 1986, p. 4). He believes that everyone is born with some level of music aptitude, but this can be affected by the environment in the first nine years of life. From birth through approximately age nine, one's music aptitude can either increase, decrease, or remain the same but will never be higher than that with which one was born. After approximately age nine, music aptitude will no longer be affected by any environmental factors or music instruction and will not continue to fluctuate. It will stabilize and remain at about that level throughout life. After age nine, one's music aptitude scores may increase from year to year, but his/her percentile ranks will remain relatively constant (Gordon, 1986, p. 4). The terms "developmental music aptitude" and "stabilized music aptitude" individually represent two stages of music aptitude: before and after aptitude stabilization.

According to Gordon (1986), listening is one of the environmental factors that may influence the development of music aptitude. Just as a young child needs to hear conversation to develop his language ability, exposure to music, either unconscious or conscious, is important for the development of musical ability. Schleuter (1984) suggested that "informal exposure through listening to music is the first step in the process of developing an awareness of tonality" (p.67). Gordon (1986) believes that "the child unconsciously absorbs what he hears but does not comprehend" (p. 71) and that the quality and quantity of the music a child unconsciously listens to helps him to acquire the ability to recognize music styles and elements, which is the basis of his comprehending

music at a later time (p.72). He considers unconscious listening to be of greatest value to the young child and suggested that "no effort should be made to make the young child listen to what is being played, nor should the playing of the music be discontinued if the young child does not appear to be attending to it" (Gordon, 1986, p. 72). Brand (1985) seconded Gordon's view by asserting that the child can benefit from listening to music without the need to attend to it. It appears to Gordon that "the most crucial time for unconscious listening to music is before age three" (p. 72).

To provide appropriate music listening experience, Gordon suggested that all styles of music should be heard, including classical music of different eras, ethnic music from various cultures, popular music, jazz, and so on (Levinowitz, 1989, p.81). Many educators have agreed that exposure to a wide variety of musical styles and elements is appropriate for young children (Bentley, 1975, p. 28; Kenney, 1989, p. 35; Matter, 1982, p. 307; Metz, 1989, p. 50). Gordon recommended several criteria for music that is good for tonal and rhythmic aptitude development. The difficulty level of music is not a concern because high quality "adult" recordings are favored by Gordon over those intended for children. Good tone quality is the foremost criterion in consideration for music for listening. Following tone quality, timbre, dynamics, tonality, tempo, and meter are of concern. Music with frequently changing timbre and contrasting dynamics is preferred. Gordon believes that "the more contrasting dynamics sections and contrasting timbre sections the music has, the better the impression it will make on the young child" (1986, p. 72). The children should also have opportunities to listen to melodies in various tonalities, such as major, minor, dorian, phrygian, lydian, mixolydian, and aeolian (Levinowitz, 1989, p.81). This idea was supported by Schleuter, who suggested (1984)

that children be provided with opportunities for repeated listening to recorded songs with melodies in various modes. For rhythmic development, Gordon (1986) suggested that many different tempos and meters should be heard. However, a piece of music with frequent changes of tempo or meter is not appropriate. Children may not learn the need for stability of tempo if the tempo within a piece exaggeratedly changes. In Gordon's opinion, "a given selection, or at least a major part of a selection, should remain in the same tempo and the same meter," but different pieces of music in different tempos and meters should be heard (p.74).

Music Instruction and the Development of Music Aptitude

Gordon believes that developmental music aptitude is a result of the interaction of innate capacities with environmental influences, including music instruction. In his study in western New York (1979), PMMA was administered to seventy-seven 5- to 8- year-old children in a community school and 75 children of the same age in a private academic school. The test results were compared to the scores of children who participated in the standardization program of PMMA. The 7- and 8-year-old children attending the community music school were found to score significantly higher than the standardization group on the Rhythm test. Most children who attended the community music school lived in a very poor neighborhood where musical opportunities were limited, but they may have had higher innate music aptitude as reflected by their interest in studying music. The standardization group represent a stratified sample of typical children, who probably demonstrated a normal distribution of innate capacities and who had broader cultural opportunities but less systematic music instruction than the community music school

children. Gordon believed that the quality instruction the 7- and 8-year-old children received in the community music school compensated for their meager cultural opportunities, and their significantly higher rhythmic scores might be accounted for by their high innate capacities and intensive ballet instruction in the community music school.

Gordon also purported that instructional procedures in music must be considered for their effects on developmental music aptitude (1980, p.29). He suggested that "instruction is best adapted to children's individual musical differences by exposing each group to tonal and rhythm patterns of different difficulty levels that are performed at various levels of skills." (1986, p.83) He conducted a study in West Irondequoit, New York (Gordon, 1980), in which some students received eight months of specified music instruction following the suggestion of the PMMA manual, which accommodated students' individual needs as evidenced by PMMA test results, and some students received traditional music instruction from teachers without this knowledge. The students whose individual musical needs were cared for received significantly higher PMMA scores than the students who did not receive such individual care.

The influence of instruction on the development of music aptitude, according to Gordon, may not be always positive. He stressed that appropriate music instruction is necessary to maintain or increase a child's music aptitude. If, after a child receives music instruction for a period of time, his music aptitude is found to decrease, the music instruction may have been inappropriate for him. Furthermore, the effect of instruction on developmental music aptitude varies according to the age of child. The younger the child, the stronger the influence of instruction (Gordon, 1986, p.103; Taggart, 1997). The influence of instruction upon developmental music aptitude must be taken seriously by

educators, given that music aptitude will stabilize at a level that is dependent upon its development in the first nine years of life and that a child's music achievement cannot be expected to reach a higher level than his stabilized music aptitude allows (Gordon, 1986, p. 4). Several studies have been conducted in order to explore the factors in instruction that are responsible for the development of aptitude (DiBlassio, 1984; Dowdy, 1996). The effects of some existing well-known movement and instrumental pedagogies on musical aptitude have also been examined and compared (Blesedell, 1991; Cernohorsky, 1991; Stamou, 1998; Woodruff, 1983).

Summary

Because Suzuki advocated that talent is not inborn, and that man is the product of his environment, he gave people an impression that he believed that people are born with equal ability. However, since he admitted that people may be born with different skill levels of adapting to the environment, he in fact admitted that people may be born with different talent or aptitude, similar to Gordon's opinion. While acknowledging the inequality that people could be born with, both Suzuki and Gordon advocated that the environment may largely influence a person's ability development or music aptitude. But there are some differences between their issues. First, Suzuki believed that environment is stronger than innate differences for a person's ability development. For Gordon, environmental factors contribute to a child's music aptitude development before age nine, but no matter how favorable his environment is, a child's aptitude cannot be higher than that he was born with. Second, to Suzuki, listening is the most important factor the in environment that influences a child's instrumental learning since Suzuki obviously did not

mention any other environmental factors in his writings or lectures. But to Gordon, listening as well as singing and moving may influence children's aptitude development.

Both Suzuki and Gordon borrow ideas from the learning process of language speaking and apply them to the process of musical learning; for them, in the same way that incidental listening to conversation is important to language development, incidental listening to music is the same important to musical learning. They both insist that children should be exposed from birth to beautiful music of high tone quality, regardless of the difficulty of the music. Furthermore, in addition to incidental listening, attentive listening is considered by Suzuki as important for advanced instrumental students, and also is important to developmental music aptitude from Grodon's viewpoint. However, Suzuki implied that out-of-tune lullabies sung by a mother may cause a negative influence, since the environment molds a person. For this reason, he appeared to encourage listening to musical recordings rather than hearing a mother singing. Somewhat contradictory to Suzuki, Gordon does not specifically state any possible negative influence of listening on developmental music aptitude. He considered that, in addition to hearing recorded music, the child should have opportunities to listen to adults sing or hum directly to him as long as the performance is with pleasant tone quality. He said both types of listening are equally important (Gordon, 1986, p. 72). Another difference between them in the matter of listening is that Suzuki preferred repeated listening to limited repertoire but Gordon encouraged a wide variety of listening.

Although Gordon does not mention any probable negative influence of listening on developmental music aptitude, he implies that inappropriate music instruction may

negatively influence the development of music aptitude. The effect of music instruction on developmental music aptitude should be carefully considered.

The Focus of This Study

The effects of incidental listening experience on performance achievement and on development of music aptitude of beginning violinists are the focus of the current research. The practice of regular listening in the Suzuki method, which originates in the theory of the mother tongue, lies at the heart of the Suzuki method. Although Suzuki teachers have experienced that listening to an audiotape model of pieces students are learning helps them to learn easily and perform well, the large body of literature about listening in the Suzuki approach is all based on anecdotal evidence. Suzuki suggested that incidental listening is an important means of musical exposure. In his view, the child's musical progress directly depends upon the amount of listening he or she does, and he commended the mothers who devised means to increase their children's listening by letting their children listen to music no matter in what they were engaged. From a practical viewpoint, it is almost impossible for most children to listen to music without engaging in other activities. Therefore, incidental listening may be the most common and practical type of listening for young children. It is imperative to have more knowledge of the effect of incidental exposure to music on the development of children's performance achievement and music aptitude.

Two different types of listening experiences will be investigated. Suzuki, approaching music from the angle of instrumental performance achievement, advocated the effectiveness of repeated listening to limited repertoire. Gordon, who emphasizes the development of music aptitude, advocates a variety of listening. The influences of the two

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types of listening experiences on performance achievement and developmental music aptitude will be compared to no listening and also to each other in the current study.

Furthermore, since the Suzuki method is widely adopted by music programs in the United States and has received much attention all over the world, the strengths and weaknesses of this method should be further identified and investigated by research. The results of studies on the influence of the Suzuki method on music aptitude are few, and those are rather inconclusive. The current study will seek to contribute more information to the effect of this method on music aptitude.

Purpose and Problems of the Study

The purpose of this study is to investigate the effect of incidental listening experience at home during the instrumental instruction period on the performance achievement and developmental music aptitude of beginning Suzuki violin students. The specific problems of the study are as follows:

1) to investigate the effect of different incidental listening experiences (a wide variety of music, typical Suzuki repertoire listening, none) on the performance achievement of first-grade beginning Suzuki violin students in terms of pitch, rhythm accuracy, and tone quality.
2) to investigate the effects of different incidental listening experiences (a wide variety of music, typical Suzuki repertoire listening, none) on the development of music aptitude of first-grade students.
3) to investigate the effects of Suzuki violin instruction on the developmental music aptitude of first grade students.

Definitions

Incidental/Unconscious Listening: Listening occurring in the environment that is not focused or conscious or is not expected to have any specific effects.

Attentive/Conscious Listening: Listening with attention or with specific purposes.

Aural Model: As used in this study, the aural model is the performance of music on an audiotape that is played through an audio cassette tape recorder.

Unguided Aural Model: Aural model that contains only the performance of music without any guidance or practice assistance.

Guided Aural Model: Aural model that contains verbal instruction in addition to performance of music.

Music Aptitude: The potential to achieve in music.

Developmental Music Aptitude: Music aptitude that can be affected by the environment, approximately before age nine.

Stabilized Music Aptitude: Music aptitude that cannot be affected by the environment, approximately after age nine.

Audiation: Hearing and comprehending in one's mind music that is not physically present.

Performance Achievement: Accomplishment in instrumental or vocal performance measured in terms of intonation, rhythm, etc.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The Effects of Music Listening on Instrumental Performance Achievement

The effects of aural models on performance achievement have been examined by several researchers. Most of them used guided aural models; only a small number of them used unguided aural models. The unguided model contains only performance of music, without any guidance or practice assistance, while the guided model contains verbal description in addition to performance of the music to assist practice. Guided aural models were found by most studies to have a significant influence on the learning of performance, but most unguided aural models did not demonstrate the same effects.

Guided Aural Models

Researchers have demonstrated that the recorded guided aural model is effective in assisting elementary age students to practice after receiving a teacher's instruction. Folts (1973) compared the relative effects of practicing with and without recordings on flute, clarinet, and trumpet performance. Dependent variables were tone quality and performance skill, which is the aggregate of six skills measured by the *Watkins-Farnum Performance Scale*, including articulation, expression, pitch, repeats, rhythm, and tempo. The subjects were ninety 4th-, 5th-, and 6th-grade students with one-half to one and one-half years of instrumental experience. The subjects were divided into control and experimental groups on the basis of initial achievement scores on the *Watkins-Farnum Performance Scale*. Students from both groups received instruction from the same teacher and

practiced the same material for the same amount of time during the 14 weeks of treatment. Students from the control group practiced the exercise repeatedly to work for accuracy, without the assistance of recordings. Students from the experimental group practiced with the recordings, which entailed the student to first listen to the recorded performance and then to play the exercise with recorded piano accompaniment. Results indicated significant differences in performance skill between the groups favoring the experimental group, both for comparisons by instrumental types and by entire groups. There was not a statistically significant difference between the groups in tone quality. However, since the experimental group made greater gains than the control group by both instrumental sections and entire groups, Folts suggested that a longer period of treatment might result in a statistically significant difference in tone quality as well.

Zurcher (1975) studied the effects of cassette-recorded, model-supportive practice on six musical performance variables: pitch accuracy, tempo stability, pitch matching, fingering and slide position errors, rhythmic accuracy, and time spent in practice. Forty-three beginning 4^{th}-, 5^{th}-, and 6^{th}-grade trumpet, horn, trombone, and baritone students from two elementary schools in Baldwin, New York, served as subjects. The subjects were randomly assigned to two groups that received either an experimental or a control treatment for the first week's practice of the 6-week experiment. The groups then rotated treatments in each successive week. There were no control and experimental groups in his study. Students in both groups had equal opportunities to receive control and experimental treatments. The subjects who received the experimental treatment received a method book and a tape that included instructions, reminders, and model "play-along" performances of the lessons on the subject's own instrument, but the subjects who

received the control treatment only received the method book. All subjects received a weekly 15-minute individual lesson from the investigator. During the private instruction, tests of the previous week's assigned material were administered. After the test, new instruction was given, and new lesson booklets and/or tapes were distributed. Previous booklets and/or tapes were collected each week so that the subjects could not repeat lessons. Both weekly and cumulative measurements were analyzed. Cumulative scores (an experimental and a control score for each subject) indicated that model-supportive practice was significantly more effective than traditional practice for pitch accuracy, pitch matching, rhythmic accuracy, and increasing time spent in practice, but not for tempo stability and fingering or slide position errors. Weekly scores were not normally distributed, and in general did not draw out the difference found in the cumulative analysis. Although a difference was shown between the two treatments in total practice time, Spearman rank correlation coefficients showed no correlation between total practice time and performance achievement. Thus Zurcher attributed the performance differences of the experimental and control treatments to the model supportive practice.

Guided audio and audiovisual models can be effective self-instructional practice materials for both children and adults. Puopolo (1971) designed a 10-week sequence of programmed materials to assist the self-instruction of beginning elementary trumpet and cornet students. Fifty-two 5th-grade beginning trumpet and cornet students were randomly assigned to experiment and control groups. Each weekly lesson was programmed on tape for self-instruction. The content of the tape consisted of a model performance of all lesson material, a simple piano accompaniment for all model performances, and verbal instructions. All students had 20 minutes of monitored, self-

directed practice of the same material in each school day, except that the students in the experimental group practiced according to the format of the programmed tape and the students in the control group practiced without the programmed tape. The *Watkins-Farnum Performance Scale* was used as the posttest. The results of the study indicated that programmed practice was significantly (.01 level) superior to practice without the programmed practice tape as evidenced in performance achievement. Additionally, a questionnaire was administered to the experimental subjects showing that 80% of the experimental subjects preferred more model performance and less verbal explanation on the programmed tape.

Arant (1970) investigated the effects of a guided aural model as self-instructional material for beginning college voice students. Arant programmed the lesson material on an audiotape that included verbal instruction and performance of exercises. Twenty-six beginning-level college voice students were randomly assigned to two groups. Both groups were instructed by the researcher for eight weeks and three days. The experimental group used the programmed materials without live instruction in 25-minute voice laboratories four days a week. They also had a five-minute individual session with the instructor once a week. In the individual session, the instructor listened to the singing of the student, made comments and answered the student's questions. No additional practice time was required for the experimental group. The control group met twice a week for 50-minute traditional voice classes. The students were expected to have at least one hour of out-of-class independent practice each week. Both the experimental and control group covered the same material during the experimental period. Four dimensions were measured with a pretest and posttest: breath management, tone quality, vowel purity,

and consonant pronunciation. There was no significant difference between the two groups in the amount of improvement for each of the four rating categories and the overall rating. In addition, the amount of improvement in all categories was found to be significant for both groups. The researcher concluded that self-instruction using the guided aural model was equally as effective as traditional voice class instruction. However, the distribution of practice time could be a confounding variable in this study, because there is evidence that a greater number of practices for less time (as in the experimental group) is more effective than a smaller number of practices for a greater amount of time (as in the control group) even when cumulative time is equal (Magill, 1998, p. 240).

Simpson (1970) found that the guided aural model can be effectively used in rehearsal situations. He used programmed listening material during the high school band rehearsal to teach musical concepts and improve performance achievement. A typical programmed tape included 1) a performance of the entire composition being studied, 2) identification of certain inherent characteristics relating to the composition, and 3) two to five performances of a smaller section of the total composition that best illustrated the focus concept being studied. Half of the 60 subjects were assigned to the experimental group and worked with the programmed tape during one of their five regularly scheduled band rehearsals every week. During that time, the control group subjects were rehearsing in another large instrumental ensemble. After 20 weeks of instruction, Simpson reported that, according to student responses in listening to music and his observation of student performances, sensitivity to music style and intelligent performance of the experimental subjects improved through the listening experience. However, he did not define intelligent performance in his paper and no statistics were given.

Linklater (1997) compared the effects of using guided video and guided audio models to assist home practice on visual and aural performance skills. Subjects in Linklater's study (1997) were 146 5th- and 6th-grade beginning clarinet students. The subjects were randomly assigned to one of three treatments: a videotape, a modeling audiotape, or a nonmodeling tape that consisted only of instrumental accompaniments with no clarinet performance. A beginning method book that contained numerous photographs of exemplary performance practice was used for all three groups. The modeling video- and audio-tapes consisted of two parts. The first part was a narrated instructional sequence, paralleling the content of the method book. The second part was model performance and instrumental accompaniment of 11 songs in the method book. Students were encouraged to listen to the model performance and play with the accompaniment. The treatment lasted for 8 weeks, after which all students returned their video and audio cassette tapes and method book. Amounts of student practice time, tape use, and parental involvement were recorded during the treatment period. At the end of the treatment, a researcher-designed performance achievement test was administered to determine the immediate effect of modeling on performance ability. Two further tests were also conducted at the 20th and 32nd week of treatment to determine the retention of performance achievement. Both visual and aural performance skills were measured. Visual criteria included embouchure, hand position, instrumental position, and posture. Aural criteria included tone quality/intonation, articulation, rhythmic accuracy, and melodic accuracy. Results indicated that videotape group students scored significantly higher on the aggregate of visual performance criteria than did students in the nonmodeling audiotape group immediately after the treatment. However, this advantage

was not retained in the second and third test, during the time the students no longer had access to visual models. There were no immediate significant differences among the three groups for all aural criteria. However, the second test showed that the videotape group students scored significantly higher on tone quality/intonation than did the nonmodeling audiotape group students. Also, this tone quality/intonation superiority was retained at levels near statistical significance (p=.08) for the third test. Although not statistically significant, the modeling video group had the highest mean scores (visual, aural, and composite), followed by the modeling-audiotape group, with the nonmodeling audio group having the lowest mean scores immediately after the treatment. No significant difference among the three groups was found for the amount of practice time, tape usage, and parental help. However, the video and modeling-audio groups generated higher practice time, tape usage, and parental involvement than did the nonmodeling audio group. The researcher attributed most of the non-significant differences in the study to the possibility that an insufficient amount of music was included on the tapes; the students might have stopped using their tapes too early since many of them believed that they had completed all their song materials ahead of schedule. Another possible explanation the researcher suggested was that the length of the treatment period was insufficient to result in a larger difference in performance achievement. No explanation was provided for why the videotape group scored significantly or almost significantly higher on tone quality/intonation than the nonmodeling audiotape group for the second and third test, but not for the first test.

Similar to Linklater, Quindag (1993) compared the effects of using guided video and guided aural models at home to assist practice on both visual and aural performance

skills, but used a different instrument. Twenty-three 4th-, 5th-, and 6th-grade beginning string students were randomly assigned to one of three groups: guided aural modeling, guided aural-visual modeling, and no modeling. An instructional script coinciding with the contents of the instruction book, *String Builder*, Book 1 (Applebaum, 1960), was recorded with the model performance of the exercises for each instrument on both audiotapes and videotapes. However, it appeared that the instructional procedure did not lead the students to listen to the model performance but only to play with the model. All subjects were instructed by the investigator in a traditional school string class and were required to practice at home for at least 90 minutes a week. The subjects who received tapes were required to practice along with their audiotape or videotape. The subjects without tapes were required to practice with the instruction book. The treatment period was 10 weeks. The overall aural and visual performance skills were measured by four string faculty members from Bob Jones University using a researcher-designed evaluation form. No significant relationship was found among subjects' aural and visual performance scores. However, the group that received guided aural modeling scored higher on aural criteria than those receiving guided aural-visual modeling and those receiving no modeling. The group receiving guided aural-visual modeling had higher scores on visual criteria than those receiving aural modeling and receiving no modeling. The group that received no modeling scored the lowest on both the visual and aural criteria.

There were only 23 subjects in the study and they were equally distributed in three groups. Therefore, the number of students in each group was small. Also, these subjects came from three grade levels playing different string instruments. The non-homogeneous distribution of age and instruments may have affected the results of this study. The

researcher suggested that a larger sample size consisting of students on one instrument and at one grade level might produce more reliable results.

Unguided Aural Models

The unguided recorded aural model is a tape recording that contains only performance of music, without separate piano accompaniment or verbal description. The unguided audio model did not demonstrate significant effectiveness in assisting home practice in Anderson's (1981) investigation. His experiment lasted for 8 weeks. A sample of 80 clarinet students was drawn from two 6th-grade centers in the Austin (Texas) Independent School District. Each school had 20 students in the control group and 20 students in the experimental group. Both the control and experimental groups used the same band method book for practice at home and rehearsed in the woodwind classes at school. The subjects in the experimental group were provided a cassette tape that contained solo clarinet performance of the exercises to which to listen at home. The subjects in the control group were not provided with any tapes. In the woodwind classes, each student in both groups was required to pass or complete as many of the exercises as possible. The students were allowed to pass the exercises only if they were performed at a steady tempo without making any pitch, rhythmic, or articulation errors. However, the researcher did not specify who served as the judge. Measures of pitch reading, rhythm reading, tempo accuracy, and intonation accuracy were selected to represent both sight-reading and performance skills. In addition to the selected sight reading and performance skills, the number of completed exercises was also compared.

The *Watkins-Farnum Performance Scale* (Form B) was given as a pretest to determine equivalency of the experimental and control groups on the four selected sight-

reading skills. After 8 weeks of treatment, the *Watkins-Farnum Performance Scale* (Form A) served as the posttest measure of the four selected sight-reading skills. The Practiced Performance Evaluation Test that is on the "final check-out" page of the band method book was assigned for home practice at the beginning of the final week of treatment and was used as the posttest measure of the four performance skills. The amount of home practice time during the treatment period was also recorded but was not controlled for the analysis of performance and sight-reading skills, because little correlation was found for the amount of home practice with all selected performance and sight-reading skills. The statistical analysis indicated both the experimental and control groups made significant pretest-posttest gains for two sight-reading skills: pitch-reading and rhythm-reading. No significant differences were found between the experimental and control group with regard to either the performance and sight-reading skills measured or the number of music exercises completed during the study. These results appeared to indicate that tape-recorded aural models used in the study did not significantly help students learn the selected performance and sight-reading skills.

Hodges (1974) examined the effects of unguided aural models on the performance of students in beginning band class when these models were presented in rehearsals. Seven classes, four from one school and three from the other, constituted the experimental groups, and an equal number of classes from each school constituted the control groups. The total number of subjects was 200. Subjects in both schools used the same method book, and each school had one teacher teaching all classes in that school. Rehearsals were held for 40 minutes every other school day in a mixed-instrument format. Subjects in both groups were taught in a like manner except that the subjects in the experimental group

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listened to aural recorded models during rehearsal. The content of the aural model included exemplary performance of selected exercises from the method book in use, and kept pace with the materials on which the students were working. Solo performances of six instruments: flute, clarinet, alto saxophone, horn, trumpet, and trombone, were included and each instrument was heard by the students every time the tapes were played. The experimental group heard the tapes about 3 to 5 minutes in nearly every rehearsal, and fingered their instruments following the music in their books while listening to the tapes. After 14 weeks of instruction, each subject's performance of three etudes was tape recorded. Each student had one week to prepare the first and second etude with the music score. The model performance of the first etude for all six instruments was heard by students in the experimental groups, but no one heard a model performance of the second etude. The third etude was a sight-reading exercise. The performance tapes in terms of pitch accuracy, rhythm accuracy, tempo stability, tone quality, dynamics, and total combined performance skills were rated by three judges who were either woodwind or brass specialists. In order to control for the teacher effect, comparisons were made only between each teacher's (school's) experimental groups and his own control groups. No comparisons were made between students in different schools. No statistically significant differences were found on any of the measured performance skills for all etudes in either school. There were also no statistically significant differences in the performance achievements on all etudes between the experimental and control groups for either woodwind or brass instruments. It appeared that students in the group where recorded aural models were presented during the rehearsal did not achieve a higher performance level than students in the rehearsal without recorded aural models. However, three to five

minutes of listening every other school day is a lot less than most music educators recommend and may be not enough to produce any significant differences.

Fortney (1992) examined the immediate effect of unguided recorded aural modeling on performance achievement, and both found significant results. Fortney (1992) compared the relative effectiveness of 4 practice methods--aural modeling, silent analysis, free practice, and sight-reading--on the performance ability of advanced elementary school instrumentalists. Forty 6th-grade band students were randomly assigned to one of the 4 practice conditions. They were asked to sight-read the etude (Study No. 10, *24 Arban-Klose-Concone Studies for Band Instruments*, Rusch, 1955) for the pretest and were asked to perform the composition again for the posttest after a 2-minute practice session. During the practice session, the modeling group listened to a tape recording of the etude with the printed music available; the silent analysis group mentally rehearsed the etude; the free practice group practiced the etude on their instruments; and the sight-reading group practiced an unrelated etude. The tape recording of the etude used with the modeling group was performed using a violin so that no bias would exist toward any of the band instruments. The performance of subjects was rated for pitch accuracy, rhythm accuracy, and articulation. Statistical analysis of the pre-post gain scores revealed that modeling was the most effective practice method and was significantly better than sight reading at the .05 level. Both modeling and silent analysis were more effective than free practice. Additionally, practice of any kind was better than simply sight reading.

Rosenthal (1984) examined the effect of aural models and verbal instruction on the performance of music major students. Forty-four graduate and upper-level college woodwind or brass major students served as subjects and were randomly assigned to one

of 4 practice conditions. The models used for the practice conditions were: (1) guided model: an audiotape with combined aural script and model performance; (2) model only: an audiotape with model performance only; (3) guide only: an audiotape with verbal explanation only; (4) practice only: without tape. The performance model of the étude was recorded by a professional violinist so that no instrument was favored. Each tape lasted approximately six and one-half minutes. The subjects who were provided with tapes listened to them first, then were allowed to play the assigned étude for 3 minutes. The subjects in the practice only group were allowed to play the étude for 10 minutes. Results indicated the model only group was significantly superior to all other groups on the accuracy of notes, rhythms, dynamics, and tempo. For the performance of phrasing/articulation, the effect of the model only was not significantly superior to that of other conditions but still generated the highest score. The guided model group was significantly superior to guide only and practice only groups on the accuracy of notes, rhythms, dynamics, and tempo.

Rosenthal, Wilson, Evans, and Greenwalt (1988) compared the effects of another 5 types of practice conditions: model alone, singing, silent analysis, practice, and sight reading, on the performance achievement of woodwind and brass college students. Subjects for this study were 60 graduate and upper-level undergraduate students majoring in either a woodwind or brass instrument. Subjects were randomly assigned to one of the 5 treatment groups and were asked to practice 3 minutes with the method corresponding to their group. The "Etude No. 96" from a collection for various brass instruments by P. Bona (1969) was used for practice and also for the performance model. The results of the study showed that the modeling group had the highest ratings in tempo, notes, and

articulation accuracy, and had the second highest ratings in rhythm and phrasing/dynamics. The modeling groups also scored significantly higher in rhythm, phrasing/dynamics, and tempo than the singing group.

The efficacy of the guided aural model on the learning of instrumental or vocal performance appears to be supported by the findings of the studies presented above. Unguided aural models are effective for a very short time of practice, according to the studies of Fortney (1992) and Rosenthal (1984, 1988). However, these researchers provided their subjects with music scores so that they could read along when listening to the aural models. Therefore, the studies of Hodges (1974), Fortney, and Rosenthal (1984, 1988) may not be studies of incidental, or unconscious, listening. Research that focuses on the effects of incidental listening on performance achievement is rare, except for the study of Anderson (1981).

Although the aural model treatment used in Anderson's study is a type of incidental listening, similar to that of the present study, the studies differ in several ways. First, Anderson's study might be more likely to determine whether using aural models for home practice effectively aids performance achievement when the instrumental instruction is held in school-setting mixed woodwind classes. In the present study, the type of instruction is closer to private, although the instruction was given in a small group setting and large group lessons were given every other week. Second, the subjects in Anderson's study obviously were not beginning students as are the subjects in the present study, since they were in grade six and were able to practice the songs without much help from the teacher. Third, nowhere in Anderson's study was it revealed whether the testing song for performance skills was included in the aural tapes. Also, because the testing piece was not

assigned to students for home practice until the beginning of the final week of treatment, it seems that the students studied the piece by themselves without much help from the teacher. In the present study, both test pieces were taught by the researcher and one of those was included in the models. Furthermore, the present study is designed to have a much longer treatment period (20 weeks) with the expectation that significant results may be demonstrated after a longer period of aural exposure. Finally, the present study investigated violin performance rather than clarinet, as in Anderson's study.

The Effects of Listening on Musical Response and Developmental Music Aptitude

According to Gordon's theory, the music aptitude of a child before age nine is influenced by the quality and quantity of musical stimulation in his environment. Aural exposure is a kind of musical stimulation and the amount of aural exposure has been found by research to be related to children's musical response and capability. Shelton (1965) investigated the factors in the home musical environment that influence the musical response of first-grade children. Eighteen "musical" and twelve "unmusical" children were selected according to their ability to sing in tune, discriminate pitches and melodic direction, respond to rhythms by bodily movement, and respond to contrasting tempos and moods while listening to music, etc. The researcher went into the home of each subject and interviewed the parents and others in the family to determine what the musical environment had been previous to the child's entering first grade. The interview sought information about children's opportunities for music listening and participation, parents' musical backgrounds, parents' listening preferences, and kindergarten and church musical experience. On the basis of these findings, the home environments were rated as musical,

average, or unmusical. The results indicated that 75% of the musical homes produced musical children, while 73% of the unmusical homes produced unmusical children. The number of opportunities to hear records played in the home was found to have a close relationship to the children's musical responses. The researcher suggested that parents should provide frequent opportunities for children to hear music.

Reynolds (1960) investigated the factors in the home musical environment that may contribute to children's ability to sing in a definite tonality with rhythmic and melodic delineation (awakened musicality). Eighty-five children from six kindergartens served as subjects. The families of the children were all residents of small communities of fewer than one thousand population or were from farms surrounding these communities. The researcher believed that the musical home environment in such a setting would be less confounded by outside factors than in an urban setting. All of the children in the study were asked to sing a song at kindergarten entrance. The recordings were rated by five judges on a 0-5-point rating scale. Children whose average score fell between 2.5 and 5.0 were considered musically awakened; the others were considered musically unawakened. Eleven of the 85 children were found to be musically awakened at kindergarten entrance. The researcher interviewed the parents of each child in the study to seek information about the children's opportunities in music listening, music participation, and the parents' musical background, participation, and attitude, and so on. Results indicated that musically awakened children had many more musical listening opportunities than musically unawakened children in terms of hearing the mother singing, the piano playing, children's recordings, classical music recordings, radio music, and school concerts.

The study of Lineburgh (1994) supports the idea that music stylistic discrimination can be fostered by exposure to musical prototypes without direct instruction. Four hundred thirty children from 13 kindergarten and 13 second grade classes were involved in the study. All classes in each grade were randomly assigned to one of two experimental groups or one control group. Before treatment, a preparation lesson was given to all subjects in the three groups. In the preparation lesson, a prototypical example of piano music was played from each of three composers: Mozart, Debussy, and Joplin. Before each example was played, the name of the composer was announced; then the music was played and the children lined up in a designated way when the classroom teacher signaled them to do so. The children were asked to line up in three different ways depending on the composer of the music played. The three ways of lining up were: single file, boys' line/girls' line, and with a partner assigned in advanced. The students got into a single-file line when the Mozart example was played, a girls' line and a boys' line when the music of Debussy was played, and lined up with a partner when the music of Joplin was played. During the 4 weeks of treatment, one of the experimental groups listened to 40 pieces of music of the three composers (13 or 14 pieces for each composer) without repetition, while the other repeatedly listened to one piece by each composer. The control group did not listen to any music. All music selected met the researcher-designed criteria for prototypicality of each composer's musical style. Music was played twice each school day, a piece each time, and the children lined up according to the composer of the music as they were taught in the preparation lesson. Either before or after the music played, the composer of the music and the specific way of lining were pronounced each time so that the connection between the music, composer, and the specific way of lining up could be

established for the children. No verbal instruction about the prototypicality of the three composers' music styles was given. A style discrimination test was given to all subjects before the treatment began (at the end of the preparation lesson) as the pretest, and then after two weeks as the midtest, and again after four weeks as the posttest. In addition to the style discrimination test, all subjects were administered the PMMA test before beginning the treatment. The style discrimination scores were covaried with the PMMA composite scores when the ANCOVA test was conducted. Results indicated that the second grade scored consistently significantly higher than the kindergarten. The second grade also increased significantly more than the kindergarten on both the midtest and the posttest. For kindergarten, both experimental groups had significantly larger gains between the pretest and the midtest than the control group. The experimental groups also had larger gains from midtest to posttest than the control group, but not significantly so. The group which heard nonrepeated examples had slightly larger gains from pretest to midtest and from pretest to posttest than the group which heard repeated examples. In the second grade, the group which heard nonrepeated examples had significantly larger gains from pretest to midtest and from pretest to posttest than the group which heard repeated examples and than the control group. However, the group that heard repeated examples did not have larger gains than the control group on both midtest and posttest. Lineburgh concluded that for both kindergarten and second grade, students in the group that heard different examples throughout the treatment excelled faster than the students in the group that heard the same examples repeated throughout the treatment and the students in the control group. She also concluded that style discrimination can be learned without any direct teaching for style by children as early as the kindergarten year.

Although previous research has demonstrated that music listening opportunities at home or at school significantly affect children's music response and music capability, the study of Elliott (1995) did not find a significant relationship between exposure to background music and kindergarten children's music aptitude, as measured by PMMA. A variety of music examples was selected as background music, and these were played when children were engaging in their daily classroom activities. The selected music styles included Renaissance, Baroque, Classical, Romantic, Irish, Alpine, Bavarian, Jewish, Jazz, African, West Indies Calypso, Twentieth Century, Contemporary Popular, Impressionist, Rag, Tango, Scottish, and March. A variety of tempos and instrument settings (from solo to orchestra setting) was included. The dynamics in the music ranged from no contrast, to little contrast, to some contrast, to greatly contrasting. The meters included simple/compound duple and simple/compound triple. The tonalities were major, minor, and modal. The sample was students of five kindergarten classes at an elementary school in Escambia County, Florida. Three classes constituted the experimental group and two classes constituted the control group. Before the treatment, the PMMA was administered to both experimental and control groups as the pretest. The 47 subjects of the experimental group were exposed to two hours of the selected background music every school day for 14 weeks, and the 36 subjects of the control group engaged in the daily school activities as usual without listening to the selected music. At the end of the treatment period, the PMMA was administered to both experimental and control groups again as a posttest. The pretest scores were used as a covariate to adjust the posttest scores when doing statistical analysis. No significant differences were found between the

adjusted music aptitude scores (tonal, rhythm, and composite scores) of the experimental and control groups.

The researcher suggested several explanations for the insignificant results. First, because the sample was drawn mainly from families of middle class or higher socioeconomic status, they may have enjoyed rich musical stimulation at home and outside of school before the treatment. This was reflected in the high pretest PMMA scores in both the experimental and control groups. Since the musical environment at home was not controlled, the results may have been confounded by the presence of music and musical activities at home. Second, Elliott reported, "since informal instruction tends to elicit a random response rather than a specific measurable response, test results may not demonstrate that learning has taken place. Students in the music babble stage may acquire music information before they have the ability to place it into tonal and rhythm categories" (p. 58). Although a background listening program may not show immediate results in improving music aptitude scores of kindergarten students, the aural presence and perception of music in early years might lead to higher music aptitude scores in later years. Third, kindergarten-age children probably benefit more in term of music aptitude from actively engaging in music-making rather than passively absorbing aural presentation of music. Without attention directed to music and enhanced by singing and moving, listening may not effectively improve the development of music aptitude. Fourth, although PMMA is a reliable measurement for developmental music aptitude, the researcher indicated that the reliability of PMMA for kindergarten children has room for improvement. Last, the researcher suggested that, for kindergarten children to make significant improvement in music aptitude, 14 weeks of passive exposure to background music might not be long

enough. Another study conducted by Flohr (1981), found 12 weeks of active music-making instruction to result in a significant increase in music aptitude in children about this age (five years, three months on average). The researcher implied that "passive" (incidental) listening requires longer treatment time than "active" music-making to result in significant music aptitude improvement.

Just as in the study of Elliott, an objective of the present study is to investigate whether music aptitude can be effectively enhanced by incidental exposure to music. No effort was made to direct children's attention to the music played in the present study; however, unlike the study of Elliott, the music is not deliberately relegated to the background, either. The design of Elliott's study was to compare the effects of listening and no listening, while in the current study, different music listening experiences and no listening are compared. Furthermore, both experimental and control groups had music activities, which included singing, chanting, listening, moving, and playing, in their kindergarten classroom. Therefore, the study of Elliott more closely resembled one determining how music aptitude developed when children were exposed to an additional background music listening program when general music instruction is present. In addition to investigating the effect of listening on students who receive general music instruction in their regular school curriculum, the current study also investigates the effect of listening on children who are involved in Suzuki instruction as well as their regular school general music instruction.

The Effects of Music Instruction on Developmental Music Aptitude

The relationship of music instruction and developmental music aptitude has recently received much attention in research. The study of Taggart (1997) investigated the effects of age-appropriate instruction on the developmental music aptitude of 3 to 8 year old children. The effects of age-appropriate instruction are compared to no instruction at all. The sample consisted of 183 preschool to second grade children in at-risk schools in Lansing, Michigan. They were given 20-minute music instruction twice a week by a music specialist for an entire school year. This instruction consisted of singing and chanting in a variety of tonalities and meters, tonal and rhythm pattern instruction in major and minor tonalities and duple and triple meters, and movement instruction that involved both continuous, fluid movement and movement on the beat. Previously, there had been very little music instruction as part of the students' school curriculum. *Audie*, a Gordon-designed music aptitude test for preschool children, was administered to all preschool children immediately prior to and after the instruction. PMMA was administered to children in grades K-2 immediately before and after the instruction period and also after a summer of no instruction. Results indicated that, except for the tonal scores of preschool children, post-instruction scores were significantly higher than pre-instruction score for all age levels. The younger the children, the greater the differences. The children in grades K-2 were tested again after a summer of no instruction and the aptitude scores were found to continue to increase even after the instruction stopped. The scores were also found to be significantly higher than the aptitude scores of the children at the same grade level the year before, who at that time had not received this treatment and only had minimal music instruction from the school curriculum. Taggart (1997) concluded

that (a) appropriate music instruction significantly aids the development of music aptitudes of children from age 3 to 8; (b) the influence of music instruction on the development of music aptitudes varies according to the age of the child, and the younger the child is, the greater the influence; (c) the effect of appropriate music instruction on developmental music aptitude holds over time. The increase in music aptitude during the summer for the children who had received music instruction for a school year was significantly greater than the increase caused by maturation alone.

Flohr (1981) sought to determine the influence of short-term music instruction on developmental music aptitude as measured by PMMA. Twenty-nine children enrolled in the Child Development Center at Texas Woman's University in Denton participated in the study. The mean age of the subjects was five years and three months. They all had received music instruction once a week for three months preceding experimentation. The subjects were randomly assigned to one of three groups. The Music-I group received instruction focusing on improvisation experience. They used Orff xylophones in their improvisation activities, including question and answer games, improvising to a bordun, improvising extensions to phrases, and playing in response to verbal stimuli. The Music-II group received typical classroom music instruction consisting of singing, playing percussion instruments, dancing, and movement. No music instruction was given to the control group. Both Music-I and Music-II groups received 25 minutes of music instruction twice a week for 12 weeks. PMMA was administered to all children at the beginning of the experimentation and again after the 12 weeks of instruction. The pretest scores were used as a covariate to adjust the posttest composite scores when doing statistical analysis. Although no significant differences on the adjusted posttest scores was

found among the three groups, when the scores of the two music groups (Music-I and Music-II) were combined and compared to the control group scores, a significant difference was found on the adjusted PMMA composite posttest scores favoring the combined music group. The PMMA composite mean scores of the combined music groups also demonstrated significant improvement during the 12 weeks of instruction. The control group's composite mean score was nonsignificantly lower on the posttest than on the pretest. Based on the results of the study, Flohr (1981) concluded that a 12-week period of instruction could yield to a significant positive effect in music aptitude and the results supported the theory that "a young child's music aptitude as measured by PMMA is influenced by instruction" (p. 223). However, since there was no statistically significant differences among the three groups before the two music groups were combined, the relative effectiveness of the two types of instruction was unknown. Flohr (1981) also suggested that the effects of instruction on the change of music aptitude may be temporary because the control group children received music instruction once a week during the three months preceding experimentation and their aptitudes decreased after 12 weeks of no instruction, though not significantly so.

In order to support his concept of developmental music aptitude and the overall validity of PMMA, Gordon (1979) administered PMMA to 77 5-8-year-old children in a well-known community music school in western New York State, and 75 children of the same age in a highly respected private academic school. Most children in the private school came from privileged families who might have enjoyed rich musical environments and more cultural opportunities, whereas the children who attended the community school mostly lived in a very poor neighborhood where musical opportunities were limited. The

private school had two required periods of Orff instruction a week and Suzuki instruction was offered as an elective. Private instrumental lessons, voice instruction, music theory, and ballet constituted the curriculum of the community music school. The test results from students at each school were compared to each other and to the results of children who participated in the standardization program of PMMA, in which developmental music aptitude was normally distributed. Results indicated that except for the tonal scores of the 5-year-old children, the children in the private academic school scored significantly higher than the standardization group. Children in the community music school also had higher tonal and rhythm mean scores than those of the standardization group at age levels 5, 7, and 8. However, only the mean rhythm scores at age levels 7 and 8 showed significant differences. No data were reported for age level 6 because only three 6-year-old children were tested in the community music school. No statistically significant differences were found between the children in the two schools although most scores for students in the private academic school, who were provided plenty of music learning opportunities, were moderately higher than the scores of those in the community music school.

Gordon (1979) explained the practical and statistical differences in the study as resulting from early informal environmental cultural influences and innate music capacities. The children in the private academic school probably had the same distribution of innate music capacity as that in the standardization group, but since they enjoyed more cultural advantages and rich school or community music activities, it was reasonable for them to have demonstrated higher overall developmental music aptitude. Gordon also attributed the fact that the 5-year-old children in the private academic school demonstrated significantly higher scores than the children in the standardization group on the rhythm test

and not on the tonal test to the emphasis on eurhythmic activities in the private academic school, and the emphasis on pentatonic songs in the Orff program, which have been shown to be limiting for children's tonal aptitudes.

The overall non-significant differences between the subjects in the private academic school and those in the community music school were also an outcome of the equalizing of innate capacity and environment, according to Gordon (1979). The children in the community music school probably had a higher level of music aptitude than the children in the private academic school, which was suggested by their interest in attending the community music school. On the other hand, the children in the private school enjoyed a much richer environment than the children in the community music school. The same might be said of the overall non-significant differences between the community music group and the standardization group. The children in the community music school may have had a higher level of music aptitude but the children in the standardization group may have had broader cultural opportunities. However, because the standardization group had less systematic music instruction and the community music school offered intensive ballet instruction, Gordon suggested that the continuing quality instruction received by the 7- and 8-year-old children in the community school compensated for their poorer cultural opportunities and enabled them to significantly surpass their counterparts in the standardization group on the rhythm test.

In another study by Gordon (1980), PMMA was administered to 167 children in kindergarten through grade 3, enrolled in an inner-city school in Rochester, New York, where over 98% of the student body was black. Thirty-nine children in kindergarten, 44 in grade 1, 42 in grade 2, and 42 in grade 3 participated in the study. The kindergarten

children received music instruction from their classroom teachers and children in other grades received instruction from a music specialist twice a week. Their PMMA scores were compared to those of the culturally heterogeneous standardization group as reported in the PMMA manual. Results indicated that the differences on the tonal test significantly favored the standardization group at every grade level. For the rhythm test, the inner-city school children had systematically higher scores in the first, second, and third grades, and a statistically significant difference was found at the third grade. Gordon attributed the systematically lower tonal scores of inner-city school children to their lower developmental tonal aptitude, and their systematically higher rhythm scores to the quality of their exposure to rhythm in school or out of school. However, no explanation was provided for their lower developmental tonal aptitude. He reported that benefits from participation in structured rhythmic activities do accrue as evidenced by the pronounced superior developmental rhythmic aptitude of the inner-city school third grade children (p. 29). Thus, Gordon concluded that instructional procedures in music for young children are of primary importance.

Several studies have been designed to explore the factors of music instruction that may influence the development of music aptitude. DiBlassio (1984) attempted to determine which type of tonal instruction and rhythm instruction, if any, might best affect a child's developmental music aptitude. Sixteen first grade classes, 376 students total, from 4 schools in Wilmington, Delaware, participated in the study. One hundred eighty-nine students from 8 classes in 2 schools participated in the tonal part of the study, and 187 students from 8 classes of another 2 schools participated in the rhythmic part of the study. The 8 classes that participated in the tonal part of the study were randomly

assigned to 4 tonal groups, and the remaining 8 classes were randomly assigned to 4 rhythm groups. For 12 consecutive weeks, each group was taught tonal or rhythm patterns from 7 to 10 minutes once a week within the framework of their regular music classes. Before the treatment, the tonal group students were administered the tonal subtest of PMMA, and the rhythm groups were administered the rhythm subtest of PMMA. All tonal groups were taught the same tonal patterns, but in different modes. The students in Group I were taught tonal patterns in both major and minor; the students in Group II were taught tonal patterns in major, minor, dorian, and mixolydian; the students in Group III were taught tonal patterns in major, minor, and atonal; and the students in Group IV were taught tonal patterns in pentatonic. The students would listen to a particular tonal pattern and then sing the pattern in ensemble. All rhythm groups were taught the same rhythm patterns but in different meters. Group I was taught duple and triple; Group II, duple, triple, and combined; Group III, duple, triple, unusual paired, and unpaired; Group IV, duple, triple, combined, unusual paired, and unpaired. The students would listen to a rhythm pattern and then march, swing their arms, tap their feet, and echo in ensemble. At the end of the treatment, the tonal groups were re-administered the tonal subtest of PMMA, and the rhythm groups were re-administered the rhythm subtest. The gain scores on the tonal tests were analyzed by a two-way ANOVA (4 treatments x 2 tonal aptitude levels). The same method was used to analyze the rhythm gain scores. Students who scored at or above the 50^{th} percentile on the pre-instruction tonal test were designated high aptitude students. The same criterion was used for high rhythm aptitude students. Analysis indicated no significant interaction and no significant differences among treatments for both tonal and rhythm aptitudes. However, a significant main effect was

found for both tonal and rhythm aptitude in the analysis. Low aptitude students made greater gains than high aptitude students, regardless of treatment, in analysis of both tonal and rhythm aptitude.

The study of Dowdy (1995) attempted to determine the relationship between movement activities and rhythm skills and aptitude in children ages 7 and 8. The sample consisted of 47 second- and third-grade students from two classes (both contained second and third graders) in Medora Elementary school in Louisville, Kentucky. Determined by chance, one class of 23 students served as the experimental group while the other class of 24 students served as the control group. The control group received regular music lessons on rhythm. The experimental group received the same lessons but with movement activities. The instructional period was 12 consecutive weeks, one 30-minute class per week. All students were administered the *Music Achievement Test* (MAT) by Richard Colwell and the PMMA as pre- and post-test measures. Only part three, meter discrimination, of MAT, and the rhythm subtest of PMMA were used for the test. The data were analyzed by comparing the pre-post gains of the experimental group to those of the control group. Results indicated that the use of movement in addition to regular music instruction did not significantly increase either the students' rhythm skill as measured by MAT, or their rhythm aptitude as measured by PMMA. Also, both control and experimental groups showed a significant increase on their posttest MAT, but they showed no significant improvement on their posttest PMMA.

Some studies have adopted several well-known methods to supplement their own instruction procedures and have attempted to determine whether these methods would have a greater effect upon the development of music aptitude than traditional methods.

Moore (1987) investigated whether school-setting instruction emphasizing rhythm and movement would have an effect upon the students' rhythm aptitudes. There were three groups in the study. Group 1, which served as the experimental group, received instruction that emphasized rhythm and movement activities. The lessons employed rhythmic speech and movement, singing, and the playing of small percussion instruments adapted from the Orff approach materials. Many chants, songs, and dances with locomotor and nonlocomotor movements were included. Gordon's taxonomy of rhythm patterns was used in progressive order throughout the lesson plans. Group 2 received more traditional instruction that emphasized singing and listening activities. No emphasis was placed on rhythm or movement exercises. Group 3 received no music instruction in school. Group 2 and Group 3 were control groups. Four intact second and third grade classes from the Virginia public schools were randomly assigned to serve as Group 1 (n=85) or Group 2 (n=80). Group 3 (n=95) were students randomly selected from second and third grade classes in the North Carolina public schools. Each of the groups was comparably divided between second and third graders, between males and females, and between black and white students. Both Group 1 and Group 2 received half-hour lessons twice a week for 10 weeks. Prior to the treatment period, all subjects completed a researcher-designed Music Experience Questionnaire to provide information on previous formal and informal music experience. PMMA was administered to all subjects as the pretest and posttest. Results of data analysis indicated that the rhythm aptitude of the experimental group significantly improved after 10 weeks of treatment. Significant improvement was not demonstrated in either control group. No significant change was found in the overall music aptitude of the experimental group as compared to that of the

two control groups. It was also found that there was a correlation between previous music experience and tonal scores on PMMA. According to Moore (1987), this suggested that early music experiences for these students probably contributed to their tonal aptitudes. Moore concluded that evidence from this study supported the idea that specific types of music instruction can have influence upon rhythm aptitude.

McDonald (1987) investigated the effect of an investigator-designed recorder instruction method in which the sequential objectives were logically ordered using Edwin Gordon's empirical model of music learning sequence. Performance achievement on the recorder and change in developmental music aptitude were compared to those produced by a traditional method that stressed note reading. Subjects were 27 third grade students in a laboratory school of a regional Midwestern university, and were randomly assigned to the control (n=14) or the experimental group (n=13). Students in both groups received four 15-minute lessons each week for 12 weeks. The experimental group received an instruction sequence in which children (a) first learned to sing the song by rote; (b) phrase by phrase, sang the pitches on neutral or sol-fa syllables without rhythm, then played the pitches without rhythm on the recorder and chanted the rhythmic patterns on neutral or Gordon rhythm duration syllables, then played the combined tonal and rhythm patterns on the recorder; (c) learned the notations of these tonal and rhythm patterns much later when several songs had been learned. The control group received instruction that involved a teaching-learning procedure in which individual fingerings, pitches, and rhythm symbols were presented in isolation one at a time and assembled together in playing songs from notation. PMMA was administered to all children before and after the treatment as the measure of developmental music aptitude. The children's recorder performance

achievement was measured with an investigator-designed rating scale. Five songs and three dimensions: melodic accuracy, rhythmic accuracy, and executive skills accuracy, were measured. Results indicated that the mean increase in rhythm aptitude and composite aptitude scores was significantly greater for the experimental group than the control group. The mean increase in the tonal scores was higher for the experimental group, although it was not significant (p=.071). The experimental group also demonstrated significantly higher performance scores in all dimensions and in the composite than the control group.

How existing well-known pedagogies and learning theories act on the development of music aptitude has drawn much research interest. Cernohorsky (1991) investigated the effects of movement instruction adapted from the theories of Rudof Von Laban upon the rhythm performance and developmental rhythm aptitude of kindergarten and second grade boys. The subjects consisted of 30 boys in kindergarten and 33 boys in grade two from Philadelphia, Pennsylvania, from upper socio-economic backgrounds. Before the treatment, the rhythm subtest of PMMA was administered to all subjects. The treatment was a total of 23 weeks of movement and rhythm instruction; two 40-minute music classes a week for grade two and three 20-minute classes a week for kindergarten students. Rhythm and movement instruction were included in only two of the three weekly kindergarten classes to ensure equal amounts of instruction at each grade level. Rhythm instruction was based on a modification of Edwin Gordon's *Jump Right In: The Music Curriculum* (1986), and was given twice every other week to all students during the first 5 to 10 minutes of the music classes. Students developed sequential skills in audiation and a vocabulary for rhythm patterns in duple, triple, and unusual paired meter, as well as in

combined and unusual unpaired meters during the rhythm instruction. Movement instruction, based on the theories of Laban, was given to all students for 5 to 10 minutes in music class twice each week. The movement lessons included activities using 5 effort elements: body awareness, weight, flow, time, and space. Students developed a vocabulary of movements which could be sequentially recalled when performing or listening to music. During the last two weeks of instruction, subjects were taught three chants: one in duple meter, one in triple meter, and one in unusual paired meter. The chants were performed on a neutral syllable. Students were asked to move their bodies when performing the chants. At the end of instruction, each student was re-administered the rhythm subtest of PMMA and was tape-recorded while performing the three chants. All students performed each chant on a neutral syllable with or without movement. The tape-recorded performances were rated for rhythm performance achievement on an investigator-designed five-point continuous scale by two judges. The combined judges' ratings of all three chants represented the student's total rhythm performance score. The rhythm aptitude gain scores from pretest to posttest and the rhythm performance means were analyzed by a two-way ANOVA between grades and the level of music aptitude. Students who scored at or above the 81st percentile on the pre-instruction rhythm test were designated as having high rhythm aptitude. Results indicated that for rhythm aptitude, no significant interaction was found between grade and aptitude level, nor was a main effect found for grade. However, the main effect for level of developmental rhythm aptitude was statistically significant. The students with low rhythm aptitude had higher mean gains than students with high aptitude scores in both grades. For the analysis of rhythm performance, the interaction between grade and aptitude level was not significant,

nor were main effects for grade and level of rhythm aptitude. Although it may not be concluded that movement instruction has an effect upon the rhythm performance of boys in kindergarten and grade two, according to Cernohorsky, it may be concluded that movement instruction has an effect upon the developmental rhythm aptitude of boys with lower rhythm aptitude.

Blesedell (1991) compared the effects of Dalcroze-based movement instruction and Laban-based movement instruction on the rhythm achievement and rhythm aptitude of three- and four-year-old children. Two intact classes of three-year-old children and two intact classes of four-year-old children from two private preschools in Pennsylvania participated in the study. The classes were randomly assigned to one of the two methods of movement instruction. Each class of children received one 30-minute lesson each week for 10 weeks from the researcher. All lessons of children who were assigned to the Laban-based method (n=12 for the 3-year-old group, and n=13 for the 4-year-old group) focused on 4 of the 16 basic movement themes described by Laban: awareness of body, weight and time, space, and flow. Children assigned to the Dalcroze-based method (n=14 for the 3-year-old group, and n=12 for the 4-year-old group) received lessons adapted from Findlay's applications of Dalcroze eurhythmics, which focused on the use of the whole body; physical coordination through rhythm; listening skill; integration of body, mind, and emotion in rhythm expression, and freedom of expression. Three things were measured: rhythm aptitude, rhythm performance, and movement performance. For the measure of rhythm aptitude, *Audie* was administered to all children prior to and following the instruction. For the measure of rhythm performance, all children were videotaped performing micro-beats and macro-beats on a small hand drum to a researcher-designed

criterion song. Three judges independently rated their performances using a researcher-designed 5-point continuous rating scale. For the measure of movement performance, another researcher-designed 5-point continuous rating scale was used. Children's movement performance from the 1st, 5th, and 10th lessons were videotaped and rated by three judges. The combined ratings of the three performances represented the child's movement performance. From the observed means, Blesedell concluded that Dalcroze-based instruction might be preferable for guiding the rhythm achievement of three-year-old and four-year-old children and Laban-based instruction might be preferable for guiding the movement abilities. A significant difference was found for the pre-instructional and post-instructional *Audie* scores on both melody and rhythm subtests for all children. Blesedell concluded that any type of movement instruction is beneficial for the musical development of preschool children and that instruction increased developmental aptitude.

Woodruff (1983) sought to determine the predictive validity of PMMA and the effects of Suzuki violin instruction on the developmental music aptitude of kindergarten Suzuki violin students. Two classes of kindergarten students in Manhattan, New York participated in the study. One class had 13 students and the other class had 10 students. The two groups of students were taught separately by the same violin Suzuki teacher over a period of 12 weeks. The students in both groups received between eighteen and twenty 30-minute lessons during the 12 weeks of training and were taught the first two phrases of "Twinkle, Twinkle, Little Star" in A major. PMMA was administered to all students prior to and at the conclusion of the 12-week training period. At the end of the training, each student was individually tape-recorded performing 14 performance tasks that were taken directly from the first two phrases of "Twinkle, Twinkle, Little Star". The tape-recorded

performances were rated independently by two judges for both tonal and rhythm achievement. Each student's tonal performance achievement was assigned to a 15-point scale, as was the rhythm performance achievement. The composite performance score was the sum of tonal and rhythm performance scores; thus, 30 points was the highest possible composite score. To determine the predictive validity of PMMA, the pre-training tonal, rhythm, and composite scores on the PMMA were correlated with the corresponding achievement rating scores for both groups of students. To determine the effect of Suzuki training on developmental music aptitude, the pre-training tonal, rhythm, and composite scores on the PMMA were correlated to the corresponding post-training scores. The post-training scores on the PMMA were also correlated with the corresponding achievement rating scores for both groups of students.

Results indicated that for the first group (n=13), the pre-training PMMA tonal, rhythm, and composite scores correlated with the corresponding achievement rating scores with coefficients of .67, .41, and .59 respectively. Those coefficients demonstrated that the pre-training PMMA were significant predicators of achievement. However, for the second group (n=10), the pre-training PMMA tonal, rhythm, and composite scores only predicted the corresponding achievement with coefficients of .31, .02, and .15 respectively, much lower than the coefficients obtained from the first group. Since the split-half reliabilities of the pre-training PMMA for both groups were satisfactorily high (tonal, rhythm, and composite were .94 , .56, .79 respectively for the first group, and .85, .60, and .81 for the second group), and the inter-judge reliabilities for the achievement rating was unusually high (ranging between .91 and .98), Woodruff (1983) suggested that the diversity of results between the two groups might be due to the fact that similar

training could have a different effect upon the two groups of students. The correlation coefficients between the post-training PMMA and achievement scores, which were .61 for tonal, -.21 for rhythm, and .19 for the composite for the first group, and .39 for tonal, .00 for rhythm, and .14 for the composite for the second group, were generally lower for both groups than those between the pre-training PMMA and achievement scores.

The diverse results in PMMA predictive power between the two groups also appeared in the correlations between pre-training and post-training PMMA scores. For the first group, the pre-training PMMA scores were correlated with the post-training PMMA scores by coefficients of .47, .02, and .37 for tonal, rhythm, and composite. For the second group, the pre-training PMMA scores were correlated with the post-training PMMA scores with coefficients .96, .28, and .86 for tonal, rhythm, and composite. The pre- and post- PMMA correlation coefficients tended to be higher for the second group, and the coefficients of rhythm correlations were much lower than those of tonal correlations for both groups.

Although the mean tonal, rhythm, and composite PMMA scores increased slightly for both groups after training, observing that PMMA rhythm and composite scores did not accurately predict rhythm achievement of the second group (coefficients were .02 and -.22 respectively), and that there was not any correlation (coefficient was .00) between post-training PMMA rhythm scores and rhythm achievement scores for the second group, Woodruff (1983) suggested that the rhythmically rigid training that Suzuki instruction offers may have had a negative influence on the developmental rhythm aptitude of the students of the second group, to the extent that rhythm achievement could not be predicted by the PMMA rhythm subtest (p. 38 and p. 41).

Because of the inconsistent results between the two groups, and the fact that the groups were not randomized, and the fact that true Suzuki instruction was not utilized if there was no parental involvement, nor private or small group instruction, the conclusion drawn by Woodruff concerning the influence of Suzuki instruction on rhythm aptitude may not be viewed as conclusive. More research is needed to further examine the effects of Suzuki instruction on the development of tonal and rhythm aptitude.

Another study that also examined the effect of Suzuki instruction on developmental music aptitude was conducted by Stamou (1998). Unlike Woodruff, she drew her sample from string programs of three community music schools in cities near Lansing, Michigan, and initially involved more 5-8 year old subjects. A control group was also included for contrast. Thirty-six beginning Suzuki students (16 five-year-olds, 6 six-year-olds, 8 seven-year-olds, and 6 eight-year-olds) constituted the experimental group. They received a 20- to 30- minute private Suzuki violin or cello lesson and a 45- to 60-minute Suzuki group lesson every week for 22 weeks. Among students in the experimental group, some had had at least one early childhood music class before age 5. The control group consisted of 73 students from 4 classes (18 students in kindergarten, 17 in first grade, 19 in second grade, and 19 in third grade) in a public school in Okemos, Michigan. Students in the control group received general music lessons as part of their school curriculum for 30 minutes twice a week during the experimental period. The general music instruction was taught by a music specialist with an emphasis on singing and elements from Kodaly and Orff methodologies. PMMA tonal and rhythm subtests were administered to all students as the pre- and post-test. At the end of the 22-week instructional period, twenty-six Suzuki students were audiotaped performing the "Twinkle

Theme" and were rated by three judges on intonation, rhythm, and expression, using a researcher-designed 5-point rating scale.

Three problems were examined in this study: (a) the effect of Suzuki instruction on developmental music aptitude of beginning Suzuki string students; (b) the extent to which PMMA scores can predict beginning students' performance achievement after 22 weeks of Suzuki string instruction; (c) the effect of early childhood music instruction on Suzuki string students' future performance achievement. In order to determine the effect of Suzuki instruction on developmental music aptitude, the changes in aptitude of Suzuki students (experimental group) were compared to those of the general music students (control group). Students were selected from the control group to match the age, and pre-instruction PMMA Tonal, Rhythm, and Composite scores with those of the experimental subjects. A paired-samples *t* test was conducted to ensure that there were no significant differences on the pre-instruction PMMA Tonal, Rhythm, and Composite mean scores between the experimental and control subjects with whom they were matched. The post-instruction PMMA scores of the two groups were compared as a whole group, and also at each age level. When the post-instruction PMMA scores were compared between the matched pairs, no significant differences were found on the post-instruction PMMA scores between the two groups. However, from the observed mean, the Suzuki students tended to have slightly higher post-instruction PMMA Tonal and Composite mean scores and slightly lower Rhythm scores than the general music students. When post-instruction PMMA scores of the two groups were compared at each age level, still no significant differences were found. However, post-instruction PMMA Composite mean scores of the Suzuki students tended to be higher than those of the general music students at all age

levels except the 8-year-old students. Also, although post-instruction PMMA Rhythm mean scores of Suzuki students were slightly lower than those of the general music students with whom they were matched, it was found that the Rhythm mean scores of the 6- and 7-year-old Suzuki students tended to be higher than those of the matched general music students.

In order to determine whether pre-instruction PMMA scores of the experimental group subjects were predictive of their instrumental performance achievement at the end of the 22-week instructional period, pre-instruction PMMA Tonal, Rhythm, and Composite scores of Suzuki students were correlated with their Intonation, Rhythm, Expression, and Composite performance achievement ratings. Results indicated that pre-instruction PMMA Tonal and Composites scores were predictive of Intonation, Rhythm, Expression, and Composite performance achievement scores. Pre-instruction PMMA Rhythm scores were found to be predictive of Rhythm, Expression, and Composite performance achievement scores, but not Intonation performance achievement. This result was significant at the .01 level. To determine the effect of early childhood music instruction on performance achievement, Suzuki students were divided into two groups according to whether or not they had received early childhood music instruction before age 5. The Suzuki students who had had early childhood music instruction before age 5 constituted Group 1 (n=21), and the remaining Suzuki students constituted Group 2 (n=3). The two groups did not significantly differ in mean age and pre-instruction music aptitude, although students in Group 1 tended to have higher pre-instruction PMMA Tonal, Rhythm, and Composite scores than students in Group 2. The string performance achievement of the two groups was compared, and no significant differences were found.

However, Stamou concluded that Group 1 students tended to receive higher ratings in Intonation, Rhythm, Expression, and Composite performance achievement than students in Group 2.

Stamou (1998) concluded that Suzuki students tended to have lower rhythm aptitude than general music students, based on a comparison of students aged from 5 to 8. Because the involved sample size was small at each age level (especially for age 6 to age 8) in her study, the effects of Suzuki instruction on developmental music aptitude compared to general music instruction at specific age levels need further investigation. Also the number of non-early childhood Suzuki students used for that comparison was extremely low. Unlike her study, which involved students from 5 to 8 years old, part of the present study focuses on the effect of Suzuki instruction on the developmental music aptitude of first grade students (6 years old), and involves a much bigger sample size at that age level.

Summary

The research reviewed in this chapter focuses on three major areas: (a) the effects of music listening on instrumental performance achievement, (b) the effects of listening on musical response and developmental music aptitude, and (c) the effects of music instruction on developmental music aptitude.

The studies presented in this chapter regarding the effect of music listening on instrumental performance achievement focused on the effects of attentive listening which mostly involves the guided aural model. Positive effects were usually demonstrated, but not always statistically significant. Although the unguided aural models demonstrated a

significant effect in helping students' performance learning when allowable practice time is very short, their effect in assisting home practice was largely not examined. No study focused on the effect of incidental listening on performance achievement when instrumental instruction was given outside of school and in a private lesson format. Since early stimulation and learning is a trend in current education, studying how formal learning may be assisted by informal stimulation for young children is very important.

The studies that focused on the effect of environment on children's musical performance all suggested that there is a connection between children's informal musical experience and their musical response. Children tended to be more musical if their parents were musical and they had more opportunities to hear family members singing or playing instruments, music recordings, and attending school or community concerts. Musical listening was demonstrated as an effective method to teach musical style discrimination. Nonrepeated listening to many prototypes of music tended to be more effective than repeated listening to a few prototypes of music for teaching musical style discrimination. Background music does not appear to have a significant influence on the developmental music aptitude of kindergarten children when general music instruction is present. More research is needed to establish the relationship of musical listening and the development of music aptitude at other age levels or when no music instruction is involved.

From the studies presented in this chapter that investigated the effects of instruction on developmental music aptitude, it appears that music instruction is at least partially responsible for the increase of developmental music aptitude. However, no significantly different effects were found between different methods of general music instruction. For instrumental pedagogy, the effect of the Suzuki method on music aptitude

has been examined at the kindergarten age level, and has been compared to that of general music instruction at all age levels for which PMMA is appropriate. Since no conclusive results were obtained from previous studies, and development of music aptitude varies according to age, as suggested by Gordon and Taggart (1997), it is possible that music instruction might have a different influence on developmental music aptitude of children at different age levels. Studies that involved a greater number of subjects at a specific age level are needed, so that the effects of Suzuki instruction on aptitude may be more clearly established.

The present study seeks to shed more light on the relationship of incidental listening to performance achievement and to developmental music aptitude by comparing three kinds of listening treatments. It also seeks to illuminate how additional Suzuki instruction may influence the development of music aptitude of first grade students who receive general music instruction in the regular school curriculum.

CHAPTER THREE

METHODOLOGY

The procedures described in this chapter are designed to investigate (a) the effect of different incidental listening experiences (a wide variety of listening, typical Suzuki listening, none) on the performance achievement of first grade beginning violin students after 21 weeks of Suzuki instruction, (b) the effect of different incidental listening experiences (a wide variety of listening, typical Suzuki listening, none) on developmental music aptitude of first grade students, and (c) the effect of Suzuki violin instruction on the developmental music aptitude of first-grade beginning Suzuki violin students. The subjects, research procedure, research instruments, and the data analysis methods will be discussed in detail in this chapter.

Sample

One hundred and seventy first-grade students in Tainan, Taiwan, were involved in this study. Sixty-six students from various elementary schools who did not have previous instrumental experience constituted the Suzuki groups while 104 students from 3 intact classes of two elementary schools constituted the non-Suzuki groups. The sample for this study represented various educational, occupational, and socio-economic backgrounds.

All subjects who volunteered to receive Suzuki violin instruction were pre-tested using *Primary Measures of Music Audiation* (PMMA) and were divided into three groups (Group 1, Group 2, and Group 3) so that each group had equivalent level of PMMA

Composite scores. Three intact first grade classes from two public elementary schools formed three non-Suzuki groups (Group 4, Group 5, and Group 6) individually. Subjects in both Suzuki and non-Suzuki groups received general music instruction from their home room teachers in schools as part of their school curriculum while the Suzuki groups also received weekly violin instruction from the researcher. Three different listening treatments were given to the three Suzuki groups and three non-Suzuki groups. Group 1 (n=22) and Group 4 (n=35) were assigned to listen to a 30-minute tape, consisting of a wide variety of music of different styles, tonalities, meters, and instrumental settings. Group 2 (n=22) and Group 5 (n=35) were also assigned to listen to a 30-minute tape daily, but theirs consisted of repetitions of the first 9 pieces of *Suzuki Violin Book I*. No listening tape was assigned to students in Group 3 (n=22) and Group 6 (n=34).

Preparation of Listening (Treatment) Tapes

Two different listening tapes, each 30 minutes in length, were prepared to provide two different listening treatments: either a wide variety of music listening, or typical Suzuki listening. For the varied music listening experience, a tape of fifteen pieces of different styles, timbres, dynamics, tonalities, meters, and instrumental setting was assembled by the researcher from quality commercially-available recordings. Renaissance, Baroque, Classical, Romantic, Ethnic/Folk Song, and Jazz styles were included. Most pieces were in major or minor tonality and duple or triple meter. One piece was in aeolian tonality, and one piece in unusual paired meter (5/4). The instrumentation included solo performances of violin, piano, trumpet, and bassoon, as well as a vocal duet, chorus, string quartet, African instrument (Kora), and orchestra. The dynamics of these pieces ranged

from soft to loud, and no contrast to high contrast. A detailed description of those pieces is given in Appendix A. The typical Suzuki listening experience was provided by researcher-recorded audiotapes consisting of the first 9 pieces on the *Suzuki Violin Book I* CD, repeated 3 times (see Appendix B). Music from quality commercial compact disks was duplicated on two master cassettes (one for each listening treatment), and each master cassette was duplicated onto 80 cassette copies. For a variety of listening, 22 copies were made for group 1 and 35 copies were made for group 4. For typical Suzuki listening, 22 copies were made for group 2 and 35 copies were made for group 5. Twenty-two copies of both master cassettes were made for group 3 students for compensation after the treatment period. A high quality CD player (Pioneer CD Player CLD-D504), cassette player (Yamaha Natural Sound Cassette Deck K-903) and the TDK IECI /TYPE I audiotapes were used in order to produce a high quality of recording.

Preparation of PMMA Testing Cassette in the Chinese Language

After permission for translating the PMMA testing CD into the Chinese language was granted by GIA Publications (see Appendix C), the whole testing CD was recorded onto an IBM personal computer with 16 bits, 44 KHz, stereo sampling format. The identification of each test item (in PMMA, each question item was identified by the name of an object) then was transformed into Mandarin with a PC sound editor software, *Cool Edit 96*, which is a product of Syntrillium Corporation. Finally, the transformed sound file (wav format) was recorded back to audio cassette.

Procedure

After permission for conducting the research study was granted by the University Committee on Research Involving Human Subjects (see Appendix D), fliers (Appendix E) explaining the contents of this research with consent forms (Appendix F) for receiving the Suzuki instruction were given out to children in many kindergartens in Tainan, Taiwan in June. All children who turned in the consent forms and had no previous violin experience constituted the Suzuki groups when they went to first grade in September.

The researcher also obtained permission from principals of two elementary schools to conduct the PMMA tests and listening treatments with their students (see Appendix G). A letter of explanation and an informed consent form was passed out to the students to bring home to their parents (see Appendix H and Appendix I). Three first grade home room teachers agreed to assist in this research and the three first grade classes constituted the three non-Suzuki groups.

One week prior to the designated date of the first PMMA test, a meeting with the parents and children in the Suzuki groups was held. In the meeting, the researcher explained the purpose and problems of this study, the meaning of music aptitude, the purpose and procedure of the PMMA test, and the correct attitude towards the results of the test; he also answered parents' questions. In the same week, the researcher met with students of the three non-Suzuki groups in school in the presence of their home room teachers for the same purpose. All PMMA tests were administered by the researcher himself in two weeks. The Tonal subtest was administered during the first week, and the Rhythm subtest was administered during the second week. Suzuki students took the tests in two groups during the weekend with the assistance of several friends of the researcher.

If a student missed one or both of the test sections, an individual test was given by the researcher within a few days. The non-Suzuki students took the tests during the school week in one of their free activity class periods, with the assistance of their home room teachers. After administering the PMMA test, the researcher computed the scores according to the directions of the PMMA manual, and assigned Suzuki students to groups of 3 according to proximity of their Composite scores.

One week prior to the violin instruction, all parents and Suzuki students met together to decide what listening treatment they would receive during the experimental period. Students in the same group, as determined by the researcher according to their pre-instruction PMMA Composite scores, drew lots themselves to determine what treatment group (Group 1, Group 2, and Group 3) they would belong to, i.e., what listening treatment they would receive during the following experimental period. Each student who was assigned to Group 1 or Group 2 obtained a treatment tape as his/her daily listening assignment at his/her first violin lesson. Students were not allowed to exchange tapes or give them to other children. No listening tape was distributed to students in Group 3 during the experimental period, but both tapes were given to them at the end of the experiment period as a compensation.

Parents were also informed of their responsibilities in this pre-instruction meeting. At least one parent was expected to accompany the child to the violin lesson. Parents were required to take notes in the class and help with the child's practice at home. It was the parents' responsibility to guarantee the child's listening to the treatment tape every day, if he/she was assigned to listening groups. They also needed to log the child's practice and/or listening time every day.

The Suzuki students received weekly 50-minute violin lessons from the researcher in groups of 3 or 4 students. Every teaching group had students with different listening treatments. All students were taught the same repertoire and playing techniques. Every other week, all Suzuki students attended a 90-minute group lesson. Students in Group 1 and Group 2 were also required to listen to their treatment tapes one time every day. Their parents were asked to record the length of listening time in a log book, and the students turned in their logs every week when they came to violin class. In addition, the parents of all Suzuki students were asked to record their children's daily practice amount in their logs and this was monitored in the same way.

The three non-Suzuki groups, Group 4, Group 5, and Group 6, were randomly assigned to three different listening treatments. The tape with a wide variety of music was played every morning in the classroom of Group 4 when students were studying independently. The tape with repeated Suzuki repertoire was played in the classroom of Group 5 at the same period as that of Group 4. Students in these two groups obtained a tape to listen to at home during the winter break. Before winter break, a letter was sent by the two home room teachers to parents of every student, asking for help with their children's listening at home. However, their listening was not monitored during the break. No listening tape was provided for students in Group 6.

At the end of the 21-week instructional period, PMMA was administered again to all students in both the Suzuki and non-Suzuki groups. Students in the Suzuki groups were also individually audiotaped performing "Twinkle Variation A" (Appendix J) and "Yankee Doodle" (Appendix K) . The "Twinkle" piece was included in the daily listening repertoire of both Group 1 and Group 2, while the "Yankee" piece, which is unfamiliar to

most Taiwan first grade children, was not recorded on the tapes for either Group 1 or Group 2. Both testing songs were taught by the researcher during the instruction period. Students were brought individually to a separate room where their performances of the two pieces were audiotaped on two different tapes. Therefore no one except the researcher heard their performances. Also, no name, but an identification number was recorded with each student's performance so that identities would be known only to the researcher. In order to ensure a quality recording of students' performances, the TDK IECI /TYPE I audiotapes and Panasonic Dual Cassette Decks RX-FT 550 were used.

Their recorded performances were rated by three independent judges on the dimensions of Intonation, Rhythm, and Tone Quality using a researcher-designed performance achievement rating scale (Appendix L). The judges were either violin or general music teachers in Taiwan who did not know the students participating in the study. In order to pilot test the reliability of this performance achievement rating scale, eleven students of the study with different performance achievement levels, based on their ordinary performances in classes, were selected. Their performances of "Twinkle Theme" were audio recorded and were rated by the three judges using the researcher-designed rating scale. The interjudge reliabilities (Cronbach's α) were found to be .85 for Intonation, .86 for Rhythm, .90 for Tone Quality, and .92 for Composite.

The Research Instruments

Primary Measures of Music Audiation (PMMA)

PMMA is a music aptitude test for children from kindergarten through third grade, developed by Edwin E. Gordon in 1971, and published by GIA publications in 1979.

Gordon believes that the music aptitude of children in this stage is still developing, and that a valid measurement of their music aptitude is essential for better monitoring aptitude development, as well as aiding the child's musical development. PMMA would help teachers and parents realize the musical strengths and weaknesses of each child, and adapt instruction or environment to the musical needs of each individual accordingly, in the hope that each child's musical potential can be increased while it is still developing.

PMMA consists of two subtests: Tonal and Rhythm. Each subtest contains 40 questions and several practice examples. Each question has two Tonal patterns or two Rhythm patterns and the children are asked to make decisions whether the two patterns are the same or different. The tones in the tonal patterns are performed in beats of equal length, and notes in the rhythm patterns are performed on the same pitch.

Each question is identified on the cassette by the name of an object instead of a number, and shown as the picture of the object on the answer sheet. Instead of using the words "same" and "different," the test uses two identical faces and two different faces representing these response options (see Appendix M). When children hear two musical patterns that sound the same, they draw a circle around the pair of faces that are the same on the answer sheet. As children hear two musical patterns that sound different, they draw a circle around the pair of faces that are different. Therefore, children do not need to have the ability to read language, music, or numbers to answer the questions.

Each subtest lasts approximately 12 minutes. Each subtest requires 20 minutes to administer including directions and practice examples. The two subtests should be administered on different days and no more than two weeks apart. The directions are to

be read to young children instead of pre-recorded on the cassette in order to be better understood.

According to the report in the PMMA manual (Gordon, 1986, p.91), the split-halves reliabilities for both subtests and the Composite scores for children grades K-3 range from .72 to .92. Split-halves reliabilities for first grade children are .89 for Tonal, .85 for Rhythm, and .92 for the Composite. The intercorrelation coefficients between the Tonal and Rhythm subtests for the first-grade children is .49 (p.95). The Tonal scores correlated to the Composite scores with a coefficient .84, and the Rhythm scores correlated to the Composite scores with a coefficient .82 (Gordon, 1986, p.95) for the first grade children.

Performance Achievement Test

A rating scale was designed by the researcher to measure the students' performance achievement. The dimensions used in the rating scale were Tonal, Rhythm, and Tone Quality. Each dimension included five criteria. The criteria were ranked from easiest to hardest in a continuous scale. Each dimension was rated from 1 to 5, with 5 being the highest score, and 1 being the lowest score. Each Suzuki student received a rating for each of the three dimensions, as well as a composite rating (the summation of the three ratings), from each of the three judges.

Interjudge reliabilities were computed with Cronbach's α coefficient. The coefficients for the rating of "Twinkle Variation A" were found to be .81 for Intonation, .86 for Rhythm, .90 for Tone Quality, and .92 for the Composite performance achievement. For the rating of "Yankee Doodle," the interjudge reliabilities (Cronbach's

α) were found to be .81 for Intonation, .86 for Rhythm, .84 for Tone Quality, and .92 for the Composite performance achievement.

Data Analysis

Eighty-five percent of the Suzuki students turned in their listening and/or practice logs for 17 weeks or more in the 21-week instructional period. Their daily listening and practice times were separately summed up each week. The totals of all weeks for each student were averaged by the weeks he turned in his logs and represented his average weekly listening or practice amount. The listening or practice amount of students who turned in logs less than half of the instructional period were ignored. It was found that Group 1 students listened to their tapes 5.36 times a week in average and Group 2 students listened to their tapes 5.17 times a week.

All statistical analyses in the present study were computed using SPSS. In order to determine whether listening experience influences violin performance achievement of beginning violin students, one way ANOVA analyses with covariates were conducted to test for significant differences (α=.05) among the three Suzuki groups in their performance achievement in "Twinkle Variation A" and "Yankee Doodle". The pre-instruction PMMA scores on the Tonal and Rhythm subtests, as well as weekly practice amounts, were used as covariates

To determine whether first grade students' developmental music aptitude was influenced by their listening experience, a one way ANOVA test was conducted to reveal any significant differences in the PMMA mean gains among the three Suzuki groups. An independent-samples two-tailed *t* test was conducted to examine the significant difference

in average PMMA gain scores between students who were provided with Suzuki repertoire listening experience (Group 5) and students who were not provided with listening tapes (Group 6).

To determine the effect of Suzuki instruction on the developmental music aptitude of first grade beginning Suzuki violin students, with no listening assignment, an independent-samples two-tailed *t* test was conducted to test the significant differences in PMMA average gain scores between students who received Suzuki instruction but no listening tape (Group 3) and those without either listening tape or Suzuki instruction (Group 6). Both groups' posttest PMMA scores were also compared to their own pretest PMMA scores by the paired-samples two-tailed *t* test.

CHAPTER FOUR

RESULTS AND INTERPRETATION

The Effects of Incidental Music Listening on Instrumental Performance Achievement

Results

At the end of the experimental period, subjects who received Suzuki violin instruction were individually taped playing "Twinkle Variation A" and "Yankee Doodle," and performances were rated by three independent judges on Intonation, Rhythm, and Tone Quality using a researcher-designed rating scale (see Appendix J). Each student was rated on 3 dimensions (Intonation, Rhythm, Tone Quality) by each judge for each performance. For each test song, the ratings of each student by the three judges were averaged for each dimension and the Composite, and these averages were used to represent the student's performance achievement on Intonation, Rhythm, Tone Quality, and the Composite on that song. Interjudge reliabilities for the rating of "Twinkle Variation A," which were computed with Cronbach's α coefficient, were found to be .81 for Intonation, .86 for Rhythm, .90 for Tone Quality, and .92 for the Composite. For the rating of "Yankee Doodle," the interjudge reliabilities were found to be .81 for Intonation, .86 for Rhythm, .84 for Tone Quality, and .92 for the Composite performance achievement. In order to determine the effect of incidental listening on instrumental performance achievement, a one way ANOVA test was done for the performance ratings on the two test songs. Performance achievement ratings were compared among students who received different listening treatments during the instructional period, in which

students in Group 1 were given tapes that included a wide variety of music with different styles, students in Group 2 were provided with tapes of Suzuki repertoire that were selected from the recording of Suzuki violin method Book 1 with several repetitions of certain pieces, and no tape was given to students in Group 3.

Results for "Twinkle Variation A".

Fifty-nine students' (20 in Group 1, 19 in Group 2, and 20 in Group 3) performances on "Twinkle Variation A" were recorded and rated. The means and standard deviations of the ratings of Intonation, Rhythm, Tone Quality, and the Composite performance achievement for each group are reported in Table 1. A one way ANOVA was conducted on each performance dimension and the Composite performance to determine whether the three groups demonstrated significant differences in performance achievement. The significance level was set at .05 level. The results, as shown in Table 2, indicate that there were no significant differences among the three groups on each performance dimension or on the Composite performance achievement.

Table 1

Performance Achievement Scores for "Twinkle Variation A"

		N	Mean	SD
Intonation	Group 1	20	3.63	.72
	2	19	3.28	.73
	3	20	3.61	.78
Rhythm	Group 1	20	3.96	.81
	2	19	4.02	.89
	3	20	3.93	.77
Tone Quality	Group 1	20	3.68	.91
	2	19	3.70	.95
	3	20	3.40	.61
Composite	Group 1	20	11.28	2.03
	2	19	11.00	2.28
	3	20	10.95	1.81

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Table 2

Comparison of Performance Achievement for "Twinkle Variation A" (ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
Intonation	Between Groups	1.532	2	.766	1.386	.258
	Within Groups	30.939	56	.522		
	Total	32.471	58			
Rhythm	Between Groups	7.109E-02	2	.036	.052	.949
	Within Groups	37.966	56	.678		
	Total	38.037	58			
Tone Quality	Between Groups	1.135	2	.567	.812	.449
	Within Groups	39.105	56	.698		
	Total	40.239	58			
Composite	Between Groups	1.277	2	.638	.153	.859
	Within Groups	234.422	56	4.186		
	Total	235.699	58			

In order to remove the possible effects of music aptitude and practice amount upon performance achievement, the pre-instruction PMMA scores on the Tonal and Rhythm subtests, as well as weekly practice amounts, were used as covariates in a General Factorial ANOVA analysis conducted to determine whether or not the variance of performance achievement was caused by the treatment. Because one student in Group 2 and one student in Group 3 did not regularly hand in their practice logs, and their amount of practice could not be determined, the ratings of only 57 students were used in this analysis. Results shown in Table 3 indicate that no significant differences were found among the performance achievement of the three groups in any dimension, nor in the composite scores. The variances among the three groups that were caused by listening experience were shown as p-value at .23 on Intonation, .93 on Rhythm, .52 on Tone Quality, and .90 on the Composite, which are all greater than the designated level of significance, .05. The overall statistically significant (α=.05) contribution of the covariates used for performance achievement ratings suggests that their use is necessary. Table 4 contains the performance mean scores of each group on Intonation, Rhythm, Tone Quality, and the Composite, adjusted for pre-instruction PMMA Tonal and Rhythm scores, as well as weekly practice amount.

Table 3

Comparison of "Twinkle" Performance Achievement When Pre-instruction PMMA Tonal, Rhythm Scores and Practice Amount Were Used as Covariates (General Factorial ANOVA)

			Sum of Squares	df	Mean Square	F	Sig.
Intonation	Covariates	(Combined)	4.664	3	1.555	3.074	.036*
		Tonal Aptitude	1.165	1	1.165	2.303	.135
		Rhythm Aptitude	1.076	1	1.076	2.127	.151
		Practice Amount	2.300	1	2.300	4.548	.038*
	Treatment	Group	1.529	2	.764	1.511	.230
	Error		25.793	51	.506		
	Total		31.924	56	.570		
Rhythm	Covariates	(Combined)	6.901	3	2.300	4.010	.012*
		Tonal Aptitude	1.537	1	1.537	2.679	.108
		Rhythm Aptitude	3.337	1	3.337	5.817	.020*
		Practice Amount	1.668	1	1.668	2.908	.094
	Treatment	Group	.008	2	.004	.070	.933
	Error		29.256	51	.574		
	Total		36.205	56	.647		
Tone Quality	Covariates	(Combined)	8.409	3	2.803	5.590	.002*
		Tonal Aptitude	3.735	1	3.735	7.448	.009*
		Rhythm Aptitude	.346	1	.346	.689	.410
		Practice Amount	4.451	1	4.451	8.875	.004*
	Treatment	Group	.664	2	.332	.662	.520
	Error		25.576	51	.501		
	Total		34.983	56	.625		
Composite	Covariates	(Combined)	55.421	3	18.474	5.818	.002*
		Tonal Aptitude	18.016	1	18.016	5.674	.021*
		Rhythm Aptitude	11.862	1	11.862	3.736	.059
		Practice Amount	24.137	1	24.137	7.602	.008*
	Treatment	Group	.660	2	.330	.104	.901
	Error		161.936	51	3.175		
	Total		217.674	56	3.887		

* Significant at .05 level

Table 4

Adjusted Performance Mean Scores for "Twinkle Variation A"

	Group	Mean	Standard Error
Intonation	1	3.6526	.161
	2	3.2900	.168
	3	3.6346	.167
Rhythm	1	4.0035	.172
	2	4.0476	.179
	3	3.9523	.178
Tone Quality	1	3.6768	.160
	2	3.7737	.168
	3	3.5025	.167
Composite	1	11.3308	.404
	2	11.1112	.422
	3	11.0911	.419

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Results for "Yankee Doodle".

Because one student in Group 3 was not willing to tape record his performance of "Yankee Doodle," only 58 students (20 in Group 1, 19 in Group 2, and 19 in Group 3) were recorded and rated performing "Yankee Doodle." The means and standard deviations for the ratings for Intonation, Rhythm, Tone Quality, and the Composite performance achievement for each group are reported in Table 5. A one way ANOVA was conducted on each performance dimension and the Composite performance to determine whether the three groups demonstrated significantly different performance achievement. The significance level was set at .05. The results, as shown in Table 6, indicate that there were no significant differences among the three groups on each performance dimension and also on the Composite.

Table 5

Performance Achievement Scores for "Yankee Doodle"

		N	Mean	SD
Intonation	Group 1	20	3.28	.77
	2	19	3.00	.87
	3	19	3.16	.86
Rhythm	Group 1	20	3.27	1.03
	2	19	3.16	.86
	3	19	3.70	.79
Tone Quality	Group 1	20	2.91	.94
	2	19	2.89	.86
	3	19	3.12	.82
Composite	Group 1	20	9.47	2.39
	2	19	9.05	2.23
	3	19	9.98	2.05

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Table 6

Comparison of Performance Achievement for "Yankee Doodle"(ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
Intonation	Between Groups	.785	2	.392	.562	.573
	Within Groups	38.378	55	.698		
	Total	39.163	57			
Rhythm	Between Groups	3.173	2	1.586	1.954	.151
	Within Groups	44.648	55	.812		
	Total	47.821	57			
Tone Quality	Between Groups	.615	2	.308	.403	.671
	Within Groups	42.013	55	.764		
	Total	42.628	57			
Composite	Between Groups	8.231	2	4.115	.828	.442
	Within Groups	273.365	55	4.970		
	Total	281.596	57			

In order to remove the possible effects of music aptitude and practice amount upon performance achievement, the pre-instruction PMMA scores on the Tonal and Rhythm subtests, as well as weekly practice amounts, were used as covariates when a General Factorial ANOVA analysis was conducted to analyze the variance of performance achievement among subjects. Because one student in Group 2 did not regularly hand in her practice logs (and the student in Group 3 who was not willing to record his performance of "Yankee Doodle" also did not hand in his practice logs regularly), only the ratings of 57 students were used in this analysis. Results shown in Table 7 indicated that no significant differences were found among performance achievement scores of the three groups in any dimension, nor in the Composite scores. The variances among the three groups that may have been caused by listening experience are shown as p-value at .56 on Intonation, .18 on Rhythm, .31 on Tone Quality, and .28 on the Composite, which are all greater than the designated significant level, .05. The overall significant contribution of the used covariates to performance achievement ratings suggests that their use is appropriate and necessary. Table 8 contains the performance mean scores of each group on Intonation, Rhythm, Tone Quality, and the Composite, adjusted by pre-instruction PMMA Tonal and Rhythm scores, as well as weekly practice amount.

Table 7

Comparison of "Yankee" Performance Achievement When Pre-instruction PMMA Tonal and Rhythm Scores and Practice Amount Were Used as Covariates (General Factorial ANOVA)

			Sum of Squares	df	Mean Square	F	Sig.
Intonation	Covariates	(Combined)	6.927	3	2.309	3.744	.017*
		Tonal Aptitude	5.417	1	5.417	8.784	.005*
		Rhythm Aptitude	.179	1	.179	.291	.592
		Practice Amount	1.386	1	1.386	2.248	.140
	Treatment	Group	.734	2	.367	.595	.555
	Error		31.451	51	.617		
	Total		39.140	56	.699		
Rhythm	Covariates	(Combined)	13.306	3	4.435	7.275	.000*
		Tonal Aptitude	4.996	1	4.996	8.194	.006*
		Rhythm Aptitude	4.587	1	4.587	7.523	.008*
		Practice Amount	3.105	1	3.105	5.093	.028*
	Treatment	Group	2.171	2	1.085	1.780	.179
	Error		31.092	51	.610		
	Total		47.317	56	.845		
Tone Quality	Covariates	(Combined)	16.245	3	5.415	10.858	.000*
		Tonal Aptitude	7.598	1	7.598	15.235	.000*
		Rhythm Aptitude	.006	1	.006	.012	.913
		Practice Amount	9.360	1	9.360	18.768	.000*
	Treatment	Group	1.184	2	.592	1.187	.313
	Error		25.433	51	.499		
	Total		42.203	56	.754		
Composite	Covariates	(Combined)	96.384	3	32.128	9.320	.000*
		Tonal Aptitude	53.458	1	53.458	15.507	.000*
		Rhythm Aptitude	6.992	1	6.992	2.028	.160
		Practice Amount	35.972	1	35.972	10.435	.002*
	Treatment	Group	8.893	2	4.446	1.290	.284
	Error		175.811	51	3.447		
	Total		279.305	56	4.988		

* Significant at .05 level

Table 8

Adjusted Performance Mean Scores for "Yankee Doodle"

	Group	Mean	Standard Error
Intonation	1	3.2573	.178
	2	2.9886	.186
	3	3.1957	.185
Rhythm	1	3.2959	.177
	2	3.1920	.185
	3	3.6650	.184
Tone Quality	1	2.8838	.160
	2	2.8796	.167
	3	3.1991	.166
Composite	1	9.4387	.421
	2	9.0630	.440
	3	10.0585	.437

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Interpretation

Listening experience during the 21-week instructional period, either listening to a wide variety of music or listening to repeated Suzuki repertoire, did not significantly aid performance achievement of beginning Suzuki violin students. However, the observed mean after adjustment (see Table 4) suggests that for the performance of "Twinkle Variation A", students who were provided with typical Suzuki listening experience (Group 2) tended to have higher Rhythm and Tone Quality mean scores than students who were not provided with listening opportunities (Group 3), and also tended to perform slightly better in Rhythm and Tone Quality than the students who were provided with a wide variety of music listening experience (Group 1), in which the Twinkle piece was included. The Rhythm and Tone Quality performance achievement of Group 1 was also slightly

higher than that of Group 3. This superiority of the two listening groups was not found in the performance achievement analysis of "Yankee Doodle," where the test piece was not included in the listening repertoire of both Group 1 and Group 2. Contrary to the results shown in Table 4, the observed mean scores shown in Table 8 suggested that, for the performance of "Yankee Doodle," students who were not provided listening tapes (Group 3) tended to have the highest Rhythm and Tone Quality mean scores, while students who listened to typical Suzuki repertoire (Group 2) tended to have the lowest Intonation, Rhythm, and Tone Quality mean scores. The non-significant and contradictory results make it difficult to draw any significant conclusions.

The fact that Group 3 demonstrated higher achievement on Rhythm and Tone Quality performance than both Group 1 and Group 2 for the piece "Yankee Doodle," suggests that a short period of listening experience, either a wide variety of listening or typical Suzuki listening, did not help with performance learning of an unlistened-to piece. The first grade students may have needed a longer time to develop their audiation skills enough to generalize their musical thinking to "Yankee Doodle." Also, the fact that Group 2 students had slightly inferior performance achievement to Group 1 students on the piece "Yankee Doodle", suggests that the limited repertoire Group 2 listened to may have provided lesser information for generalization than a variety of music heard by Group 1.

It is also possible that students in Group 3, who did not receive a listening assignment, tended to learn this piece better due to some reasons that were not controlled in this study. First, according to the researcher's personal observation, the parents of students in Group 3 demonstrated greater effort and enthusiasm for their children's

learning. It is possible they felt that it was a disadvantage not to have the listening tapes, especially since all parents had access to the Chinese version of the book *Nurtured by Love* (Suzuki, 1983), in which the importance of listening is stressed. Parental involvement is of ultimate importance in the Suzuki approach. The success of the Suzuki approach, according to Slone (1982, p. 29), depends upon the triangular relationship of parent, teacher, and student. The influence of parental involvement on performance achievement is also evident in a study of Brokaw (1983), who found the amount of parental supervision of home practice to be significantly related to beginning students' instrumental performance achievement ($p<.01$). The study of Doan (1973) also indicated that parents' attention and assistance with children's practice contributed to the children's performance ability. Furthermore, "Yankee Doodle" is more difficult than "Twinkle" in terms of left-hand technique. Students may need more parental assistance to perform the "Yankee" piece. Second, instrumental performance achievement is a result of an aggregate of elements that may not be able to be explained by several isolated factors like music aptitude, practice amount, or listening experience. Factors such as fine and gross motor skill development, personality, richness of environment, previous instrumental experience, as well as parental involvement, etc., may have an impact on instrumental performance achievement. Several studies (Jenkins, 1976; Reynolds, 1960; Shelton, 1965) have shown that home environment, such as the parents' musical backgrounds, whether or not the mother and/or siblings sing or play instruments, and frequent singing with members of their families, etc., are closely related to the musical response of children from two years old to first grade.

If the advantages of stronger parental involvement of Group 3 holds true, then the superior performances of Group 2 and Group 1 over Group 3 on Rhythm and Tone Quality achievement of the Twinkle piece, although slight, may not be overlooked and may be attributed to their daily listening opportunities of "Twinkle Variation A." Students in Group 2 demonstrated higher Rhythm and Tone Quality achievements than those in either Group 1 or Group 3, but not higher Intonation achievement for both test pieces. Listening experience in Group 2 did not appear to help with their Intonation performance. This might be largely attributable to the use of finger tapes. Each student's violin in each group was marked with tape on all correct finger placements at the beginning of the instructional period, as is customary in the Suzuki approach. If a student could see the mark when playing the violin, and had no difficulty placing fingers on the mark, he should have been able to produce correct intonation without relying much on his mental images of the songs or pitch discrimination ability. Thus, the effects of listening experience on Intonation achievement may be lessened because of the use of finger tapes. Moreover, the idea that students in Group 2 did not demonstrate higher Intonation achievement because of the use of finger tapes, further supports that the superiority of Group 2 on Rhythm and Tone Quality achievement, though not significant, may be due to the influence of listening experience.

There may be several reasons for the non-significant superiority of Group 2 and Group 1 in the Rhythm and Tone Quality performance of "Twinkle Variation A." First, as stated above, from the observation of the researcher, parents of students in Group 3 had more involvement in their children's instrumental learning. The stronger parental involvement in Group 3 possibly compensated for the advantage of the listening

experience of students in Group 1 and Group 2. Second, although Group 3 students did not listen to the "Twinkle Variation A" daily at home, they had many opportunities to listen to the piece in their weekly lessons (small groups of 3 or 4) and large group lessons every other week. This piece was frequently reviewed in the weekly class or group lessons because review is a common practice within the Suzuki approach. Third, almost every Taiwanese child can sing the song "Twinkle Twinkle Little Star" from an early age, and the simple, single rhythm pattern of "Twinkle Variation A" is probably also easily audiated by a first-grade student. In this situation, the influence of listening experience on Intonation and Rhythm performance may not be expected to be salient. Although listening experience may contribute to their sense of tone quality, the students' immature bowing skills might not reflect this on the violin.

The amount of listening may be another reason that could account for the non-significant differences among the three groups. Especially for incidental listening, the type of listening the present study investigates, saturation listening probably is necessary in order to produce a statistically significant effect. In Suzuki's opinion, "the young child's rate of progress is directly dependent upon the amount of listening he does" (Starr, 1976, p.7). Suzuki encouraged saturation or 'endless' listening, meaning that the music is always there no matter what the child is doing. In the current study, students in Group 1 and Group 2 were asked to listen to their 30-minute tapes one time a day; that is, every day Group 2 students would listen to the Twinkle piece three times, and Group 1 would listen to the Twinkle piece one time. It is possible that three repetitions a day or one time a day in a short period was not enough listening to enable students in Group 1 and Group 2 to perform significantly better than Group 3 students, especially when most children in

the current study were familiar with the Twinkle piece before this instruction. Also, the daily practice and listening log handed in indicated that students did not finish listening to their tapes every day (Group 2 students every week listened to their tapes 5.17 times a week on average, and Group 1 students, 5.36 times).

Because students in Group 1 demonstrated better performance in Rhythm and Tone Quality achievement than those in Group 3 for the Twinkle piece, but did not demonstrate better performance achievement for the piece "Yankee Doodle," it may be inferred that listening to a wide variety of music mostly not related to performance repertoire in a period of 21 weeks, may not help with students' performance learning, at least in Rhythm and Tone quality. According to Suzuki (Starr, p.7), in order to aid students' performance learning, repeated exposures to a limited repertoire that is being learned, has been learned, and will be learned in the near future, should be more effective than listening to various unrelated classical music. However, this recommendation must be viewed very cautiously. Data from this study only suggest that if an observable effect upon the performance achievement of a beginning learner is to be expected after only a short term or several months of listening, repeated listening to the piece studied may be more effective than listening to a variety of unrelated recordings, at least for Rhythm and Tone quality.

Although a wide variety of listening did not appear to help with the performance of the unlistened-to piece, and was not more effective than typical Suzuki listening in enhancing Rhythm and Tone Quality performance of Twinkle piece, a wide variety of music listening seems to have stronger influence on the performance achievement of Intonation than limited repertoire listening experience, because in performances of each of

the two test songs, no matter whether the piece was heard or not in their daily listening experience, students in Group 1 who listened to a variety of music had comparable but slightly higher Intonation achievement scores than Group 3 but students in Group 2 who listened to limited Suzuki repertoire had lower Intonation scores than those of both Group 1 and Group 3. Because the use of finger tapes may have lessened the effects of listening on Intonation achievement, the relation of listening experiences and Intonation achievement needs to further examined in a situation that finger tapes were avoided.

Also, because Group 1 students demonstrated the highest overall performance achievement in "Twinkle Variation A," repeated listening to the piece studied and at the same time listening to a wide variety of music may be the most beneficial for overall performance achievement.

In summary, from the results of the present study, it may be inferred that (a) listening to a piece that is being learned or has been learned may reinforce the performance of that piece, at least in Rhythm and Tone quality; (b) listening experience for a period as short as 21 weeks, may not influence the performance learning of a piece if the learned piece is not included in the listening repertoire; (c) a wide variety of listening enhances Intonation performance achievement; (d) simultaneous listening to the piece studied and a variety of other music is most profitable for performance achievement. It should be kept in mind, however, that these inferences are made on tendencies and not statistically significant differences. Due to the non-significant results, the greater Rhythm and Tone Quality achievement that was demonstrated in the present study by students who were provided with opportunities to listen to the Twinkle piece, needs to be further examined and validated by increasing the amount of listening and extending the instruction/listening

period. The benefit of a wide variety of listening to Intonation should also be further tested for its statistical significance. The effects of the two types of music listening, either a wide variety of listening or repeated limited listening, upon the performance achievement on a piece that has never been heard, should be further examined.

The Effects of Incidental Music Listening on Developmental Music Aptitude

Two different comparisons were done in order to determine the effect of listening experience on developmental music aptitude. The changes of PMMA scores from pretest to posttest were compared among Group 1, Group 2, and Group 3, who all received the same Suzuki instruction but not the same listening experiences. Second, the changes in scores for the groups (Group 4, Group 5, and Group 6) that were provided with different listening experiences but did not receive Suzuki instruction were compared. The aptitude development of students who were provided Suzuki repertoire listening tapes but not Suzuki instruction (Group 5) was also compared to that of students who were provided neither listening tapes nor Suzuki instruction (Group 6).

Results

Comparison among Suzuki groups.

Before the instruction began, 66 students who volunteered to receive Suzuki instruction were administered the PMMA Tonal and Rhythm subtests within a period of two weeks. Students who had close PMMA Composite scores were randomly assigned to three groups. Students in Group 1 (n=22) were provided with a wide variety of listening experience which included major, minor, and modal tonalities, and duple, triple, and unusual paired meters. Students in Group 2 (n=22) listened to repeated Suzuki repertoire

in which only major tonality and duple meter were included. Students in Group 3 (n=22) were not provided with any listening tapes. All initial PMMA test scores are reported in Table 9, where it can be seen that the mean PMMA Composite scores for each group are very close.

Table 9

PMMA Pretest Results of All Suzuki Students

		N	Mean	SD
Tonal	Group 1	22	35.82	3.35
	2	22	35.43	3.53
	3	22	34.36	3.72
	Total	66	35.21	3.54
Rhythm	Group 1	22	27.86	4.07
	2	22	28.27	4.26
	3	22	29.32	3.92
	Total	66	28.48	4.07
Composite	Group 1	22	63.68	5.83
	2	22	63.73	6.04
	3	22	63.68	5.51
	Total	66	63.70	5.71

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Because some students left the experiment or were absent from the PMMA posttest, the number of students whose scores were included in the analysis was decreased to 21 in Group 1, 20 in Group 2, and 22 (21 in Tonal, 21 in Rhythm, and 20 in Composite*) in Group 3. Their pretest and posttest PMMA scores, and differences in

* One person missed the Tonal subtest, while another missed the Rhythm. Thus, there were 22 actual subjects, but only the number of scores stated for analysis.

these scores, are presented in Table 10. A one way ANOVA analysis was conducted to compare the scores of the three groups. Results in Table 11 indicate that there were no significant differences among the three groups in the pretest and posttest PMMA mean scores, as well as in the average gain scores from pretest to posttest. However, it should be noted that, although not statistically significant, students in Group 1 and Group 2 both had almost twice the Rhythm aptitude gains of students in Group 3 (Table 10). On the other hand, students in Group 3 tended to have much higher Tonal gain than those in Group 1 and Group 2. Group 1 students tended to have the greatest improvement in the PMMA Composite mean score, and Group 3 students tended to have the lowest PMMA Composite gain scores.

Table 10

PMMA Pretest, Posttest, and Gain Scores of Suzuki Groups

				N	Mean	SD
Tonal	Pretest	Group	1	21	35.86	3.42
			2	20	35.30	3.66
			3	21	34.67	3.53
		Total		62	35.27	3.51
	Posttest	Group	1	21	36.48	2.66
			2	20	35.60	3.22
			3	21	36.00	3.19
		Total		62	36.03	3.00
	Gain	Group	1	21	.62	2.65
			2	20	.30	2.77
			3	21	1.33	3.48
		Total		62	.76	2.98
Rhythm	Pretest	Group	1	21	27.67	4.07
			2	20	28.10	4.39
			3	21	29.62	3.75
		Total		62	28.47	4.09
	Posttest	Group	1	21	30.67	3.17
			2	20	31.15	3.33
			3	21	31.14	4.11
		Total		62	30.98	3.51
	Gain	Group	1	21	3.00	3.89
			2	20	3.05	4.20
			3	21	1.52	3.47
		Total		62	2.52	3.86
Composite	Pretest	Group	1	21	63.52	5.92
			2	20	63.40	6.24
			3	20	64.45	5.07
		Total		61	63.79	5.69
	Posttest	Group	1	21	67.14	4.93
			2	20	66.75	5.90
			3	20	67.05	6.20
		Total		61	66.98	5.60
	Gain	Group	1	21	3.62	4.36
			2	20	3.35	5.40
			3	20	2.60	4.07
		Total		61	3.20	4.59

Group 1: Listening to a variety of music
Group 2: Listening to Suzuki repertoire
Group 3: No listening

Table 11

Comparison of PMMA Scores Among Suzuki Groups (ANOVA)

			Sum of Squares	df	Mean Square	F	Sig.
Tonal	Pretest	Between Groups	14.901	2	7.450	.596	.554
		Within Groups	737.438	59	12.499		
		Total	752.339	61			
	Posttest	Between Groups	7.897	2	3.949	.430	.653
		Within Groups	542.038	59	9.187		
		Total	549.935	61			
	Gain	Between Groups	11.552	2	5.776	.643	.529
		Within Groups	529.819	59	8.980		
		Total	541.371	61			
Rhythm	Pretest	Between Groups	44.016	2	22.008	1.328	.273
		Within Groups	977.419	59	16.566		
		Total	1021.435	61			
	Posttest	Between Groups	3.196	2	1.598	.126	.882
		Within Groups	749.788	59	12.708		
		Total	752.984	61			
	Gain	Between Groups	31.296	2	15.648	1.051	.356
		Within Groups	878.188	59	14.885		
		Total	909.484	61			
Composite	Pretest	Between Groups	13.241	2	6.621	.199	.820
		Within Groups	1930.988	58	33.293		
		Total	1944.230	60			
	Posttest	Between Groups	3.196	2	.856	.026	.974
		Within Groups	749.788	58	32.401		
		Total	752.984	60			
	Gain	Between Groups	11.337	2	5.668	.263	.770
		Within Groups	1250.302	58	21.557		
		Total	1261.639	60			

Comparison among non-Suzuki groups.

The three non-Suzuki groups received the same three listening treatments as the Suzuki groups. Group 4 students (n=35) were provided with a wide variety of listening experience which included major, minor, and model tonalities and duple, triple, and unusual paired meter. Students in Group 5 (n=35) listened to repeated Suzuki repertoire in which only major tonality and duple meter were included. Students in Group 6 (n=34) were not provided with any listening tapes. Unlike the Suzuki groups, subjects in the three non-Suzuki groups were students of three intact elementary school classes. All three groups received two 40-minute general music lessons a week from their homeroom teachers, but no Suzuki instruction, during the experimental period.

Singing children's songs and doing concurrent movement activities are staple activities in all music classes of first and second graders in public elementary schools in Taiwan. The home room teachers of both Group 5 and Group 6 majored in music when they studied at Teachers Colleges, so the two groups should have received almost the same quality and content of music instruction, since Taiwanese music curricula are fairly similar. However, the home room teacher of Group 4 was not a music major; therefore, the quality of music instruction Group 4 received may not have been as high as that the other two groups received. Also, the students in Group 4 once complained that the music was not clearly heard during the experimental period. Although the cassette player was replaced immediately after the complaint was known by the researcher, the students' listening experience may have been affected negatively. Because the general music instruction for Group 4 may not have been equivalent to that for Group 5 and Group 6, and there was doubt about the listening experience of Group 4 because of the problem

with the cassette player, the difference between Group 4 and the other two groups in the development of music aptitude could not confidently be attributed to the effect of listening. Therefore, the data for Group 4 is reported only for the purpose of reference, but not used in any analysis.

All initial PMMA test scores are reported in Table 12. The PMMA pretest and posttest scores, as well as PMMA gain scores of the three groups, are reported in Table 13. Because some students were absent from school on the days that PMMA tests were given, if a student missed a subtest in either pretest or posttest, his score in that dimension is not reported. From the data shown in Table 13, it can be found that the students in Group 5 and Group 6 had comparable PMMA pretest mean scores, but Group 4 had much higher Tonal, Rhythm, and Composite scores than both Group 5 and Group 6. This is another reason that the data for Group 4 is not involved in the analysis. It can be found that the gain for Group 4 tended to be lower than the gain of Group 5 and Group 6 in Tonal, Rhythm, and the overall music aptitude. This may be attributed to the following three reasons or their combination: first, students in Group 4 had higher Tonal, Rhythm, and overall music aptitude than students in Group 5 and Group 6 to begin with; second, Group 4 received general music instruction from a non-music specialist, while the other groups received instruction from music specialists; third, the effects of listening may have been disturbed. In summary, the data of Group 4 is excluded from the analysis because of the complicated influences of the above factors.

Table 12

PMMA Pretest Results of All Non-Suzuki Students

			N	Mean	SD
Tonal	Group	4	35	33.03	4.91
		5	34	31.41	5.67
		6	34	29.62	7.47
	Total		103	31.37	6.20
Rhythm	Group	4	34	26.03	4.70
		5	34	24.76	6.01
		6	34	24.91	5.26
	Total		102	25.24	5.33
Composite	Group	4	34	58.97	8.17
		5	34	56.18	10.46
		6	34	54.53	11.98
	Total		102	56.56	10.38

Group 4: Listening to a variety of music
Group 5: Listening to Suzuki repertoire
Group 6: No listening

Table 13

PMMA Pretest, Posttest, and Gain Scores of Non-Suzuki Groups

				N	Mean	SD
Tonal	Pretest	Group	4	34	33.03	4.98
			5	33	31.48	5.75
			6	32	29.84	7.58
		Total		99	31.48	6.25
	Posttest	Group	4	34	33.12	4.53
			5	33	35.06	2.15
			6	32	34.19	4.54
		Total		99	34.11	3.95
	Gain	Group	4	34	.12	3.51
			5	33	3.58	4.75
			6	32	4.34	7.33
		Total		99	2.64	5.65
Rhythm	Pretest	Group	4	33	26.30	4.49
			5	32	24.59	6.15
			6	33	24.85	5.33
		Total		98	25.26	5.36
	Posttest	Group	4	33	27.61	3.57
			5	32	29.63	4.48
			6	33	26.15	4.81
		Total		98	27.78	4.51
	Gain	Group	4	33	1.12	4.87
			5	32	5.03	6.56
			6	33	1.30	4.98
		Total		98	2.46	5.75
Composite	Pretest	Group	4	32	59.44	7.66
			5	32	55.94	10.70
			6	32	54.75	12.23
		Total		96	56.71	10.45
	Posttest	Group	4	32	61.19	6.75
			5	32	64.56	5.54
			6	32	60.41	7.53
		Total		96	62.05	6.83
	Gain	Group	4	32	1.59	6.04
			5	32	8.63	9.00
			6	32	5.66	10.19
		Total		96	5.29	8.98

Group 4: Listening to a variety of music
Group 5: Listening to Suzuki repertoire
Group 6: No listening

In order to further validate the findings in the analysis of Suzuki group scores in which both listening groups (Group 1 and Group 2) showed greater improvement in Rhythm aptitude than the group that was not provided with a listening tape (Group 3), an independent-samples *t* test was conducted to examine the difference in music aptitude development between non-Suzuki students who were provided with the Suzuki repertoire listening experience (Group 5) and students who were not provided with listening tapes (Group 6). Results shown in Table 14 indicate that the listening group made significantly ($p=.012$) greater gains in Rhythm aptitude than the non-listening group.

Table 14

PMMA Pretest, Posttest, and Gain Scores of Listening (Group 5) and Non-listening (Group 6) Students Without Suzuki Instruction

		Listening (Group 5)			Non-Listening (Group 6)				Sig.
		N	Mean	SD	N	Mean	SD	t value	(2-tailed)
Tonal	Pretest	33	31.48	5.75	32	29.84	7.58	.986	.328
	Posttest	33	35.06	2.15	32	34.19	4.54	.996	.323
	Gain	33	3.58	4.75	32	4.34	7.33	-.503	.617
Rhythm	Pretest	32	24.59	6.15	33	24.85	5.33	-.179	.859
	Posttest	32	29.63	4.48	33	26.15	4.81	3.009	.004*
	Gain	32	5.03	6.56	33	1.30	4.98	2.586	.012*
Composite	Pretest	32	55.94	10.70	32	54.75	12.23	.413	.681
	Posttest	32	64.56	5.54	32	60.41	7.53	2.516	.014*
	Gain	32	8.63	9.00	32	5.66	10.19	1.236	.221

* Significant at .05 level (2-tailed)

Interpretation

The significant results shown in Table 14 indicate that first grade students who were given 21 weeks of typical Suzuki repertoire incidental listening treatment made significantly greater Rhythm aptitude gains than did students without the listening treatment. These results demonstrate that repeated incidental listening to typical Suzuki repertoire, even when only duple meter was included, positively affected the development of Rhythm aptitude of the first grade students to the extent that a statistically significant difference was reached when compared to the improvement made by students who did not listen to music. Although the results shown in Table 11 did not demonstrate significant differences among the three Suzuki groups that were provided with different listening treatments, attention must be given to the fact that students in those groups all received Suzuki instruction in the treatment period. The effects of listening may be confounded by the effects of Suzuki instruction. The effect of a wide variety of music listening may be comparable to or better than the effect of typical Suzuki repertoire listening, as demonstrated in this study by its effect on Tonal, Rhythm and overall aptitude development (see Table 10). The effects of different listening experiences upon developmental music aptitude when only minimal formal music instruction is involved need to be further examined. Future research is also needed to determine the factors in listening experience that may contribute to a higher level of Rhythm aptitude.

Furthermore, the results shown in Table 10, indicating that the Suzuki students who were provided with listening opportunities, either a variety of music or Suzuki repertoire, made almost twice the Rhythm gains of students who were not provided with listening opportunities, suggest that the development of Rhythm aptitude may be

strengthened by formal instruction (Suzuki instruction) together with informal instruction (listening opportunities). This finding is in accord with Gordon's opinion that children in kindergarten through grade three should receive both formal and informal music instruction for the sake of music aptitude development (Gordon, 1986, p. 70).

It also should be noted that, although Group 5 and Group 6 students received general music instruction from two different teachers, both were music specialists, and had similar educational backgrounds. The teaching was also similar because singing children's songs with concurrent movement is the typical diet in all first grade music classes in Taiwan's public elementary schools. It does not seem possible that the general music instruction the students in the two groups received would account for their significantly different development in Rhythm aptitude.

An unusual result found in this study is that both the group listening to a wide variety of music (Group 1) and those listening to a limited amount of the Suzuki repertoire (Group 2 and Group 5), made less Tonal aptitude improvement, although not statistically significant, than the non-listening groups (Group 3 and Group 6), no matter whether Suzuki instruction was present or not. It may be that the listening groups happened to have more students with very high Tonal aptitude. There were 8 students (38%) in Group 1 and 6 students (30%) in Group 2 who received a percentile rank of 99 or higher in terms of PMMA norms (which were provided in the PMMA manual, p. 61) on the pre-instruction Tonal subtest, while only 4 students (19%) in Group 3 scored at the 99th percentile or above. Also, compared to 2 students (6%) in Group 6 who scored at the 99th percentile or above, 5 students (15%) in Group 5 received a percentile rank of 99 or higher on the pre-instruction Tonal subtest. There was little room for these students to

grow in Tonal aptitude scores; on the other hand, according to Gordon (1987, p. 8), more effort is needed in order to maintain their exceptionally high Tonal aptitude.

It is also possible that listening experience in limited tonalities may not help with children's tonal growth, especially that of children with high Tonal aptitude. As evidenced in Table 10, students in all Suzuki groups (Group 1 to Group 3), on average, ranked higher than the 80th percentile on the pre-instruction Tonal subtest. The listening experiences provided in the present study were mostly major and minor, with some modal for Group 1, and major tonality only for Group 2 and Group 5. The limited tonal listening experience perhaps could not help the tonal growth of high Tonal aptitude students, the population that the subjects in the present study represents.

Because results of the present study also indicate that Group 1 students who were given broader tonal listening experience (major, minor, and modal) tended to have higher Tonal gains than Group 2 students who listened to music of only major tonality, it is possible that listening experience including a variety of tonalities is desirable for Tonal aptitude development. The suggestion of Levinowitz (1989) and Schleuter (1984) that children should be provided with opportunities to listen to music in various modes or tonalities for the sake of better tonal development is supported by this study. In general, however, listening experience provided in the current study did not demonstrate positive influence on the development of Tonal aptitude. Future research is needed to further investigate the development of Tonal aptitude of children who are provided with incidental listening experience of even broader tonalities (e.g. major, minor, dorian, phrygian, lydian).

Finally, the non-significant differences in the Composite aptitude gain scores between the listening and non-listening groups in the present study also suggest that listening may have had significant influence upon the development of Rhythm aptitude but not strong enough to affect the overall development of music aptitude.

The Effects of Suzuki Instruction on Developmental Music Aptitude

Results

In order to determine the effects of Suzuki instruction on the developmental music aptitude of beginning violin students, the development of music aptitude of students who received Suzuki instruction but were not provided with listening tapes (Group 3) was compared to that of students who received neither Suzuki instruction nor listening tapes (Group 6). Group 3 instead of Group 2 was chosen to compare with Group 6 because listening experience may confound the effect of Suzuki instruction on the development of music aptitude. The pre-instruction PMMA scores of these two groups are reported in Table 15. Because Group 6 had more students than Group 3; and in order to make the two groups more equivalent in pre-instruction music aptitude, students in Group 6 whose Composite aptitude scores were equal to or higher than 55 were selected to be compared to Group 3 students. An independent-samples *t* test was conducted and the results shown in Table 16 indicate that there were no significant differences in the PMMA Tonal, Rhythm, and the Composite gain scores between the Suzuki (Group 3) and the non-Suzuki group (selected Group 6).

Table 15

Pre-Instruction PMMA Scores of Suzuki (Group 3) and Non-Suzuki (Group 6) Students

		N	Mean	SD
Tonal	Group 3	21	34.67	3.53
	6	32	29.84	7.58
Rhythm	Group 3	21	29.62	3.75
	6	33	24.85	5.33
Composite	Group 3	20	64.45	5.07
	6	32	54.75	12.23

Table 16

Comparison of PMMA Scores Between Suzuki and Non-Suzuki Groups (Independent-Samples *t* Test)

		Suzuki (Group 3)			Non-Suzuki (Selected Group 6)				Sig.
		N	Mean	SD	N	Mean	SD	t value	(2-tailed)
Tonal	Pretest	21	34.67	3.53	20	34.50	2.14	.182	.857
	Posttest	21	36.00	3.19	20	35.90	2.61	.109	.913
	Gain	21	1.33	3.48	20	1.40	2.98	-.066	.948
Rhythm	Pretest	21	29.62	3.75	20	27.90	3.18	1.580	.122
	Posttest	21	31.14	4.11	20	27.80	4.60	2.457	.019*
	Gain	21	1.52	3.47	20	-.10	4.75	1.225	.217
Composite	Pretest	20	64.45	5.07	20	62.40	4.16	1.397	.170
	Posttest	20	67.05	6.20	20	63.70	5.48	1.810	.078
	Gain	20	2.60	4.07	20	1.30	5.24	.876	.387

* Significant at .05 level (2-tailed)

Although the difference in gains is not significant, the Suzuki group scored significantly higher in the posttest PMMA Rhythm subtest (p=.019) and almost significantly higher in the Composite (p=.078) than the non-Suzuki group. When their differences were further examined, it was found that for students who received a pretest Tonal percentile rank of 80 or higher (based on PMMA percentile norms provided in PMMA manual, pp. 61-63), the Suzuki group had statistically significant higher gain in Rhythm (p=.013) and Composite (p=.007) scores than the non-Suzuki group (see Table 17). Their difference in Tonal development was still not significant (p=.785). The students' posttest PMMA scores were also compared to their own pretest PMMA scores for both Suzuki (Group 3) and Non-Suzuki groups (selected Group 6). The results of the paired-samples *t* test (see Table 18) indicate that the Suzuki group made significant improvement in the overall music aptitude (p=.010), and a nearly significant improvement in Tonal (p=.095) and Rhythm aptitude (p=.058). Results shown in Table 19 indicated that students in the non-Suzuki group made significant improvement in Tonal aptitude (p=.049) but not in the overall music aptitude (p=.281). Their Rhythm mean score decreased after the period of general music instruction, although the decrease was not significant (p=.926).

Table 17

Comparison of PMMA Scores Between Suzuki and Non-Suzuki Groups for Students With High Pretest PMMA Tonal Scores(Independent-Samples *t* Test)

Tonal>=80%		Suzuki (Group 3)			Non-Suzuki (Selected Group 6)				Sig.
		N	Mean	SD	N	Mean	SD	t value	(2-tailed)
Tonal	Pretest	14	36.57	1.95	12	35.83	1.70	1.021	.318
	Posttest	14	36.86	2.38	12	35.92	2.50	.981	.337
	Gain	14	.29	1.59	12	.08	2.15	.275	.785
Rhythm	Pretest	14	28.93	4.16	12	28.08	2.57	.610	.548
	Posttest	14	31.21	4.34	12	26.50	4.42	2.739	.011*
	Gain	14	2.29	3.71	12	-1.58	3.58	2.694	.013*
Composite	Pretest	14	65.50	5.32	12	63.92	3.48	.881	.387
	Posttest	14	68.07	5.95	12	62.42	5.87	2.430	.023*
	Gain	14	2.57	3.55	12	-1.50	3.40	2.975	.007*

* Significant at .05 level (2-tailed)

Table 18

Comparison of Pretest and Posttest PMMA Scores of Suzuki Students Without Listening Treatment (Paired-Samples *t* Test)

Group 3	Pretest			Posttest				Sig.
	N	Mean	SD	N	Mean	SD	t value	(2-tailed)
Tonal	21	34.67	3.53	21	36.00	3.19	1.754	.095
Rhythm	21	29.62	3.75	21	31.14	4.11	2.011	.058
Composite	20	64.45	5.07	20	67.05	6.20	2.857	.010*

* Significant at .05 level (2-tailed)

Table 19

Comparison of Pretest and Posttest PMMA Scores of Non-Suzuki Students Without Listening Treatment (Paired-Samples *t* Test)

Selected Group 6	Pretest			Posttest				
	N	Mean	SD	N	Mean	SD	t value	Sig. (2-tailed)
Tonal	20	34.50	2.14	20	35.90	2.61	2.101	.049*
Rhythm	20	27.90	3.18	20	27.80	4.60	-.094	.926
Composite	20	62.40	4.16	20	63.70	5.48	1.109	.281

* Significant at .05 level (2-tailed)

Interpretation

Although students in the non-Suzuki group did not receive Suzuki instruction during the experimental period, they did receive general music instruction, with emphasis on singing and moving, from a music specialist in their regular school program. Because general music is required for all public elementary schools of Taiwan, the Suzuki group not only received Suzuki instruction from the researcher, but also received general music instruction in their regular school program. However, because all music classes of first and second grade students in Taiwan are taught by their home room teachers who may or may not be music specialists, and the Suzuki students came from various public schools and classes, students in the Suzuki group may or may not have received general music instruction from a music specialist. It cannot be determined whether or not there were differences in the quality of general music instruction the two groups received, but at least it may be assumed that the chance that the students in the Suzuki group received better general music instruction than those in the non-Suzuki group students is very slight,

especially since the general music instruction for Group 6 was provided by a music specialist. The different developmental music aptitudes of the Suzuki and non-Suzuki group will be interpreted as the effect of Suzuki instruction where the effect of the listening assignment was absent, compared to no Suzuki instruction on students who also received general music instruction. Also, because Suzuki students who were involved in the present study had higher pre-instruction Tonal, Rhythm, and overall aptitude scores than the first grade students in the non-Suzuki groups, and all of them received Composite test score percentiles of 50 (based on PMMA percentile norms provided in the PMMA manual, pp. 61-63, a first grader who receives a Composite raw score of 55 is ranked at the 50^{th} percentile) or higher in the pre-instruction PMMA test, any conclusion drawn from this part of study is limited to the first grader whose Composite percentile is at 50 or higher, as measured by PMMA.

The significant results shown in Table 17 suggest that, for students with high Tonal aptitude (Tonal percentile equal to or higher than 80), those receiving beginning Suzuki violin instruction made significantly higher gains in Rhythm and overall music aptitude than students who did not receive Suzuki instruction.

It is interesting to note that the positive effects of Suzuki instruction on the development of Rhythm and overall music aptitude were not demonstrated on students who received medium high to low pretest PMMA Rhythm scores (lower than 80%), but were demonstrated on students who received high pretest PMMA Tonal scores (higher than 80%). Because it was found that 73% of the students with high Tonal aptitude received low Rhythm aptitude, it is inferred that it is easier for Suzuki instruction to demonstrate aptitude influence on Rhythm and overall music aptitude for students with

low Rhythm aptitude but with high Tonal aptitude; for students with both low Tonal and Rhythm aptitude, Suzuki instruction did not demonstrate the same effect. The intense rhythm training in the four different rhythm patterns of "Twinkle" and the frequent rhythm practice in learning to play the songs may be profitable for the Rhythm aptitude development of students with high Tonal aptitude but not as high Rhythm aptitude.

Suzuki instruction did not appear to demonstrate comparable influence on developmental Tonal aptitude to that on developmental Rhythm aptitude. Although the Suzuki group made greater Tonal gains than the non-Suzuki group for students with high Tonal aptitude, as suggested by Table 17, their difference is much less than their difference in Rhythm aptitude development. Furthermore, as suggested by Table 18 and Table 19, students who did not receive Suzuki instruction made significant improvement ($p=.049$) in Tonal aptitude but the improvement of students who received Suzuki instruction was not significant ($p=.095$). The non-Suzuki group also made greater Tonal gains than the Suzuki group (see Table 16). It is possible that the Tonal development of students who had high Tonal aptitude did not benefit much from learning repertoire as simple as "Twinkle". It is also possible that the use of finger marks hindered the tonal development of Suzuki students because the visual input from these cues may have interfered with the aural. Or it may be possible that the singing activities in general music instruction are beneficial to developmental Tonal aptitude of first grade students, so the influence of additional Suzuki instruction becomes less. The effect of Suzuki instruction on developmental music aptitude should be further examined in a situation in which no other type of music instruction is involved.

These findings seem to contradict what was concluded in the studies of Woodruff (1983) and Stamou (1998). However, it is not clear how Woodruff drew the conclusion that the rhythm instruction provided in the Suzuki method is rigid and may decrease developmental Rhythm aptitude of kindergarten children, when no contrast group was provided and the data shown in his report indicated that all PMMA mean scores (Tonal, Rhythm, and the Composite) of both groups who received Suzuki violin instruction were improved after training (Woodruff, 1983, p.25, 26, 41). Also, Stamou reported that Suzuki students tended to have higher post-instruction PMMA Tonal and Composite mean scores but lower Rhythm mean scores than the general music students. Her conclusion is based on the comparison of paired Suzuki and non-Suzuki students from age 5 to age 8; performance at individual age levels of students may be different. It may be that the same instruction has different aptitude development upon children of different ages, or even, of different music aptitude levels. It should also be kept in mind that results did not reach significance in either study; therefore, any conclusions drawn should be approached with caution.

Finally, the results shown in Table 18 and Table 19 provide more evidence that Suzuki instruction has a positive effect on the developmental Rhythm aptitude and overall music aptitude of first grade students, because students who received Suzuki instruction made very significant improvement in overall music aptitude ($p=.01$) and an almost significant improvement in Rhythm aptitude ($p=.058$), while students who did not receive Suzuki instruction were found to decrease slightly (and not significantly) in their Rhythm aptitude gains, and their improvement in overall music aptitude ($p=.281$) was not as high as that of Suzuki students.

CHAPTER FIVE

CONCLUSIONS

Summary of the Study

Purpose and Problems

The purpose of the study was to investigate the effect of incidental listening on the performance achievement and developmental music aptitude of beginning Suzuki violin students. The specific problems of the study were as follows:

1. to investigate the effect of different incidental listening experiences (a wide variety of listening, typical Suzuki listening, none) on the performance achievement of first-grade beginning violin students after 21 weeks of Suzuki instruction.
2. to investigate the effect of different incidental listening experiences (a wide variety of listening, typical Suzuki listening, none) on the developmental music aptitude of first-grade students.
3. to investigate the effect of Suzuki violin instruction on developmental music aptitude of first-grade beginning Suzuki violin students.

Procedure

One hundred and seventy first grade students in Tainan, Taiwan, were involved in this study. Sixty-six students from various elementary schools who did not have previous instrumental music experience constituted the Suzuki instruction groups while 104 students from 3 intact classes of two elementary schools constituted the non-Suzuki

groups. The sample for this study represented various educational and socio-economic backgrounds.

PMMA was administered to all subjects by the researcher prior to the Suzuki violin instruction period. The Suzuki students were divided into three groups, according to their pre-instruction PMMA Composite scores, so groups would have equivalent aptitude profiles. Students in each of these groups were given the same Suzuki violin instruction but different listening treatments. All students in Suzuki groups were given a 50-minute violin lesson by the researcher once a week, in a small group of 3 or 4 students, and one 90-minute group lesson every other week. There were students of each treatment group in every small teaching group. Students in Group 1 were required to listen to a 30-minute tape daily, containing a wide variety of music of different styles, tonalities, meters, and instrumental and vocal settings. Students in Group 2 were also required to listen to a 30-minute tape daily, but it contained repeated recordings of the first 9 pieces of the *Suzuki Violin School*, Volume 1 repertoire. No listening assignment was given to students in Group 3. The parents of all Suzuki students were asked to record the amount of their children's practice each day. In addition to the practice amount, parents of Group 1 and Group 2 students needed to record their listening amount every day. The log sheets were handed in to the researcher when the students came to violin class each week.

The three non-Suzuki groups, Group 4, Group 5, and Group 6, were also assigned to three different listening treatments. The students in Group 4 received the same listening treatment as students in Group 1. Group 5 students received the same listening treatment as Group 2. Similar to Group 3, no listening tape was provided for students in Group 6.

Both Group 4 and Group 5 students listened to the treatment tape one time everyday during the school's individual study period.

At the end of the 21-week instructional period, PMMA was administered again to all students in both Suzuki and non-Suzuki groups. Students in the Suzuki groups were also individually audiotaped performing "Twinkle Variation A" and "Yankee Doodle." Their performances were rated by three independent judges on Intonation, Rhythm, and Tone Quality using a researcher-designed rating scale.

Analysis

In order to determine whether incidental listening experience influenced the performance achievement of beginning violin students, oneway ANOVA analyses with covariates were conducted to test for significant differences (α=.05) in performance achievement that were caused by listening treatments on "Twinkle Variation A" and "Yankee Doodle," among the three Suzuki groups. The pre-instruction PMMA scores on the Tonal and Rhythm subtests, as well as weekly practice amounts, were used as covariates.

To determine whether first grade students' developmental music aptitude was influenced by their listening experience, an oneway ANOVA test was conducted to determine whether any significant differences existed in the PMMA mean gains among the three Suzuki groups. An independent-samples two-tailed *t* test was conducted to examine the significant difference in Tonal, Rhythm, and Composite gain scores between students who were provided with Suzuki repertoire listening experience (Group 5) and students who were not provided with listening tapes (Group 6).

To determine the effect of Suzuki instruction on the developmental music aptitude of first grade beginning Suzuki violin students when the listening treatment was absent, an independent-samples two-tailed *t* test was conducted to test the significance of differences in PMMA mean gain scores between students who received Suzuki instruction but no listening treatment (Group 3) and those who did not receive either one (Group 6). Both groups, posttest PMMA scores were also compared to their own pretest PMMA scores using the paired-samples two-tailed *t* test.

Results and Conclusions

The effects of incidental music listening on performance achievement.

It was found that students who were provided opportunities for incidental listening to the piece they were learning tended to perform the piece better in the Rhythm and Tone Quality dimensions than students without this kind of aural exposure. Either a wide variety of listening (Group 1) or typical Suzuki listening experience (Group 2) did not effectively help with the learning of the piece that was not included in the listening repertoire. A wide variety of music listening seemed to enhance the performance achievement on Intonation; however, the effect of typical Suzuki listening on Intonation performance achievement appeared to be none or slightly negative. The presence of finger tapes in the present study may also have confounded the effect of listening on intonation. The fact that Group 1 students received the highest Composite performance mean scores suggests that simultaneous listening to the piece studied and a variety of other music is most profitable for performance achievement. However, it should be noted that these inferences are based on non-significant findings.

In general, for both "Twinkle Variation A" and "Yankee Doodle," Group 1 (listening to a wide variety of music) and Group 2 (listening to typical Suzuki repertoire) had closer performance achievements on both Rhythm and Tone Quality dimensions, while the performance achievement of Group 3 (no listening assignment) differed more from that of Group 1 or Group 2. In the performance of "Twinkle Variation A," both Group 1 and Group 2 tended to perform better overall than Group 3, while in "Yankee Doodle", Group 3 tended to perform better than Group 1 and Group 2. It is possible that Group 1's and Group 2's daily aural exposure to the piece "Twinkle Variation A" enabled them to perform better than Group 3, but for the piece that was not in their daily listening repertoire, the effects of listening might have been weaker. Thus, if Group 3 students happened to have some learning advantages that were not controlled in the present study, such as parental involvement (as the researcher observed), the achievements of Group 1 and Group 2 would not be able to compete with those of Group 3. Or, it is also possible that twenty-one weeks of aural exposure may not have been long enough for first-grade students to generalize the musical skills they gained by listening.

In the performance of "Twinkle Variation A," both groups who were provided with opportunities to listen to the Twinkle piece had higher Rhythm and Tone Quality mean scores than the group without the listening treatment (Group 3). Although the superiority of the two listening groups did not reach statistical significance, if the advantages of stronger parental involvement of Group 3 hold true, it may be speculated that the two groups' performance superiority as suggested in the observed performance mean scores is accounted for by their frequent aural exposure to that piece.

In summary, based on the results of the present study, it might be concluded that incidental listening to repertoire that the student will be learning may reinforce the student's performance achievement in Rhythm and Tone quality. Listening to a wide variety of repertoire may enhance Intonation performance achievement. Simultaneous listening to the piece studied and a variety of other music is most profitable for overall performance achievement. Again, due to non-significant results, the conclusions of the present study need to be validated by further research.

The effects of incidental music listening on developmental music aptitude.

A statistically significant difference in the development of Rhythm aptitude was found between the first grade students who received the typical Suzuki repertoire incidental listening treatment and students who had no listening treatment, neither having had Suzuki instruction. Students who were provided with the typical Suzuki listening experience, even though only major tonality and duple meter were included, made significantly better Rhythm aptitude gains than students who were not provided with any listening treatment. Further research is needed to determine the factors in listening experience that contribute to superior rhythm development.

The effect of musical listening upon developmental Rhythm aptitude of Suzuki students was found to be positive, but not statistically significant. The effects of listening may not be fully demonstrated when Suzuki instruction is also present. However, the development of Rhythm aptitude seems to be reinforced by formal instruction (Suzuki instruction) together with informal instruction (listening opportunities).

An unusual result found in the present study is that students who were provided with listening opportunities appeared to have less gain in Tonal aptitude, although not

statistically significant, than students not provided with listening opportunities. It is suspected that limited tonal listening experience might not have helped the tonal growth of high tonal aptitude students, as were the majority of the Suzuki subjects in the present study. As suggested by Gordon (1987, p.8), "the higher the level of music aptitude a child was born with, the more and varied early informal and formal experiences are required for him to maintain that level." Research is therefore needed to investigate the effect of listening experience with even broader tonalities (e.g. major, minor, dorian, phrygian, lydian) on the development of Tonal aptitude.

The non-significant differences in Composite aptitude gain scores between the listening and non-listening groups in the present study also suggest that listening may have a significant influence upon the development of Rhythm aptitude but not one strong enough to influence the overall development of music aptitude.

The effects of Suzuki instruction on developmental music aptitude.

It was found that for the first-grade students with high pre-instruction Tonal aptitude (Tonal score percentile equal to or higher than 80), beginning Suzuki violin instruction significantly contributed to their Rhythm and overall developmental music aptitude when no listening was provided. The intense rhythm training in the four different rhythm patterns of "Twinkle" and the frequent rhythm practice in learning to perform the pieces may be profitable to the Rhythm aptitude development of students with high Tonal aptitude but lower Rhythm aptitude.

It was also found that PMMA mean scores of students who received Suzuki instruction increased from pre- to post-instruction in both Tonal and Rhythm dimensions, though none of these results was significant. PMMA mean scores of students who did not

receive Suzuki instruction increased significantly (p=.049) in the Tonal dimension, but decreased non-significantly in the Rhythm dimension. The increase of Suzuki students in overall developmental music aptitude reached the significance level of .01, while the increase of non-Suzuki students did not reach significance (p=.281).

Suzuki instruction did not appear to aid the development of Tonal aptitude as effectively as it aided the development of Rhythm aptitude, although the Suzuki students still had higher Tonal gains than non-Suzuki students for those with Tonal aptitude at or above the 80th percentile. It was also found that the Tonal mean scores of Suzuki students did not increase as much as those of non-Suzuki students. It is possible that the singing activity in the general music instruction diminished the influence of Suzuki instruction on the development of Tonal aptitude, and that a longer period of Suzuki instruction is needed to make tonal development more evident. It is also possible that intonation training in the beginning Suzuki method is not challenging enough for the tonal development of students with high Tonal aptitude. The use of finger tapes may also hinder tonal development.

Although the findings concerning the effect of Suzuki instruction upon the development of music aptitude in the present study contradict those of Woodruff (1983) and Stamou (1998), the instruction in the study of Woodruff might not have been typical Suzuki instruction since features such as parental involvement and listening assignments that are essential to Suzuki instruction appeared to be absent. The conclusion of Stamou is based on a comparison between the results of Suzuki instruction and general music instruction for students aged from 5 to 8, and the number of 6-year-olds was very small. Different age groups of students may develop differently from the same instruction.

Moreover, the present study did not compare the effect of Suzuki instruction and general music instruction.

Implications for Music Education

Because a tendency was found, although not statistically significant, aural exposure to music that relates to their learning as well as a wide variety of music is highly recommended in order to facilitate beginning students' instrumental performance. This trend suggests that incidental listening that takes place while doing homework, having meals, traveling, or playing, is beneficial to the learning of instrumental performance. Parents are encouraged to provide their children with plenty of opportunities to listen to the repertoire they are learning as well as a wide variety of other works. Instrumental teachers should encourage students to attend various concerts in the community and listen to music beyond their performance level as well as music not performed on instruments of their study. If there is opportunity, music of various styles and cultures other than Western should be introduced in the listening activity to extend students' audiation skills. Young children should be provided with a variety of listening experience before they are ready to start to study an instrument. The effect of listening experience in early childhood upon children's future instrumental performance achievement needs to be explored further.

The typical beginning Suzuki listening experience was found to significantly aid the development of Rhythm aptitude of the first grade students who did not receive concurrent instruction. The development of Rhythm aptitude of Suzuki students was also found to be reinforced by either type of listening experience. Thus, listening activity is

recommended to be included in all types of music instruction and in home assignments, including general music instruction, instrumental music instruction, and early childhood music instruction, for children whose music aptitude is still developing.

The factors in listening experience that may contribute to the development of music aptitude need to be identified by future research. Listening experience with an even broader variety of tonalities is recommended because in this study, students who were given listening experience with broader tonalities (major, minor, and modal) tended to have higher Tonal aptitude gains than students who listened to music with major tonality only. How a variety of tonality in listening experiences influences the development of Tonal aptitude should be further validated by future research.

Contrary to conclusions of previous research (Stamou, 1998; Woodruff, 1983), the present study found that rhythm instruction provided through the Suzuki method, when the effect of listening is not present, was significantly beneficial to the developmental Rhythm aptitude of the violin students whose Tonal aptitude percentile was at 80 or higher. Therefore, further research is needed to clarify the conflicting results among these studies.

Moreover, surprisingly, the expected Tonal benefit, which was suggested by previous research, was not significantly demonstrated in the present study. The tonal instruction in the beginning Suzuki method may not be adequate for students with high Tonal aptitude. Tonal patterns of higher difficult level may be adapted to beginning Suzuki instruction, or at least, in the students' daily listening assignment, to stimulate their growth of Tonal aptitude. Furthermore, the typical use of finger tapes by Suzuki teachers

may need to be reconsidered, because of their possible negative influence on developmental Tonal aptitude. This speculation needs to be verified by further research.

These contradictory findings suggest the possibility that the same instruction may have different influence upon the development of aptitude for students with different music aptitude levels and at different ages. This conclusion agrees with Gordon's (1986, p.83) theory that instruction should be adapted to children's individual musical differences. Thus, any conclusion concerning the effect of any specific music instruction upon the development of music aptitude should be made with caution.

Recommendations for Future Research

Although results of the present study suggested a possible influence of incidental listening on performance achievement, this tendency did not reach statistical significance. Replication of the present study employing larger sample sizes and longer instructional periods is needed to further determine the validity of this tendency by testing it for statistical significance.

A beginning Suzuki piece with a less familiar melody and more variety of rhythm patterns, which is more advanced than "Twinkle" (e.g. piece 3 - "Song of the Wind," piece 5 - "O Come, Little Children"), could be used as a test song so that the effect of the prescribed listening treatment could be more evident. Also, testing using slightly more advanced piece allows students to have a longer period of aural exposure before they start to learn the performance piece. Another way to improve the statistical significance of the results may be to increase the daily exposure to music by listening to the treatment tapes

two or three times a day. Finger tapes should be avoided for research because they may confound the effect of listening upon intonation performance achievement.

In the present study, the students who were given the listening treatment of a wide variety of music nonetheless listened to the same treatment tape every day. In order to exaggerate the difference of expansive listening and typical Suzuki listening, it is recommended that the repertoire for the expansive listening tapes change every month or less. Suzuki repertoire should not necessarily be included in these treatment tapes.

The effects of different listening experiences in early childhood upon children's future performance achievement is worthy of investigation because any stimulation in the formative stages may be critical to their later development. The effect of listening should also be examined on performance achievement of intermediate and advanced instrumental students, so that it may be more clearly defined.

For further examining the effect of a wide variety of listening on developmental music aptitude and comparing the effect of expansive listening to typical Suzuki listening or repeated limited listening, the present study needs to be replicated in a situation in which little or no other music instruction takes place. Studies that recruit subjects from various classes and are randomly assigned to different treatments of listening are needed to generalize the conclusion about the significant effect of typical Suzuki listening upon the development of Rhythm aptitude which was drawn from the present study. Furthermore, because the sample of the present study was limited to children of age 6 (first graders), future research is needed to examine the effect of listening on children of other ages at which their aptitude is still developing. Studies that employ even broader tonal listening

experience are recommended in order to find out how listening may enhance the tonal development of students with high Tonal aptitude.

Finally, because the pre-instruction PMMA mean scores of Suzuki students in the present study were higher than the mean scores of non-Suzuki students in the same study and the standardization group reported in the PMMA manual, the effect of Suzuki instruction on developmental music aptitude needs to be investigated with populations of lower music aptitude. The effect of Suzuki instruction on students at other grade levels and performance levels should also be examined in order to have a better understanding of the effect of Suzuki instruction on developmental music aptitude. The effect of listening experience was purposely excluded from the Suzuki instruction which was employed in the present study for one group (Group 3); however, since the listening assignment is an essential feature of Suzuki's basic approach, the effect of Suzuki instruction with its typical listening assignment need to be examined together. The non-Suzuki students who were used to contrast the Suzuki students came from an intact class. In order to better control the influence of general music instruction, studies that involve control students from various classes are recommended. Again, it is recommended that finger marks be avoided for their possible negative influence upon developmental Tonal aptitude of Suzuki students.

This study validates the idea that incidental listening in many forms is a very important element in music learning. Good music teachers have suspected this for years. Further research may help solidify this conclusion. In summary, although results concerning the effect of incidental listening on performance achievement did not reach statistical significance, they revealed some trends on the effect, positive or negative, of

expansive listening and repeated limited listening on instrumental performance learning. Incidental listening was found to be an effective element for the development of Rhythm aptitude. For good development of Tonal aptitude, listening experience with an even broader variety of tonalities may be necessary. Further research is needed to validate this possibility and provide more conclusive information on any possible positive or negative effects of listening on developmental Tonal aptitude. Suzuki instruction was also found to be beneficial for developmental Rhythm and overall aptitude of first-grade beginning violin students. Tonal instruction in the beginning Suzuki method may need modifications in order to challenge students' tonal development. More research is needed to examine the effect of Suzuki instruction on development of Tonal aptitude.

APPENDIX A

REPERTOIRE FOR A WIDE VARIETY OF MUSIC LISTENING

1. Title: Twinkle, Twinkle, Little Star Variations
   Composer: W. A. Mozart, arranged by Shinichi Suzuki
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 3:00
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: Folk song

2. Title: What Child Is This?
   Composer: English Folk Song, arranged by Gowinston Cassler
   Performer(s): Chorus of St. Olaf College
   CD: The St. Olaf Christmas Festival Vol. III, St. Olaf
   Performance Time: 2:00
   Timbre: Chorus
   Dynamics: Soft and some contrast
   Meter: Triple
   Tonality: Minor
   Style: English folk song

3. Title: Lightly Row
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:35
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: German folk song

4. Title: Für Elise
   Composer: Ludwig Van Beethoven
   Performer(s): Moura Lympany
   CD: Piano Favorites, EMI Classics
   Performance Time: 3:19
   Timbre: Piano
   Dynamics: Soft and some contrast
   Meter: Triple
   Tonality: Minor
   Style: Romantic

5. Title: Song of the Wind
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:40
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: German folk song

6. Title: La Sarabande
   Composer: Michael Praetorius
   Performer(s): New London Consort, conducted by Philip Pickett
   CD: Praetorius: Dances from Terpsichore, Decca
   Performance Time: 1:42
   Timbre: Violin, Lira de braccio, Lute, Organ, Cello
   Dynamics: Mostly soft
   Meter: Duple
   Tonality: Major
   Style: Renaissance

7. Title: Go Tell Aunt Rhody
   Composer: French Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:35
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: French folk song

8. Title: Brandenburg Concerto No. 6, BWV 1051, Allegro
   Composer: Johann Sebastian Bach
   Performer(s): British Chamber Orchestra, conducted by Neville Marriner
   CD: J. S. Bach Brandenburg Concertos Nos. 5 & 6, EMI Classics
   Performance Time: 6:01
   Timbre: Violin, Viola, Cello, Bass, Harpsichord
   Dynamics: Contrasting
   Meter: Triple
   Tonality: Major
   Style: Baroque

9. Title: Take Five
   Composer: Dave Brubeck
   Performer(s): Dave Brubeck Quartet
   CD: The Dave Brubeck Quartet: Time Out, Columbia
   Performance Time: 2:10 (excerpt)
   Timbre: Piano, Alto Saxophone, Bass, Drums
   Dynamics: Some contrast
   Meter: Unusual paired
   Tonality: Aeolian
   Style: Jazz

10. Title: Peter and the Wolf, Andantino
    Composer: Sergei Prokofiev
    Performer(s): St. Petersburg Radio & TV Symphony Orchestra
    CD: Prokofiev: Peter and Wolf, Saint-Saëns: Carnival of the Animals, Sony
    Performance Time: 1:00
    Timbre: Orchestra
    Dynamics: Soft, Little contrast
    Meter: Duple
    Tonality: Major
    Style: Classical

11. Title: Coventry Carol
    Composer: French Folk Song
    Performer(s): K. David VanHoesen
    CD: Jump Right In, Solo and Accompaniment Compact Disc Set, Solo Book One, GIA
    Performance Time: 0:26
    Timbre: Bassoon
    Dynamics: Moderately loud
    Meter: Triple
    Tonality: Minor
    Style: Folk song

12. Title: The Nutcracker Ballet; Act II Divertissement: Tea (Chinese Dance)
    Composer: Peter Ilyich Tchaikovsky
    Performer(s): Orchestra of the Deutsche Opera, Berlin
    CD: The Best of Tchaikovsky, RCA
    Performance Time: 1:09
    Timbre: Orchestra
    Dynamics: Contrasting
    Meter: Duple
    Tonality: Major
    Style: Romantic

13. Title: Sunset
    Composer: Foday Musa Suso
    Performer(s): Kronos String Quartet and Foday Musa Suso
    CD: Kronos Quartet: Pieces of Africa, Elektra Nonesuch
    Performance Time: 4:20
    Timbre: String quartet and Kora
    Dynamics: Some contrast
    Meter: Duple
    Tonality: Major
    Style: African

14. Title: When Johnny Comes Marching Home
    Composer: Folk Song
    Performer(s): Dina Alexander Trojan
    CD: Jump Right In, Solo and Accompaniment Compact Disc Set, Solo Book One, GIA
    Performance Time: 0:21
    Timbre: Trumpet
    Dynamics: Loud
    Meter: Triple
    Tonality: Minor
    Style: Folk song

15. Title: The Magic Flute, Duett: Pa-Pa-Gena
    Composer: Wolfgang Amadeus Mozart
    Performer(s): Dietrich Fischer-Dieskau, Lisa Otto, Berlin Philharmonic Orchestra
    CD: Mozart: The Magic Flute-Highlights, PolyGram
    Performance Time: 2:41
    Timbre: Voice, Orchestra
    Dynamics: Contrasting
    Meter: Duple
    Tonality: Major
    Style: Classical

APPENDIX B

REPERTOIRE FOR TYPICAL SUZUKI LISTENING

1. Title: Twinkle, Twinkle, Little Star Variations
   Composer: W. A. Mozart, arranged by Shinichi Suzuki
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 3:00
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: Folk song

2. Title: Lightly Row
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:35
   Timbre: Violin
   Dynamics: Soft and Moderately loud
   Meter: Duple
   Tonality: Major
   Style: German folk song

3. Title: Song of the Wind
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:40
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: German folk song

4. Title: Go Tell Aunt Rhody
   Composer: French Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:35
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: French folk song

5. Title: O Come, Little Children
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:50
   Timbre: Violin
   Dynamics: Soft and Moderately loud
   Meter: Duple
   Tonality: Major
   Style: German folk song

6. Title: May Song
   Composer: German Folk Song
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:33
   Timbre: Violin
   Dynamics: Loud, Moderately loud and Soft
   Meter: Duple
   Tonality: Major
   Style: German folk song

7. Title: Long, Long Ago
   Composer: T. H. Bayly
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:43
   Timbre: Violin
   Dynamics: Loud, Moderately loud, and Moderately soft
   Meter: Duple
   Tonality: Major
   Style: Folk song

8. Title: Allegro
   Composer: Shinchi Suzuki
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 0:45
   Timbre: Violin
   Dynamics: Loud and Soft
   Meter: Duple
   Tonality: Major
   Style: Etude

9. Title: Perpetual Motion
   Composer: Shinichi Suzuki
   Performer(s): David Nadien
   CD: Suzuki Violin School I, Warner Brothers
   Performance Time: 1:15
   Timbre: Violin
   Dynamics: Moderately loud
   Meter: Duple
   Tonality: Major
   Style: Etude

APPENDIX C

PERMISSION LETTER FROM G.I.A. PUBLICATIONS

09/22/98 11:03 GIA PUBLICATIONS → 15173329269 NO. 412 001

7404 S. MASON AVENUE
CHICAGO, ILLINOIS
60638
(708) 496-3800
(708) 496-3828 FAX

TO: Da-Li Chang
Michigan State University
School of Music

FAX No: 517.332.9269

From: Tom Hawley
GIA Publications, Inc.

Date: September 22, 1998

No. of Pages: 1

Re: Permission

Dear Da-Li,

Permission is hereby granted for you to make three (3) copies of the tape and convert the appropriate PMMA test sheets into Chinese for research purposes only. You must be sure to include the name of the test, the author and all of the copyright information found on the different areas of the test are included on your copies. This includes the tapes you will be making.

Good luck with your research study.

Sincerely,

Thomas W. Hawley

Thomas W. Hawley

APPENDIX D

UCRIHS PERMISSION

MICHIGAN STATE
UNIVERSITY

April 27, 1998

TO: Judith Ann Palac
203 Music Practice Bldg.

RE: IRB#: 98-214
TITLE: THE EFFECTS OF DIFFERENT LISTENING EXPERIENCES ON THE PERFORMANCE ACHIEVEMENT AND THE DEVELOPMENTAL MUSIC APTITUDE OF BEGINNING VIOLIN STUDENTS
REVISION REQUESTED: N/A
CATEGORY: 1-B
APPROVAL DATE: 04/22/98

The University Committee on Research Involving Human Subjects'(UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DRW:bed

cc: Da-Li Cahng

OFFICE OF
RESEARCH
AND
GRADUATE
STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/432-1171

APPENDIX E

LETTER TO PARENTS OF THE SUZUKI SUBJECTS

Dear Parents:

I am a Suzuki violin teacher. I have a Master of Music degree in Music Education with an emphasis in Suzuki pedagogy and have taught for ten years, including a year in the Community Music School at Michigan State University. I am also a doctoral student in Music Education and this year I will be working on my dissertation research. The objectives of my study are: (a) to determine whether instrumental performance is enhanced by using an aural model (cassette tape) at home during the instrumental instruction period, and (b) to investigate the effects of different listening experiences and violin instruction on the development of music aptitude. The children who are going to participate in the study should the first-grade students in the coming fall who did not receive any prior violin instruction.

They will receive free violin instruction for 5 months (October to March) from me. They are also going to be randomly assigned to either one of two cassette tapes for listening at home, or no specific listening material assigned. Although your child may receive different listening material from other children, the violin instruction for all children will be the same and Suzuki Violin School, volume 1, will be the instruction material. The children who receive the listening material will not necessarily benefit more than those who do not have listening material. Many successful violinists were not required to listen to music if they received traditional violin instruction other than Suzuki instruction.

In March children will be audiotaped performing pieces. Only an identification number will be recorded with your child's performance, so no one except me can identify the performers from the tapes. The tapes will be sent to three music teachers to score. The children who are going to participate in the study will also take a music aptitude test (a test that shows the child's music potential) twice during the instruction period. The first time will be in October and the second in March. The music aptitude test, Primary Measures of Music Audiation (PMMA), has two parts, the tonal subtest and the rhythm subtest. Each part lasts for 20 minutes including directions and test. Children will listen to recorded pairs of rhythm or tonal patterns and decide whether the patterns of each pair are the same or different. The purpose of PMMA is to help teachers and parents to realize the music strengths and weaknesses of each child so that each child's music potential can

be thoroughly developed. According to research studies, music aptitude is developmental or flexible, so please do not use the score to judge your children's musical abilities.

The violin instruction is totally free. The cassette tapes will be assigned to your child without any charge but must be returned when the study is finished. A violin will cost you about NT $4,500 and the instruction book is NT $180. Therefore your total expenses will not exceed NT $5,000. Participation is entirely voluntary and at no risk. The aptitude and achievement scores will remain confidential and can be given to you only upon your written request. Your child is free to withdraw from the study at any time without penalty. Your child can also refuse to answer any questions or refuse to participate in any procedure. I hope you will approve your son or daughter's participation, and you can indicate this by signing and returning the consent form attached to this letter. If you have any questions or concerns about this study, please call my brother at 290-0789, or reach me at changdal@pilot.msu.edu.

Yours sincerely,

Da-Li Chang
Ph.D. student in Music Education at Michigan State University

APPENDIX E (TRANSLATION)

LETTER TO PARENTS OF SUZUKI SUBJECTS

親愛的家長:

我是一位鈴木小提琴教師，擁有鈴木教學法的碩士學位，並有十年的小提琴教學經驗。我現在就讀於美國密西根州立大學音樂教育博士班，準備進行一項短期的教學研究。這項研究主要有二個目的：⑴探討聽音樂對學習樂器的影響，⑵聽音樂與學習樂器對音樂性向發展的影響。我的研究對象是今年秋季將上小學一年級，而且以前沒有學過小提琴的小朋友。

我將免費教每一位參加的小朋友小提琴五個月（今年十月至明年三月）。有些小朋友必須每天在家聽我給的錄音帶，有些小朋友不必。需不需要聽錄音帶完全由抽籤來決定。雖然有聽錄音帶的差異，所有的小朋友都用鈴木小提琴教本第一册爲教材。有錄音帶的小朋友不見得就會比較好。傳統的小提琴教學法並沒有要求聽錄音帶，很多小朋友也是學習得很好。

在明年三月最後一次小提琴上課時，我將爲每一位小朋友的演奏作錄音。錄音乃是匿名的，錄音帶中只有小朋友的編號，除了我本人，沒有人知道小朋友的編號。錄音的結果將分送給三位評審評分。同時我將爲每位參加的小朋友作二次音樂性向測驗（PMMA），一次在十月，一次在明年三月。這項音樂性向測驗有二部份，音調與節奏。每一部份測驗約需二十分鐘。小朋友將會聽到一組（二個）音調或節奏形態，然後決定他們是否一樣。音樂性向測驗的目的在幫助老師及父母瞭解孩子的個別差異，使他們的潛能得到完全的發展。根據研究報告，小朋友的音樂性向是會變動，不是一成不變的。所以請父母不要以此斷定孩子音樂潛能的强弱。

小提琴教學與錄音帶是完全免費的。但您必須自行負擔小提琴與教本的費用。小提琴一支約需台幣4500元，教本約需180元。您的花費約在5000元內之譜。是否參與這項研究完全決定於您個人的意願。您不必擔心有任何的風險，無論是音樂性向測驗或演奏成就測試，其結果都是絕對保密的。只要您提出書面要求，我便可將結果給您。您隨時可退出這項研究，不需賠償任何費用。您的孩子也有權拒絕參與這項研究的任何活動或測試。

我誠摯地邀請您的孩子參與這項研究。如果您同意您的孩子參與這項研究，請您填寫下面的資料並簽名，交給將這份資料傳給您的老師或朋友。若您對這項研究有任何問題，歡迎隨時洽詢我弟弟姜建宏老師，或以電子郵件直接與我聯絡（changdal@pilot.msu.edu）。

姜大立　鞠躬

APPENDIX F

CONSENT FORM FOR SUZUKI SUBJECTS

To Da-Li Chang:

I have read the explanation attached and hereby consent to my child's participation in your study. I understand that participation is entirely voluntary, that my child is free to withdraw from the study at any time without penalty, and that my child can refuse to answer any questions or refuse to participate in the procedures. I understand that my child will be randomly assigned either a listening cassette or not. I understand that the estimated cost for buying a violin and a violin instruction book will not exceed NT $5,000. If actual costs exceed this estimate, I recognize I am still responsible for them. I understand that participants in the study will be at no risk and that my child's name will not be used in any report of results. Within these restrictions, I understand that when the study is completed the overall results of my child's tests will be made available to me upon my written request.

Child's Name:_____ Gender: _____

School:_____

Address: _____

Telephone: _____

Have you child ever learned violin? (Y/N) _____

Signed:_____ Date:_____
(Parent or Legal Guardian)

APPENDIX F (TRANSLATION)

CONSENT FORM FOR SUZUKI SUBJECTS

給姜大立：

我已閱讀過以上關於您的研究計劃的說明，並且同意我的孩子參與您的這項研究。我瞭解參與這項研究完全決定於我個人的意願，我隨時可退出這項研究，不需賠償任何費用。我的孩子也有權拒絕參與這項研究的任何活動或測試。我瞭解要不要聽錄音帶完全由抽籤來決定。我瞭解我可能需要台幣5000元的花費購買小提琴與教本。如果實際的花費超過這個數目，我瞭解我仍須自行負擔多出的費用。我瞭解參與這項研究沒有任何的風險，我孩子的姓名不會出現於任何此項研究的報告中。在以上條件限制之下，我瞭解當此項研究結束後，我可以提出書面要求，得知我孩子在此項研究中的任何測試結果。

學生姓名：_____ 性別：_____

學校：_____

地址：_____

電話：_____

您的小孩以前是否學過小提琴？（是／否）____

家長簽名：_____日期：_____

APPENDIX G

LETTER TO THE PRINCIPALS

Dear Principal:

I am a doctoral student in Music Education at Michigan State University, USA. I will be working on my dissertation research this year. I am writing to ask your permission for your students to participate in my research study. One objective of my study is to investigate the influence of listening experience and instrumental instruction upon children's music aptitude development. The purpose of discovering children's music aptitude is to help teachers and parents to realize the music strength and weakness of each child so that each child's music potential can be thoroughly developed. The children who are going to participate in the study are the first grade students in the coming fall.

I will administer a music aptitude test twice in half a year, once probably in October and once next March. The test that will be used to evaluate students' music aptitude is Dr. Edwin Gordon's Primary Measures of Music Audiation (PMMA). The PMMA consists of two subtests, Tonal and Rhythm subtests. Children will listen to recorded pairs of rhythm or tonal patterns and decide whether the patterns of each pair are the same or different by marking the circles on the answer sheet. Each subtest of PMMA will take about twenty minutes including directions and test. I will administer the test with the homeroom teacher. The scores of your students will be either compared to those of students with different listening experience or those of my violin students. These scores also will remain confidential and only be given to the homeroom teacher or parents of students upon their written request.

During the period between the two tests of PMMA, some classes of students will be provided with 30-minute cassette tapes, which contain either a variety styles of music or selected pieces from Suzuki violin repertoire. The time for playing these tapes will be the decision of homeroom teachers.

If you approve my request to conduct this study, I will visit the homeroom teachers and give them a written explanation. I will also make an appointment with the homeroom teachers so that I can explain my study to the students and pass out a letter of explanation and an informed consent form to the students to bring home to their parents.

I would be happy to visit your office and explain my request in greater detail if that would be helpful. I look forward to beginning the research study that will help me learn

more about the development of children's music aptitude. If you have any question about this request, please call me at 228-1384.

Your sincerely,

Da-Li Chang
Ph. D. student in Music Education at Michigan State University

APPENDIX G (TRANSLATION)

LETTER TO THE PRINCIPALS

校長大人鈞鑒：

我是美國密西根州立大學音樂教育博士班的一位學生，正準備進行一項短期的教學研究。在此特地向您報告我的研究計劃，並希望您能核準您的學生參與這項研究計劃。這項研究的一部份目的在探討聽音樂與學習樂器對音樂性向發展的影響。音樂性向測驗的目的在幫助老師及父母瞭解孩子的個別差異，使他們的潛能得到完全的發展。我的研究對象是今年秋季將上小學一年級的小朋友。

我將爲每位參加的小朋友作二次音樂性向測驗，一次約在十月，一次在明年三月。我將用Dr. Edwin Gordon 所設計的Primary Measures of Music Audiation (PMMA) 爲小朋友作測試。此項音樂性向測驗有二部份，音調與節奏。每一部份測驗約需二十分鐘。小朋友將會聽到一組（二個）音調或節奏形態，然後決定他們是否一樣。我將與小朋友的級任導師一同作測試。小朋友的測試結果將與其他聽不同音樂或我的小提琴學生作比較。所有小朋友的測試結果將被保密，只有他們的級任導師及父母能透過書面要求得知孩子在此項研究中的測試結果。

在二次音樂性向測驗中間的這段期間，有些班級的學生將會每天給他們聽30分鐘的音樂；這些音樂可能是各種不同風格的音樂或是鈴木小提琴教本第一册的部份曲子。播放音樂的時間由級任導師作決定。

如果您核准我的研究計劃，我將拜訪一年級的級任導師並向他們報告我的研究計劃。我將與級任導師約定時間當面向小朋友報告我的研究計

劃並分發說明信與同意書給他們帶回給家長。

如果有需要，我很樂意當面拜訪您作更詳盡的說明。我期待藉由此項研究能對音樂性向發展有更多的瞭解。若您對這項研究有任何問題，歡迎隨時與我聯絡。我的電話是228-1384。

姜大立　鞠躬

APPENDIX H

LETTER TO PARENTS OF THE NON-SUZUKI SUBJECTS

Dear Parents:

I am a Suzuki violin teacher and a doctoral student in Music Education at Michigan State University. I am writing to ask your permission for your child to participate in my research study. One objective of my study is to investigate the effects of listening experiences and violin instruction on the development of music aptitude. Your child along with other children in his or her school class will take a music aptitude test (a test that shows the child's music potential) twice during the study period. The first time will be in October 1998 and the second in March 1999. The music aptitude test, Primary Measures of Music Audiation (PMMA), has two parts, the Tonal subtest and the Rhythm subtest. Each part lasts for 20 minutes including directions and test. Children listen to recorded pairs of rhythm or tonal patterns and decide whether the patterns of each pair are the same or different. The purpose of PMMA is to help teachers and parents to realize the music strengths and weaknesses of each child so that each child's music potential can be thoroughly developed. According to the study of many music educators, music aptitude is developmental, or flexible, so please do not use the score to judge your children's musical abilities.

During the period between the two tests of PMMA, your child along with other children in his or her school class may or may not be given 30 minutes of daily music listening, depending on the class to which your child belongs. The music will be either Suzuki violin repertoire or music of various styles. The time for playing these tapes will be the decision of your child's homeroom teacher.

This study has already been explained to the school principals and homeroom teacher of your child and I am contacting you with his or her permission. Participation is entirely voluntary and will be at no risk. The test score will remain confidential and can be given to you upon your written request or that of his/her homeroom teacher only. Your child is free to withdraw from the study at any time without penalty. Your child can also refuse to answer any questions or refuse to participate in any procedure.

I hope you will approve your son or daughter's participation, and you can indicate this by signing and returning the consent form attached to this letter. If you have any questions or concerns about this study, please call me at 228-1384.

Your sincerely,

Da-Li Chang
Ph. D. student in Music Education at Michigan State University

APPENDIX H (TRANSLATION)

LETTER TO PARENTS OF THE NON-SUZUKI SUBJECTS

親愛的家長:

我是一位鈴木小提琴教師，目前就讀於美國密西根州立大學音樂教育博士班，準備進行一項短期的教學研究。在此特地向您報告我的研究計劃，並希望您能核準您的孩子參與這項研究計劃。這項研究的一部份目的在探討聽音樂與學習樂器對音樂性向發展的影響。我將爲您的孩子與他班上的同學作二次音樂性向測驗（PMMA），一次在十月，一次在明年三月。這項音樂性向測驗有二部份，音調與節奏。每一部份測驗約需二十分鐘。小朋友將會聽到一組（二個）音調或節奏形態，然後決定他們是否一樣。音樂性向測驗的目的在幫助老師及父母瞭解孩子的個別差異，使他們的潛能得到完全的發展。根據研究報告，小朋友的音樂性向是會變動，不是一成不變的。所以請父母不要以此斷定孩子音樂潛能的強弱。

在二次音樂性向測驗中間的這段期間，您的孩子與他班上的同學將會每天給他們聽30分鐘的音樂（也可能不會）；這些音樂可能是各種不同風格的音樂或是鈴木小提琴教本第一册的部份曲子。播放音樂的時間由級任導師作決定。

這項研究已向校長及孩子的級任導師報告過，現在我希望能得到您的同意，讓您的孩子參與這項研究。是否參與這項研究完全決定於您個人的意願。您不必擔心有任何的風險，音樂性向測驗的結果是絕對保密的。只要您（或孩子的級任導師）提出書面要求，我便可將結果給您（或孩子的級任導師）。您隨時可退出這項研究，不需賠償任何費用。您的孩子也有權拒絕參與這項研究的任何活動或測試。

我誠摯地邀請您的孩子參與這項研究。如果您同意您的孩子參與這項研究，請您填寫下面的資料並簽名，交給您孩子的級任導師。若您對這項研究有任何問題，歡迎隨時與我聯絡。我的電話是228-1384。

姜大立　鞠躬

APPENDIX I

CONSENT FORM FOR NON-SUZUKI SUBJECTS

To Da-Li Chang:

I have read the explanation attached and hereby consent to my child's participation in your study. I understand that participation is entirely voluntary, that my child is free to withdraw from the study at any time without penalty, and that my child can refuse to answer any questions or refuse to participate in the procedures. I understand that participants in the study will be at no risk and that my child's name will not be used in any report of results. Within these restrictions, I understand that when the study is completed the overall results of it will be made available to me upon my written request.

Child's Name:_____ Gender: _____

School:_____

Class: _____ Teacher:_____

Signed:_____ Date:_____
(Parent or Legal Guardian)

APPENDIX I (TRANSLATION)

CONSENT FORM FOR NON-SUZUKI SUBJECTS

給姜大立：

我已閱讀過以上關於您的研究計劃的說明，並且同意我的孩子參與您的這項研究。我瞭解參與這項研究完全決定於我個人的意願，我隨時可退出這項研究，不需賠償任何費用。我的孩子也有權拒絕參與這項研究的任何活動或測試。我瞭解參與這項研究沒有任何的風險，我孩子的姓名不會出現於任何此項研究的報告中。在以上條件限制之下，我瞭解當此項研究結束後，我可以提出書面要求，得知我孩子在此項研究中的任何測試結果。

學生姓名：_____ 性別：_____

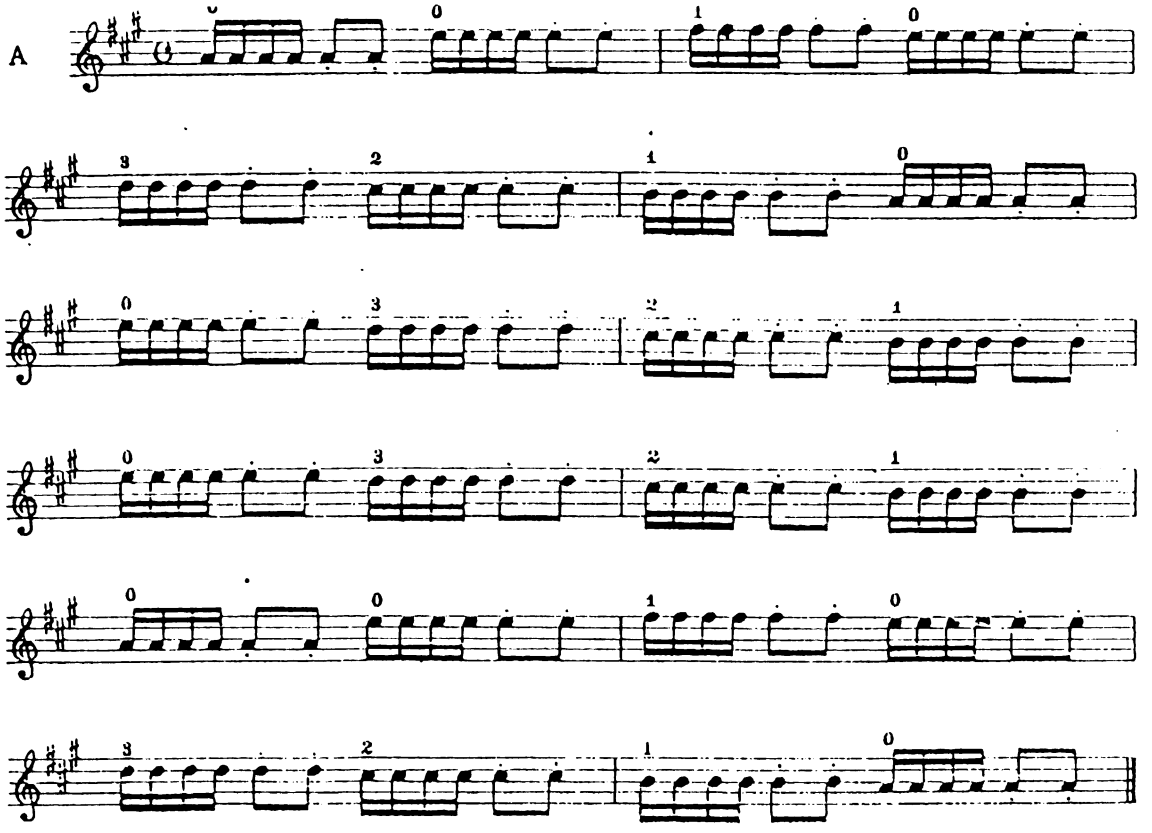
學校：_____

班級：_____ 級任導師：_____

家長簽名：_____日期：_____

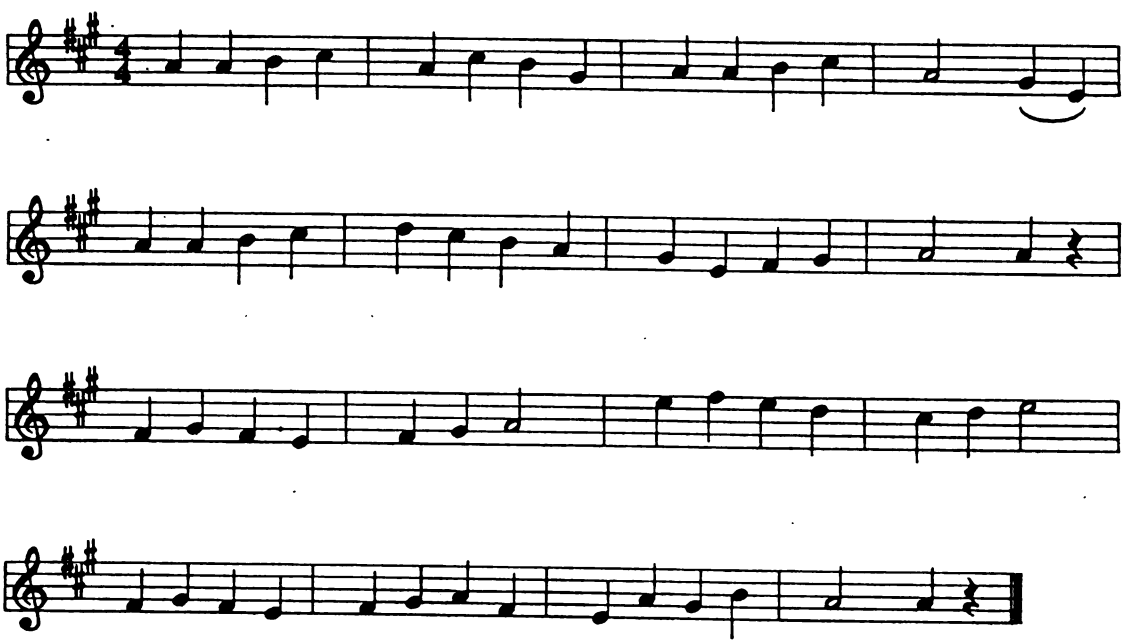
APPENDIX J

TWINKLE VARIATION A



APPENDIX K

YANKEE DOODLE



APPENDIX L

PERFORMANCE ACHIEVEMENT RATING SCALE

Performance will be rated from 1 to 5 (highest) for each dimension.

Intonation (Check only one item which best described the student's performance level)

__ All notes are in tune and correct. (5 points)
__ All notes are in tune and most notes are correct. (4 points)
__ Most of the notes are in tune and all notes are correct. (3 points)
__ Most of the notes are in tune but not all notes are correct. (2 points)
__ Most of the notes are out of tune. (1 point)

Rhythm (Check only one item which best described the student's performance level)

__ Plays with accurate rhythm and consistent tempo. (5 points)
__ Plays with mostly accurate rhythm and consistent tempo. (4 points)
__ Plays with mostly accurate rhythm and somewhat inconsistent tempo. (3 points)
__ Plays with mostly accurate rhythm and inconsistent tempo. (2 points)
__ Plays with mostly inaccurate rhythm and inconsistent tempo. (1 point)

Tone Quality (Check only one item which best described the student's performance level)

__ Plays with good tone quality consistently throughout the pieces. (5 points)
__ Plays with good tone quality most of time but lacks consistency. (4 points)
__ Plays with average tone quality consistently throughout the pieces. (3 points)
__ Plays with average tone quality mostly but poor tone quality sometimes. (2 points)
__ Plays with poor tone quality. (1 points)

APPENDIX L (TRANSLATION)

PERFORMANCE ACHIEVEMENT RATING SCALE

每個項目最高分爲5分，最低分爲1分

⑴音準（請選擇一個與學生的演奏表現最接近之敘述）

___ 所有的音準完全正確且音名皆無誤（5分）
___ 所有的音準完全正確且大部份的音名爲正確（4分）
___ 大部份的音準完全正確且所有的音名爲正確（3分）
___ 大部份的音準完全正確但不是所有音名皆無誤（2分）
___ 大部份的音準不正確（1分）

⑵節奏（請選擇一個與學生的演奏表現最接近之敘述）

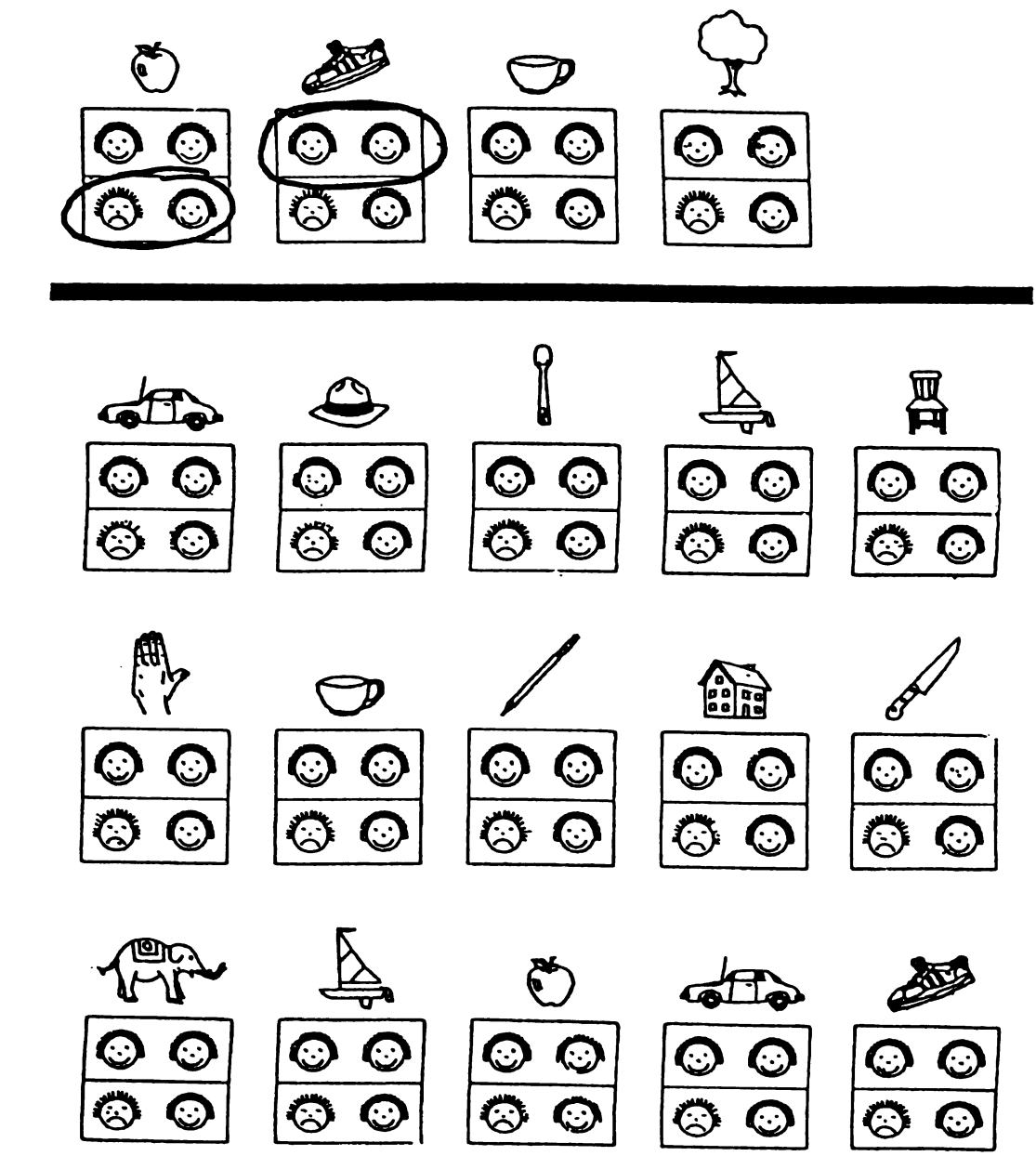
___ 節奏完全正確且速度穩定（5分）
___ 節奏大部份正確且速度穩定（4分）
___ 節奏大部份正確但速度有些不穩定（3分）
___ 節奏大部份正確但速度不穩定（2分）
___ 節奏大部份不正確且速度不穩定（1分）

⑶音色（請選擇一個與學生的演奏表現最接近之敘述）

___ 全曲音色的表現優美且一致（5分）
___ 音色表現大部份爲優美，但無法維持一致（4分）
___ 全曲音色表現中等且一致（3分）
___ 音色表現大部份爲中等，但有時表現差（2分）
___ 全曲音色表現差（1分）

APPENDIX M

SAMPLE OF PMMA TEST SHEET, TONAL SUBTEST



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