

## ABSTRACT

Title of thesis: THE EFFECT OF PASSIVE LISTENING ON BEGINNING  
STRING STUDENTS' INSTRUMENTAL MUSIC  
PERFORMANCE

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The purpose of this study was to develop an understanding of how teachers of beginning string students can most effectively use the CDs now available as part of each individual student method book to improve their students' instrumental music performance level. I investigated the extent to which the inclusion of passive listening (modeled on the Suzuki listening tradition) affects the beginning string student's music performance level. The dependent variable for this study was the students' instrumental music performance achievement on the assigned test pieces from *Do It! Play Strings* (Smith & Froseth, 2003). The independent variable was the students' daily passive listening to selected tracks from *Do It! Play Strings* CD (Smith & Froseth, 2003). Data indicated that participants in the group who received the passive listening treatment scored significantly higher on overall music performance level and in all subareas than those in the control group.

THE EFFECT OF PASSIVE LISTENING ON BEGINNING STRING STUDENTS'  
INSTRUMENTAL MUSIC PERFORMANCE

by

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## Introduction

In the past three years there has been an explosion of new beginning group string method publications: *Essential Elements 2000 for Strings* (Allen, Gillespie, Hayes, & Higgins, 2001), *String Explorer* (Dabczynski, Meyer, & Phillips, 2001), *Artistry in Strings* (Frost, Fischbach, & Barden, 2002), and *Do It! Play Strings* (Smith & Froseth, 2003). While using new formats and presenting some new teaching techniques, the most significant departure from previous method books is the availability of a companion audio CD for every student book. Recordings made available on CDs for student use in conjunction with a method book can serve as a model for specific or general musical purposes. When used for specific musical purposes the CD can model tone or musicality demonstrated through instrumental technique used in a specific piece. When used for general musical purposes the CD can model the tempo and general style of the genre of a piece.

*Essential Elements 2000 for Strings* (Allen et al., 2001) includes the first of two companion CDs with the student book and makes the second available as an additional purchase. *String Explorer* (Dabczynski et al., 2001) makes a free companion CD, that teachers can order for their students, available through their website. These CDs can also be used in a computer to load “Interactive Explorer” which transforms the selections on the companion CD into MIDI accompaniments. The MIDI accompaniments can be manipulated to allow students to select the melody instrument, adjust the tempo, and choose the level of melody, accompaniment, rhythm and click track for each selection. *Artistry in Strings* (Frost et al., 2002) offers

one edition of the student book with two companion CDs included and one edition where the CDs must be purchased separately. *Do It! Play Strings* (Smith & Froseth, 2003) includes a companion CD with each student book. The previous generation of beginning group string methods publications, *Essential Elements for Strings* (Allen, Gillespies, & Hayes, 1994) and *Strictly Strings* (Dillon, Kjelland, & O'Reilly, 1992) offered companion CDs but these were only available for purchase separately from the student method book. In my experience, these CDs were usually purchased by teachers for use in the classroom but not by students for use during home practice.

The one beginning string method book that has consistently offered (and required) recordings for student use during home practice is that of Suzuki (1978). In 1930 Shinichi Suzuki began teaching very young Japanese children, the youngest age 3, how to play the violin using what he called the “mother tongue” method. It was Suzuki’s belief that “good environmental conditions [not good genes] produce superior abilities” (Suzuki, 1983, p.13). In his view, a crucial element of a good environment is a child’s exposure to good music.

According to Suzuki (1983), this exposure should begin in infancy with the repeated playing of a particular movement from the Baroque or Classical repertoire. About three years before commencing formal lessons, the child should begin listening to the Book 1 repertoire daily. This listening should be done passively while the child is engaged in other fun activities. When lessons begin, this routine of passive listening should continue until the child gets older and the repertoire more difficult, at which time the child is instructed to sit down and actively listen to the piece on which

he is currently working. This active listening is in addition to the daily passive listening to good classical music and future Suzuki repertoire.

In the Suzuki beginning violin book (1978; the teacher and student edition are one and the same as teachers are expected to take a training class to learn how to use the materials) the introduction written for the student states, “Companion recordings should be used with these publications” (p. 2). Under the subheading “Suzuki violin method: Principles of study and guidance” it states, “The child should listen to the reference recordings every day at home to develop musical sensitivity. Rapid progress depends on listening” (p. 6). Under another subheading “Education for musical sensitivity” the importance of the listening routine is reinforced:

Every day, children should listen to the recordings of the music they are currently studying. This listening helps them make rapid progress. It is the most important factor in the development of musical ability. Those children who have not had enough listening will lack musical sensitivity. (p. 6)

There are separate CDs for each instrument (violin, viola, cello, bass) on which professional musicians perform the solos with piano accompaniment.

In contrast to the defined use of the recordings in Suzuki teaching, the new method books make little mention of how the included CD should be used. In the student book of *String Explorer* (Dabczynski et al., 2001), the only reference to the CD directs students: “Numbering corresponds to track numbers on the String Explorer CD” (p. 3). In the teacher’s edition, use of the CD is mentioned in relation to incorporating the National Standards into the method book. Under standard six – listening to, analyzing, and describing music – it states, “Students and teachers have easy access to recordings with accompaniments on a free CD. . . . These recordings

provide ample material for listening exercises” (p. 14). The CD itself contains recordings of solo instrument and synthesized MIDI accompaniments.

The *Essential Elements 2000 for Strings* (Allen et al., 2001) student book makes no mention of the CD except for the logo on the cover referring to the recording as a “play-along CD”. Under the title “Play-along CD Disc 1” in the teacher’s edition it states, “From the very beginning, they [the students] can model tone production and technique by listening to a professional orchestra. . . . These tracks are performed on real instruments that support phrasing and dynamics, teaching musicality from the start” (p. 10). The recordings on the CD are of a professional orchestra with a synthesized accompaniment.

*Artistry in Strings* (Frost et al., 2002) addresses the students directly, “Accompaniment CDs 1 and 2 allow you to play with an ensemble. Playing with accompaniments will improve your pitch and rhythm, and will make practicing more fun” (p. 1). In the teacher’s edition, *Artistry in Strings* describes the content of the CD:

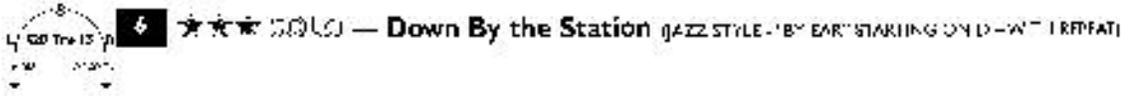
Accompaniment CDs are an integral part of the curriculum of *Artistry in Strings*. Two CDs are available and provide accompaniment for the majority of songs contained in the method. The accompaniments contain a variety of tempos and styles to complement, motivate, strengthen, and refine the musical skills of the young string student. Accompaniments are played twice, once with student parts, then as accompaniment only. (p. 13)

This CD has recordings of a composite violin/cello sound as the solo instrument with synthesized accompaniments.

In *Do It! Play Violin* (Smith & Froseth, 2003) students are shown how to use the balance control knob to regulate the melody and accompaniment lines of the CD. There is also a logo on the front cover stating that a CD is enclosed. Throughout, the

students are given the opportunity to listen to the CD and play various selections “by ear” (Smith & Froseth, p. 8).

**JAZZ** Originally a style of music characterized by strong rhythms and expressiveness, originating in the South by African-Americans.



Although no direct instruction for use of the student CD is found in the teacher’s resource edition, the section on “Teaching to the National Content Standards for Music” found on pp. xxii-xxiii refers to use of the CD for implementation of two of the nine standards.

**Listen to, analyze, and describe music (representing diverse genres and cultures)**

The *Do It! Play Strings* CD provides boundless opportunities for listening, analyzing, and describing recorded music representing diverse genres and cultures.

**Evaluate music and music performances**

The *Do It! Play Strings* CD provides extensive opportunities for evaluating music, recorded music performances, and student music performances.

Later on p. 5-F, use of the student CD is recommended as a way for students to “Study . . . at home with an artist”.

Music repertoire contained on Compact Disc, performed by an artist, and set in an authentic music context that defines the elements of: (a) rhythm (tempo, meter, melodic rhythm), (b) melody (tonality), (c) harmony, (d) tone quality (timbre), (e) intonation, (f) phrasing, (g) style of articulation, (h) expressive nuance, and (i) ethnicity (music culture).

The recordings on the CD are consistent with the idea of studying at home with an artist in that there are separate CDs for the upper (violin/viola) and lower (cello/bass) strings. A professional musician plays each solo instrument with an acoustic instrumental accompaniment.

Since there is little to no direction given to students or teachers on how to use the CDs in these new method books, a question emerges: How does one determine the most effective use of the CD during practice? In all previous studies involving recorded modeling and practice, students were instructed to listen to the model of the piece they were to learn during the same time period they were instructed to practice it (Anderson, 1981; Hewitt, 2001; Linklater, 1997; Puopolo, 1971; Rosenthal, 1984; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Zurcher, 1975). In the majority of these studies, (Hewitt, Puopolo, Rosenthal, Rosenthal et al., Zurcher) the use of modeling via audiotape during practice did improve the subjects' playing abilities. However, none of these studies examined the long-established listening tradition of the Suzuki philosophy. As string instruction does not normally begin in the public schools until the third or fourth grade, it is not feasible to have the students begin listening to the recordings in infancy. It is, however, possible to have the students begin listening to the recordings as soon as they have attended their first lesson, which is often before most even have an instrument.

#### *Statement of the Problem*

The purpose of this study was to develop an understanding of how teachers of beginning string students can most effectively use the CDs now available as part of each individual student method book to improve their students' instrumental music performance level. I investigated to what extent the inclusion of passive listening (modeled on the Suzuki listening tradition) affected the beginning string student's music performance level.

Research was needed in this area of study because:

- 1) The use of the CD, included as part of the individual method book in a group strings series, was a new (as of 2001) phenomenon that had not yet been researched.
- 2) Contact time between student and teacher during school lessons is limited; therefore it is important to make outside practice as productive as possible.

### *Research Hypothesis*

The music performance achievement of beginning fourth grade string students who passively listen (modeled on the Suzuki listening tradition) to selected tracks from the *Do It! Play Strings* CD as part of their daily classroom routine, will differ from the music performance achievement of beginning fourth grade string students who do not. Data will be analyzed using a general linear model (GLM) repeated-measures analysis with multiple dependent variables, Alpha = .05. The strength of the relationship will be examined by the use of  $\eta^2$ .

### *Scope of the Study*

This study was limited to the effect of passive listening to the *Do It! Play Strings* CD on the beginning fourth grade string students' music performance achievement on four selected test pieces from the *Do It! Play Strings* method book. Passive listening was defined as playing music in the homeroom classroom of the participant when he/she was focused on another activity, other than listening (i.e. the recording was played as background music).

This CD and method book was chosen for its similarity to the Suzuki beginning repertoire and recordings. On the CD, each musical selection is played without verbal introduction and with a musical introduction. In addition there are separate CDs for violin/viola and cello/bass. Most musical examples are actual folk songs as are the beginning songs in the Suzuki repertoire.

Participants were fourth-grade beginning violin, viola, cello, and bass students. All participants received weekly heterogeneous group lessons taught by the researcher during the school day. The researcher made all student recordings using a minidisc player during the weekly heterogeneous group lessons. The researcher and two other music teachers rated all recordings using the modified Zdzinski/Barnes String Performance Rating Scale. The participants' classroom teachers implemented the passive listening treatments during the school day. Classroom teachers recorded the date of each treatment on a form provided by the researcher.

## Review of Related Literature

The areas of research relevant to this study include the use of modeling as a practice technique in instrumental music, implicit memory for melody, and the role of listening in the Suzuki philosophy. While researchers have investigated the first two areas in various experimental studies, the role of listening in the Suzuki philosophy has been documented mainly through anecdotal evidence.

### *The use of Modeling as a Practice Technique in Instrumental Music*

Research into the concept of instrumental practice was the focus of Hallam's study in *Does Practice Make Perfect? Current Theory and Research on Instrumental Music Practice* (Jørgenson & Lehmann, 1997). Hallam introduced the topic by presenting two complementary views of practice. The first was from a study by Ericsson, Krampe and Tesch-Römer (1993) where "'deliberate practice' [was described as] including activities 'that have been specifically designed to improve the current level of performance'" (p. 180). The second was an idea shared by Jørgensen (1995) and Ribke (1987) in which practice was characterized as "self-teaching" in which the use of conscious strategy in learning was stressed (p. 180). Finally Hallam defined effective musical practice as "that which achieved the desired end-product, in as short a time as possible, without interfering negatively with longer-term goals" (p. 181). For the purposes of this study, the concept of practice will be thought of in these terms: a deliberate, conscious effort to achieve the desired end-product as efficiently as possible.

Modeling is defined as “instruction consist[ing] of alternations of teacher demonstrations and student imitations” (Dickey, 1992, p. 27). The medium the teacher chooses to present his demonstrations, however, can come from a wide range of sources: “a musical instrument, voice, or electronic media” (Dickey, 1992, p. 27). This study will focus on modeling via electronic media, specifically CD recordings. The studies cited in this literature review all focus on modeling via electronic media, specifically tapes, and videotapes. As mentioned earlier, in all previous studies involving recorded modeling and practice, students were instructed to listen to the model of the piece they were to learn during the same time period they were instructed to practice it (Puopolo, 1971; Zurcher, 1975; Anderson, 1981; Rosenthal, 1984; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Linklater, 1997; Hewitt, 2001). There have been no studies that have examined the listening tradition of the Suzuki philosophy.

In 1992, Dickey wrote a review of all previously conducted research in the area of modeling in music teaching and learning. He began by describing modeling as a “technique used to demonstrate correct and incorrect rhythm patterns, pitches, styles, articulation, and other elements of musical performance” (pp. 27-28). In the section of the review entitled “Studies Utilizing Taped Models” (p. 32), Dickey cited four studies (Puopolo, 1971; Rosenthal, 1984; Rosenthal, Wilson, Evans, & Greenwalt, 1988; Zurcher, 1975) dating from 1971 through 1988. Summarizing the results, Dickey found that in all four studies, modeling used during practice improved the instrumentalists’ performance accuracy. These four studies plus three additional studies are summarized in this section of the literature review.

The first research focusing on the use of modeling as a practice technique was conducted by Puopolo (1971) who studied the effect of audiotaped verbal instructions and modeled examples used during practice on beginning trumpet and cornet students' performance achievement. For this purpose he created an audiotape based on each week's lesson that included:

a model performance of all material; a sample piano accompaniment for all model performances, student responses and reinforcements; and verbal instructions, explanations, and counting of meter during occurrence of all model performances, student responses, and reinforcements. (pp. 343-344)

Fifty-two 5th-grade students, randomly assigned to either a control or experimental group, practiced individually for 20-25 minutes every day for 10 weeks in a monitored situation during the school day. Students in the experimental group were guided by the audiotape during their practice time while students in the control group practiced in the traditional manner without any guidance. To evaluate performance achievement, a posttest of the Watkins-Farnum Performance Scale was administered at the completion of the 10-week treatment period. Results indicated a significant difference in performance achievement between programmed practice and traditional practice, with programmed practice resulting in superior performance achievement.

Zurcher's study (1975) was the first to examine the effect of using tape-recorded models during home practice (in Puopolo's study the students practiced in school) on beginning instrumental students' performance. In this study Zurcher created a method book and corresponding audiotape for use by 43 fourth-, fifth-, and sixth-grade beginning brass students. Students were randomly assigned to two groups that switched weekly over a six-week period between control and experimental

treatments. The rotation of treatments allowed for both weekly and cumulative measurements of results. When receiving the treatment students were instructed to use the audiotape, which included “instructions, reminders, and model ‘play along’ performances” (p. 134) on the subject’s own instrument, during home practice. Students were evaluated weekly on gross pitch discrimination, tempo stability, pitch matching, finger and slide position errors, rhythm errors, and time spent in practice. The cumulative results indicated that model-supportive practice was more effective than traditional practice in improving student performance in four of the six areas: gross pitch discrimination, pitch matching, rhythmic discrimination, and time spent in practice.

Anderson (1981), like Zurcher, studied the effects of tape recorded aural models used during home practice. Anderson, however, examined the effect on sight-reading as well as performance skills and chose 40 sixth-grade beginning clarinetists instead of brass students as subjects. At the beginning of the 8-week study, students in the experimental group were given a tape of musical selections, performed by solo clarinet, to use during home practice. The only verbal instruction on the tape was the title of each selection. It is unclear if the students were instructed in how to use the tape during home practice. To assess the reliability of the reported home practice time, 20% of all students were selected to tape record their home practice. During school lessons the teacher taught all students the musical selections that were to be practiced at home but did not use the tape during instruction. At the end of the treatment period all students performed the Practiced Performance Evaluation Test as a posttest through which their pitch-reading, rhythm-reading, tempo accuracy, and

intonation accuracy were evaluated. Examining the results, Anderson found there was no significant difference in any of the skills between control and experimental groups. He suggested, as a possible explanation for the lack of effect, that all students were taught the exercises during school lessons thereby negating the effect of the tape used during home practice.

In a study of the relative effectiveness of musical and verbal models, alone and in combination, on college musicians' performance Rosenthal (1984) created three different audiotapes to assist the subjects with the learning of an etude. Tape 1 contained a guided model (a combined verbal explanation and aural example), tape 2 contained a model only (an aural example only), and tape 3 contained a guide only (a verbal explanation only). Forty-four students were randomly assigned to one of four treatment groups, three of which used the tapes with the fourth serving as the control group. For the treatment each student listened to the tape, was then given 3 minutes to practice the etude, and was lastly recorded performing the etude. The control group was given 10 minutes to practice the etude and was then recorded performing it. The recorded performances were evaluated by two independent judges for frequency of measures played with correct notes, rhythm, tempo, dynamics, and phrasing/articulation. Rosenthal found significant differences among all groups in the performance of notes, rhythms, dynamics, and tempo but not phrasing/articulation. The model only group was found to have the highest mean scores on all variables. Rosenthal concluded that direct modeling might be "most effective in helping a student perform accurately" (p. 272).

In a later study, Rosenthal, Wilson, Evans, & Greenwalt (1988) compared the effectiveness of modeling, singing, silent analysis, free practice, and sight reading as aids to practice, again using college students as subjects. In this investigation, 60 woodwind and brass instrumental music graduate students were randomly assigned to one of five groups and asked to perform an etude after completing the treatment. Students in Group 1 listened to a model of the etude, played it once, then performed it. Students in Group 2 practiced singing the etude for 3 minutes, played it once, then performed it. Students in Group 3 silently studied the etude for 3 minutes, played it once, then performed it. Students in Group 4 practiced the etude for 3 minutes, then performed it. Students in Group 5 practiced a different exercise for 3 minutes, then performed the etude. The recorded performances were evaluated by two independent judges for frequency of measures played with correct notes, rhythm, articulation, phrasing/dynamics, and tempo. Of the five dependent variables studied, significant differences were found in the areas of phrasing /dynamics, tempo, and rhythm. Rosenthal et al. stated the most important outcome of the study was that listening to a model alone without any practice was about as effective as practicing with the instrument. These results therefore “lend credence to the use of teaching methods that make considerable use of modeling . . . as in the Suzuki approach” (p. 254).

Making use of new technology, Linklater (1997) compared the effectiveness of video and audio models used by beginning instrumentalists during home practice. Like Anderson, he chose to use fifth- and sixth-grade clarinet students as his subjects and randomly assigned each to one of three groups. Students in Group 1 received a videotape that included visual and aural clarinet models plus instrumental

accompaniments. Students in Group 2 received an audiotape that included aural clarinet models plus instrumental accompaniments. Students in Group 3 (control group) received an audiotape that included only instrumental accompaniments. All of the clarinet models and instrumental accompaniments were exercises taken from the method book students used during class instruction. Each modeling video and audiotape included two distinct sections. In the first half, the tape followed the instructional sequence of the first eighteen pages of the method book. In the second half, each exercise was sequenced in the following manner: a solo clarinet performed the melody (students were asked to only listen to this melody), a solo clarinet performed the melody with accompaniment (students had the option to listen or play along), and lastly only the accompaniment was performed (students were asked to play the melody with the accompaniment). At the end of the 8-week treatment a posttest of four etudes was administered to evaluate the visual/physical criteria (embouchure, hand position, instrument position, posture) and aural/musical criteria (tone quality/intonation, articulation, rhythmic accuracy, and melodic accuracy). The same posttest was administered two subsequent times after 20 weeks of instruction and after 32 weeks of instruction. After the first posttest the students in the videotape group scored significantly higher on the visual/physical criteria. After the second posttest these same students scored significantly higher on the tone quality/intonation criteria but not the visual/physical criteria. There were no significant differences found between the groups after the third posttest. After examining the results Linklater concluded that the lack of significant differences between the audiotape and control groups could have been due to an insufficient amount of music included on

the tapes, lack of a true control group that did not receive any tape, or a treatment time that was too short.

In the most recent study focusing on the use of modeling during home practice, Hewitt (2001) examined the effect of modeling, self-evaluation, and self-listening on junior high band students' music performance and practice attitude. For the purpose of this research, 82 band students were randomly assigned to one of eight treatment groups: (a) Model/Self-Listening/Self-Evaluation, (b) Model/Self-Listening/No Self-Evaluation, (c) Model/No Self-Listening/Self-Evaluation, (d) Model/No Self-Listening/No Self-Evaluation, (e) No Model/ Self-Listening / Self-Evaluation, (f) No Model/Self-Listening/No Self-Evaluation, (g) No Model/No Self-Listening/Self-Evaluation, and (h) No Model/No Self-Listening/No Self-Evaluation.

At the beginning of the study, all groups were led through three daily performances of the Performance Etude and were then taped performing the etude as a pre-test. Over the course of the next 5 weeks, each student received an individual in-class treatment in accordance with his/her treatment placement. During the in-class treatment, students in the modeling treatment group were given an audiotape of the Performance Etude in its ideal form and listened to the recording, played the etude on their own instrument imitating the model as closely as possible, and practiced the etude. Students in the self-listening treatment group recorded themselves performing the etude, listened to their performance, and practiced the etude. Students in both the modeling and self-listening group listened to the model recording, performed and recorded the etude imitating the model as closely as possible, listened to their performance, and practiced the etude. Students not in a modeling or self-listening

group performed the etude and then practiced the etude. Any student in a self-evaluation group filled out a modified Woodwind Brass Solo Evaluation Form at the end of each treatment session. All students were expected to practice at home in the same manner as the in-class treatment session throughout the 5 weeks. After all treatments were administered, all students were taped performing the Etude as a post-test. Student performances were evaluated on tone, intonation, technique/articulation, melodic accuracy, rhythmic accuracy, tempo, and interpretation using the Woodwind Brass Solo Evaluation Form. After examining the results of the post-tests, Hewitt concluded that students who listened to a model increased their performance scores more than those who did not in the subareas of tone, technique/articulation, rhythmic accuracy, tempo, interpretation, and overall performance but not in the subareas of intonation and melodic accuracy. He also noted that the model/self-evaluation group had the highest mean performance gain scores.

In summary, the studies by Puopolo (1971), Zurcher (1975), Rosenthal (1984), Rosenthal et al. (1988), and Hewitt (2001) all found that the use of modeling via audiotape during practice improved the subjects' performance skills in some manner. Linklater (1997) found that the subjects in the modeling via videotape group had significantly higher scores on visual/physical performance criteria than subjects in the nonmodeling via audiotape group in the short term. He found no significant difference in subjects' performance skills between the modeling audio and nonmodeling audio groups. Anderson (1981) found no significant differences in his study.

Closer examination of these seven studies reveals that although all looked at the use of a recorded model during practice, the lack of standardization of protocol and procedures make the results difficult to transfer to the general beginning instrumentalist population. For example, studies by Puopolo (1971), Rosenthal (1984), Rosenthal et al. (1988), and Hewitt (2001) administered treatments to subjects in the school setting while Zurcher (1975), Anderson (1981), and Linklater (1997) administered treatments at home. This difference in protocol is significant in that it is much easier to control the treatment when the researcher is monitoring the situation. A monitored treatment allows the researcher to collect more reliable data but weakens the ecological validity (Hallam, 1997) since data cannot be easily obtained on the way practice is actually undertaken in the home.

The audio and/or videotapes used by Puopolo (1971), Zurcher (1975), Rosenthal (1984), and Linklater (1997) included verbal instructions along with the modeled examples while those used by Anderson (1981), Rosenthal et al. (1988), and Hewitt (2001) did not include verbal instructions. It may be likely that the inclusion or non-inclusion of verbal instruction as part of the recorded model was not a factor in the studies in which the treatments were administered during the school day. However, in the case of Anderson (1981) where the treatments were administered in the students' homes, lack of verbal instruction could have influenced the results of the study.

The length of treatment varied widely among the seven studies ranging from 3 minutes to 10 weeks. Although it is important to see how both short-term and long-term use of recorded models affects student performance, this difference makes

comparison of the results problematic. The dependent variable of student performance was fairly consistent throughout all of the studies but the use of rating scales was not. The Watkins-Farnum Scale, Practiced Performance Evaluation Test, and Woodwind Brass Solo Evaluation Form were all used in addition to other researcher-developed rating scales. These variations again make it difficult to compare results.

Finally, none of the studies included the repetitive passive listening model but rather a “listen-once-and-play” model. There were also no studies that used students of string instruments as participants. This study will address this gap in the research base by examining the effect of repetitive passive listening on the performance of beginning string students.

### *Implicit Memory for Melody*

“The effects of learning that result from exposure to music are often subtle . . . and often occur without conscious awareness” (Thompson & Schellenberg, 2002, p. 473). Although the majority of research in the area of implicit memory has studied the effects of visual stimuli, there have been several recent studies (Peretz, Gaudreau, & Bonnel, 1998; Thompson, Balkwill, and Verescu, 2000; Tillman, Bharucha, & Biggand, 2000) that have studied the effects of aural stimuli (Schacter, 1987).

In his 1987 review “Implicit Memory: History and Current Status” Schacter defined *implicit memory* as “memory [that] is revealed by a facilitation or change in task performance that is attributable to information acquired during a previous study episode” (p. 501). The contrasting term *explicit memory* was then defined as

“conscious recollection of recently presented information, as expressed on traditional tests of free recall, cued recall, and recognition” (p. 501). To further clarify the distinction between implicit and explicit memory, Schacter presented three theoretical approaches to the implicit memory phenomena: *activation, processing, and multiple memory system*.

Activation views hold that priming effects on implicit memory tests are attributable to the temporary activation of preexisting representations. Activation is assumed to occur automatically [while containing] no contextual information about an item’s occurrence as part of a recent episode and therefore does not contribute to explicit remembering of the episode. (p. 511)

Processing views seek to understand differences between implicit and explicit memory by explicating the nature of and relations between encoding and retrieval processes or procedures. Explicit memory tests typically draw primarily on conceptually driven processes, whereas implicit tests typically draw primarily on data-driven processes. (p. 511)

Multiple memory system interpretations ascribe differences between implicit and explicit memory to different properties of hypothesized underlying systems. Conscious or explicit recollection is a property of, and supported by, a declarative memory system that is involved in the formation of new representations or data structures. Implicit memory phenomena such as learning of skills and repetition priming effects are attributed to a procedural system in which memory is expressed by on-line modification of procedure or processing operations. (p. 511)

In a beginning strings class an activation view might be used to explain why a student easily learns a new piece after having passively listened to the same piece being learned by students in the lesson group before his. A processing view might be used to explain why a student easily learns a new piece in the key of C major after having passively listened to a different piece also in the key of C major being learned by students in the lesson group before his. Finally a multiple memory system interpretation might be used to explain why a 12- year- old beginning student who had previously studied the violin when he was very young (2 or 3 years old) but

stopped playing after 1 year of lessons could easily learn the same beginning songs he previously knew without being able to explicitly remember ever having learned them.

It has yet to be determined if any theory will be established as the basis for understanding the phenomena of implicit memory. As of now, each approach is consistent with some but not all of the research results in this field of study (Schacter, 1987). Three recent studies have examined the effects of passive exposure to music on musical preferences, knowledge of tonal relations, and expectancies for melodic continuations.

A study, consisting of three experiments, conducted in 1998 by Peretz, Gaudreau, and Bonnel looked at the effects of exposure to melodies on preference and recognition. In the first experiment, Peretz et al. asked subjects to listen to precoded tapes containing a mix of 20 familiar and 20 unfamiliar melodies. On the first hearing all subjects were instructed to indicate which melodies were familiar to them. On the second hearing, half of the subjects were instructed to indicate which melodies they recognized, and half were instructed to rate their preference for the melodies. The results suggested that a single repetition of the melodies led to a greater preference for unfamiliar melodies.

In the second experiment, the same procedures were followed for the first and second hearings. However, there were three subsequent hearings after time delays of 1 day, 1 week, and 1 month. In each hearing subjects were instructed to complete the same recognition and preference tasks. Results demonstrated that after a 1-month time delay, memory effects were significantly diminished on preference tasks but remained above chance level on recognition tasks. Peretz et al. (1998) suggested that

in order for subjects to show greater preference for unfamiliar melodies over time, those melodies might need to be played with greater repetition.

In the third experiment on the first hearing, half of the subjects were instructed to indicate which melodies were familiar to them and half of the subjects were instructed to indicate whether the flute or the piano was playing each melody. During the second hearing, all subjects were instructed to rate their preference for the melodies. Changing the timbre of the melodies between study and test and changing the focus of attention while encoding the melodies did not affect the subjects' preference for the melodies. It did however demonstrate a memory advantage for same-timbre over different-timbre melodies. The main finding from this experiment was that exposure effects on preference were not affected by experimental manipulations while exposure effects on recognition were.

In conclusion, Peretz et al. (1998) stated the overall results were reflective of the separation of preference and recognition tasks in relation to implicit and explicit memory processes, respectively. The effects of prior exposure found in the study were attributed to the process of intentional retrieval for recognition tasks and to implicit memory for preference ratings. Finally, "the results suggested that affect judgments function in an obligatory fashion which was expected from an implicit system that operates in a largely unconscious, automatic mode" (p. 897).

In a study based on the activation theory of implicit memory, Tillman, Bharuca, & Bigand (2000) investigated how implicit knowledge of some basic features of Western musical grammar may be acquired and mentally represented. Tillman et al. theorized that Western musical grammar is learned in a manner similar

to language grammar. “Native speakers or nonmusician listeners internalize the regularities underlying linguistic or musical structures with apparent ease” (p. 885). Tillman et al. began the study by defining the regularities of Western musical grammar (scales, chords, keys) and then creating a connectionist model that simulated a person’s passive exposure to them. After running four simulations, two with simple harmonic material and two with short chord sequences and analyzing the resulting data, Tillman et al. concluded that passive exposure to the regularities of Western musical grammar did lead to implicit knowledge of tonal relations.

Thompson, Balkwill, & Vernescu (2000), in a series of four experiments, examined the effects of exposure to unfamiliar tone sequences on melodic expectancy and memory. In the first experiment subjects listened to 30 unfamiliar tone sequences three times each in random order while recording the number of notes in each sequence. The task of recording the number of notes was used as a distracter to interfere with the subjects depth of processing, making it more difficult for the subjects to remember the sequences explicitly. After a 10 minute pause, subjects listened to modified sequences (each modified sequence was a replica of an original sequence but with a different last note) in addition to the original sequences. During this hearing, the subjects were asked to rate the predictability of the last note of each sequence. The results showed that the ratings were higher for the original sequences than the modified sequences, indicating that exposure to note sequences affects subsequent melodic expectancy.

The second experiment was used to check if the results of the first experiment were truly caused by previous exposure to the original sequences. This time different

subjects were only given one hearing of the original and modified sequences and then asked to perform the same rating of predictability. The expectancy ratings for both sequences were very similar thereby supporting the conclusion of the first experiment.

Experiment 3 was also conducted to verify the results from the first experiment. In this experiment, Thompson et al. (2000) assessed whether explicit memory was used by the subjects when rating the predictability of the last note of each sequence. In the first hearing, subjects listened to both the original and modified sequences presented in random order and followed the same procedure as in Experiment 1. In the second hearing, they listened to all of the same sequences as in the first hearing and were asked to indicate which they had heard before. Results were mixed, indicating that while unlikely, explicit memory could have played a role in the expectancy ratings of the first experiment.

Thompson et al. (2000) carried out the final experiment to further clarify the effect of explicit memory on Experiment 1's original results. This was accomplished by directly asking subjects if their expectancy ratings were influenced by memory of the original sequences and by further reducing the depth of processing by requiring subjects to rapidly classify a series of words as nouns or verbs while listening to the sequences. Results similar to those found in Experiment 1 indicated significantly higher ratings for original sequences than modified sequences. In addition, all subjects answered "no" when asked whether recognition of the test sequences influenced their expectancy ratings.

According to Thompson et al. (2000), the results from this study provided empirical evidence that melodic expectancies were influenced by recent exposure to note sequences. Thompson et al., also concluded that the exposure was shown to affect expectancies through implicit memory.

To summarize, implicit memory refers to behavioral changes that are caused by a prior experience that cannot be explained by having an explicit memory of that event. Three current theories (activation, processing, multiple memory system) have differing explanations as to how and why this phenomenon occurs. In the area of implicit memory for music, studies have found that passive exposure to music affects musical preferences (Peretz et al., 1998), knowledge of tonal relations (Tillman et al., 2000), and expectancies for melodic continuations (Thompson et al., 2000).

The findings from these studies seem to provide empirical evidence for the anecdotal findings of Suzuki on the role of listening in the development of child's musical ability. Suzuki believed that through passive listening to music the child's ear would be well trained. This could arguably be supported by the research on the knowledge of tonal relations (Tillman et al., 2000) and on the expectancies for melodic continuations (Thompson et al., 2000). Suzuki also believed that the child would be motivated to play the music he hears. This belief is corroborated by the research on musical preferences conducted by Peretz et al., (1998) which demonstrated that even a single repetition of melodies led to greater preference among participants for melodies with which the participants were previously unfamiliar. The next logical step in research on implicit memory for melody might be to use Suzuki students as subjects to investigate the effects of long-term passive

exposure to music. One such study could use Pre-Twinkle Suzuki students who generally range in age from 3-5, have not actually learned to play the first song in Suzuki Book 1, but have begun passively listening to the Book 1 recordings at home as participants. An examination of how this passive listening has affected their musical preferences is one of many research possibilities in the area of implicit memory.

Although this current study will be investigating the effects of passive listening to music on the student's music performance level, it will not distinguish between the effects of implicit and explicit memory. If a positive effect is found, these theories do give possible explanations as to how implicit memory might be involved. Specifically, the multiple memory interpretations theory that delineates between a declarative memory system and procedural memory system as applied to the conclusions reached by Peretz et al. (1998) might also be used to explain why the passive listening treatment had a positive effect on the participants' performance. If the treatment does positively influence the participants' preference for the selected melodies this in turn might influence the participants to be more motivated in their home practice and consequently affect their performance level.

### *The Role of Listening in the Suzuki Philosophy*

Although Suzuki himself did not use the specific terms *passive listening* and *active listening*, he believed strongly that repetitive listening to good music from an early age was necessary for the development of a child's musical ability. Today master teachers use these terms in Suzuki teacher training courses to describe the role

of listening in the Suzuki philosophy. Passive listening occurs when a CD of either current or future repertoire is being played as background music while the child goes about his daily activities. Active listening occurs during the child's practice time when he sits down and listens, as if he is at a concert, to the piece he is currently studying. After listening to the piece he proceeds to practice it. Much has been written by Suzuki himself and other Suzuki teachers about the importance of listening within the philosophy.

In an early book written to introduce Americans to the Suzuki philosophy (Mills & Murphy, 1973), the chapter entitled "The Use of Recordings and Tape Recordings in Suzuki Training" written by the faculty members of the American Suzuki Institute – West begins with the idea that classical music is like a foreign language in most American homes. The chapter states that the recordings of the Suzuki repertoire are essential for all students but are especially necessary for those who are unfamiliar with classical music. If a child is going to understand it and play it, "he must hear it over and over again until it becomes a part of his unconscious" (p. 121).

The authors point out that Suzuki held listening to be one of the most important elements of the Suzuki philosophy and recommended it be started at birth. A baby should listen to one piece repeatedly so that it will be memorized. By listening to good music from birth, it is possible for even very young children to learn to discriminate between good and bad playing.

The authors advise that children should listen to the recording of Book 1 before starting violin study so they will be familiar with each piece prior to learning

to play it. This listening should be informal so the child will enjoy the experience as he absorbs the music unconsciously while engaged in other pleasurable activities. He should not be forced to sit and listen to the recording for an hour a day. However, while learning a particular piece, they advise that the child listen to it without distraction to help correct any musical problems, such as incorrect pitches or rhythms, he may be having with it. Recordings are also recommended for use when the child goes on vacation and cannot take his instrument with him. This way the child does not lose touch with the music. Finally, the authors stress that listening can also be a source of motivation. When a child hears pieces he likes, he becomes excited to learn those pieces and will therefore be more inclined to practice.

In *The Suzuki Violinist* (2000), originally written in 1976, Starr chooses to place the chapter on the role of listening at the front of the book thereby emphasizing its importance in the overall Suzuki philosophy. Starr states that according to Suzuki, a child's music education should start shortly after birth with the repeated playing of a single selection of music as this is the best method for the child to assimilate the characteristics of the music. Suzuki is then quoted:

If I let a newborn baby listen to classical music for example, a Brandenburg Concerto or Tchaikowsky Serenade or a Beethoven quartet, I choose one movement from such classics and let the baby listen to the same tune every day. In about five months time the baby will memorize this melody. . . . It is very easy to test whether the infant has memorized the melody or not.

To relate one of my experiences: A certain friend of ours had a baby. At that time its sister was six years old and she would practice the first movement of Vivaldi's G Minor Concerto every day. I visited the home when the bay was five months old. The baby was in a good mood and in its mother's arms. So I decided on the test. I played Bach's Minuetto. The baby looked happy. In between I switched to the first movement of Vivaldi, which the baby was always hearing. At the first three notes, the baby moved his

whole body in time with the music and looked much happier. He clearly distinguished these two melodies. . . .

The 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. . . . The young child’s rate of progress is directly dependent upon the amount of listening he does. (p. 7)

Starr explains that before a child begins the study of the violin, the mother should play the recordings of the Book 1 songs daily and continue this as the child learns the basic posture and bow hand. By the time the child is ready to begin *Twinkle Twinkle Little Star* he should have the song completely memorized. This allows the child to focus on the physical aspect of playing the instrument without worrying about remembering the notes. This type of repeated listening to the recordings also motivates the child to want to play the upcoming pieces in the repertoire.

Starr emphasizes that listening should be a daily habit but does not need to be done with concentration. The child can listen while doing something else, as he will absorb the sounds of the music without paying direct attention to it. However as the child progresses to more advanced literature, concentrated listening is necessary. Starr concludes the chapter on listening by summarizing Suzuki’s beliefs about the benefits of listening: the child’s ear will be well trained, the child will be motivated to play the music he hears, and the child will have the music memorized so he can concentrate on the physical aspect of playing the instrument and not concentrate on the notes when playing the instrument.

Another early publication written to explain the Suzuki philosophy to American music teachers (Kendall, 1978) summarizes the role of listening: “Since this is a rote approach similar to the way a young child develops language ability,

regular listening to the music being studied and the music to be studied is vital” (p. 8). A common misconception about the philosophy, according to Kendall, is that “children are encouraged to play continuously with the recording as part of their practice” (p. 13). Kendall refutes this stating that children play with the recording only occasionally with the main purpose of the recording being for listening so that the children will develop an “inner image” of tone and structure.

In *Shinichi Suzuki: The Man and his Philosophy* (1981), Hermann compiles original documents from various conferences held throughout Suzuki’s lifetime that contain statements about the use of cassette tapes during practice. In “Teaching Points for 1976” (p. 186), Suzuki describes how parents should develop their child’s musical sensitivity by playing recordings for the child every day. He reminds teachers that it is not sufficient for the child to only hear the teacher play once a week at the lesson; the child must listen to the recordings at home. He tells teachers they must point out to the parents the importance of listening to the recording at home and of practicing earlier pieces with the accompaniment tape. In “Developing Children’s Ability Using the Suzuki Method: How We Are Doing Now 1977”, Suzuki lays out three distinct uses for the cassette tape:

1. “Practice with me.”

Children should enjoy practicing at home with me [Suzuki] one piece at a time. The children practice parts of the piece over and over with the tapes and can then play the whole piece. When they can play the piece satisfactorily they may play with the accompaniment recording.

2. Accompaniment tapes.

Children practice with the accompaniment tapes to master the correct musical tempo. A child should only move on to the next piece if he can play the current piece well with the accompaniment. This method has brought marvelous results.

3. Recording the lesson.

Children should record their lesson so they can take the tape home for practice. (p. 217)

In his treatise, “Discovery of the Law of Ability and the Principle of Ability Development: Proof that Talent is not Inborn”, Suzuki again stresses the use of the cassette tapes for use during practice:

1. The accompaniment tapes

These tapes are to be used for students to learn musical beat and the correct musical tempo. When a child has practiced a piece sufficiently the teacher may ask him to play it with the accompaniment tape. The method has had a marvelous effect on the students’ sensitivity for musical tempo and beat. It also enhances children’s enthusiasm for music.

2. Practice with me

Children’s abilities are developed at home. Teachers must teach the children how to practice correctly and they must make the home practice enjoyable. This is why I made the “Practice With Me” tapes. Each piece from the repertoire is recorded along with an explanation of how to practice the piece at home joyously. A piano accompaniment part is also included on the tape. The tape begins with, ‘Now let’s practice together. I will repeat my performance as many times as you want to practice with me. When you become able to play this piece very well, please play again with the piano accompaniment.’ This series of tapes should help parents who do not know how to help their children practice at home. (p. 241)

Over the years, much has been written about the role of listening in the *American Suzuki Journal*. Most of the articles are written by Suzuki teachers and are based on anecdotal evidence or philosophical ideas. In an article on the Suzuki philosophy and methodology in the public schools, Crock (2000) states that all of the basic aspects of the Suzuki philosophy, including “listening and aural exposure to repertoire and other good music” have a place in the public school string class (p. 56). She believes the ideal is an “environment of consistent repetitive listening [in the home]” to the Suzuki repertoire (p. 57). She suggests teachers should also model the repertoire using their own instrument and using the CD during class. In addition,

Crock recommends that teachers should encourage students to listen to other music supplied by guest artists, outside recordings, and performance ensembles in the community.

Barber (1993), comparing traditional and Suzuki teaching, points out that one of the main contributions of Suzuki's published materials is the recordings of the repertoire. According to Barber, these recordings were the only source of beginning and intermediate literature available to parents, teachers, and students. In Suzuki teaching students learn to play the instrument before they learn to read, therefore the students are assisted in learning to play by listening to the recorded pieces many times each day. Barber concludes, "Put very simply, traditional teaching is symbol before sound and Suzuki teaching is sound before symbol, which is in fact, the world's most 'traditional' means of education" (p. 35).

Beegle's (1999, 2000) contribution to the literature on the role of listening in the Suzuki philosophy is based on research done for her master's thesis. In Part one of her article "Music Learning Research and the Suzuki method", Beegle documents evidence from multiple researchers that supports the idea that "talent development is a long-term process requiring constant support from the environment" (p. 73). She finds further evidence related to the direct importance of listening in a study conducted by Benjamin Bloom. In this study on the development of talent in young people Bloom found that "in all the families involved, musical listening was a natural part of life from the beginning" (p. 73). After examining research in the area of musical aptitude, Beegle concludes that it is of "great importance that children are early and consistently exposed to a variety of music styles, especially the music of

their own culture” (p. 74), an idea that has long been a critical part of the Suzuki philosophy. This statement may seem inconsistent with Suzuki’s use of the Western European classical repertoire in the Eastern country of Japan.

It is sometimes asked, “Should Suzuki have used Japanese tunes?” (Howe, 1995, p. 190). Since the standard repertoire of the instrument Suzuki chose to teach is based in the Western European classical tradition, he chose tunes in a Western chromatic scale to teach the violin technique necessary to play this repertoire. Western music was officially adopted in the schools of Japan in 1881 when the Ministry of Education approved the *Song Collection*, a collection of European music and music composed in Western and Japanese styles authored by Luther Whiting Mason and Shuji Izawa, for use throughout Japan. The folk tunes Suzuki chose for his method book can be found in the *Song Collection*. The folk tunes were chosen based on their familiarity to Japanese children and on their usefulness for teaching specific technical problems.

In part two of the article, Beegle (2000) states that the implementation of music listening is the easiest way to start a child’s music education. Highlighting the tenets of the Suzuki philosophy, Beegle explains that a listening routine (that includes the Suzuki repertoire and other recordings of outstanding performers) should begin three years before the start of lessons. This routine serves as a preparation for music reading since notation is more easily understood in the context of the listening experience. Regular listening also helps the child notice the subtle nuances of touch, phrasing, and style. She believes it is through listening that the child will unconsciously absorb the “language” of music. Based on her research Beegle

concludes that “listening forms the foundation for music learning, and therefore should be the most important consideration in music education” (p. 88).

In summary, there are two distinct types of listening within the Suzuki philosophy: passive listening and active listening. When listening passively, a child should be engaged in enjoyable activities and should never be forced to sit down and listen for an extended period of time so that the experience will be pleasurable. This type of listening trains the child’s ear, motivates the child to play the pieces he hears, and allows the child to concentrate on the physical aspect of playing the violin instead of focusing on reading the notes. During active listening, the child listens with concentration to the piece he is currently studying during his practice time. The purpose of this type of listening is to assist in fixing any musical problems the child may be having while learning that particular piece. Finally Suzuki suggests that after mastering each piece, the child play along with the accompaniment tape to help him establish a musical tempo.

As documented in the literature review through experimental, theoretical, and pedagogical evidence, listening should be a critical element in the development of any instrumental instructional setting. Affordable technology, as found in the recent availability of a companion audio CD for every student book, allows a string teacher to easily include listening as part of his or her students’ musical experience. Building on the previous research, the results of this study will help teachers make informed decisions about how to incorporate listening through the method book CD into their instructional plans.

## Methodology

### *Participants*

The participants for this study were beginning fourth-grade string students (violin, viola, cello, bass) from two elementary schools in a large, socio-economically diverse suburban county school system in the mid-Atlantic region. The control school had a total enrollment of 881 students, 77 (8%) were enrolled in the English as a second language program, 38 (4%) were enrolled in the Gifted and Talented program, and 117 (13%) received special education resource assistance. The treatment school had a total enrollment of 439 students, 34 (7%) were enrolled in the English as a second language program, 36 (8%) were enrolled in the Gifted and Talented program, and 83 (18%) received special education resource assistance. All fourth-grade students who elected to participate in the strings program at the two schools chosen by the researcher and had parental permission to participate in the study were assigned by school to the treatment (School A) or control (School B) group. The treatment group was assigned to School A by the researcher for ease in implementation of the treatment. School A had only 2 fourth-grade classrooms and a high student participation rate in the beginning strings program (75% of all fourth grade students were enrolled in the program).

String classes began with a total enrollment of 87 students, 47 in the control group and 40 in the treatment group. Before the study began, 4 students quit from the control group while 1 student moved from the treatment group resulting in 82 participants for the study, 43 (34 violins, 6 violas, 2 cellos, 1 bass) in the control group and 39 (26 violins, 12 violas, 1 cello) in the treatment group. After all testing

and rating was completed 16 participants (8 from the control group and 8 from the treatment group) were removed from the study because all three judges were unable to rate any of their performances due to the participants' inability to play a complete performance. In the final analysis only data from those participants who completed all 4 tests were used ( $N = 39$ ). The resulting control group ( $n = 19$ ) and the treatment group ( $n = 20$ ) remained approximately equal in size.

### *Design*

The design of the study was a Posttest Only (Control Group) Design consisting of a treatment period of 10 weeks with posttests given in weeks 7, 8, 9, and 10. Possible threats to the internal validity of this type of design were history, maturation, instrumentation, experimental mortality, and interaction with selection. The threats of history, maturation, and experimental mortality came as a result of the length of the study as students were tested at various points throughout the 10-week treatment period.

The threat of instrumentation came from the idea that rating the quality of a musical performance is inherently subjective (Boyle & Radocy, 1987) but was addressed through the use of three judges to rate each performance. In addition, identifying numbers were randomly assigned to all participants allowing for a blind scoring technique in which judges were unaware of which group the participants were in. Furthermore, participant recordings for each testing piece were placed in a random order on the CDs used by the judges for rating the performances.

The threat of interaction with selection was due to the fact that participants in the treatment and control groups went to different schools. This was addressed by using two schools whose student population was closely matched on an educational and economic level. It was however, not possible to match the size of the lesson groups themselves allowing some participants to hear many more student performances of the selected test pieces.

The internal validity was strengthened by the use of separate schools for control and treatment groups as participants in the control and treatment groups did not have any way to compare experiences during the study. Treatments were implemented at approximately the same point in time and within comparable instructional environments.

The external validity of the study was vulnerable to the threats of reactive effects of experimental study and multiple treatment interference. Also a random process was not used in the selection of subjects from the population of interest. The schools from which the samples were drawn were chosen because they were the schools at which the researcher taught.

The dependent variable for this study was the students' instrumental music performance achievement on the four assigned test pieces from *Do It! Play Strings* (Smith & Froseth, 2003). Following the sequence of skills taught in *Do It! Play Strings*, one musical example from each page, beginning on page 7 and ending with page 10, was selected as a test piece. The specific pieces were chosen for the study because they were folk songs with which the participants may not have been familiar (see Appendix A). The unfamiliarity of the pieces was important to determine if the

treatment affected the students' music performance level. Music performance level was measured by student demonstration of interpretation/musical effect, articulation/tone, intonation, and rhythm/tempo during the recorded performance of each assigned test piece (see Appendix B).

A researcher-modified form of the Zdzinski/Barnes String Performance Rating Scale (2002) was used to rate each performance of the four selected test pieces. This scale was the product of a study to develop a valid and reliable assessment measure for stringed instrument performance. In developing this scale, 100 recorded solo string performances at the middle and high school level were assessed. Although no elementary school level performances were assessed, the authors did state the performances "represent[ed] a wide variety of ages and ability levels" (p. 248). This lack of ratings data on elementary school student performances does affect the reliability of the scoring of the participants' recordings for this study. As a result of this research Zdzinski and Barnes identified five factors (interpretation/musical effect, articulation/tone, intonation, rhythm/tempo, and vibrato) to be the basis of the String Performance Rating Scale. For this study the subarea of vibrato was eliminated from the scale due to its unsuitability as a measure of beginning string student performance. The overall interjudge reliability of the String Performance Rating Scale was found to be consistently high (.873-.936) while the criterion-related validity (.605-.766) was found to be moderately high. The overall interjudge reliability of the modified Zdzinski/Barnes String Performance Rating Scale as used for this study was also found to be high ( $\alpha = .82$ ).

The independent variable was the students' passive listening to selected tracks from *Do It! Play Strings* (Smith & Froseth, 2003) CD. Participants were assigned by school to one of two groups.

Group A – Passive listening (modeled on the Suzuki listening tradition) of selected tracks from *Do It! Play Strings* CD every school day.

Group B – No passive listening.

### *Procedures*

This study began after all participants had 7 weeks of weekly strings class instruction during which they learned basic technique and skills necessary for playing a stringed instrument through rote instruction. The researcher presented this instruction to participants once a week during strings class for 45-50 minutes in heterogeneous groups ranging in size from 8 to 22. Over the course of the following 10 weeks, while the study was implemented, the frequency and length of instruction remained constant. Group size fluctuated somewhat as participants quit or moved or as new students joined the classes.

During Week 1 the passive listening treatment began in the homeroom classrooms of the participants in group A. The two fourth-grade classroom teachers at the school receiving the treatment were each given a CD of 20 selections (including the selected test pieces) from the *Do It! Play Strings* CD. The selections on the treatment CD were copied from the teacher's edition CD 1 and 2 of *Do It! Play Strings* (Smith & Froseth, 2003). For each piece both an upper string (violin/viola) and lower string (cello/bass) model was used allowing all participants to hear a solo

example of their chosen instrument (see Appendix C). These teachers were asked to play the CD once every school day as background music while their students were participating in a quiet activity (see Appendix D and E). The classroom teachers implemented the treatment for all 10 weeks of the study. The CD was approximately 10 minutes in length. Although asked to play the CD once every school day, on average the participants received the treatment three times each week. Assuming the teachers followed the treatment instructions and played the CD in its entirety one class received 140 total minutes of the treatment while the other class received 400 total minutes of the treatment. It is clear from this data that one teacher implemented the treatment in a more consistent manner than the other teacher. The reason for this is unknown. In strings class all participants continued to receive rote instruction during Week 1 continuing through Week 2. In addition, the researcher practiced recording the students playing *Twinkle Twinkle Little Star* (not a selected test piece), in preparation for the upcoming tests.

During Week 3, all participants were given the *Do It!* method book and CD and began a home practice routine of listening to each assigned piece before practicing it. The home practice routine was described in specific written instructions detailing what and how to practice each week. This home practice routine continued throughout the duration of the study. At this time all participants were told that the researcher was conducting an experiment about the use of the *Do It!* CD during home practice and that they would be recorded playing various test pieces as part of the experiment. Additionally during Week 3, the researcher began to demonstrate and teach a test piece to the participants at each weekly strings class. For the

demonstration, the researcher would play the recording of the piece from the *Do It!* CD at least once and play the piece on the violin with and without the *Do It!* CD at least once. The researcher would then have the participants play the piece in parts or as a whole without the *Do It!* CD. Participants were told to practice the assigned test piece, following the home practice routine, for 1 week. At the following school lesson, the participants were recorded playing the assigned test piece. When recording each test piece, the participants were required to play the piece from memory with the *Do It!* CD accompaniment. Participants were given one opportunity to record each test piece. When the testing portion of the lesson began the participants formed a line near the microphone to be recorded. Although no formal randomization process was used, the researcher tried to make sure that the same participants did not always play first or last. As each participant was recorded, the other participants silently listened to the performance while waiting for their turn. This procedure was followed throughout the length of the study for all test pieces.

During Week 6, the first test piece to be used as part of the study, *Au Claire de la Lune*, was assigned. Participants were recorded playing the assigned test piece the following week. *Down By the Station* was assigned during Week 7 and recorded during Week 8. There was a 2 week break between Week 7 and Week 8 for winter vacation. *Old King Cole* was assigned during Week 8 and recorded during Week 9. Finally *Bile 'em Cabbage Down* was assigned during Week 9 and recorded during Week 10. The participants were unaware of which test pieces were used in the study.

All recordings were made on a minidisc player and subsequently burned on to a CD for use by the judges. The procedures for creating the CDs given to the judges

were the same for all test pieces. First the upper and lower string model of the selected test piece was copied to the CD. Secondly the student recordings were randomly ordered and copied to the CD. Each judge received a packet of ratings sheets labeled by recording number and a CD of all participant recordings for each of the four test pieces. Judges were not instructed to rate the selected test pieces in a specific order. All of the recordings were rated using the modified Zdzinski/Barnes String Performance Rating Scale by the researcher and two other string teachers. Judge one is a former strings teacher who is currently enrolled in a doctoral program in music education. Judge two is a current strings teacher and supervisor in a large, socio-economically diverse suburban county school system in the mid-Atlantic region.

As discussed earlier, the overall interjudge reliability of the Zdzinski/Barnes String Performance Rating Scale was found to be consistently high (.873-.936) while the criterion-related validity (.605-.766) was found to be moderately high. The overall interjudge reliability of the modified Zdzinski/Barnes String Performance Rating Scale as used for this study was also found to be high ( $\alpha = .82$ ). However, the lack of ratings data on elementary school student performances from the original Zdzinski/Barnes String Performance Rating Scale does affect the reliability of the scoring of the participants' recordings for this study.

## Results

A general linear model (GLM) repeated-measures analysis with multiple dependent variables was performed to determine the relationship between passive listening and overall performance including the subareas of interpretation/musical effect, articulation/tone, intonation, and rhythm/tempo. Overall performance scores were calculated by summing each subarea. The nature of the relationships was examined by song using descriptive statistics (see Appendices I-F). The nature of the relationships was examined by subarea by using bar graphs (see appendix J). An alpha level of .05 was set for each test. Analysis was run using the program SPSS version 8.0.

Data were normally distributed for all subareas and total performance scores for the treatment group. Data were normally distributed for the subareas of articulation/tone and intonation and total performance scores for the control group but not for interpretation/musical effect and rhythm/tempo. All data showed homogeneity of variance.

All effects were found to be statistically significant,  $p < .05$ . The analysis of the first three subareas (interpretation/musical effect, articulation/tone, intonation) was statistically significant at the .03 level. First was the subarea of interpretation/musical effect ( $f = 5.07, p = .03, \eta^2 = .59$ ). Second was the subarea of articulation/tone ( $f = 5.00, p = .03, \eta^2 = .58$ ). Third was the subarea of intonation ( $f = 5.06, p = .03, \eta^2 = .59$ ). The analysis of the fourth subarea of rhythm/tempo yielded a

slightly higher alpha value ( $f = 5.09, p = .04, \eta^2 = .52$ ). The main effect of overall performance scores was also statistically significant ( $f = 5.09, p = .03, \eta^2 = .59$ ). These tests revealed that the participants in the treatment group had significantly higher scores in each subarea and on the overall music performance of the test pieces than did the participants in the control group. In summary, listening to the *Do It! Play Strings* CD seemed to have a positive general effect on performance scores.

## Conclusion

The purpose of this study was to develop an understanding of how teachers of beginning string students could most effectively use the CDs, now available as part of each individual student method book, to improve their students' instrumental music performance level. Since there was little to no direction given to students or teachers on how to use the CDs in these new method books, I decided to study the suggestions of the one beginning string method book that had consistently offered (and required) recordings for student use during home practice, that of Suzuki (1978).

Although Suzuki himself did not use the specific terms, *passive listening* and *active listening*, he believed strongly that repetitive listening to good music from an early age was necessary for the development of a child's musical ability. Today master teachers use these terms in Suzuki teacher training courses to describe the role of listening in the Suzuki philosophy. Based on many years of anecdotal evidence, the type of repetitive passive listening I chose to study is believed to train the child's ear, motivate the child to play the pieces he hears, and allow the child to concentrate on the physical aspect of playing the violin instead of focusing on reading the notes. Being unable to adequately control a passive listening treatment in the participants' homes, I chose to have the treatment implemented by the classroom teachers of the participants' homeroom classes, feeling that the results of passive listening during quiet seatwork in a child's classroom was comparable to passive listening during homework or quiet study in a child's home.

Based on these ideas, I formed my research hypothesis: The music performance achievement of beginning fourth grade string students who passively listen (modeled on the Suzuki listening tradition) to selected tracks from the *Do It! Play Strings* CD as part of their daily classroom routine will differ from the music performance achievement of beginning fourth grade string students who do not. The effects of passive listening on beginning string student performance are clearly shown in the results of this study. The participants in the treatment group demonstrated a higher music performance level overall and in all subareas (interpretation/musical effect, articulation/tone, intonation, rhythm/tempo) on the selected test pieces than those in the control group.

Use of random sampling and selection of the participants is the strongest research design; for this study the researcher chose the schools and chose which school would receive the treatment. These choices, in conjunction with the threat of interaction with selection caused by the use of separate schools for the treatment and control groups, weakens the validity of the results of this study. Despite the effort to use schools that were closely matched on an economic and educational level, the differences found in performance achievement between control and treatment groups could be due to difference in schools, not the implemented passive listening treatment.

Despite the limitations of this study, string teachers could use it as a basis to implement a passive listening routine of their own design to help improve their beginning students' performance level. When designing such a routine, particular attention should be paid to the musicality of the recording. Participants in this study

seemed to enjoy listening to the selected pieces. After listening to a particular piece during strings class, many students would leave humming or singing the piece. The other factor to be considered is classroom teacher cooperation, without which implementation of daily listening would be impossible. The classroom teachers implementing the treatment in this study were cooperative but not always consistent with the implementation. This inconsistency was apparent in the discrepancy between the time of treatment implementation of the two classrooms (140 total minutes vs. 400 total minutes). Perhaps asking classroom teachers to include the listening as part of their students' daily routine when they are planning for the school year would improve consistency. The classroom teachers in this study were asked to add the listening treatment to their daily routine 3 months into the school year. Keeping these recommendations in mind, I believe string teachers would find implementation of a passive listening component to their instructional plan to have an overall positive effect.

### *Discussion*

The results from this study are comparable to past research by Puopolo (1971), Zurcher (1975), Rosenthal (1984), Rosenthal et al. (1988), and Hewitt (2001) that found the use of modeling via audiotape improved the subjects' performance skills in some manner. This study differed from the previous studies in that the repetitive passive listening model was used, rather than the "listen-once-and-play" model. In addition, the participants were students of string instruments not woodwind, brass, or percussion instruments as in the previous studies. Because of these

differences, the comparable results from this study add to the body of research showing that passive as well as active listening leads to improved performance skills and that the use of modeling has a positive effect on the performance skills of string students as well as brass, percussion, and woodwind students.

The results from this study can also be seen as compatible with the findings in the area of implicit memory for music where studies have found that passive exposure to music affects musical preferences (Peretz et al., 1998), knowledge of tonal relations (Tillman et al., 2000), and expectancies for melodic continuations (Thompson et al., 2000). This study however, did not distinguish between the effects of implicit and explicit memory. Results did show a positive effect on the participants' music performance achievement, allowing one to infer that the multiple memory interpretations theory that delineates between a declarative memory system and procedural memory system as applied to the conclusions reached by Peretz et al. (1998) might explain why the passive listening treatment had this positive effect on the participants' performance. If the treatment did positively influence the participants' preference for the selected melodies this in turn might have influenced the participants' to be more motivated in their home practice and consequently affect their performance level.

Finally, the results from this study provide empirical evidence to support the anecdotal findings of Suzuki on the role of listening in the development of a child's musical ability. Participants in the treatment group had higher scores on all subareas demonstrating that they had aurally absorbed the modeled interpretation/musical effect, articulation/tone, intonation, and rhythm/tempo of the recordings. This

phenomenon is known as training the ears through passive listening in the Suzuki philosophy. It is important to note that due to the discrepancy in treatment time between the two classes in the treatment school it is still unclear how much time students need to be exposed to passive listening to absorb the interpretation/musical effect, articulation/tone, intonation, and rhythm/tempo of the recordings.

### *Recommendations*

Research was needed in this area of study for 2 main reasons: (1) the use of the CD, included as part of the individual method book in a group strings series, was a new (as of 2001) phenomenon that had not yet been researched, (2) contact time between student and teacher during school lessons is limited; therefore it is important to make outside practice as productive as possible.

I feel this study has made a valuable first attempt at investigating how the CD, now included as part of the beginning string student method book, can be used to improve the students' performance level. One study, however, is not conclusive and this study should therefore be replicated to determine if the results hold true in other instructional settings. If replicating this study, I would change two facets of the variables. For the dependent variable, in addition to recording and rating the participants playing the test pieces, I would record and rate all the participants playing a piece that had been learned prior to the implementation of the treatment. The results from this pretest would shed light on whether it was the passive listening or the make-up of the groups that had the effect on performance level. Secondly, in regards to the independent variable, I would collect the data sheets on which the classroom teachers

recorded the implementation of the treatment weekly, rather than at the conclusion of the study. This weekly collection would hopefully serve as a continual reminder to the teachers to play the CD every day, leading to a more controlled implementation of the treatment.

If the study results were replicated successfully, a next step could be to examine why repetitive passive listening had a positive effect on performance level. This could be done through a questionnaire asking participants about their attitudes towards and practice habits of the pieces selected for the passive listening and testing allowing the researcher to gauge if difference in motivation level was a factor.

Finally, a number of other factors could be considered in further research on passive listening. First, the length or frequency of the treatment could be manipulated. Second, to determine if age or experience was a factor, younger, older, or non-beginner participants could be chosen. Third, testing could take place at various intervals after the treatment had been completed to decide if the effect persisted over time, affected attrition, or affected motivation to learn pieces not included in the treatment.

The topic of home practice is one of great importance to the elementary strings teacher as school lessons are commonly held only once or twice a week. Although the results of this research did show that repetitive passive listening in the classroom improved the performance level of beginning string students, it is unknown if the same results would be obtained if the treatment took place in the participants' homes. In previous modeling studies where the treatment was implemented in the home, results were less conclusive than those in which the treatment was monitored

during the school day. Results from a similar study in which the passive listening treatment was implemented in the home would be of interest in the continuing study of this area of research.

In summary, to continue the research in the area of passive listening and its effects on performance level I feel this study should be replicated with the previously discussed modifications of independent and dependent variables. Secondly, similar studies should be conducted investigating whether changes in participants' age or experience, length of treatment, or timing and number of post-tests affect performance level. Thirdly, follow-up questionnaires should be used to examine why passive listening has an effect on performance level. Finally, the effect of implementing the passive listening treatment in the participants' homes should be considered.



## Appendix B

### Rating Sheet

#### Rating Instructions

- 1) Please begin by confirming the recording number at the top of the rating sheet matches the recording you are rating.
- 2) The rating of each student recording should be made in comparison to the model recording.
- 3) Before you begin the rating process, please listen to the model at least once, paying attention to the interpretation, musical effect, articulation, tone, intonation, rhythm and tempo. You may listen to the model as often as you feel is necessary throughout the rating process.
- 4) Please rate the student recordings in the order they appear on the CD.
- 5) You may listen to each student recording as many times as you feel is necessary

Piece \_\_\_\_\_ Recording # \_\_\_\_\_ Judge # \_\_\_\_\_

Key: SA- Strongly Agree  
A- Agree  
U- Undecided  
D- Disagree  
SD- Strongly Disagree

#### 1. Interpretation/Musical Effect

SA A U D SD	1. Lack of style in performance
SA A U D SD	2. Very musical
SA A U D SD	3. Melodic Phrasing
SA A U D SD	4. Subtle nuances lacking
SA A U D SD	5. Dry – too technical
SA A U D SD	6. Appropriate range of dynamics

## 2. Articulation/Tone

- |             |   |
|-------------|---|
| SA A U D SD | 1. Student is using correct proportion of weight              |
| SA A U D SD | 2. Clear articulation produced by left hand                   |
| SA A U D SD | 3. Maintains proper contact point                             |
| SA A U D SD | 4. Arm weight draws full sound from string and speed with bow |
| SA A U D SD | 5. Tone is full without harshness on forte                    |
| SA A U D SD | 6. String crossings are controlled/smooth                     |

## 3. Intonation

- |             |  |
|-------------|--|
| SA A U D SD | 1. Pitch was mostly consistent                 |
| SA A U D SD | 2. Half steps not close enough                 |
| SA A U D SD | 3. Consistently good intonation on all strings |
| SA A U D SD | 4. Performer was able to adjust pitch          |
| SA A U D SD | 5. Played out of tune                          |
| SA A U D SD | 6. Minor thirds are sharp                      |

## 4. Rhythm/Tempo

- |             |  |
|-------------|--|
| SA A U D SD | 1. Uneven rhythm                             |
| SA A U D SD | 2. Excellent rhythm                          |
| SA A U D SD | 3. Tempo is not stable                       |
| SA A U D SD | 4. Rhythm was distorted                      |
| SA A U D SD | 5. Correct Rhythms                           |
| SA A U D SD | 6. Tempo is steady during technical passages |

Positive Statements will be scored SA A U D SD

4 3 0 2 1

Negative Statements will be scored SA A U D SD

1 2 0 3 4

## Appendix C

### Treatment CD Contents

- |  |  |
|--|--|
| 1. <i>Au Claire de la Lune</i> violin    | 11. <i>Champaigne Branle</i> violin    |
| 2. <i>Au Claire de la Lune</i> cello     | 12. <i>Champaigne Branle</i> cello     |
| 3. <i>Down By the Station</i> violin     | 13. <i>Fais do do</i> violin           |
| 4. <i>Down By the Station</i> bass       | 14. <i>Fais do do</i> cello            |
| 5. <i>Jazz Down By the Station</i> viola | 15. <i>Vesper Hymn</i> viola           |
| 6. <i>Jazz Down By the Station</i> cello | 16. <i>Vesper Hymn</i> cello           |
| 7. <i>Old King Cole</i> violin           | 17. <i>Lightly Row</i> violin          |
| 8. <i>Old King Cole</i> bass             | 18. <i>Lightly Row</i> bass            |
| 9. <i>Bile 'em Cabbage Down</i> violin   | 19. <i>Quicktime Lightly Row</i> viola |
| 10. <i>Bile 'em Cabbage Down</i> cello   | 20. <i>Quicktime Lightly Row</i> cello |

Note. From *Do it! Play strings: Teacher's resource edition* (pp. ii-iii), by B. P. Smith & J. O. Froseth, 2003, Chicago, IL: GIA Publications, Inc.. Copyright 2003 by GIA Publications. Adapted with permission.

## Appendix D

### Treatment Instructions

Subject: Strings CD

Date: 11/3/03

Dear 4<sup>th</sup> grade teachers,

Thanks again for agreeing to help me with my study. In this envelope you should have a copy of the CD for use in your classroom and a Passive Listening Record.

Please start playing the CD for your class on **Wednesday, November 5<sup>th</sup>**.

I have told the students that I am doing research involving the use of the CD during home practice and that their involvement will consist of using the CD at home and being recorded performing various songs during strings class. They do not know the actual treatment is the daily passive listening they will be doing in your class. As an explanation for why you will be playing the CD **please tell the students the following before you play the CD for the first time:**

“Ms. DeStefanis has told me about the experiment she is doing with the string students. She has told me you are going to be getting books that come with CDs for you to use at home. Since she hasn’t been able to give you your books yet, she asked me if I would be willing to play a CD of some of the songs each day during class. I said that would be fine as long as my class keeps doing their work while the CD is playing.”

The CD has 20 tracks and is about 10 minutes in length. Please play the CD as background music once each day while students are doing quiet work. If possible play the tracks in random order. Each day, when the treatment has been completed, please check off the appropriate box on the Passive Listening Record.

Finally, try not to express a strong opinion about the songs or about listening to the CD that might influence the students' attitudes. Again, I really appreciate you helping me with this and I hope listening to this CD for the next couple of months does not drive you nuts. Please let me know if you encounter any problems.

Thanks so much,  
Rebecca

## Appendix E

### Passive listening record

Fourth grade homeroom teachers,

Please play the treatment CD as background music while students are doing quiet seatwork one time during each school day. Immediately following the completion of each treatment, please check the appropriate box for that day.

Thank you

November

Monday 3rd NO SCHOOL	Tuesday 4 <sup>th</sup> NO SCHOOL	Wednesday 5 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 6 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 7 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 10 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 11 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 12 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 13 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 14 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 17 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 18 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 19 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 20 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 21 <sup>st</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 24 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 25 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 26 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 27 <sup>th</sup> NO SCHOOL	Friday 28 <sup>th</sup> NO SCHOOL

December

Monday 1 <sup>st</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 2 <sup>nd</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 3 <sup>rd</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 4 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 5 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 8 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 9 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 10 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 11 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 12 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 15 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 16 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 17 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 18 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 19 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 22 <sup>nd</sup> NO SCHOOL	Tuesday 23 <sup>rd</sup> NO SCHOOL	Wednesday 24 <sup>th</sup> NO SCHOOL	Thursday 25 <sup>th</sup> NO SCHOOL	Friday 26 <sup>th</sup> NO SCHOOL
Monday 29 <sup>th</sup> NO SCHOOL	Tuesday 30 <sup>th</sup> NO SCHOOL			

January

			Thursday 1 <sup>st</sup> NO SCHOOL	Friday 2 <sup>nd</sup> NO SCHOOL
Monday 5 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 6 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 7 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 8 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 9 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 12 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Tuesday 13 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 14 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 15 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 16 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 19 <sup>th</sup> NO SCHOOL	Tuesday 20 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Wednesday 21 <sup>st</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 22 <sup>nd</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 23 <sup>rd</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO
Monday 26 <sup>th</sup> NO SCHOOL	Tuesday 27 <sup>th</sup> NO SCHOOL	Wednesday 28 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Thursday 29 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO	Friday 30 <sup>th</sup> Treatment Completed  <input type="checkbox"/> YES <input type="checkbox"/> NO

## Appendix F

### Mean Performance Scores of Treatment and Control Groups on *Au Claire de la Lune*

Dependent variable	Participants	Mean	Std. deviation	n
Interpretation/Musical Effect	Control	1.79	.89	19
	Treatment	2.04	1.04	20
	Total	1.92	.97	39
Articulation/Tone	Control	2.02	1.14	19
	Treatment	2.25	1.11	20
	Total	2.14	1.12	39
Intonation	Control	2.03	1.10	19
	Treatment	2.32	1.13	20
	Total	2.18	1.11	39
Rhythm/Tempo	Control	2.06	1.04	19
	Treatment	2.27	1.24	20
	Total	2.17	1.14	39
Overall Performance	Control	7.88	3.92	19
	Treatment	8.88	4.38	20
	Total	8.39	4.14	39

## Appendix G

### Mean Performance Scores of Treatment and Control Groups on *Down By the Station*

Dependent variable	Participants	Mean	Std. deviation	n
Interpretation/Musical Effect	Control	.99	1.20	19
	Treatment	1.96	1.29	20
	Total	1.49	1.33	39
Articulation/Tone	Control	1.08	1.28	19
	Treatment	2.21	1.44	20
	Total	1.66	1.46	39
Intonation	Control	1.08	1.26	19
	Treatment	2.07	1.43	20
	Total	1.59	1.42	39
Rhythm/Tempo	Control	1.09	1.40	19
	Treatment	2.22	1.50	20
	Total	1.67	1.54	39
Overall Performance	Control	4.24	5.08	19
	Treatment	8.46	5.56	20
	Total	6.41	5.68	39

## Appendix H

### Mean Performance Scores of Treatment and Control Groups on *Old King Cole*

Dependent variable	Participants	Mean	Std. deviation	n
Interpretation/Musical Effect	Control	1.89	1.06	19
	Treatment	2.48	.84	20
	Total	2.19	.99	39
Articulation/Tone	Control	1.94	1.13	19
	Treatment	2.70	.97	20
	Total	2.33	1.10	39
Intonation	Control	1.68	.93	19
	Treatment	2.40	.96	20
	Total	2.05	1.00	39
Rhythm/Tempo	Control	2.05	1.12	19
	Treatment	2.79	.91	20
	Total	2.43	1.07	39
Overall Performance	Control	7.56	4.10	19
	Treatment	10.36	3.53	20
	Total	9.00	4.03	39

Appendix I

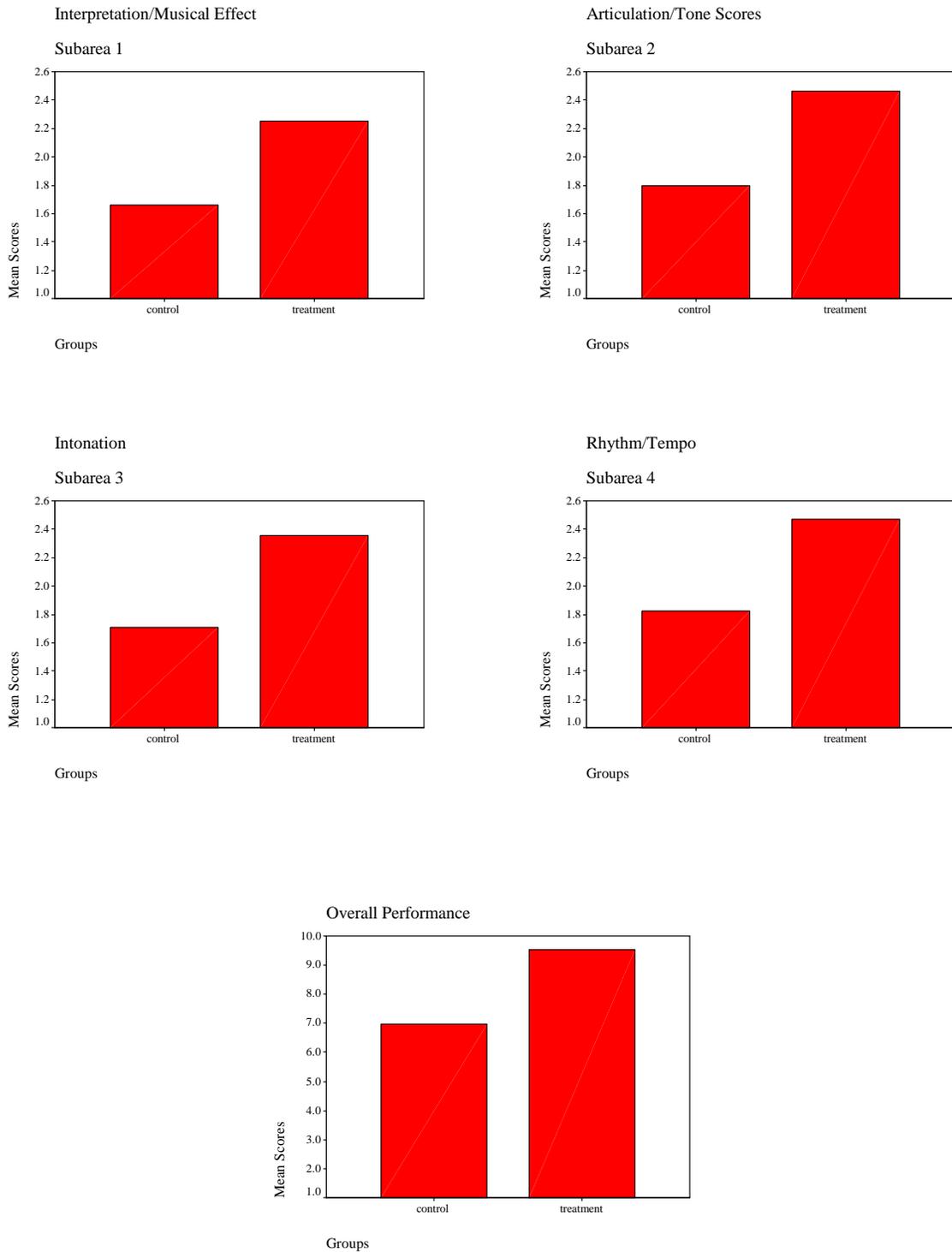
Mean Performance Scores of Treatment and Control Groups on *Bile 'em Cabbage*

*Down*

Dependent variable	Participants	Mean	Std. deviation	n
Interpretation/Musical Effect	Control	1.96	1.04	19
	Treatment	2.54	.58	20
	Total	2.26	.88	39
Articulation/Tone	Control	2.14	1.20	19
	Treatment	2.71	.62	20
	Total	2.43	.98	39
Intonation	Control	2.05	1.10	19
	Treatment	2.62	.72	20
	Total	2.34	.96	39
Rhythm/Tempo	Control	2.11	1.27	19
	Treatment	2.61	.79	20
	Total	2.37	1.07	39
Overall Performance	Control	8.26	4.45	19
	Treatment	10.48	2.53	20
	Total	9.40	3.72	39

## Appendix J

Comparison of control and treatment mean performance scores of subareas 1-4 and overall performance.



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