DEVELOPMENT OF A STRUCTURED METHOD OF MENTAL PRACTICE AND ITS EFFECT ON THE PERFORMANCE OF HIGH SCHOOL BAND STUDENTS

By

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This document is dedicated to my wife, Kelley. I could not have done this without you. Thank you for the sacrifices you made, for the encouragement and support you gave me, for selflessly wanting me to be happy, and for believing in me.

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This study developed and tested a structured method of teaching mental practice to high school band students. This method served as an attempt to synthesize various mental practice techniques so that the school music teacher could apply the techniques during class instruction. The method involved exercises in a) visual, auditory, and motor imagery, b) a combination of physical and mental practice, and c) alternating physical and mental practice.

Four high school bands in Southwest Virginia practiced a unison etude and an excerpt from a concert band composition for six weeks. Each intact band was assigned to one of three practice conditions (mental practice method, unstructured mental practice, or physical practice) or to a no practice control condition. Selected students ($N = 86$) were evaluated in terms of individual sight-reading, individual prepared performance, and intact ensemble prepared performance.

For individual sight-reading, the mental practice method group had the highest mean gain score for pitch and dynamics, and the lowest mean gain for rhythm. No significant differences were found among the groups.

For individual prepared performance, the mental practice method group had the highest mean gain scores in all performance areas. The mental practice method group made statistically significant gains over the control group in every performance area, and over the unstructured mental practice group in dynamics ($p < .05$). The physical practice group made significantly greater gains than the control group in rhythm ($p < .05$) and pitch ($p < .01$). The unstructured mental practice group made significant improvement over the control group in rhythm ($p < .01$).

For ensemble performance, analysis was based solely on raw scores due to a low N ($N = 4$). All three experimental groups had considerably higher gain scores than the control group for all performance areas (pitch, tone quality, and rhythm). There was no noticeable difference in the gain scores among the three experimental groups for the three performance areas.

These results suggest that high school students taught using a structured method of mental practice perform better or just as well as those using an unstructured form of mental practice or physical practice.

CHAPTER 1
INTRODUCTION

Mental practice refers to the covert, cognitive rehearsal of a skill without the use of physical movement or sound. Musicians engage in mental practice every time they silently analyze a piece of music before sight-reading it, hear a melody in their heads before actually playing it, or imagine themselves in a successful performance. The concept of mental practice has been applied to many disciplines, including sports (Weinberg, 1989), dance (Franklin, 2004; Taylor, 1995), language education (Guerrero, 1991), special education (Allbritton-Grant, 1985), medical rehabilitation (Richardson, 1995), and music (Brooks, 1995).

An essential component of mental practice is mental imagery – the imaginary representation of objects and events in the mind. Much of the imagery that is of interest in the field of music is auditory imagery. Mental imagery techniques are often used in rehearsal and performance by professional singers (Carter, 1993; Moyer, 1992) and brass players (Trusheim, 1987). Mental practice employs mental imagery extensively, but is a much broader term. Pierson (1992) describes mental practice as follows:

> During this type of practice the performer analyzes the rhythms, notes, key signature, and any other musical elements presented on the page, without the benefit of physical movement. In addition, the instrumentalist tries to imagine the pitches (audiation or aural imagery) that appear on the page and also tries to imagine all muscular movement that will occur while actually playing the music. (Pierson, 1992, pp. 29-30)

Stated another way, mental practice involves the use of all the senses in an "imaginary rehearsal of performance activities without observable movement or sound"

(Kohut, 1985, p. 127). These imaginary rehearsals involve mentally hearing the music, visualizing the performance, and feeling the muscles used in musical performance.

The value of mental practice lies in its potential to improve the cognitive aspects of musical perception and performance. The ability to use mental practice techniques can allow a musician to practice when the instrument is not available or when injury prevents practice, and can help to prevent physical exhaustion. It can also enhance memory of words or music, motivation, confidence, and concentration. Connolly (2001) states that the value of mental rehearsal is that it

> can cut short the learning process and complement the actual practice of skills, as it is in the brain where the ultimate learning of skills, and unlearning of bad habits, takes place. The purpose of practicing a skill, mentally or physically, is to tell the brain, as clearly as possible, how to organize the body's movement. (p. 17)

Freymuth (1993) states that regular mental rehearsal can serve as a form of quality control, with "the potential for refocusing attention, restoring concentration, and revitalizing performance" (p. 142). Ross (1985) states that mental practice is valuable because

> unlike physical practice, [it] focuses the performer's attention on the cognitive aspects of music performance with less emphasis on the sounds being made. The performer can now think more carefully about what kinds of things might be tried, the consequences of each action can be predicted based on experience, and inappropriate courses of action ruled out. (p. 228)

Mental practice techniques could be beneficial to high school band students in several ways. They could provide additional rehearsal techniques for the band director to use in rehearsing a piece of music. Students could be encouraged to use the techniques during "down time" in rehearsal, such as when the director is rehearsing another section of the ensemble. Students could also use mental practice as part of their home practice routine. There is a need for educators to provide multiple practice strategies for

instrumental music students (Rawlins, 2004). Mental practice could be included as one of these strategies.

Mental practice could be beneficial in preventing physical exhaustion. Physical exhaustion in musical performance is a common result of the lengthy rehearsal sessions that typically take place at honor bands and summer band camps. Physical exhaustion is also an issue for school bands who operate under a block schedule (Blocher and Miles, 1999). Mental practice could serve as a means to continue working on a piece of music without causing physical strain.

Mental practice could also benefit students during sight-reading. It is common for school band contests and honor band auditions to require a sight-reading performance. Typically, the student or ensemble is allowed to silently study the music for a specific length of time before performing the piece. Band directors often teach students a study routine to use during this time that typically involves scanning the music for key and meter signatures and for potential obstacles (Casey, 1991; Sorrells, 1992). Appropriate mental practice techniques could be useful during this study period.

Statement of the Problem

The research literature regarding mental practice has yielded inconsistent results. This inconsistency is due to a number of problems with the methodology employed in mental practice research. Connolly and Williamon (2004) attribute the inconsistency among research findings to the

> wide disparity in the methods employed in the research, including core differences in the groups of musicians recruited to take part (i.e. their level of skill and instrument specialization), the procedure implemented (i.e. the amount of time given for mental rehearsal, the selection and length of the piece to be rehearsed, and the purpose of the rehearsal itself), and the outcome measure of the performance

> skill. What is clear from the extant literature is that musicians themselves vary considerably in their use of mental rehearsal. (pp. 224-225)

Additionally, many research studies use a design in which subjects attempt mental practice in a single practice session with little or no training in mental techniques. These studies have two problems. First, because they only measure the effect of mental practice after one trial, they fail to consider that training and practice may be necessary to fully master the technique. Research supports the notion that mental practice should be practiced on a regular basis in order to be beneficial (Connolly & Williamon, 2004; Freymuth, 1993; Salmon & Meyer, 1992). Therefore, research that attempts to assess the effectiveness of mental practice after only one practice session may not be an accurate indicator of the potential of the technique.

Second, the mental practice techniques used in these studies are often open-ended and unstructured. Subjects are asked to mentally rehearse a musical selection mentally with no guidance as to the kind of mental practice to use. This freedom may be beneficial for those who are experienced with mental practice, but not for those who have never attempted such techniques before. Research is needed that tests the effect of mental practice after a consistent period of practice with the techniques, and that provides structure and training to those with little or no experience with mental rehearsal.

Mental practice techniques used in musical performance are often adapted from those used in sports, which tend to focus on the visual aspects of performance. Because of the aural nature of music, mental practice techniques in musical performance should stress auditory imagery rather than visual imagery as the primary component.

The overwhelming majority of studies that apply mental practice to musical performance have used individual adult subjects. The extent to which these research

findings transfer to public school music, with its emphasis on ensemble instruction of younger musicians, remains to be seen. Few studies have been done to test the effectiveness of mental practice in the school ensemble rehearsal setting. One exception is a study by Keenan-Takagi (1995), who tested the effect of mental practice in a choral rehearsal setting. There is little, if any, information regarding the effectiveness of mental practice techniques in the instrumental ensemble rehearsal. In addition, research that incorporates mental practice techniques with younger musicians is sparse and inconclusive.

Purpose of the Study

Recent research has focused on mental practice with adult musicians, and relatively few studies have attempted to apply mental practice techniques to teaching situations involving younger musicians. This study will attempt to determine the effectiveness of mental practice with high school band students. A pilot study using middle school band students indicated that younger musicians could use mental practice techniques effectively. The study suggested that further research in this area is necessary to determine the best method of teaching mental practice to younger musicians.

Studies have not allowed for the regular practice of mental rehearsal techniques, despite the fact that many experts in the field advocate regular practice in order to fully develop the skills of mental practice. While the literature on mental practice provides several exercises and techniques, there appears to be a lack of a structured method of utilizing mental practice. This study will develop and test a six-week structured method of teaching mental practice to students.

The majority of studies involving mental practice in music use individual subjects. However, wind and percussion instruments are usually taught as an ensemble in school music programs. Mental practice techniques are needed that can be used by the school music teacher with the instrumental ensemble. Therefore, the method of mental practice will be designed to be appropriate for use by high school bands. The study will evaluate the performance of both the ensemble as a whole and the student as an individual. Students will be evaluated in terms of how mental practice affects their sight-reading performance and prepared performance.

The primary concern of the study is *how* mental practice techniques should best be taught to students, and how these techniques can be used in the band class setting. Therefore, the purpose of this study is to design and test the effectiveness of a structured, sequential method of mental practice instruction on the musical performance of high school band students.

Delimitations of the Study

This study focused on a structured method of mental practice techniques as applied to the high school band class. Many psychologists have suggested that relaxation techniques or exercises in concentration might complement mental rehearsal. This study focused on mental practice techniques only – relaxation and concentration techniques were not included.

There is ample evidence that alternating mental and physical practice is superior to mental practice alone. Therefore, the mental practice treatment used in this study alternated between mental and physical practice, rather than exclusive mental practice without physical practice.

The design of the study presented several limitations. The treatment period for this study was limited to six weeks. More experience with mental practice may be required in order to assess its effectiveness. Because the participants were high school band students in grades 9-12, results may not apply to students of other age levels. Four bands from four different high schools were selected for participation in this study. Because each band was taught by its respective band director, a teacher effect could have been present. Teacher-related variables such as years of teaching experience, rapport with students, personality, and enthusiasm for the study may have influenced the results. Home practice was not monitored during the treatment period. Additionally, student absences from school during the treatment period were not accounted for.

As with any study involving covert mental activity, it was impossible to determine if each student actually engaged in mental practice. It was also impossible to determine the quality of the mental practice. Students likely had differing levels of concentration and attention during mental practice sessions. The only way to estimate what the students were thinking was to ask them at the completion of the study. A post-study questionnaire asked students to estimate their level of participation in mental practice. However, the exact amount and quality of mental activity cannot be determined.

Research Questions

The following research questions were addressed in this study:

1. What is the effect of a structured method of mental practice in ensemble rehearsal on the sight-reading performance of high school band students?

2. What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of high school band students?

3. What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of a high school band performing as an ensemble?

4. What is the effect of mental practice on the musical performance of students in terms of grade level, gender, and performing instrument?

5. What are the opinions of high school band students regarding mental practice?

Research Hypotheses

The research hypotheses for this study were as follows:

1. Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in sight-reading performance than students using an unstructured method of mental practice, physical practice, or no practice (control).

2. Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in prepared performance than students using an unstructured method of mental practice, physical practice, or no practice (control).

3. A band ensemble that receives specific training in mental practice and whose mental practice sessions were structured by the teacher will make considerably greater improvement in prepared performance than an ensemble using an unstructured method of mental practice, physical practice, or no practice (control).

4. Within each of the three experimental groups, there will be significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

The corresponding null hypotheses were as follows:

1. There will be no significant differences in the mean gain scores for sight-reading performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

2. There will be no significant differences in the mean gain scores for prepared performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

3. There will be no considerable difference in the mean gain scores for ensemble prepared performance of an ensemble that practices using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

4. Within each of the three experimental groups, there will be no significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

Definitions

Audiation – Hearing music in the mind without the physical presence of the sound. Synonymous with the term "aural imagery."

Band class – A school performing ensemble of wind and percussion students comprising the instrumentation of the complete modern concert band, which typically includes piccolo, flute, oboe, clarinet, bass clarinet, bassoon, alto saxophone, tenor saxophone, baritone saxophone, trumpet, French horn, trombone, baritone, tuba, and percussion.

Imagery – An imaginary or visual picture in the mind that can encompass all the senses. An imaginary representation of any of the six senses in the mind. Leahey and Harris (2001, p. 167) define six types of imagery: visual (sight), auditory (sound), olfactory (smell), gustatory (taste), tactile (touch) and kinesthetic (motor).

Mental practice/mental rehearsal – The covert, cognitive rehearsal of a skill without the use of physical movement or sound, but mentally involving all the senses.

Physical practice – The actual practice of a skill or action involving all the muscles used in actual performance.

Prepared performance – The performance of a piece of music that the performer has rehearsed prior to the performance.

Visualization – Obtaining and manipulating a visual image in the mind without the physical presence of the image. Synonymous with the term "visual imagery."

Sight-reading performance – The initial performance of a piece of music that the performer has not previously seen, heard, or played.

Slow-motion practice – Slowing down an action in order to focus on the component parts or movements of the action.

CHAPTER 2
LITERATURE REVIEW

This study was concerned with the development of a method of mental practice and its effect on the performance of high school wind and percussion students. There is a considerable amount of literature in the area of mental practice. The literature can be divided into two groups: research studies and non-empirical literature. Research studies in mental practice consist of empirical findings related to the mental rehearsal of a skill. However, studies in this area suffer from the limitation that mental practice is a covert mental activity that cannot be directly observed.

The non-empirical literature consists primarily of techniques suggested by expert performers or teachers that are not typically supported by research findings. This literature review includes both research studies as well as the non-research literature. While the review concentrates on mental practice as it is applied to music, studies involving mental practice in non-musical activities are also included.

There is also a considerable amount of literature in the specific area of imagery. One of the primary components of cognitive science is the idea that the human brain stores and operates on mental representations or images of the world. It is a fundamental component of both our perception of music and our aesthetic response to music. Meyer (1956) affirmed the value of imagery in music when he stated that imagery is "the stimuli to which the affective response is really made" (p. 256). The role of imagery and its influence on musical learning has been the subject of numerous research studies. Imagery plays a central role in the ability to execute mental practice techniques. Because of the

underlying foundation of imagery in mental practice, studies involving imagery and imagery in music are included in the review.

The present review of literature is divided into four sections: 1) imagery, 2) theoretical foundations of mental practice, 3) non-empirical approaches to mental practice, and 4) research studies in mental practice. The chapter concludes with a summary of findings in the literature.

Imagery

The concept of mental practice relies on the idea that humans can store and manipulate images in the brain. Theories involving mental representations have been found in the work of philosophers and psychologists throughout history. The idea of mental imagery is fundamental to the cognitive psychologist's proposal of the multi-store model of the brain and the use of cognitive maps in problem solving. Imagery in music is primarily concerned with auditory imagery, which is the essential component of producing or reproducing music in the mind, and therefore is essential to mental practice. The following section reviews the historical foundations of mental imagery and the empirical research regarding its application to human behavior and learning, including imagery in musical learning.

Copy Theory

Much of the history of philosophy and psychology has dealt with the idea that the human brain contains mental representations of objects and events. This idea, known as the copy theory, is "perhaps the oldest theory of knowledge" and was "originally proposed by the Greek philosophers Alcmaeon, Empedocles, and Democritus in the fourth and fifth centuries B.C." (Leahey and Harris, 2001, p. 3). The main idea of copy theory is that when we perceive an object or event, a mental copy of the object is created

in our minds. Therefore, we only know the about the object itself indirectly, through its copy.

Aristotle echoed the ideas of the copy theory, believing that "humans have a capacity to produce immaterial objects which they have perceived previously. This capacity can also be used to recall objects which are stored in memory, as well as to create visions of real or imaginary objects" (Godoy and Jorgensen, 2001, p. 7). Descartes elaborated on this idea by stating that imagination could also include new objects that have not been previously experienced.

Copy theory is paramount in the work of Tolman (1948), who posited that organisms form internal maps of the world based on environmental stimuli. These "cognitive maps" are central to Tolman's theories of learning and behavior. Copy theory also provides the basis for the architecture of cognitive study known as the symbol-system hypothesis. According to this theory, "an organism or computer stores within it representations of the world – symbols – which it manipulates to construct new representations" (Leahey and Harris, 2001, p. 32).

Imagery

Leahey and Harris (2001) state that imagery is often defined as a visual picture in the mind, but that this definition is misleading because imagery can encompass all the senses. They state that "unlike pictures, imagery is very dynamic and constructive with a high degree of plasticity. We can image moving objects, changing events, and things and situations we have never actually seen or experienced" (p. 166). Leahey and Harris define six types of imagery: visual (sight), auditory (sound), olfactory (smell), gustatory (taste), tactile (touch) and kinesthetic (motor) imagery. Mental imagery is an essential

component of the cognitive maps proposed by cognitive psychologists: “We have imagery representations of familiar places and use these to find our way around” (Leahey and Harris, 2001, p. 167).

Piaget and Inhelder (1971) divide imagery into two large groups: reproductive images, which represent objects or events already known, and anticipatory images, which represent events that have not previously been perceived. Based on a series of studies, Piaget and Inhelder conclude that the two classifications of imagery correspond “to an essential genetic sequence” (p. 352). Reproductive images are formed during the pre-operational stage of development or “even as soon as the appearance of the symbolic functions” (p. 352). During the pre-operational stage, these reproductive images are static and unable to represent movements or transformations. Anticipatory imagery is developed in the concrete operations stage, along with the ability to represent kinetic movement and transformation processes.

In his review of scientific literature on mental imagery, Marks (1999) concludes that “mental imagery serves a significant adaptive function in the preparation of action and coping with change” (p. 568). Marks’ review focuses on the visual mode of mental imagery. He claims that “mental practice which employs subjectively experienced images of future events – and explores how these events might be influenced by behavioral intervention – enables the experiencer’s future actions to be more effectively targeted toward his/her goals” (p. 568). According to Marks, the primary function of conscious mental imagery is “the selection, rehearsal and planning of goal-directed activity” (p. 568).

Marks (1999) distinguishes between a conscious mental imagery used for goal-directed actions and an unconscious imagery used for habitual actions such as walking. The conscious form of imagery involves "the representation in consciousness of perceptual-motor activity in the absence of the activity that is represented" (p. 569). He also states that the vividness of the imagery affects the success of the perceptual-motor task:

> A core assumption is that conscious mental imagery serves a basic adaptive function in enabling each person to prepare, rehearse and perfect his or her actions. Mental imagery provides the means to guide experimentally and transform experience by running off activity cycles as mental simulations of the real thing. Such activity rehearsal can only proceed effectively when the rehearsal incorporates vivid imagery. Imagery that is vivid, through virtue of being clear and lively, and therefore closely approximating actual perceptual-motor activity, is of great benefit to action preparation, simulation and rehearsal. (p. 579)

Murphy (2005) suggests that individuals have different levels of imagery ability, and that the level of imagery ability corresponds to the effect imagery has on performance. He states that the two important components of imagery ability are vividness and controllability:

> An image is said to be vivid if it is clear and resembles a real experience in some way. One athlete, for example, tries to imagine successfully sinking a basketball free throw in the final seconds of a tied game, but she can't "feel" the ball, can't "see" the net, or can't "hear" the crowd. We say that her imagery is not vivid. On the other hand, some athletes create vivid images that don't turn out the way they want. For example, another athlete can vividly imagine himself standing at the free throw line and can easily feel the imaginary ball in his hands. But whenever he tries to imagine making a free throw, he sees the ball missing the net. We say that he has low controllability of his image. (p. 131)

Murphy claims that imagery is useful in learning new skills, but also in retaining skills over time. "Once athletes have learned a skill, they face the challenge of maintaining it . . . the regular rehearsal of learned skills, with the goal of retention, is another widely used imagery strategy among athletes" (p. 139).

Jeannerod (1995) distinguishes between different types of imagery by determining "the subjective 'distance' between the self and his own imaginal experience" (p. 1419). He states that mental images can involve "the self as a spectator watching a visual scene in which an action is performed by the representing subject himself" (p. 1419). On the other hand, mental imagery can also be experienced "as the result of the 'first person' process involving mostly a kinesthetic representation of the action" (p. 1419). According to Jeannerod, the term 'motor imagery' refers to this latter type of imagery, and occurs when "the subject feels himself executing a given action, whether it involves the whole body . . . or it is limited to a body part" (pp. 1419-1420).

Mahoney and Avener (1977) examined the psychological factors and cognitive strategies used by male gymnasts during the final trials for the U.S. Olympic team. They found positive correlations between superior athletic performance and certain forms of mental imagery. They also found that better athletes reported a greater use of internal imagery rather than external imagery. They describe the two different perspectives of imagery as follows:

> In external imagery, a person views himself from the perspective of an external observer (much like in home movies). Internal imagery, on the other hand, requires an approximation of the real-life phenomenology such that the person actually imagines being inside his/her body and experiencing those sensations which might be expected of the actual situation. (p. 137)

Additional research indicates that imagery from the internal perspective produces activity in the muscles that are involved in the task, while imagery from the external perspective produces activity in the eye muscles only (Hale, 1982).

Auditory Imagery

Much of the imagery that is of interest in the field of musical performance is auditory imagery. Seashore (1938) states that auditory imagery is a dominant presence in

"natural musicians with a rich feeling for music" (p. 6), and that motor imagery is also well developed in these musicians. Seashore cites the writings of Schumann, Mozart, Berlioz, and Wagner to illustrate that imagery is a fundamental component of musical composition. Seashore states that in the highest form of listening, "the actual sounds of the tones merely furnish the cues for the mental reconstruction that proceeds from the mind of the listener" (p. 169). Musical imagery is therefore essential for a musical memory in which we relive the music. Seashore concludes that the mental image "operates in music in the following three ways: (1) in the hearing of music; (2) in the recall of music; (3) in the creation of music" (p. 169).

Karpinski (2000) suggests that aural imagery is an essential component to reading and performing music:

> Before performing, musicians should be able to establish a key or set a tempo without making a sound. The ability to auralize these procedures is valuable not only in actual performing situations but also for everyday music-reading tasks. Anyone reading metric tonal music must be able to auralize key and meter before beginning to interpret and understand the individual notes. And the ability to auralize the sounds of the individual notes is equally important. Proficient readers scan ahead, taking in musically meaningful groups of notes and hearing them internally before producing their sounds. (p. 156)

There is evidence that auditory imagery activates a different area of the brain than visual imagery. Aleman, Nieuwenstein, Bocker, and de Haan (2000) found that musically trained subjects performed better than subjects untrained in music on a musical imagery task and a non-musical auditory imagery task. However, there was no difference between the two groups on a visual imagery task, suggesting that visual imagery activates different cortical areas of the brain than auditory imagery.

In a review of several studies involving auditory imagery, Halpern (2001) concludes that the brain processes both actual sound and aural images in a similar

manner. She states that "parts of the cortex specialized for processing actual sound are also recruited to process imagined sound. Furthermore, the particular structures processing imagined music bear some similarity to those processing heard music" (p. 190).

Findings by Washington (1993) support these results. Washington monitored the electrical currents of the brain in practice conditions that involved mental practice. She trained two violinists and two violists in a mental rehearsal technique. Quantitative electroencephalographic measurements were taken of twenty electrode sites during seven different practice conditions. The practice conditions involved imagined versus actual playing as well as solo versus chamber (duet) playing. The practice conditions included a resting baseline, imagining playing the duet without looking at the score, imagining playing the duet while looking at the score, playing the music alone (one person), violinist plays while violist imagines playing, violist plays while violinist imagines playing, and both musicians playing together. Results indicated that the activity of the brain during imagined musical performance resembles the brain activity during actual performance.

Imagery in Music: General Research

In a series of studies on mental imagery, Betts (1909) dedicated three experiments to imagery in music. The first experiment resembled a musical eartraining exercise involving relative pitch. Subjects listened to a note played on the piano and were told the name of the note. After 30 seconds, another note was played, and subjects were instructed to write down the name of the second note. Subjects were asked after each trial to report if they had used an auditory image of the first note to compare to the second note, or if

they just "knew" what the second note was. Results indicated that 81% of the subjects reportedly used auditory images, with 14 out of 18 subjects reportedly using auditory images in every trial. The percentage of accuracy for note naming was greatest when auditory imagery was used, with the "percentage of error being almost twice as high for those who reported no imagery" (p. 85).

In the second experiment, subjects were asked to study a composition and then respond to a questionnaire regarding the imagery used while studying the score. The majority of subjects reported using auditory, kinesthetic, and/or visual imagery in their silent study of the music. In the third experiment, subjects were asked to describe the images that appeared in their minds as they listened to a performance of piano music. Results indicated that 18 out of 19 subjects reported using visual or kinesthetic images as they listened. Betts (1909) states:

> One is impressed with the large amount of imagery reported in all of these tests, and, even after allowance is made for the tendency of the untrained observer to over-state his imagery, the conviction still obtains that a great deal of imagery of visual, auditory, and kinesthetic kinds accompanied the interpretation of the tones and the music. (p. 86)

Bergen (1967) found that there was a positive correlation between pitch identification and musical imagery. Imagery scores were determined from an imagery questionnaire that asked subjects to rate their images of certain sounds on a five-point scale. To determine pitch identification ability, subjects were presented with a pitch and asked to locate identical pitches from a series of 10 tones. Bergen states that "because of the significant number of cues it is capable of providing, an 'image tone' may serve as the standard against which to compare other tones being judged" (p. 108). He suggests

that the ability to make judgments regarding pitch depends on our internal representations of those tones.

Imagery in Music: Qualitative Research

The use of mental imagery by professional singers was strongly supported in Carter's (1993) qualitative study on the issue. Carter interviewed eleven professional singers currently or previously active in the fields of opera, oratorio, or recital work. Results indicated that there is a "widespread use of imagery strategies in many areas of voice training, performing, and teaching" and that "imagery is unique to the individual, private in nature and employed in accordance with the degree of individual need in specific situations" (p. 299). The singers reported using mental imagery to check and retain proper posture and to assist with proper breathing. They used imagery to feel sound rather than to hear it, feeling the pronunciation of words and the vibrations in different parts of the head and body. They also used imagery to combat anxiety, tension, and lack of self-confidence. The vocalists reported using kinesthetic, auditory, and visual imagery.

In a similar study, Moyer (1992) found that 95% of singers interviewed used mental imagery. The majority of singers used kinesthetic, sensory, and auditory imagery, and more experienced singers used visuo-spatial imagery as well. Most singers indicated that they used imagery from an internal perspective, used mental rehearsal techniques, and imaged pitch and vowel interactively.

Trusheim (1987) interviewed twenty-six orchestral brass players from five major symphony orchestras regarding the role of mental imagery in their musical performance. Results indicated that a majority of the musicians used auditory imagery as well as visual, kinesthetic, and tactile imagery in their musical experiences. The players reportedly used

prior personal experiences as a source of imagery and used imagery elicited in response to the content of specific musical compositions.

Imagery in Music Education

Serafine (1981) investigated the ability of young children to structure and manipulate mental images of sounds. Specifically, she sought to determine the extent to which children are able to mentally combine the images of two different sounds and predict what they would sound like simultaneously. The study was based on the theories of mental imagery by Piaget and Inhelder (1971), and dealt primarily with what they called anticipatory imagery. As stated earlier, anticipatory imagery refers to images that represent events that have not previously been perceived. Results indicated that many children ages 3-5 are unable to determine if two simultaneous sounds are the same as two successive sounds. Serafine states that "they seem incapable of an imaginal combining of two separate sounds (A=B) in order to predict or anticipate the result (AB)" (p. 106). The findings support Piaget and Inhelder's theory that developmental stages are related to the ability to mentally conceive aural images.

Giles, Hayes, and Grant (1993) found that the use of imagery increased motivational and affective responses of fifth-grade children studying a musical composition. Children who used imagery exercises in studying a piece of music were better able to describe the elements of the music than children participating in traditional activities. In a second study, subjects in the treatment condition listened to a composition about the Grand Canyon, and were asked to imagine themselves on a camping trip in the Grand Canyon. They were also asked to draw pictures of what they saw. Although there was no significant difference between the control and treatment groups in terms of

cognitive test scores and listening concepts, the imagery group did have higher affective scores. Subjects in the imagery group also responded the most favorably in that they liked the activity, felt the activity helped them understand the piece, and liked the music studied.

Bagley and Hess (1987) describe multiple ways to use imagery in the classroom, and provide subject-specific imagery lessons in language arts, math, science, social studies, art, and music. The lessons ask students to imagine the visual, aural, and kinesthetic aspects of a place, situation, or event. For example, in a lesson titled "Live at Symphony Hall," students listen to a symphony recording and are provided with instructions such as "see the conductor enter," "hear the silence as she taps and raises her baton," and "feel the rhythm" (p. 200).

Orzolek (2002) found that imagery and movement exercises aimed at increasing the expressiveness of student conducting increased the ability of students to conduct expressively. The exercises combined imagery with the movement associated with the imagery (active imagery). For example, subjects were asked to visualize a volleyball and physically simulate certain actions with the ball. Another exercise involved imaging and acting out a sword fight or a rope pulling activity (D. C. Orzolek, personal communication, October 26, 2004).

Gordon (1980) created the term "audiation" to describe auditory imagery: "Audiation takes place when one hears music through recall or creation, the sound not being physically present (except, of course, when one is engaging in musical performance) and derives musical meaning" (p. 2). Gordon prefers the term audiation because the word "imagery" often implies a visual representation.

Several recent studies have suggested that audiation-based techniques made no significant difference in the musical achievement of young band students. In a study that applied audiation techniques in the beginning band class, Josuweit (1991) found that there was no significant difference in musical creativity skills between students taught using an audiation-based approach and those using traditional methods.

Similar results were obtained by Frierson-Campbell (2000) in a study that tested the effects of audiation-based enrichment activities on the achievement of second-year wind and percussion students. Results indicated that there were no significant differences in achievement between the control group and the group using audiation-based activities.

Liperote (2004) found that fourth-grade band students who received audiation-based instruction in the third-grade were not significantly superior in areas of music achievement or aptitude than students who did not received audiation-based instruction. However, Gromko (2004) found that audiation was a significant predictor of sight-reading ability in high school wind players.

It appears that the extent to which audiation can serve as a teaching technique to improve musical performance remains unclear. In his review of the literature regarding audiation, Grashel (1991) cites numerous studies that involve the use of audiation in assessing student musicians. However, few studies were cited that examined the specific use of audiation as a teaching tool to improve musical performance. Grashel suggests that future studies should examine the use of audiation in improving intonation in school ensembles.

Clearly, imagery plays an important role in the creation and perception of music. Auditory imagery may be a valuable component to the process of musical composition

(Seashore, 1938), music reading (Gromko, 2004; Karpinski, 2000), music perception (Bagley and Hess, 1987), conducting (Orzolek, 2002), and musical performance (Carter, 1993; Moyer, 1992; Trusheim, 1987). Imagery ability in children is strongly correlated with developmental stages (Piaget and Inhelder, 1971; Serafine, 1981). Research indicates that imagery can increase motivational and affective responses of fifth-grade children studying a musical composition (Giles, Hayes, and Grant, 1993). The degree to which imagery is beneficial may depend on the vividness of the image (Marks, 1999; Murphy, 2005) and the perspective (internal or external) of the imagery (Hale, 1982; Jeannerod, 1995; Mahoney and Avener, 1977).

Theoretical Foundations of Mental Practice

As it will be shown, many research studies have examined the effect of mental practice on the performance of a task, and have suggested that mental practice may be effective in improving performance. How is it possible that mental practice could facilitate improved performance? Suinn (1993) cites four theories that attempt to explain how imagery rehearsal helps improve performance: the psychoneuromuscular theory, the arousal or activation theory, the symbolic learning theory, and the bioinformational or information processing theory.

Psychoneuromuscular Theory

The psychoneuromuscular theory claims that when imaging an action, the muscles that would be used in the real life action are activated, although on a much smaller scale. Suinn (1993) states that under this theory,

> imagery rehearsal duplicates the actual motor pattern being rehearsed, although the neuromuscular innervations with imagery are of a smaller magnitude than in physical practice. Although minute, the neuromuscular activation from imagery is said to be sufficient to enhance the motor schema in the motor cortex or the priming of the corresponding muscle movement nodes. (p. 493)

Several additional research findings support the notion that mental imagery can cause activation of the muscles used in performance (Jacobson, 1931; Shaw, 1940; Suinn, 1980; Wehner, Vogt, and Stadler, 1984).

In a series of studies, Jacobson (1930a, 1930b, 1930c, 1931) found that when a subject imagined performing a movement task (bending the right arm), the specific muscles that would have been activated in the real-life movement were contracted. He states that "contraction of specific muscles takes place following the instruction to imagine an act performed with the voluntary musculature [and the] movement usually is of microscopic extent and generally is confined within the group of muscles whose contraction would be required for the actual performance of the voluntary act" (Jacobson, 1930c, p. 711). Contraction of those specific muscles were not recorded when the subject did not imagine the action or imagined "performing acts with other parts of his body" (1930a, p. 606). Jacobson concludes that "the total physiological activity present when there is imagination of voluntary movement includes neuromuscular processes in the locale comprised of the imaginary act" (1930a, p. 607).

Jacobson (1931) found that when subjects were asked to imagine bending the right arm, there was not only a contraction of muscle fibers in the right arm, but also a contraction of muscles in the ocular region. Jacobson states that this lends evidence to the idea "that mental activity is not confined to closed circuits within the brain, but that neuromuscular regions participate" (p. 121).

Suinn (1980) recorded EMG measurements of muscle activity in the legs of a skier as he imagined himself skiing down a slope. Results indicated that although the athlete was stationary, muscle responses were similar to those that would be activated in the real

situation: “muscle reactions peaked at various moments in the imagery corresponding to times at which extra muscle involvement would be expected in real life on such a course. Where the imagery scene involved a jump, for example, the corresponding EMG recording showed intense leg activity” (p. 35). He also found that when athletes imagined themselves in a race, heart rate increased similar to the way it would in a real life situation.

However, Feltz and Landers (1983) cast doubt on the idea that the effects of mental practice are due to localized innervation of the muscles used in the actual performance. Instead, they claim that the minute muscle innervations associated with mental practice are “more general throughout the whole body or a whole limb” (p. 50). They state that because Jacobson (1930a, 1930b, 1930c, 1931) only placed electrodes on the right arm, it is unclear whether other muscles were activated when the subject imagined bending the right arm. They cite the findings of Shaw (1938), who found no evidence of localization of muscle groups during imagery. When subjects imagined squeezing a hand grip with the right hand, there was a heightened EMG activity in both the right arm as well as the left leg. Similar non-localized results were found when subject imagined typing, singing, and playing a musical instrument. Hale (1981, cited in Feltz and Landers, 1983) found that when subjects imagined performing a curl with the right arm, muscle activity increased in both the right arm and as well as the triceps.

Regardless of whether muscle activity during mental imagery is localized or generalized, it appears that mental practice may cause a minute activation of the musculature. Proponents of the psychoneuromuscular theory believe that mental practice is effective because it causes a duplication of the motor patterns used in actual

performance. However, proponents of the arousal or activation theory believe that these muscle responses serve a different purpose.

Arousal or Activation Theory

The arousal (or activation) theory states that the minimal muscle innervations found during mental practice are a result of the performer psychologically preparing for the task. Schmidt (1982) states that the "performer is merely preparing for the action, setting the arousal level, and generally getting prepared for good performance" (p. 520). Feltz and Landers (1983) state:

> In contrast to the deleterious performance effects associated with maximal tension levels (e.g., reduced accuracy of discrimination), the minimal tension levels accompanying mental practice would help to prime the muscles. . . . [and] can act to lower the sensory threshold of the performer and facilitate performance in a wide variety of motor tasks. (p. 50)

Suinn (1993) states that by this rationale, the arousal would also influence attention: "From this view, the theory is really a theory of attention and arousal. In this elaboration, imagery rehearsal focuses attention on task-relevant thoughts and away from task-irrelevant cues which could disrupt performance" (p. 495).

Symbolic Learning Theory

The symbolic-learning theory states that mental practice may improve performance because it provides an opportunity to rehearse the symbolic component of a task, rather than activating the muscles involved. Schmidt (1982) states that during mental practice the subject "can think about what kinds of things might be tried, the consequences of each action can be predicted to some extent based on previous experiences with similar skills, and the learner can perhaps rule out inappropriate courses of action" (p. 520).

Feltz and Landers (1983) state that according to this theory, mental practice improves performance only if cognitive factors are involved in the task. Suinn (1993)

agrees, stating that mental practice may be more beneficial when it enhances "performance involving high levels of cognitive requirements, such as during spatial tasks, tasks involving strategic planning, or sequential learning tasks" (p. 494). By this definition, music performance would qualify as an act that requires high levels of cognition. Therefore, mental practice may be beneficial in music to the extent that it allows the performer to rehearse the symbolic elements of musical performance.

This theory is supported by Sackett (1934), who claims that "the influence of symbolic rehearsal is limited to those skills in which there is a symbolic control of the movements involved" (p. 393). Sackett found that mental rehearsal was beneficial to the retention of a finger maze pattern. He asked subjects to learn a finger maze and then instructed them to practice the maze using one of three practice conditions. One group was instructed to practice drawing the maze pattern, the second group was told to practice the maze pattern by thinking through it, and a third group was told not to practice or think about the maze pattern at all. Not surprisingly, the drawing group produced the best retention score, followed by the thinking and no practice groups respectively. Results indicated that thinking through the maze was beneficial to retention and was better than no practice at all.

Peynircioglu, Thompson, and Tanielian (2000) found that mental rehearsal improved the performance of a basketball free-throw shooting task involving high cognitive demand, but not the performance of a grip strength task involving low cognitive demand. This finding supports that of Sackett (1934), who found that mental rehearsal involving the representation of overt actions improves performance only if the task

demands a high level of cognition. Peynircioglu et al. state that

> an elaborate cognitive mental strategy such as imagery, which breaks down thinking into steps and analyzes the upcoming responses, should enhance performance in sports in which coordination of numerous fine and specific skills is required, but not performance in sports in which success depends on focusing on just one gross motor skill. For the latter type of sports, a better type of strategy appears to be one, such as overt and nonspecific arousal, in which the primary objective is to gather up strength, focus, and concentration, without having to pay much attention to cognitive aspects. (p. 155)

Because instrumental musical performance also involves the "coordination of numerous fine and specific skills" (p. 155), a mental rehearsal strategy would seem to be an appropriate method of improving musical performance skills.

Mulder, Sjouke, Wiebren, and Hochstenbach (2004) found that subjects showed significant improvement in a motor task after mental practice only if they had prior experience with the task, which involved movement of the big toe. Subjects who had no prior experience with the task could not acquire the muscle movement after mental practice but could acquire the task after physical practice. Subjects who were already capable of executing the task showed improvement in the task after mental practice as well as physical practice. Mulder et al. state: "The conclusion that we can mentally train only those movements that we have performed before is important, because it may restrict the use of mental practice in neurological rehabilitation and sports to movement categories that have been performed earlier" (p. 216).

Mulder et al. (2004) claim that this finding supports the central representation theory, which posits that mental practice activates a stored representation of the task. Subjects with no experience in the task would have no such stored representation for mental practice to operate on. They believe that this finding provides evidence against the psychoneuromuscular theory. If the psychoneuromuscular theory were valid, then

subjects with no experience with the task "would be able to learn a totally novel movement by means of mental practice, since mental practice would lead to activation of the involved target muscle" (p. 215). In this study, no EMG activity was found in the foot during mental practice.

In their meta-analysis of research on mental practice, Feltz and Landers (1983) found evidence that the effects of mental practice were evident in both early and later stages of learning. They conclude that "for tasks high in symbolic or cognitive elements, mental practice will be the most effective when subjects have had some prior practice with the task" (p. 48). Similarly, Connolly and Williamon (2004) state that the person performing mental rehearsal "should have prior experience in executing the task (or one similar to it)" (p. 226). Ungerleider (1996) agrees, stating that imagery "is based on memory, and we experience it internally by reconstructing external events in our minds" (p. 6).

Ginns, Chandler, and Sweller (2003) provide support for the notion that mental practice is more valuable when used to improve performance on previously learned tasks. They examined the effects of mental rehearsal on subjects' ability to type HTML computer code or to solve geometry problems. In each experiment, one group was instructed to study the written steps of the procedure while a second group was instructed to imagine performing the procedure. Results indicate that mental practice of instructions was effective only when subjects had prior experience with or knowledge of the task.

Ginns, Chandler, and Sweller (2003) cite the schema construction theory in their explanation of why prior knowledge is necessary for mental practice to be effective. They state that new information is processed in working memory, which is a limited

capacity memory store. However, when information is learned it can be organized in long-term memory into a schema, and can be retrieved and processed in working memory as a single entity rather than separate pieces of data. By processing this schema as a single entity, the load on working memory is reduced. With practice, schemas can be retrieved from long-term memory with very little effort, and require minimal attentional capacity. They state:

> If students are unable to process interacting elements in working memory, requesting them to imagine those interacting elements will be counterproductive. They will be better studying the materials to commence schema construction. . . . If students are able to process interacting elements in working memory because schema construction has sufficiently progressed, further studying of the materials will have diminishing returns. Automating the information by imagining the materials is a superior strategy. . . . Finally, it follows that unlearned material should first be studied to assist in schema construction and then imagined to assist in schema automation. An imagination strategy followed by a study strategy should be counterproductive. . . . From an instructional design perspective, the recommendations that flow from this theory and results are clear-cut. In the initial phases of learning complex material, students should be advised to study the information with the assistance of well-structured instruction. Subsequently, once sufficient learning has occurred, students should cease to "study" the material and commence to "imagine" it. (p. 247-248)

These findings are consistent with those of Driskell, Copper, and Moran (1994), who found that mental practice was more effective for subjects who were experienced with the task than for novices. They state that "mental practice may be more effective, everything else held constant, if novice subjects are given schematic knowledge before mental practice of a physical task" (p. 489). Their findings indicate that mental practice may help novices more with cognitive tasks than physical tasks. Experienced subjects may benefit from mental practice in both cognitive and physical tasks.

Bioinformational or Information Processing Theory

A fourth and final theory, cited by Suinn (1993) as the bioinformational or information processing theory, considers mental practice from the standpoint of

information processing mechanisms in the brain. In this theory, imagery activates a "network of coded propositions stored in long-term memory" (p. 496). This network functions as a "prototype for behavior . . . [that] can be processed by internally generating prototype-matching information, such as through imagery rehearsal" (p. 496).

Decety (1996) found that when movement is imagined specific areas of the brain are activated. During imagery, the premotor cortex is activated as the action is prepared, the prefrontal cortex as the action is initiated, and the cerebellum during the control of sequences of movement requiring a specific order. According to Decety, converging data from three different types of experimental paradigm indicate that "representations for action rely on distributed networks at the cortical and subcortical levels. Indeed, neural representations for action involve all levels of the motor hierarchy, even the primary motor cortex" (p. 294).

Based on this theory, imagery will better enhance performance when it more closely resembles the actual task. Ziegler (1987) examined the difference between "active imagery" and "passive imagery." Active imagery involves going through the physical motions involved in the task during mental rehearsal. Ziegler's subjects imagined shooting a basketball free throw and simultaneously went through the physical motions associated with the task, but did not use the ball. Active imagery involves simultaneous movement and imagery:

> Low grade muscle innervation is believed, by some, to be involved in imagery training, so the adding of the correct movement pattern to the successful imagery would serve a double benefit. First, it would cause innervation of the appropriate muscular system and reinforce correct execution of the motor task. Secondly, it would have the built-in control of proper attentional focus to the task and the reinforcement of successful practice of the task. (p. 580)

Passive imagery includes mental rehearsal with no physical movements. Ziegler (1987) describes passive imagery as "the most traditional form of imagery training," involving "vivid imagery of the environment, the task elements and the successful completion of the task" (p. 580). The bioinformational theory suggests that active imagery would be better than passive imagery because it more closely matches the prototype for behavior found in the information network.

In her study, Ziegler (1987) tested the effects of imagery rehearsal on basketball free throw shooting using five practice conditions: passive imagery, active imagery, physical practice, passive imagery and physical practice, and a no practice control. The study found no significant differences between the imagery groups, but the active imagery group did show greater improvement than the physical practice group. For the current study, active imagery, passive imagery, and passive imagery with physical practice are incorporated into the mental practice method.

Further research is necessary to more accurately determine the processes by which mental practice may facilitate improved performance. Perhaps all four positions are correct, and the answer lies in a combination of the theories. Under this assumption, mental practice would be effective because it a) activates the muscles used in performance, b) activates additional musculature that is not used in performance, preparing the body for action, c) operates on the mental schema of the action, d) provides an opportunity to rehearse the symbolic component of a task, and e) activates a network of coded propositions in the brain.

Perhaps the most important conclusion from the literature is the notion that prior experience with the task may be necessary for mental rehearsal to be effective (Connolly

and Williamon, 2004; Driskell, Copper, and Moran, 1994; Feltz and Landers, 1983; Ginns, Chandler, and Sweller, 2003; Mulder et al., 2004; Ungerleider, 1996). This finding has important implications for research in mental practice. It may explain why some research studies have found that mental practice is not as good as physical practice. Many of these studies have given the participants a task they have no prior experience with, and then asked them to mentally rehearse the task. Based on these findings, this study will allow the participating students to rehearse the compositions for two weeks (four rehearsals) before attempting any mental practice on the music.

Non-Empirical Approaches to Mental Practice

The following section includes a review of methods that apply mental rehearsal to practice and performance strategies. The difference between imagery and mental practice is not always clear in the literature. According to Ungerleider (1996), there is a difference between mental practice, imagery, and visualization. Mental practice "simply means repeating a task in your mind, without any movement from your body" (p. 6). Imagery constitutes "a very specific and very focused type of mental practice that uses all the senses to create an experience in the mind" (p. 6). Visualization concerns the part of imagery that involves a visual image of an event. The other senses can also be used in the imagery experience. The reader is cautioned to be aware that in much of the literature, the definitions of these terms are not always clear and are often used interchangeably.

Although some of the following techniques are derived from empirical research, most lack the research findings to accept or reject them as valid techniques. The value of these methods may be due to the fact that they have been created and used with some degree of success by expert performers.

Dance

Imagery has been recommended as a valuable technique for improving dance performance (Franklin, 2004; Taylor, 1995). In his book *The Psychology of Dance,* Taylor (1995) devotes an entire chapter to dance imagery. According to Taylor, imagery is a common practice technique among dancers:

> A common sight backstage at performances is dancers with their eyes closed, slowly rehearsing the critical elements of their roles. They are imagining themselves performing with mastery and virtuosity. They are envisioning the proper execution of their movements and, most importantly, feeling the artistry of their role. (p. 86)

He states that dance imagery should be systematically incorporated into rehearsal time, preparation prior to the performance, and training outside of the studio. According to Taylor, the benefits of imagery include the enhancement of motivation, concentration, intensity, and self-confidence.

Taylor (1995) recommends ten techniques to increase the effectiveness and quality of mental imagery. The following is a summary of those techniques:

> 1. Imagine total performance – Dancers should mentally reproduce all aspects of performance: visual, auditory, kinesthetic, thinking, and emotional elements.
>
> 2. Imagery perspective – Dancers should maximize both internal and external perspectives of performance. An internal perspective involves imagining a performance through the performer's eyes. An external perspective involves viewing the performance as an observer, watching the performance from outside the body.
>
> 3. Vivid imagery – Dancers should use vivid images that are "realistic, detailed, and clear and include all of the requisite senses, thoughts, and emotions" (p. 88).
>
> 4. Imagery control – Dancers must not imagine themselves making mistakes in performance. They must control their imagery so that only successful performances are imagined. "When dancers engage in poor imagery, they must immediately correct it with better imagery" (p. 90). Also, when learning new techniques it is sometimes best to break the skill down into smaller parts and rehearse each part in slow motion. "Once able to imagine it in slow motion, they can progressively speed up the imagery until they can perform the skill at normal speed" (p. 90).

5. Combine relaxation with imagery – Relaxation exercises can help increase imagery vividness and control, and can help dancers be more open to imagined scenarios.

6. Imagine realistic conditions – Dancers should imagine performances in the same conditions that the performance is likely to occur.

7. Imagine realistic performances – Learning more complex skills takes time, and results in some mistakes. Therefore, dancers should not imagine themselves performing new or complex skills perfectly. Rather, "they should imagine themselves performing within their ability and coping well with the new demands" (p. 91).

8. Adjust imagery speed – Taylor suggests that dancers use slow motion imagery to learn new skills, and fast motion imagery to increase focus on the performance and prevent distracting thoughts from invading imagery rehearsal.

9. Feel the imagery – Taylor suggests that dancers move their bodies with their imagery in order to facilitate the physical feeling aspect of imagery.

10. Not feeling right – By imagining a successful past performance, dancers can combat feelings of tightness, bad feelings, or timing problems.

Leadership

Garfield (1987) recommends mental practice for use by organizational leaders. He includes mental practice in a list of nine characteristics of peak performers:

> [Peak performers] rehearse, in their mind's eye, an incident or event that is important to them. Mental rehearsal is a core capability of peak performers – one that the Soviets and East Germans have developed extensively in their athletic programs. Business executives can benefit by rehearsing specific events in the mind's eye, including all those possible outcomes and possible surprises that can materialize. (p. 6)

Perhaps this application of mental practice could be extended to helping classroom teachers improve their teaching. Music educators and college music education majors could mentally rehearse teaching a specific lesson to a specific class, and could rehearse different scenarios that are likely to occur in the classroom.

Sports

Fanning (1988) provides several guidelines for visualization in sports performance. He suggests that athletes externally visualize themselves performing as they usually do, including any mistakes, and then "wind down the action to extreme slow motion" (p. 131), breaking down the moves into smaller parts. Athletes should identify where moves go wrong, and mentally practice the move in slow motion, watching the moves improve until they approach perfection. Next, "speed up the film to normal speed" (p. 131) and see the moves done successfully. Athletes should then internally visualize the moves, first in slow motion, then at regular speed.

Professional golfers such as Tiger Woods, Bobby Jones, and Jack Nicklaus have used mental rehearsal and imagery techniques to improve their golf performance (Andrisani, 2002). Andrisani states that Nicklaus imagines the perfect shot in his mind before he hits the shot:

> Before swinging, he actually is witness to an in-color cinematic flick playing in his head that includes frames showing the flight path of the shot and its trajectory, the ball landing in the green, and Nicklaus making the swing that will produce what was in his mental storyboards. (p. 30)

May (1989) includes mental practice in his review of psychological techniques to improve athletic performance. May claims that there are three steps to mental rehearsal, the first two occurring before the actual mental practice begins. The first step is memorization, which involves defining the task or clarifying exactly what is to be rehearsed, and becoming immersed in the environment of the sport. The second step is visual imagery, which involves "producing a vivid image of the situation, one that uses all your senses" (p. 24). Included in these senses are the feelings involved in the situation, such as the excitement one might feel when making a good turn on a ski slope. The third

step is the mental rehearsal itself: "Close your eyes and experience the physical activity mentally and emotionally. Everything you visualize should look and feel the same as if you were really on the slopes or on the court" (p. 25). May provides an example of the three steps as applied to performing a golf swing:

1. Center your weight and visualize where you want the ball to go.
2. Experience the easy flow of your swing, feel the impact of the ball and the follow-through of the club.
3. Visualize lifting your head and seeing the ball land right where you want it to be. (p. 25)

Syer and Connolly (1984) list five different mental practice techniques: *performance practice, instant preplay, during performance, instant replay,* and *performance review*. *Performance practice* involves "visualizing the performance of a specific skill that you want to develop or improve" (p. 58). It also involves visualizing an ideal performance. In this technique, one might visualize a performance of a well-known expert, and then imagine becoming that person. It can also involve visualizing one of your own past performances that you consider to be perfect.

Instant preplay is a short, compact mental practice that occurs immediately before the performance. A football kicker might use this form of practice immediately before attempting a field goal, or a basketball player in the moments before attempting a foul shot. *During performance* involves the use of metaphorical imagery during the actual performance. As an example of this imagery, Syer and Connolly (1984) state: "Many archers think they are blown around and can't shoot when it's windy. One British archer we've worked with deals with such conditions by shooting 'as if' she were a steel stake in

the ground" (p. 64). In music, this kind of imagery is similar to Freymuth's (1990) characterization of musical concepts, which is discussed in the next section.

Instant replay is the opposite of *instant preplay,* and involves the visualization of a performance that has just been completed. It can be used to reinforce a good performance or to review and analyze a poor performance. *Instant replay* forms "the basis for the construction of a new *instant preplay*. The alteration of *instant preplay,* physical performance, and *instant replay,* practiced methodically and well, ensures fairly rapid improvement" (Syer and Connolly, 1984, p. 67). Freymuth (1990) suggests a similar three-step sequence in music, discussed in the next section.

The final mental practice type is *performance review,* which involves recounting an entire performance or rehearsal in order to analyze it. Syer and Connolly (1984) suggest that a coach or instructor to be present when recounting the performance in order to take notes and to ask questions that may trigger additional memories.

Syer and Connolly (1984) distinguish between "closed skills" and "open skills" in their discussion of mental practice. Closed skills are "skills which are repeated, predictable and not affected by interaction with any other performers" (p. 62). Diving and golf are examples of closed skills. Open skills involve "interaction with team mates and opponents . . . and adapting to a variety of situations" (p. 63). Mental practice can involve both open and closed skills. Syer and Connolly claim that the mental practice techniques of *preplay* and *replay* involve mostly closed skills. Scales, arpeggios, or brief technical exercises might be considered closed skills in musical performance, while a long composition of varying musical passages might require a variety open skills. Ensemble

performing in music could be considered an open skill because the individual performance depends in part on the other musicians in the ensemble.

Music

Freymuth (1990) provides a thorough exploration of mental practice for musicians. She states that mental representations can be divided into two categories: mental recall and mental projection. She defines mental recall as "recreating an experience so that the mental representation is identical to the past event" (p. 24). Mental recall can be used to recreate an ideal past performance in order to provide a model of excellent performance conditions. Mental projection, on the other hand, "is the creation of a mental 'model' that embodies ideals that you strive for" (p. 24). Mental projection precedes a physical event and represents a performance that the performer is striving for. "When projecting a mental model just moments before playing, you are programming your nervous system and directly influencing the performance" (p. 25).

Freymuth (1990) suggests that these concepts be incorporated into a "Three-Step Practice Loop" (p. 26). The loop consists of mental projection, physical playing, and mental recall: "First, project an ideal mental model. Next, try to match the model with your physical playing. Then, recall and analyze this physical rendition" (p. 26). This is similar to Syer and Connolly's (1984) alteration of *instant preplay,* physical performance, and *instant replay,* discussed in the previous section.

Freymuth (1990) states that the success of mental practice depends on a high degree of sensory awareness: "The more conscious you are of sensory feedback *while playing,* the more clearly you can imagine playing. In turn, the more vivid the mental work becomes, the more powerfully it can influence playing and performance" (p. 33).

Freymuth (1990) provides suggestions for teaching mental practice to younger students. She states that although students may respond favorably to mental practice training during lessons, they may not be able to perform mental practice at home without guidance. She recommends that teachers write out "short, specific mental practice and imagery exercises to make things more concrete" (p. 86). Mental practice techniques should also be explained to parents.

To begin mental practice with children, students should "carry out a very short, simple action followed by a mental rehearsal of the action" (p. 87). These actions could be big motions of the whole body or an arm or leg. Eartraining should be approached the same way: "First play a note, melody, etc., and have the child sing it back. Then play the same thing again, and ask the student to repeat the sounds mentally" (Freymuth, 1990, p. 87). Lessons should involve alternating physical actions and mental recall until the student is prepared to increase the complexity and frequency of the exercises.

Freymuth (1990) suggests that the imagination be used with young children to develop their instrumental technique and musical ear. Teachers should think of stories that can be expressed through music, and should characterize musical concepts using imaginative examples:

> *staccato* sounds like a jumping rabbit;
> *glissando* swoops like a bird;
> *pianissimo* is like tiptoeing around a sleeping baby. (p. 88)

Students should then be encouraged to move to the music and act out its imaginary character.

Freymuth (1993) suggests that regular mental rehearsal can serve as a form of quality control. She states that the kind of imagery used in mental practice should broaden as learning proceeds:

> The focus of imagery probably should change from specific cues and sequences (during early learning stages) to an overall auditory and kinesthetic Gestalt that captures the flow of the performance. Appropriately applied, imagery has the potential for refocusing attention, restoring concentration, and revitalizing performance. (p. 142)

The mental practice method designed for this study attempts to follow this suggestion. It allows the students to practice smaller sections of the music using specific forms of imagery. The method eventually broadens to a mental rehearsal of the entire performance incorporating all forms of imagery.

Prosser (2000) includes a visualization lesson in his method of musical ear training. The exercise, called "visualization-improvisation," involves hearing an improvised series of pitches in the mind and imagining the fingerings on a musical instrument. Although he provides a picture of a piano keyboard for visualizing purposes, the exercises can be done by visualizing the fingerings on any instrument. He states that the ability of

> the musical mind to internally create or interpret external musical sound . . . has important ramifications for musical use: the skill to envision music as it is composed, leaving only a final task of physical notation; the capacity to see printed music and to hear that music without playing it on an instrument; and the proficiency to hear played or recorded music and to understand its shape and form, possibly to the extent of seeing in the mind's eye the notes as they are played and heard. These are, most certainly, worthwhile abilities to seek through study. And note that these abilities are both analogous and complementary to the act of sight-reading. (p. 21)

Kirchner (2005) suggests that mental visualization may be a valuable tool for coping with musical performance anxiety. She states that in addition to visualizing the performance of a composition, musicians should visualize an entire concert performance. This might involve a visualization of "walking on the stage, sitting down at the piano and

composing yourself, playing through the program, having the audience favorably acknowledge the performance and walking off the stage" (p. 32).

Green (1986) suggests numerous practice techniques designed to improve performance and reduce anxiety in musicians. Several of these techniques utilize mental rehearsal strategies. Among the suggested techniques, Green suggests that musicians use visual imagination to see what the fingers and body look like when playing, and even to imagine that they are a famous composer or performer playing the piece. He recommends various techniques where musicians try to see themselves performing or imagine a scene that relates to the music in an attempt to increase expression by moving concentration away from the printed music. He also provides suggestions for using auditory imagery in musical rehearsal.

Aside from these, the majority of Green's (1986) techniques involve relaxation, focus and concentration exercises. Werner (1996) also provides imagery exercises for musical performance that focus on relaxation and meditation. However, Peynircioglu et al. (2000) state that mental strategies such as relaxation and focusing do not qualify as mental rehearsal because they do not focus on specific actions. They state that "rehearsal involves repeating or thinking about the specific actions that will be engaged in during the performance. Thus, it is specific in nature; strategies such as attentional focusing or relaxation are not rehearsal, although they are also covert or mental strategies" (pp. 145-146).

Campos (1996) suggests that mental practice techniques can be used to improve trumpet performance. He recommends both visualization techniques and mental rehearsal of the music. The visualization techniques involve imagining a successful performance.

He states: “Imagine yourself moving across the stage, the sound of the applause, and see your friends and family supporting you. Take your place, breathing freely and deeply, and start to play. Actually hear yourself playing the way you want the music to sound” (p. 71). He suggests that performers imagine details such as how they look and act, and states that “it is imperative to imagine the type of attitudes and emotions you wish to have on stage” (p. 71). Mental rehearsal of the music involves aural skills to imagine the music the way the performer wants it to sound. Campos states that some performers “like to combine the physical manipulation of the instrument, such as pushing the valves or keys, while doing mental rehearsal” (p. 71). He also suggests that performers should not simply mentally replay the music as they have just performed it, but as they want it to sound, and recommends mental rehearsal in slow motion for difficult passages.

Pratt (1990) distinguishes between two methods of reading music. The first involves looking at the notation and immediately reacting to it on the instrument. The second method involves “convert[ing] the symbols into *imagined* sound, inside your head” (p. 83). Pratt notes that the first method is a more reliable way to discover the pitches in a piece, and that during imagery few musicians can imagine a score perfectly. However, he claims that imagined reading has several benefits not provided by physical performance alone. Sight-reading on an instrument has a tendency to focus on the pitches, and incorrect notes are often replayed in order to be corrected, “creating a kind of musical stammer” (p. 83). Pratt claims that silent reading provides an opportunity to focus on the other elements of the music such as meter, rhythm, dynamics, texture, and timbre.

Pratt (1990) offers several exercises for developing imagery in music that focus on "non-pitch" elements such as timbre and dynamics. One of these exercises seems particularly adaptable to the school band rehearsal. The exercise involves "breaking down the whole process into separate constituent parts" (p. 87). The student is presented with a music staff upon which is written a second space A in treble clef. The student is asked to image the notes as:

> 1. an A played at half a dozen different dynamic levels on a piano; 2. the same note at the same dynamic levels on a violin/trumpet/flute/harpsichord; 3. the same note, at various dynamic levels, on various instruments, but repeated in a regular beat (2/4, 3/4, 6/6), at various speeds (MM=60, MM=90, MM=120), with accents on first/second notes, from staccatissimo to legato. (p. 87)

This technique was adapted for use as an exercise in the preliminary exercises portion of the mental practice method designed for this study.

Salmon and Meyer (1992) include mental practice as an alternative solution to problem solving in practice. They state: "Is slow practice the only way to master a technically difficult passage? . . . What about studying the score away from your instrument, visualizing in detail the placement of each finger on the keys or the muscles used elsewhere in the body to produce the sound?" (p. 162). Salmon and Meyer claim that mental practice strategies are "often hit-or-miss, depending mainly on the effectiveness with which such techniques are employed" (p. 182). They state that in order for mental rehearsal to be effective, it must be combined with appropriate practice and preparation, and should concentrate on positive aspects of performance. They state that mental practice techniques

> cannot substitute for other forms of preparation, but they do provide an extra margin of security because they can reinforce learning. One advantage of such techniques is that they make it possible to visualize an ideal performance of a work – even if this level of accomplishment cannot actually be achieved. The performer

> can imagine, for instance, playing a technically demanding passage in a musically sensitive manner, free of technical limitations or mechanical errors. The effect of such an image can be similar to that of attending a performance by an artist whose interpretation of a piece evokes such a powerful overall image that it can, at least temporarily, elevate the level of one's playing. Active rehearsal, particularly when frequent and systematic, can help achieve and sustain such an effect. (p. 183)

The fact that numerous sources have recommended "frequent and systematic" mental rehearsal is a central concern of the current study, as previous research has not tested the effects of a regular or systematic approach to mental practice.

Salmon and Meyer (1992) claim that when we learn a piece of music we form a mental representation of the music that we use to guide us through the piece. Developing this internal representation involves a combination of visual, auditory, and tactile or kinesthetic senses. A visual representation of the music provides us with a visual image of the musical score, and an auditory representation provides an aural image. A tactile (touch) or kinesthetic (movement) representation deals with the physical feelings of playing a piece of music. "Ordinarily, our awareness of tactile and kinesthetic cues is limited because we are more attentive to visual or auditory information" (p. 96). Salmon and Meyer state:

> A pianist, for example, will probably find it difficult to attend to the sensations of his or her fingers and joints while listening to the effects of these hand movements. Some pianists use "silent keyboards" for practice, but usually just to avoid disturbing other people. However, such a device allows you to separate the sound from the *feel* of music. (p. 96)

Wind instrumentalists can "separate the sound from the feel" through silent fingering and "air articulations." Percussionists can also make use of silent keyboards and silent practice pads.

Buffington (1989, cited in Salmon and Meyer, 1992) offers six suggestions for effective mental imagery, summarized as follows:

1. Stress accuracy in mental practice. "When you mentally rehearse a piece of music, work out a detailed image of how you expect the music to sound and what you must do to achieve the desired effect. It's a good idea to write down the features of your imagery exercise, so that you can make your mental practice consistent from one time to the next" (p. 184).

2. Accompany mental practice with positive images of success and confidence.

3. Put performance problems in perspective – one problem measure does not indicate an overall failure during performance.

4. During imagery focus on performing rather than other factors. "Being task-oriented in your mental imagery means you focus on hearing yourself play the first few notes of a piece in your mind, rather than on how the audience might react or how long you expect to be onstage" (p. 185).

5. Make mental practice resemble the actual performance as much as possible.

6. "Give the practice and refinement of mental rehearsal a chance to develop its effect. This skill requires rehearsal, and may not work especially effectively the first few times you try it. Pay attention to the circumstances under which you practice. Just as active practice profits from minimal distractions, mental rehearsal is likely to be most effective under relatively tranquil conditions" (pp. 185-186).

Lisk (1987) includes imagery exercises in his book of band rehearsal techniques. He suggests that students close their eyes to remove visual distraction and to create a mental image of sound:

> Stronger learning occurs when the students close their eyes and create their own personal images of sound. They can *"SEE"* Pitch, Balance, Blend, Intonation, Tone Quality, and Total Ensemble Sound in their *MIND'S EYE*. There are no exact images or "pictures" used. It is the uniqueness of this "picture" or image the student creates which is essential, and not what someone else sees, defines, or imposes. (p. 53)

Lisk offers a teaching procedure that uses mental imagery in the sight-reading of rhythm patterns. He claims that the practice of compiling and learning a large amount of rhythm patterns is "unrealistic because it never deals with the most significant need. That is, spontaneous mental reaction to rhythms when they are needed" (p. 134). According to

Lisk, it is mental awareness, rather than physical processes, that allow us to react to rhythm patterns. He claims that his teaching technique "creates a spontaneous response to [the musical] image" (p. 134). However, he suggests that the procedure works best in an individual lesson situation rather than an ensemble scenario.

The teaching procedure involves showing the student a rhythm pattern written on a blackboard or piece of paper. After the student sees the pattern, it is removed, and the student is instructed to remember a picture of the pattern. A pulse is given, and the student sustains a pitch while imaging the pattern. The student is informed that when the teacher cuts them off, they are to perform the pattern. This procedure aids in the development of music reading skills by developing thought processes rather than continuous physical repetition. This procedure served as a model for an exercise used in the preliminary exercises of the mental practice method designed for this study.

Lisk (1987) also provides a procedure designed to get students to imagine the perfect performance. He states:

> The mind cannot discern between real or imagined experiences (correctness and incorrectness). When we use our imagination it is *error free*. We can hear perfection in our "minds eye." It is only the mental understanding, not physical (the students are already aware of embouchure, fingering, etc.), which is important. If the proper mental understanding and process is in place, the mind will direct the muscles to produce the imagined expectation. If the phrase or passage is properly understood by the students, *they will not hear mistakes!* (p. 138)

His three-step teaching procedure starts with the student playing a passage that contains technical problems. Then, the student silently imagines playing the passage while the teacher conducts. Lisk suggests that the imaging of the passage should be done "at least three times to assure no unnecessary attention to any preconceived problems" (p. 139). In the third and final step, the student plays the passage as they heard it during the imagined

performance. This technique was adapted for use in the mental practice method of this study.

J. M. Laverty (personal communication, April 8, 2005) uses a mental practice technique in the rehearsal of secondary and college level concert bands. In each step of the method, one physical aspect of playing the instrument is removed until the student is performing total mental practice. After playing through the passage, students are taken through the following steps:

1. Air and fingers only. Students are instructed to hear the music played perfectly in their heads while they silently perform the fingerings and articulations and blow free air as if actually playing.

2. Fingers only. In this step the articulations and free air are removed, and the student is instructed to hear the passage while performing the fingerings for the passage.

3. No movement. In this step the fingerings are now removed, so that the student hears the passage in the head without any movement at all.

This method is particularly useful for student musicians because it gradually moves the student from complete physical practice to complete mental practice. This technique is similar to Zeigler's (1987) concept of active imagery, where imagery is accompanied by physical movement simulating the performance. Active imagery techniques were adapted for use in the mental practice method designed for this study.

Roland (1997) states that mental rehearsal "involves creating in your mind an image of yourself going through your performance, or parts of it, without actually physically doing so. This image includes all senses – visual, auditory, smell, taste, and kinesthetic, as well as emotions" (p. 42). He claims that although the reason for the effectiveness of mental practice is not clear, it appears that "mental rehearsal creates

psychophysiological patterns in the body that prepare the artist to carry out the physical actions in reality" (p. 42).

Roland (1997) cites four main advantages of mental rehearsal. First, a performer can rehearse without becoming physically tired, which is an advantage close to performance time in that the performer can save energy. Second, a performer can rehearse even when injury prevents or restricts physical practice, or when there is no access to instruments or practice areas. Third, a performer can train to complete a perfect performance even when they are physically unable to do so. Finally, mental practice can "enhance your memory of words, music or steps without having to go through them physically" (p. 43). Roland claims that an artist can use mental rehearsal to build self-confidence, reduce anxiety, and increase skill development. Connolly (2001) states that the value of mental rehearsal is that it

> can cut short the learning process and complement the actual practice of skills, as it is in the brain where the ultimate learning of skills, and unlearning of bad habits, takes place. The purpose of practicing a skill, mentally or physically, is to tell the brain, as clearly as possible, how to organize the body's movement. (p. 17)

Although most of the literature cited in this section is not research based, it provides a valuable insight into how professional performers use mental rehearsal to improve performance. Much of the empirical research literature includes studies that ask participants to mentally practice a task, but provide no instruction regarding specific techniques that may be valuable in mental practice. One of the main purposes of this study is to design specific exercises and techniques in mental practice for use with the high school band. The non-empirical literature in this section is valuable in that it provides specific mental practice techniques, some of which were adapted for the mental practice method designed for this study.

Research Studies in Mental Practice

The following section includes research studies that have applied mental practice to both musical and non-musical disciplines. Shanks and Cameron (2000) describe the typical research study in the area of mental practice:

> In a typical study within this research domain, participants have initially been required to mentally rehearse a task. Common instructions have included asking the participant to relax, to remain still, and to imagine performing the task successfully from start to finish. Usually, a control group and a group receiving physical practice are included for comparison. Following mental or physical practice, or both, performance is assessed. Mental practice has been observed to have a positive (enhancing) effect if the performance of the mental practice group exceeds that of the control group on some measure of speed or accuracy. (p. 305)

Weinberg (1989) summarizes several problems inherent in mental practice research. First, the covert nature of mental practice causes difficulty in determining what the subjects are actually thinking about during treatment. This becomes more of a problem the longer the amount of time mental practice is supposed to occur. Additionally, "no manipulation checks have been employed in the control groups to guarantee that these subjects have not been practicing mentally" (p. 202).

Second, Weinberg (1989) suggests that many of the studies involving mental practice may have been influenced by the Hawthorne effect (treatment groups improving simply because they received special attention) or other experimental biases. Improvements of performance "may have been the result of expecting to do better as opposed to the specific effects of MP [mental practice]" (p. 202). Third, Weinberg states that individual differences such as skill level, imaging ability, or previous experience could impact the effectiveness of mental rehearsal. Weinberg recommends that these variables be controlled and manipulated in future studies.

Freymuth (1993) claims that contradictory findings in mental practice research are due to the fact that "various ways of analyzing and interpreting results are both possible and legitimate" and that there are often flaws in the research methodology or design. She states: "Sometimes an hypothesis seems entirely logical and may even have extensive anecdotal support, yet research results show no significant differences between experimental and control groups. The central problem is obviously the subjective nature of the data" (p. 142).

Non-musical Research

In his review of research on mental practice, Weinberg (1989) states that the literature indicates "that mental practice was generally effective in enhancing performance" and that it "should be used in conjunction with physical practice and should not be thought of as a replacement for physical practice" (p. 195). The effectiveness of mental practice seems to be dependent on several variables, including ability level, type of task, conceptualizing ability, previous experience, and duration of the practice sessions.

Suinn (1986) includes mental rehearsal as part of a seven-step method to peak performance. He provides five stages for using imagery in rehearsal, which he calls visual-motor behavior rehearsal (VMBR). The exercises involve relaxation techniques whereby the individual switches on a "relaxation scene." Then, the individual is instructed to switch on different scenes for mental practice, such as a "success-competition scene" or a "winning-feeling scene." Suinn (1980) found that a skier using VMBR had the same EMG muscle responses that would have been present in actual skiing.

Mental practice may be an effective strategy to help students with learning disabilities perform motor skills. Gerich (1992) tested the effects of mental practice on a scarf-juggling task on students with learning disabilities (n = 60). Students were separated into four groups that performed the task using mental practice, physical practice, a combination of mental and physical practice, or no practice. Performance was assessed based on the number of trials necessary for skill acquisition and retention. Results indicated that there was no significant difference in retention between the mental practice and physical practice groups, but that the mental practice group required fewer trials and was more successful in skill acquisition than the other groups.

Allbritton-Grant (1985) found that combined mental and physical practice significantly improved subjects' ability to mentally measure length. She also found that mental practice alone produced no significant improvement in the task. However, Shanks and Cameron (2000) found that mental practice was less effective than either physical practice or no practice in a sequential reaction time task involving dot location.

Guerrero (1991) interviewed Spanish-speaking college students to determine the role of mental rehearsal as a strategy for learning a second language. Results of the study indicated the presence of two major types of mental rehearsal: task-related and self-related. Task-related rehearsal involves the mental practice of a specific activity or task, while self-related rehearsal is defined as self-talk which is not directly related to a particular activity or task. The study revealed that although a majority of the participants used some form of mental practice, most of them claimed that they did not understand what it was or how it could be used, and that the study helped them to better understand mental practice techniques. This is similar to methods in music education where students

are asked to study a piece of music before playing it, and may naturally engage in mental practice to some extent without actually knowing what it is that they are doing.

Whetstone (1996) examined the effect of mental imagery and mental practice on a firearm marksmanship task of police officer trainees. The treatment group received a two-hour imagery training session, ten mental practice sessions lasting five minutes each and using guided holistic imagery, twenty hours of physical practice at the firing range, and five minutes of mental practice at home. Guided holistic imagery refers to the incorporation of all the senses in mental practice. Whetstone states that imagery must be vivid to be effective, and that a multi-sensory approach increases the vividness of the image. The control group received the standard firearm marksmanship training, which involved physically firing between 50 and 150 rounds at targets. Results indicated that participants in the mental practice group had an average gain score of over thirty points higher than the control group. Results also indicate that belief in the effectiveness of mental practice may influence its success. Participants who believed in the effectiveness of the mental practice techniques scored an average of 42.63 points higher than participants who had low belief in the technique.

Dijkerman (2004) found that stroke patients who participated in daily motor imagery rehearsal showed greater improvement on an arm movement task than subjects in a control group. Results suggest that imagery training could be a valuable technique for reducing motor deficits in stroke patients.

In his review of the literature, Hall (2002) suggests that imagery practice may be a valuable tool for learning surgical skills that are cognitive in nature. He lists five potential applications of mental practice to surgical skills:

1. Early stages of learning a basic skill
2. Diminishing the learning curve for a new procedure
3. Transferring skills from an established technique
4. Hindering the decay of skills
5. Preoperation preparation for a complex procedure. (p. 468)

Hall also proposes a six-stage cyclical technique for mental imagery rehearsal: "1. Task definition, 2. Prior learning, 3. Mental rehearsal, 4. Reflection, 5. Problem solving, 6. Reality check" (p. 469).

In their meta-analysis of the literature, Driskell, Copper, and Moran (1994) found that mental practice was effective in improving performance, but not as effective as physical practice. Additional findings from their analysis suggest that:

1. Mental practice is effective for both cognitive and physical tasks, but the effect of mental practice is highly correlated with the amount of cognitive elements involved in the task.
2. The increase in performance from mental practice declines over time (approximately three weeks). "To gain the maximum benefits of mental practice, one should implement refresher training on at least a 1- to 2-week schedule" (p. 489).
3. Mental practice is more beneficial if subjects have prior experience with the task.
4. More mental practice is not always better, and extended sessions can lead to a loss of concentration. Results indicate that 20 minutes may be an optimal length for mental practice sessions.

Musical Research

The following section presents research involving mental practice in music and musical performance. Kohut (1985) states that mental practice "involves training the unconscious brain to efficiently process and organize information (goals specified by the conscious brain) and transform it into specific nerve signals to the muscles" (p. 127). He

claims that although numerous studies have been done on mental practice, intensive research in the area of musical performance is still needed. Kohut warns that mental practice may result in a decrease in motivation among some students because it lacks immediate feedback. “Therefore, in order for mental practice to be valuable to us, it needs to be judiciously alternated with physical practice. In this way the two types of practice can supplement and complement each other” (p. 128).

In his review of the literature on mental practice, Brooks (1995) states:

> Mental practice is a useful technique, elements of which are employed by music students and music educators in a variety of familiar settings. For example, band students may “air” and “finger” their parts as their director leads the ensemble in a timed, silent exercise of an unfamiliar piece just before sight-reading it for a rating at a band contest; choir members may mentally “sing” through their parts while the director rehearses with another section of the choir; and conductors may mentally “conduct” through the first few bars of the opening work of a concert before walking on stage. (p. 4)

Based on the findings in the literature, Brooks concludes that mental practice is influenced by task experience and the ability to conceptualize, and short practice sessions of no more than five minutes are necessary to maintain concentration.

Sisterhen (2004) cites mental practice as a valuable technique for enhancing musical performance abilities. In her review of the literature, she concludes that students may benefit from tapping their fingers as if playing the piano while hearing the piece mentally. She claims that because the “effects of mental practice can deteriorate after a period of seven days . . . students should be advised to practice mentally at least once a week” (p. 34). According to Sisterhen, music teachers should be aware that mentally imagining an unsuccessful performance could have a negative impact on performance. She cautions that if teachers “warn their students to be prepared for anything that could go wrong, they may be creating a negative image in the student’s mind. . . . Teachers

should remember to spend time in lessons telling students *what* to do in a competition or performance, rather than what *not* to do" (p. 33).

Similarly, Wilson (1994) stresses that mental rehearsal should be optimistic and should create a vision of success. He recommends that performing artists employ mental rehearsal as well as visual imagery depicting a perfect performance.

Connolly (2002) examined the effects of a program in mental skills training on the performance of university level musicians. The qualitative study examined subjects' perception of the effectiveness of the techniques on their playing after two years in the three-year program. Results indicate that subjects found mental rehearsal and relaxation to be the two most useful techniques. Subjects reported using mental rehearsal to "correct and rehearse specific techni *(sic)*, for developing musical memory, for practicing technical pieces in the music, and for improving communication, performance, and musicality" (p. 98). Mental rehearsal was employed in the following manner:

> Mental rehearsal was used to visualize an ideal performance both when practicing and before concerts, or to visualize a specific passage of music to overcome some technical difficulty (e.g., students envisaged themselves in the concert hall, on the stage, playing their instrument to a supportive audience). It was often supplemented with physical movement (e.g., looking at the score while moving the fingers). Mental imaging was also used to help projection or communication in performance. Adaptations of mental imaging included imagining the music as different colorful landscapes; imagining an "ideal self" rather than an "ideal other"; creating stories, paintings and images to help the performer to find a way through a piece and connect with it emotionally. (p. 98)

Connolly and Williamon (2004) applied mental skills training used by athletes to musical performance. They designed a mental skills training program and piloted the curriculum with 58 conservatory students. Results of the pilot study consisted of qualitative data obtained through interviews with the students to determine their feelings and attitudes about the program's effect on their rehearsal and performance skills.

Connolly and Williamon state that in mental rehearsal, "the basic idea is that the senses – predominately aural, visual, and kinesthetic for the musician – should be used to create or recreate an experience that is similar to a given physical event" (p. 224).

They also state that the two most significant points from the literature are that "informed physical practice at the highest levels of musicianship can hardly take place without some sort of cognitive or mental activity" and that "only through committed, personal effort can the musician expand, differentiate, and fully exploit his or her repertory of mental strategies" (p. 225).

Connolly and Williamon (2004) claim that the success of mental rehearsal depends on several factors, including an individual's technical skill level and personal preference for learning, the conditions of the particular performance, and the extent and method with which mental rehearsal is practiced. They state: "Ultimately, it is not a question of adopting either a mental or physical approach, but rather how to make the most of both approaches. The two are simply not mutually exclusive at the highest levels of performance" (p. 226).

Connolly and Williamon (2004) summarize several guiding principles for mental practice:

1. Practice regularly.
2. Short, regular sessions are better than long, infrequent sessions.
3. Start with relaxation exercises.
4. Rehearse specific skills or qualities.
5. Be positive and focus on only those aspects that contribute directly to performance.

6. Use all of the senses, including feelings and emotions, and continue to try and improve the clarity of images.

7. Use both internal and external visualization. When correcting problems, start with external visualization. When external visualization is correct, move on to internal visualization.

Connolly and Williamon (2004) offer several strategies for mental practice, and suggest that these strategies complement the physical practice process. While these techniques are intended to supplement physical practice, they do not involve any physical components – the techniques are done apart from the instrument or sheet music. The primary focus of the strategies is on visualizing a performance. Although the aural nature of music is addressed, the techniques seem to center on imaging the visual and motor aspects of performance. This may be result of the adaptation of the techniques from sports psychology, which would not include an aural component in the same sense that musical performance does. Emmons and Thomas (1998) have also recommended imagery strategies for musicians adapted from the sports imagery techniques proposed by Syer and Connolly (1984).

However, problems can arise when attempting to adapt mental practice techniques used in sports to mental practice in music. First, mental practice in sports tends to stress visual imagery and the visualization of gross motor tasks. The auditory nature of music requires auditory imagery to be the primary agent of mental practice. Additionally, the motor tasks required in musical performance involve fine motor skills rather than the gross motor skills required of athletes. Therefore, it seems that visualization in sports would be much easier and more beneficial than visualization in music. For example, an external perspective visual image of oneself shooting basketball free throws (with large movements in the hands, arms, and legs) can be a very clear image, compared to a visual

image of oneself performing on a wind instrument, where the only noticeable physical action is that of the fingers.

Ungerleider (1996) supports this notion by recognizing the possibility that "throwers, jumpers, vaulters and other field competitors use mental practice more frequently than those in other events because field events have a large visual component" (p. 13). He states that many athletes claim that imagery is easier "when you can stop, visualize your performance and then set or correct the images before proceeding" (p. 13). Clearly, musical performance differs from these kinds of sports in that it involves a continuous performance of different tasks rather than a single task of one repetitive action. In terms of mental practice, music may share a trait with marathon runners, "who have more difficulty with the visual component and therefore visualize less frequently, possibly because of fatigue and other distractions during a long race" (p. 13). In some cases, mental practice in music may be more effective if applied to short, isolated passages of music rather than entire compositions of great length.

Mental Practice versus Physical Practice

Several studies have attempted to compare mental practice, physical practice, and a combination of physical and mental practice. In an important and widely cited study, Ross (1985) found that college trombonists improved the most when using combined mental and physical practice. Subjects (n = 30) were randomly assigned to one of five treatment groups: physical practice, mental practice, a combination of physical and mental practice, mental practice with simulated slide movement, and a no practice control group. One etude served as both the pretest and posttest. The combined practice group had the highest gain scores between the pretest and posttest, but was not significantly

better than the physical practice or mental practice with simulated slide movement groups. It was concluded that a combination of mental and physical practice was just as beneficial as all-physical practice.

In an attempt to explain why mental practice is effective, Ross (1985) states:

> Mental practice, unlike physical practice, focuses the performer's attention on the cognitive aspects of music performance with less emphasis on the sounds being made. The performer can now think more carefully about what kinds of things might be tried, the consequences of each action can be predicted based on experience, and inappropriate courses of action ruled out. (p. 228)

According to Ross, the value of physical practice is that because it uses both auditory and kinesthetic feedback, it provides necessary information to the performer regarding the position of the muscles involved in performance. Therefore, the group that combined physical and mental practice was "able to benefit from both the feedback associated with physical practice and the increased concentration on the cognitive aspects of the music" (p. 228). Ross states: "Because they had just finished a physical trial, the CP [combined practice] subjects could benefit from the aural feedback obtained during the physical trial, even as they mentally practiced" (p. 228).

Geerlings (1998) obtained similar results in her investigation of the effect of mental practice on keyboard performance. Twenty pianists and twenty organists at the undergraduate and graduate levels were assigned to three treatment groups: mental practice, physical practice, alternating physical and mental practice, and a control group. The control group was a no-practice condition that consisted of reading a short article about sight-reading techniques. Two compositions were each divided in half to comprise four excerpts: two pretest and two posttest selections. Subjects sight-read the pretest, and were then allowed to practice the posttest using their assigned practice condition for five

minutes. Subjects then performed the posttest. This was then repeated using the two parts of the second composition as the pretest and posttest.

Results indicated that the alternating physical and mental practice group had the highest reduction of pitch errors, followed by the physical practice group and the mental practice group respectively. For number of pitch errors, a significant difference was found between alternating physical and mental practice and the mental practice and control groups. However, there was no significant difference for pitch errors between the alternating physical and mental practice group and the physical practice group. Geerlings (1998) states:

> This finding supports one of the current trends in MP [mental practice] research that states that PP [physical practice] and alternating PP/MP are often equally as effective. The alternating PP/MP group was forced to think about what they were playing. They relied not only on their motor skills during the rehearsal, but also on their cognitive skills. MP has been found to be more effective in aiding cognitive skills than motor skills. (p. 59-60)

This study supports the notion that guided instruction is better than rigid instruction. Subjects "had the freedom to form their own conceptualizations and to use MP [mental practice] in their own ways" (p. 61).

Pierson (1992) examined the effect of mental and physical practice on the musical performance of fifth-grade beginning band students. Subjects (n = 58) were divided into physical practice, mental practice, or no practice (control) groups. The mental practice group practiced for three minutes by studying the music silently without any kinesthetic movement. The physical practice group actually played the instrument for three minutes. The control group counted backwards from 200 during the three minutes in order to prevent any mental practice. Pierson defines mental practice as follows:

> During this type of practice the performer analyzes the rhythms, notes, key signature, and any other musical elements presented on the page, without the benefit of physical movement. In addition, the instrumentalist tries to imagine the pitches (audiation or aural imagery) that appear on the page and also tries to imagine all muscular movement that will occur while actually playing the music. (p. 29-30)

Subjects sight-read selection 2 from Form A of the Watkins-Farnum Performance Scale as a pretest. Subjects then practiced selection 2 from Form B of the Watkins-Farnum Performance Scale for three minutes using one of the three practice conditions. Subjects then performed selection 2 of Form B as a posttest. Results indicated that the physical practice group scored significantly higher than the control group. There was no significant difference between the mental and physical practice groups or the mental practice and control groups. Pierson (1992) suggests that "it is possible that the complexity of playing a musical instrument and young age of the subjects negated the effectiveness of mental practice" (p. 47).

Theiler and Lippman (1995) compared the effectiveness of four practice conditions on the skill acquisition of guitar and vocal performers (n = 14) ranging in age from 19-29. Subjects rotated between the practice conditions in a repeated measures design similar to the one used by Rubin-Rabson (1941). Each rehearsal condition lasted for a total of 12 minutes. The conditions were: physical practice for 12 minutes, alternating three minutes physical and three minutes mental practice, alternating three minutes physical practice and three minutes mental practice while listening to a model, and a control group of three minutes physical practice and three minutes reading a book about performance anxiety.

Results indicated that guitarists reading from a musical score had the highest rating for pitch accuracy when using mental practice, followed by physical practice, mental practice with model, and the control condition. For vocalists, mental practice with model

was superior to the other conditions in the areas of pitch accuracy, dynamics, tempo, and tonal quality. For tonal quality, mental practice was superior to physical practice and the control condition. Practice condition had no significant effect on rhythmic accuracy. When mental practice included a model, both guitar and vocal performers could perform longer portions of the music from memory. Theiler and Lippman (1995) conclude that the results "certainly confirm that mental practice is effective, but they also suggest that features of a mental practice regimen should be adjusted to accommodate particular applications, because different attributes may be optimal for various physical and musical endeavors" (p. 338).

The effectiveness of mental practice in these studies may have been lessened due to the fact that 1) students had no training in or experience with mental practice techniques and 2) students need to be familiar with the task before attempting mental practice of the task. Because they had no prior experience with the music, the mental practice group would not have been able to access an auditory image of the piece for use during mental practice.

Knowledge of Results

At least three studies have attempted to determine the role of knowledge of results in musical practice. Knowledge of results refers to the immediate feedback that a musician receives from the musical instrument, i.e. the sound itself. When knowledge of results is denied, the musician receives no aural feedback with which to determine the correctness or incorrectness of the performance.

Coffman (1987) examined the effect of mental practice and knowledge of results on piano performance. Subjects were 80 graduate and undergraduate music majors whose

principal instrument was not a keyboard instrument. He employed four different practice conditions: physical practice, mental practice, alternating physical and mental practice, and a motivational control. These practice conditions were divided in half, with each half of each condition receiving either a presence or absence of aural knowledge of results, resulting in eight treatment conditions. All subjects sight-read a composition as a pretest. They then practiced a different composition, which served as the posttest, using their respective practice condition over six trials. The performances were analyzed for the dependent variables of performance time, number of pitch errors, and number of rhythm errors.

Results indicated that the physical practice and alternating physical and mental practice groups achieved significantly greater improvement in reducing the amount of time needed to perform the posttest than the mental practice group, but were not significantly different from each other. Although all three practice conditions were significantly better than the control condition, there was no significant difference between the practice conditions in reducing the number of pitch or rhythmic errors. Knowledge of results did not appear to be a significant variable for reducing pitch and rhythmic errors. Coffman (1987) concludes that "modes using physical practice, alone or in alternation with mental practice, were superior to exclusive mental practice" and that "alternating physical and mental practice was no less effective than exclusive physical practice" (p. 194).

Similar to Coffman (1987), Brooks (1993, cited in Brooks, 1995) examined the effects of mental practice, physical practice, and knowledge of results on the performance of college instrumental music majors. Three practice conditions were each divided in

half, one half using a recorded model and the other half using no recorded model. The six treatment groups were: mental practice, mental practice with a performance model, physical practice, physical practice with a performance model, a combination of mental and physical practice, and a combination of mental and physical practice with a performance model. Subjects were given a pretest etude, and then practiced a posttest etude using their assigned practice condition for three practice trials. After the three practice trials, subjects performed the posttest etude. Results indicated that the presence of a recorded model did not affect the subjects' performance, and that mental practice was as effective as physical practice in improving performance.

A related study conducted by Highben and Palmer (2003) examined the effect of different mental practice conditions on the ability of pianists to perform music from memory. Subjects participated in four different practice conditions: a normal practice condition in which subjects played on the digital piano and heard their playing over headphones, a motor only condition in which subjects moved their fingers on the keyboard but did not receive auditory feedback (could not hear what they were playing), an auditory only condition in which subjects heard a recording of the piece but were not allowed to move their fingers, and a covert practice condition in which subjects did not move their fingers and heard silence. Results indicated that the normal condition was best and the covert condition was worst in terms of correctly recalled pitches. There was no significant difference between the motor only and auditory only conditions and between the normal and auditory only conditions. Performers with high aural skills were least affected when auditory feedback was removed. Highben and Palmer suggest that aural forms of mental practice assist in the learning of unfamiliar music.

Based on these studies, it appears that knowledge of results is not necessary for musical practice, especially when the subject has strong aural skills. This suggests that mental rehearsal should not be negatively affected by the absence of auditory feedback (knowledge of results).

Mental Practice in the Ensemble Rehearsal

Very few research studies have attempted to apply mental practice techniques to the ensemble rehearsal setting. Perhaps the only study to attempt this is by Keenan-Takagi (1995), who examined the effects of mental rehearsal during observational learning in the ensemble setting on the critical listening skills of high school chorus students. Seven choruses were assigned to an experimental practice condition involving modeling with mental rehearsal or a control group involving modeling with no mental rehearsal. Directors were provided with a sample rehearsal script for each condition, which included nineteen instructions that the director could use. These scripts differed only in the addition of "the phrase and time to include mental practice" (p. 53) for the treatment group.

During modeling, the director instructed the students to listen to the model and sing it back. During modeling with mental rehearsal, the director instructed the students to listen to the model or various aspects of the model, practice mentally, and then sing it back. For example, the control group was instructed to "listen and sing this back" (p. 123) while the treatment group was instructed to "listen and sing it mentally first then sing it back" (p. 120). Weymuth's *Choral Music Achievement Test* served as a pretest and posttest. Results indicated that there was no significant difference between the experimental and control conditions on the critical listening achievement of the subjects.

Several issues in the design of this study should be noted. Keenan-Takagi (1995) states that "no time or rehearsal schedule was imposed on the directors" (p. 57), but that each group was asked to record their amount of rehearsal time. However, the amount of time spent rehearsing is not included in the presentation of data and may have differed significantly for each ensemble. There is also no data regarding how much time was actually spent using the provided scripts, so it is not known how much mental practice was actually done. The study also did not attempt to determine whether mental practice improved the musical performance of the subjects. However, this study remains valuable in that it is one of the few studies to attempt to apply mental practice techniques in the ensemble setting.

Sight-Reading and Mental Practice

McPherson (1994) examined the sight-reading techniques used by high school trumpet and clarinet students in grades seven through twelve. He found that students with the highest sight-reading scores scanned the music and mentally rehearsed difficult sections prior to playing the piece. Typically, higher scoring subjects stated that they sang the harder sections in their heads while executing the fingerings on the instrument. McPherson states that one of the distinguishing characteristics of competent sight-readers is an approach that involves "a brief period of mental rehearsal of the major difficulties before commencing to play" (p. 229). He also suggests that high school students have not been taught or are unaware that certain strategies may be used to improve sight-reading scores. In the present study it is hoped that providing specific instruction in mental practice techniques may help make students aware of a strategy that may help improve their sight-reading ability.

Brucksch (1991) sought to determine the effects of mental rehearsal on the sight-reading ability of beginning non-major college guitarists. She also attempted to determine the effect of differing amounts of mental rehearsal time. Subjects (n = 43) were assigned to one of two treatment groups or a control group. Sight-reading exercises were used as the pretest and posttest, which were administered at the beginning and ending of a five-week treatment period. Treatment group 1 received 5 minutes of mental rehearsal instruction pertaining to sight-reading for five weeks or a total of 25 minutes of instruction. Treatment group 2 received 5 minutes of mental rehearsal instruction twice a week for five weeks, for a total of 50 minutes of instruction. The control group received no mental rehearsal instruction:

> Mental rehearsal instruction was provided by the teacher as follows: The students were first directed to look at the music for technical information, i.e. time signature, note values, rhythmic and melodic patterns, and intervals, for one minute. They were then asked to look at the music for one minute and to imagine themselves playing the exercise, visualizing the correct left hand and right hand movements clearly, without physically playing the instrument. The students were then allowed to play the exercise on their own for one minute, followed by another minute of mental rehearsal without playing. The final sight-reading activity involved playing the exercise for one minute (two times through) together as a class, at a pace set by the instructor. (p. 40-41)

During the pretest and posttest, subjects were given 60 seconds to study the sight-reading exercise before playing. The same exercises were used in the pretest and the posttest. Results indicated that there were no significant differences in pitch or rhythm among the three groups.

Wirt (1992) studied the effects of mental practice on the sight-reading ability of junior-high wind instrumentalists in grades seven, eight and nine. Subjects (n = 80) were divided into four separate treatment groups and one control group. The groups were as follows:

> (1) Mental practice only, without movement or sound and without physical contact with the musical instrument. (2) Mental practice with imagined physical practice, without any sound and without physical contact with the musical instrument. (3) Mental practice combined with physical practice while holding the musical instrument in playing position, but producing no sound. (4) Actual practice with sound, and (5) a "no practice" control group which performed immediately without benefit of any kind of practice. (pp. 24-25)

Subjects sight-read a sixteen-measure exercise, were given three minutes to practice using the practice condition they had been assigned, and were tested again using the same exercise. Results indicated that there was a significant difference between the control group and all four treatment groups. Wirt concludes that "even mental practice only (with no interment) produces better results than no practice at all" (p. 33). There was no significant difference between groups 3 and 4, suggesting that "mental practice while fingering along on the instrument is statistically as good as actually practicing on the instrument" (p. 33).

Several problems are inherent in this study and cause speculation about the validity of the findings. First, it should be noted that group two was told: "you may make any physical movements as you see fit" (p. 26). This seems to contradict the description of group two listed above as "mental practice with imagined physical practice" (p. 24). Furthermore, in the results chapter, Wirt (1992) describes group two as "mental practice with instrument in hand/no physical movement/no sound" (p. 32), contradicting the earlier statement that group two practiced "without physical contact with the instrument" (p. 24). These discrepancies make the replication of this study difficult, and raise doubts regarding the validity of the results.

Second, Wirt (1992) defines sight-reading as "performing music which the musician has never seen" (p. 4). Because the posttest was the same exercise as the pretest,

the posttest cannot be considered a sight-reading exercise because the subjects had performed it moments earlier in the pretest. The study by Brucksch (1991) listed above presents the same problem. To completely understand the effect of mental practice on sight-reading, subjects should be taught mental practice techniques and given a different piece to sight-read for the posttest. What these studies may actually measure is the effect of mental practice as a practice condition for rehearsed reading rather than sight-reading.

Length and Placement of Mental Practice

Cahn (2003) investigated the effects of mental practice on the musical performance of tonal patterns of two difficulty levels. Specifically, he sought to determine the effectiveness of different amounts of time spent on mental and physical practice. Undergraduate students (n = 60) were assigned to a physical practice group, a mental practice group, or one of two combined physical and mental practice groups. One combined group was assigned a proportion of 66% physical practice and 33% mental practice, and the other combined group was assigned a proportion of 33% physical practice and 66% mental practice. Subjects performed a pretest, a three-minute practice period, and a posttest. Results indicated that there were no significant differences between the groups in terms of note errors. The two groups with the higher amount of mental practice scored better on the easy pattern than on the difficult pattern. The scores for the two groups with higher amounts of physical practice were not significantly different for the easy and difficult tasks, and were as good as the mental groups on the easy pattern.

A pair of studies by Rubin-Rabson (1941a, 1941b) examined the effects of silent analysis and mental practice on the memorization and performance of piano music. The

first study (1941a) compared different lengths of silent study prior to performance. Subjects (n = 9) were given a short composition and allowed to study it silently for three, six, or nine minutes. Subjects were not told how much time they would have to insure equal intensity throughout. When time was called, the subject was instructed to write the score from memory. The writing task was not timed and subjects worked at their own speed. Subjects then learned the piece at the keyboard in trials in which they played the piece from beginning to end until the piece was brought to a perfect memorized performance. Two weeks later the piece was relearned to measure the retention value of the differing amounts of preliminary study.

Results indicated that the six-minute period was significantly greater than the three-minute period in terms of the amount of material transcribed correctly. There was no significant difference between the six- and nine-minute periods. Rubin-Rabson (1941a) states that the additional three minutes in the nine-minute group involved overlearning and were ineffective in the transcription task. The three-minute group required the most number of keyboard trials required to memorize the piece. The nine-minute group required the least amount of trials, however, there was no significant difference between the nine- and six-minute groups. No significant differences were found for retention between the three study periods. Rubin-Rabson suggests that studying a whole composition for structure and form, and then studying smaller units of a composition may "prove more efficient than attempts to memorize and carry too large units" (p. 112).

In the second study, Rubin-Rabson (1941b) compared the effects of three different practice conditions involving mental practice on piano performance and memorization. The practice conditions were placed at different times in the practice session. During

mental practice, the participants (n = 9) were instructed to perform the material "mentally with eyes closed, to maintain the image of the notes as firmly as possible, and to refer to the music only when there was confusion or uncertainty in [their] mental performance" (p. 595). Subjects were exposed to three practice conditions: mental practice in the middle of the practice session, mental practice at the end of the practice session, and no mental practice. Each condition began with five minutes of analytical pre-study. Group A then played the piece for 5 trials, and then mentally practiced for four minutes. Subjects then performed the material until they achieved a perfect memorized performance. Group B was the same as A except that subjects did not do the final physical practice trials, so mental rehearsal occurred at the end of the session. Group C played 5 keyboard trials and then 4 minutes of extra keyboard trials with no mental rehearsal.

Group A (mental practice midway through the session) was significantly superior to the other methods. It reduced keyboard trials required to learn the piece and achieved retention as good as that of Group C, which offered four extra minutes of keyboard trials. Rubin-Rabson (1941b) states that "the four minutes of mental rehearsal placed after the learning is, apparently, an inferior procedure" (p. 600). It required more keyboard trials and produced the least amount of retention. Placing mental rehearsal in the middle of the session is superior because it "is a type of distributed practice, which, although it offers no actual rest, nevertheless provides a period when the cessation of hand movements relieves the necessity for maintaining an unbroken sequence, allows further analysis and reorganization of points of confusion and presents a 're-seeing' of the small musical figures against the general background" (p. 601). Also, Group B may have been

unsuccessful because “the intensity involved in reaching a learning goal is probably not duplicated in a mental review after the goal has been reached” (p. 601).

It would be beneficial to replicate this study with the addition of a treatment group that performed mental practice at the beginning of the practice session. Silent analysis prior to performing a new piece is a common practice technique. Future studies should compare the effectiveness of mental practice placed at the beginning, middle, or end of the practice session.

Motivation and Mental Practice

In a case study of a young beginning clarinet player, Renwick and McPherson (2000, cited in Parncutt and McPherson, 2002) found that mental practice techniques were used when the subject practiced a piece she chose to learn as opposed to a piece her teacher chose. When practicing the piece her teacher assigned, the subject “almost exclusively used a play-through approach, playing her pieces from beginning to end with little attention to correcting mistakes” (p. 41). When practicing the piece she chose to learn herself, the subject displayed an increase “in the way she monitored and controlled her performance, as evidenced in greater use of silent fingering, silent thinking, singing, and more varied strategies for correcting wrong notes” (p. 41).

McPherson and McCormick (1999) found that harder working musicians were more likely to use mental practice techniques. They administered a questionnaire to 190 pianists. Subjects then took a graded music performance exam in order to determine the relationship between self-regulatory and motivational aspects of learning music. Results indicated that “students who report higher levels of practice tend to be more inclined to

rehearse music in their minds plus make critical ongoing judgments concerning the success or otherwise of their efforts" (p. 101).

Other Mental Practice Studies

The use of mental practice in piano performance was included in a study by Amaize (1993), who identified and ranked twenty-nine musical concepts emphasized by piano teachers, music teachers, and pianists. Among the concepts listed, mental practice was ranked 18th.

Rosenthal, Wilson, Evans, and Greenwalt (1988) tested the effects of five different practice conditions on the musical performance of college instrumental music majors. Subjects practiced an etude for three minutes using one of the five practice conditions: modeling (listening to a recording of the piece), singing, silent analysis, free practice, or control. During silent analysis, the subjects were instructed to "please study the music on your stand silently for three minutes" (p. 252). This type of silent analysis may have provided an opportunity for participants to engage in mental practice. No significant differences were found between the groups in terms of correct notes and articulation. However, subjects in the silent analysis group scored the best in terms of rhythmic accuracy. Phrasing was best in the free practice and modeling groups, while tempo accuracy was best for subjects in the modeling, free practice and silent analysis groups. Rosenthal et al. state that "silent analysis did not seem to provide any immediate benefits over sight-reading except in subjects' performance of rhythms" (p. 254). They state that this may have been because rhythms in the exercise were complex, so "the opportunity for silent analysis enabled the subjects to work out the analytical aspects of the rhythms.

Had they received more time, the subjects . . . might eventually have focused their attention on the other elements of the music" (p. 255).

Rosenthal (1984) examined the effects of four different practice conditions on the performance of graduate instrumental music students. The conditions were guided model, model only, guide only, and practice only. A verbal script was used to direct the subjects' attention to specific details of the piece during a six and one-half minute rehearsal. In the guided model condition, the script was combined with a recorded performance of the piece. In the model only condition, the subjects listened to the recorded model without the presence of the script. In the guide only condition, subjects were presented with the script alone, and pauses occurred after each main point in the script (where the recorded model occurred in the guided model group script). This was done so that "subjects could mentally rehearse the selection if so desired" (p. 267).

Results indicated that subjects in the model only group obtained the highest scores on all variables. Subjects in the guide only and practice only group scored considerably lower than subjects in the other two groups. The practice only group scored higher than the guide only group in terms of notes and rhythms, while the guide only group scored better in dynamics and tempo. Rosenthal (1984) did not attempt to determine or control the amount of mental practice performed by subjects in the guide only group. Had participants been instructed to mentally rehearse the selection during breaks in the script, the study may have yielded different results.

Key findings from the literature presented in this section indicate that a combination of mental and physical practice may be better than mental practice alone (Allbritton-Grant, 1985; Coffman, 1987; Geerlings, 1998; Kohut, 1985; Ross, 1985;

Weinberg, 1989). It appears that knowledge of results is not necessary for effective mental practice (Brooks, 1995; Coffman, 1987; Highben and Palmer, 2003). There is a lack of research devoted to determining the effect of mental practice on the musical performance of children and school performing ensembles. Keenan-Takagi (1995) provides the only study using mental practice in a school ensemble. Her study measured the effect of mental practice on the critical listening skills of high school chorus students, and did not measure its effect on student performance. It remains to be determined if mental practice techniques, as taught to a school music ensemble, will effect student performance.

Summary

Several conclusions can be made from the literature regarding mental practice:

1. A combination of mental and physical practice may be better than mental practice alone (Allbritton-Grant, 1985; Coffman, 1987; Connolly and Williamon, 2004; Geerlings, 1998; Kohut, 1985; Ross, 1985; Salmon and Meyer, 1992; Weinberg, 1989).

2. Knowledge of results does not appear to be necessary for effective mental practice in music (Brooks, 1995; Coffman, 1987; Highben and Palmer, 2003).

3. Short mental practice sessions may be more beneficial than longer sessions (Brooks, 1995; Connolly and Williamon, 2004; Rubin-Rabson, 1941a).

4. Mental practice should be practiced on a regular basis (Buffington, 1989; Connolly and Williamon, 2004; Salmon and Meyer, 1992; Sisterhen, 2004).

5. All of the senses should be employed during mental practice (Bagley and Hess, 1987; Carter, 1993; Connolly and Williamon, 2004; May, 1989; Moyer, 1992; Salmon and Meyer, 1992; Taylor, 1995; Trusheim, 1987; Whetstone, 1996).

6. Mental practice may help improve sight-reading skills (Brooks, 1995; Karpinski, 2000; McPherson, 1994; Prosser, 2000).

7. Active imagery – physical movement simulating the task performance during mental practice – may be more effective than passive imagery alone (Campos, 1996;

Connolly, 2002; McPherson, 1994; Salmon and Meyer, 1992; Taylor, 1995; Wirt, 1992; Ziegler, 1987).

8. An effective routine in mental practice should include points of slow motion imagery (Campos, 1996; Fanning, 1988; Taylor, 1995).

9. In addition to mental practice on isolated passages or skills, performers should mentally imagine the performance in its entirety (Campos, 1996; Freymuth, 1993; Kirchner, 2005; Taylor, 1995).

10. The effectiveness of mental practice depends on the vividness of the imagery (Freymuth, 1990; Marks, 1999; May, 1989; Murphy, 2005; Taylor, 1995; Whetstone, 1996).

11. Mental practice may be more effective if the performer has a strong belief in the effectiveness of the technique (Whetstone, 1996).

12. It is essential that performers mentally rehearse positive scenarios and performances with successful outcomes. Visualizing a negative outcome can be detrimental to performance (Buffington, 1989; Connolly and Williamon, 2004; Sisterhen, 2004; Taylor, 1995; Wilson, 1994).

13. Prior experience with the task may be necessary for mental rehearsal to be effective (Brooks, 1995; Connolly and Williamon, 2004; Driskell, Copper, and Moran, 1994; Feltz and Landers, 1983; Ginns, Chandler, and Sweller, 2003; May, 1989; Mulder et al., 2004; Ungerleider, 1996).

14. Imagery perspective may influence the effectiveness of mental practice. Taylor (1995) states that both internal and external imagery should be used. Similarly, Connolly and Williamon (2004) claim that performers should use both internal and external visualization. They recommend starting with external visualization when correcting problems. When external visualization is correct, performers should move on to internal visualization. However, other research indicates that internal imagery may be more effective than external imagery (Hale, 1982; Mahoney and Avener, 1977; Moyer, 1992).

15. Mental practice may be more effective if it occurs in the middle of a physical practice session, rather than at the end or beginning of a practice session (Freymuth, 1990; Rubin-Rabson, 1941b; Syer and Connolly, 1984).

16. Professional musicians and more successful musicians seem to actively employ mental practice strategies in their regular practice routines (Carter, 1993; McPherson, 1994; McPherson and McCormick, 1999; Moyer, 1992; Trusheim, 1987).

CHAPTER 3
DESIGN OF THE STUDY

Introduction

The purpose of this study was to develop and determine the effect of a structured method of mental practice on the musical performance of high school wind and percussion students. The mental practice method was based on various techniques described in the literature, and involved three components: 1) exercises designed to introduce, define and practice visual, auditory, and motor imagery, 2) exercises that combined physical and mental practice simultaneously, and 3) exercises that alternated physical and mental practice.

Five basic questions were addressed: 1) What is the effect of a structured method of mental practice in ensemble rehearsal on the sight-reading performance of high school band students? 2) What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of high school band students? 3) What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of a high school band performing as an ensemble? 4) What is the effect of mental practice on the musical performance of students in terms of grade level, gender, and performing instrument? 5) What are the opinions of high school band students regarding mental practice?

The research hypotheses were: 1) Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in sight-reading performance than students using an

unstructured method of mental practice, physical practice, or no practice (control). 2) Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in prepared performance than students using an unstructured method of mental practice, physical practice, or no practice (control). 3) A band ensemble that receives specific training in mental practice and whose mental practice sessions were structured by the teacher will make considerably greater improvement in prepared performance than an ensemble using an unstructured method of mental practice, physical practice, or no practice (control). 4) Within each of the three experimental groups, there will be significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

The corresponding null hypotheses were: 1) There will be no significant differences in the mean gain scores for sight-reading performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice. 2) There will be no significant differences in the mean gain scores for prepared performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice. 3) There will be no considerable difference in the mean gain scores for ensemble prepared performance of an ensemble that practices using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice. 4) Within each of the three experimental groups, there will be no significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

Pilot Study

A pilot study was conducted in order to better understand the application of mental practice to the school band rehearsal. The study examined the effect of mental practice on the intact ensemble performance of two middle school bands in North Central Florida. Each band was designated as either the treatment group or control group. After consulting with both band directors regarding the capabilities of the students and the grade level of music typically performed, the piece *Bristol Bay Legend* by Robert Sheldon was selected for use in the study. Each band sight-read the composition as a pretest. The bands then practiced the piece using an assigned practice condition for 20 minutes a day over three days for a total of 60 minutes. At the conclusion of the treatment period, each band performed the composition as a posttest. Each band director conducted and taught her respective ensemble in all rehearsals.

Band A served as the treatment group (n = 24). On the day prior to the pretest, the treatment group received 20 minutes of mental practice instruction from the researcher. This was done in order to introduce participants to the concept of mental practice and to give them experience using mental practice techniques prior to the practice trials. After playing the pretest, the treatment group rehearsed the piece using a mental rehearsal procedure that alternated physical and mental practice. The procedure was designed by the researcher but loosely based on the choral rehearsal script created by Keenan-Takagi (1995). The method was not highly structured and allowed the student to choose what kind of mental practice to use. Before engaging in mental practice, the teacher provided the following instructions to the students:

> Let's play (the first 8 measures) mentally first. Relax, put your horn in your lap, and remain as still as possible. As I conduct the music, try to imagine yourself

> playing the part. Feel your fingers moving to the right notes. Feel your embouchure and tongue (lips, face muscles, etc.) moving to the right positions. Try to hear what the rhythm sounds like. Try to hear what the melody sounds like in your head. Don't touch your instrument with your hands and don't move any muscles. Just think about playing the music and try to hear what it sounds like in your head.

Band B served as the control group (n = 19). The control group practiced the piece using traditional rehearsal techniques that only employed physical practice.

Two independent evaluators graded the performances. Each evaluator was a music education doctoral student with experience and success as a school band director. The evaluation procedure was based on a method similar to that used by Morrison (2002). Each ensemble performance was graded in seven areas: pitch accuracy, tone quality/intonation, rhythmic precision, phrasing, articulation, tempo, and dynamics. Each of these areas was graded on a five-point scale with 1.0 being poor and 5.0 being superior. Both evaluators scored the performances at the same time, with the researcher present to answer any procedural questions. Inter-scorer reliability was calculated using the Pearson Product-Moment Correlation. Results indicated that there was a relatively strong positive reliability between evaluators (r = .81).

The data was analyzed based on the mean scores of the two evaluators for each performance area (5 possible points) and the total score of each performance (35 possible points). Because the study examined the performance of the intact ensemble, statistical analysis was not conducted due to a low N (N = 2). Table 3-1 shows the mean pretest, posttest, and difference scores and difference percentages for each performance area.

There appeared to be a substantial difference in the pretest scores between the treatment and control group. The treatment group scored higher on the pretest in every

Table 3-1. Pilot study results: Mean pretest, posttest, and difference scores and percent difference for experimental (n = 24) and control (n = 19) groups

Performance Area	Pretest	Posttest	Mean Difference	Percent Difference
Pitch accuracy				
Experimental Group	1.5	3.3	1.8	36%
Control Group	1	3	2	40%
Tone quality/Intonation				
Experimental Group	1.6	2.8	1.2	24%
Control Group	1.2	2.95	1.75	35%
Rhythmic Precision				
Experimental Group	1.75	2.75	1	20%
Control Group	1.1	3.55	2.45	49%
Phrasing				
Experimental Group	1.8	3.25	1.45	29%
Control Group	1.25	3.3	2.05	41%
Articulation				
Experimental Group	2.05	2.75	0.7	14%
Control Group	1.35	3.35	2	40%
Tempo				
Experimental Group	1.75	3.45	1.7	34%
Control Group	1.15	3.25	2.1	42%
Dynamics				
Experimental Group	1.95	3	1.05	21%
Control Group	1.05	3.55	2.5	50%
Total Score				
Experimental Group	12.4	21.3	8.9	25%
Control Group	8.1	22.95	14.85	42%

performance area than the control group, indicating that the two bands may have begun the study with unequal abilities.

Scores for both groups improved between the pretest and posttest, and both groups received similar scores on the posttest. An examination of the difference scores and

percentages reveals that the control group had a greater increase in scores in every area than the treatment group. However, the difference between the control and treatment groups appears to be substantial in only three of the seven performance areas. The two groups did not appear to be substantially different in terms of improvement in the areas of pitch accuracy, tone quality/intonation, tempo, and phrasing. The physical practice group seems to have made a noticeable improvement in the areas of rhythmic precision, articulation, and dynamics. These results suggest that mental practice may be an effective alternative rehearsal technique for certain performance areas when used as a supplement to physical practice.

Results of the pilot study presented several implications that were addressed in the full study. In the pilot study, students in the mental practice group appeared to have difficulty focusing attention on the task during mental practice. This may have been the result of a lack of structure provided by the fact that students could choose whether they mentally rehearsed the rhythm, melody, finger positions, embouchure formations, etc. It was concluded that a more structured mental practice technique may be necessary for students at this age level, and that students may benefit more if they are specifically instructed as to what aspect of the music to attend to during the activity. The full study addressed this by developing a structured method of mental practice.

Second, findings suggest that the results may have been affected by the fact that students had no prior experience with the music. The mental practice group was asked to hear the melody and rhythms in their minds, but may not have had enough experience with the music to have properly encoded an aural model of the piece into memory. In this case, subjects would not have been able to hear the melody in their minds in order to

mentally rehearse it. Therefore, the pilot study suggested that mental practice might be more effective when rehearsing music that students' are familiar with because they already possess an aural image of the music that they can mentally rehearse. The full study addressed this concern by providing two weeks of physical practice for all treatment groups before any mental practice on the music was attempted.

Because the pilot study compared the performance of two intact ensembles, no statistical analysis was possible. Therefore, the full study sought to measure individual student performance as well as the performance of the intact ensemble.

Selection of the Participants

Four concert bands from four different high schools in Roanoke County, Virginia, were selected to participate in the full study. These schools were chosen based on their similarity to each other in order to obtain as homogeneous a sample as possible. All of the county band programs operated under the same music curriculum and teaching philosophy. The county school system had an enrollment of approximately 14,000 students, and was named to the American Music Conference's "Best 100 Communities for Music Education in America" in the three years immediately prior to the study (2002, 2003, and 2004), and in the school year the study was conducted (2006). Each band rehearsed during the school day for approximately 250 minutes each week, and consistently received ratings of "Superior" or "Excellent" at the Virginia State Concert Band Festival during each of the five years prior to the study. Across the school system, band has been offered to students beginning in the sixth grade.

In order to gain additional data about the students in each band, students were asked to complete an information form prior to the study (Appendix A). Further data was

collected in discussions with each teacher and in a survey of the school system's website. The four bands are compared in Table 3-2 in terms of characteristics of the school, the teacher, and the band itself.

In terms of school characteristics, all four schools had a similar enrollment size, with the school for Band C having slightly less students (815). Three of the schools operated on a daily class schedule with 50 minutes for each class period. The school schedule for Band B was a block schedule in which classes met every other day for 100

Table 3-2. Comparison of the four participating bands

	Band			
Characteristic	Band A	Band B	Band C	Band D
School Characteristics				
Class meeting schedule	Daily	Block	Daily	Daily
Minutes per class period	50	100	50	50
Total school enrollment	1005	1143	815	1075
Teacher Characteristics				
Years of teaching experience	5	7	5	28
Years at present school	5	7	3	4
Band Characteristics				
Number of students	57	50	47	46
Girls	22 (39%)	24 (48%)	20 (43%)	25 (53%)
Boys	35 (61%)	26 (52%)	26 (57%)	22 (47%)
Average student age	15.28	15.96	15.23	15.58
Students in private lessons	1 (1.7%)	7 (14%)	6 (13%)	6 (13%)

minutes each day. The difference in class meeting schedule between Band B and the other groups appears to be the most noticeable difference between the schools.

The teacher of Band D had the most teaching experience (28 years). The remaining three teachers had similar years of teaching experience. No teacher in the study had less than five years of experience as a high school band director. Each band had a similar number of students with a similar mean age. Perhaps the most noticeable difference between the bands is that only one student in Band A took private lessons, while no fewer than six students in the other bands took private lessons.

Twenty-five students from each band were selected for individual testing for a total *N* of 100 students. The assessment of individual performance was administered to only those instruments considered to be the most common and numerous in high school band classes. The instruments selected for individual testing were flute, clarinet, alto saxophone, trumpet, French horn, and trombone. An attempt was made to select an equal number of each instrument. However, the number of each instrument tested from each band varied according to band instrumentation and size.

Due to various factors, several students were unable to complete the study. Nine students from Band D were excluded from the study due to recording equipment malfunction during the pretest. One student from Band B was excluded because her instrument was broken during the pretest. Two students from Band C and one student each from Bands A and B were unable to complete the study due to student absence, withdrawal from class/school, or other reasons. This left a total *N* of 86 students who completed the individual testing. The final number and instrument of students completing individual testing are presented in Table 3-3.

Table 3-3. Number and instrument of students completing individual testing

Instrument	Band A	Band B	Band C	Band D
Flute	5	5	3	7
Clarinet	4	4	5	5
Alto Saxophone	5	5	5	0
Trumpet	5	3	4	4
French Horn	0	2	2	0
Trombone	5	4	4	0
Total	24	23	23	16

The research protocol for this study was examined and approved by the University of Florida Institutional Review Board. A letter to parents explaining the study and an informed parental consent form were mailed to all participating teachers, who gave the information to their students. The Institutional Review Board Protocol, parent letter, and informed consent form are presented in Appendix B. Correspondence with participating teachers outlining their responsibilities is presented in Appendix C.

Research Design

The design of the study was a pretest-posttest design with nonequivalent groups (Gall, Gall, and Borg, 1999). Each intact band was assigned to one of the three treatment groups or to the control group; therefore random assignment of each student was not possible. Gall et al. (1999) state that this design "is probably the most widely used quasi-experimental design in educational research" (p. 242). They claim that "many experiments carried out in the public schools do not permit random assignment of research participants. . . . When this happens, researchers usually must consider each class as an intact group" (p. 242). In this study, considering each band as an intact group was necessary because students could not be randomly assigned to each treatment condition.

Dependent Measures

Dependent variables in this study measured

1. individual student sight-reading performance achievement
2. individual student prepared performance achievement
3. band ensemble prepared performance achievement

The Watkins-Farnum Performance Scale was used to measure the sight-reading achievement of each student. Exercise 10, Form A was selected as a pretest, and Exercise 10, Form B was selected as a posttest. Each exercise was then arranged for the study using Finale notation software. The Watkins-Farnum Performance Scale is perhaps the most widely used measure of instrumental music performance. There is a high reliability coefficient between the two forms of the scale (r = .94). Validity was determined using rank order correlations between the teachers' ranking of the students and the students' scores on the test. Validity was also high and ranged from .68 to .87.

To measure the prepared performance of the individual student, an etude was chosen based on the criteria that it be relatively obscure, tonal and melodic in nature, and at an appropriate difficulty level for high school instrumentalists. *Allegro* from Canonic Sonata No. 1 by George Telemann (Appendix D) was selected from a collection of advanced trumpet duets compiled by Voxman (1951, p. 32). The band directors involved verified that the selection was relatively obscure and at an appropriate difficulty level for their students. The piece was arranged for band instruments using Finale music notation software, and shortened so that an appropriate length could be maintained for the time period of the study. The original ornaments were omitted, and articulation and expression markings were added. The composition was transposed for all wind and mallet

percussion instruments, and certain notes were rewritten an octave higher or lower in order to be playable on specific instruments. This procedure is similar to previous research methods in which a solo etude was transposed for each band instrument (Henley, 2001; Rosenthal, 1984; Rosenthal, Wilson, Evans, and Greenwalt, 1988).

To measure the performance of the ensemble, a 24-measure excerpt from the piece *Fall River Overture* by Robert Sheldon was selected for use in the study. This piece was selected because it met the criteria of being tonal and melodic in nature and of an appropriate difficulty level for high school instrumentalists. Each band director verified that to their knowledge the students had not performed this piece prior to the study.

Treatment Variable

During the six-week treatment period, each band practiced *Allegro* and *Fall River Overture* for approximately fifteen minutes two times a week using one of three practice conditions: a structured mental practice method, unstructured mental practice, or physical practice. One band was assigned to a no practice control condition. It should be noted that both mental practice conditions also included physical practice by alternating mental and physical practice. No group was asked to rehearse mentally without the feedback of physical rehearsal. The structured mental practice method group also participated in five days of preliminary exercises in the week before the start of the six-week treatment period.

The bands practiced the pieces as an ensemble under the direction of their regular band director during the band class period. The directors were free to make comments to help the students perform the piece. However, in order to minimize teacher effect, each director was given a rehearsal script to follow during each practice session (Appendix E).

The rehearsal scripts were designed to provide similar instruction (apart from the practice condition) among the groups. Therefore, the script helped ensure that each director would rehearse the same sections of the music and problem areas at the same time and for the same amount of time. The treatment conditions are described as follows:

Mental Practice Method

Band A (n = 57) was assigned to the mental practice method group. The mental practice method incorporated three types of imagery: aural imagery, visual imagery, and motor imagery. These three forms of imagery were practiced in isolation and then combined. However, in this method aural imagery received the majority of the attention. The method used five general preliminary exercises (performed in the week before the start of the treatment period) and seven "Mental Practice Techniques" which were based on previous research or techniques but created by the researcher for this study. The techniques involved one or more of the three types of imagery listed earlier. They were also based on 1) a combination of mental and physical practice in which some physical activity, such as fingering the notes, was done during mental practice (active imagery), or 2) alternating mental and physical practice, where a physical practice trial was alternated with a mental practice trial. Throughout each rehearsal, students were provided with instructions as to the specific kind of mental practice to be used. Students were directed to focus on an auditory, physical, or visual aspect of the performance. The band director silently conducted the passage during the majority of the mental practice trials. The five preliminary exercises and seven mental practice techniques, along with the imagery they focus on, are listed below:

Preliminary Exercise 1: Introduction to Mental Practice

This exercise introduces students to the concept of mental practice. It presents possible benefits of mental practice and discusses how it has been used in areas such as sports. Students are introduced to the concepts of visual and aural imagery by asking them to visualize common objects and to mentally sing the "Happy Birthday" song.

Preliminary Exercise 2: Aural Imagery

This exercise provides an opportunity to practice aural imagery skills. The ensemble plays a rhythm, and then mentally reproduces the rhythm. The director then selects various sections of the ensemble to play, and the student is asked to mentally reproduce the sound of each instrument.

Preliminary Exercise 3: Developing Aural and Visual Imagery

This exercise allows the students to practice both aural and visual imagery. In this exercise, students are shown a rhythm, and then the rhythm is removed. After a brief period of time, students are asked to play the rhythm. The purpose of this exercise is that in order to remember the rhythm once it is taken away, students must sing it in their heads, maintain a visual picture of the rhythm, or both.

Preliminary Exercise 4: Introduction to Motor Imagery

This exercise introduces the students to the concept of motor imagery. The student plays a scale, concentrating on the feelings of the muscles used to play the scale. Students are then asked to imagine the feeling of those muscles without actually moving them.

Preliminary Exercise 5: Internal and External Perspectives

This exercise introduces students to the concept of internal and external perspectives. Students are guided through an imaginary performance where they see

themselves from outside the body (external perspective) or inside the body (internal perspective).

Mental Practice Technique 1: Mental Practice with Model

This technique focuses on aural imagery and mental practice with a model. In the case of the high school performing ensemble, a model most often refers to an audio recording of a professional musician playing the piece. In many circumstances, this kind of model is not available. This technique makes use of the other members of the ensemble as models for mental practice. The steps of the technique are as follows:

1. The entire ensemble plays the passage.
2. One section of the band plays while the other sections mentally practice by fingering, blowing air, and tonguing every note. In unison passages, this is done by dividing the group into woodwinds and brass/percussion. In ensemble passages, this could be done by asking that there be only one player on a part or per stand.
3. The entire ensemble plays the passage together.

Mental Practice Technique 2: Physical to Mental Sequence

This technique involves combining mental and physical practice simultaneously. It is designed to move the player from pure physical practice to pure mental practice by gradually removing the physical element of performance. The sequence is as follows:

1. Play the passage.
2. Mentally play the passage while holding the instrument in playing position and blowing air, tonguing, and fingering each note (removes actual playing).
3. Mentally play the passage while holding the instrument in playing position and fingering each note (removes air and tonguing).
4. Mentally play the passage with the instrument placed on the students' lap, without any movement at all (removes fingering, and thus, all physical practice).

5. Play the passage.

Mental Practice Technique 3: Slow Motion Practice

This technique combines slow motion practice and mental practice. The steps of this technique are as follows:

1. Play a short passage at regular speed.
2. Play the passage again at a much slower speed (slow motion).
3. Mentally rehearse the section at the slow speed, hearing it perfectly in your head, and imagining your fingers moving to the correct positions for each note.
4. Physically play the passage again in the slow motion speed.
5. Play the passage at the regular speed.

Mental Practice Technique 4: Visual Imagery Practice

This mental practice technique involves visual imagery of the physical motions made during performance. It could also be used to image the music notation of a passage, similar to playing from memory. The technique is as follows:

1. Play through the passage.
2. Mentally play the passage while holding the instrument in playing position and fingering each note, but focusing on what the hands and fingers look like when playing each note.
3. Place the instrument in your lap and do not touch it with your hands. Imagine yourself playing the passage, hear it in your head, but focus on imagining the fingers and hands moving accurately to the right positions with the music.
4. Play through the passage.

Mental Practice Technique 5: Motor Imagery Practice

This technique involves asking students to imagine the feel of the muscles used in performance. The procedure is as follows:

1. Play through the passage.

2. Mentally play the passage while holding the instrument in playing position and fingering each note, but focusing on how the fingers and hands feel during performance.

3. Place the instrument in your lap and do not touch it with your hands. Imagine yourself playing the passage, hear it in your head, but focus on imagining how the fingers and hands feel when moving accurately to the right positions with the music.

4. Play through the passage.

Mental Practice Technique 6: Alternating Mental and Physical Practice

This procedure combines all three forms of imagery and allows the student to choose what kind of imagery to attend to during mental practice. The technique is as follows:

1. Play through the passage.

2. Mental practice the passage. Hear it in your head. You may also choose to see yourself playing the part, see fingers moving to the right notes, or imagine the feeling or your fingers as your play.

3. Play through the passage.

Mental Practice Technique 7: Complete Visualization of Performance

This technique is a complete visualization technique similar to the kind recommended by Williamon (2004). The technique involves imagining all the details of a complete performance from beginning to end.

Unstructured Mental Practice

Band B (n = 50) was assigned to the unstructured mental practice group. This group used unstructured mental practice techniques similar to those tested in other research, including the pilot study. Unlike the mental practice method group, no preliminary training exercises were given in mental practice prior to the treatment period. During

rehearsal of the music, students were periodically asked to mental practice a passage of the composition in their mind. Students were instructed that during mental practice they should try to hear the music, visualize themselves playing it, and feel the muscles used in performance. However, during rehearsal they were not directed to use any specific type of mental practice. This unstructured method gave the student the freedom to choose what and how to practice during mental rehearsal. As with the mental practice method group, the band director silently conducted the music during mental practice.

Physical Practice

Band C (n = 46) was assigned to a physical practice condition. This band rehearsed the pieces using physical practice only. No opportunity for silent analysis or mental rehearsal was provided. During rehearsal, the teacher of this group provided feedback to the students regarding their performance. All rehearsal involved the act of performing on the instrument. The director conducted during all practice trials.

Control

Band D (n = 47) was assigned to a control condition. During the six-week treatment period this group did not rehearse either composition at all.

Administration

The assessment of individual performance was administered to the following instruments: flute, clarinet, alto saxophone, trumpet, French horn, and trombone. Students who completed the individual testing included 24 students from Band A (mental practice method group), 23 students from Band B (unstructured mental practice group), 23 students from Band C (physical practice group), and 16 students from Band D (control). For the assessment of ensemble performance, the performance of the intact ensemble was used as the dependent variable.

Pretests and posttests were conducted during the regular band class time. Intact ensembles and individual students were recorded using a Crown SASS-P stereo PZM microphone and a Tascam DA30 mkII DAT recorder. Recordings were then transferred to compact disc using a Denon CDR-W1500 PCM compact disc recorder. A retired high school band director and fine arts supervisor with access to and knowledge of recording equipment served as the test administrator, and recorded all of the pretest and posttest performances. Test administration procedures are presented in Appendix F.

For the pretest, each student was asked to play Exercise 10, Form A of the Watkins-Farnum Performance Scale as a pretest of sight-reading ability level. The student then performed *Allegro* as a pretest of prepared performance ability level. Each ensemble then sight-read the *Fall River Overture* excerpt as a pretest of ensemble performance level.

At the end of the six-week treatment period, each student was asked to play Exercise 10, Form B of the Watkins-Farnum Performance Scale as a posttest of sight-reading achievement, as well as *Allegro* as a posttest of prepared performance achievement. Each ensemble then performed the *Fall River Overture* excerpt as a posttest of ensemble performance ability.

All pretest and posttest performances were placed in random order onto a series of compact discs, and the identity of the performer and group was obscured. The principal investigator scored all of the recordings, marking errors for pitch accuracy, dynamics, and rhythm. To establish reliability, two independent evaluators scored twenty percent of the individual student recordings. Each evaluator was a music education graduate student at the University of Florida with successful experience as school band director.

Individual student recordings were graded in three performance areas: pitch accuracy (correct notes), dynamics, and rhythm. Ensemble recordings were evaluated in the performance areas of pitch accuracy, tone quality/intonation, and rhythmic accuracy. Instructions for scoring the recordings are presented in Appendix G. For the individual student performances, the beat served as the scoring unit. A beat was marked incorrect if the student failed to play the correct pitch, dynamics, or rhythm. The evaluators indicated the kind of mistake that was made by marking the beat with a P, D, or R for pitch, dynamic, or rhythm error, respectively. All attempts were made to create and implement an objective scoring process.

For the ensemble performances, the principal investigator scored all of the recordings in terms of three performance areas: pitch accuracy, tone quality/intonation, and rhythmic accuracy. Each recording was listened to a minimum of five times, and each performance area was scored on a scale from 1 to 7, with 7 being superior and 1 being poor. Tenths of a point were allowed in scoring. The recordings were then randomly re-ordered and scored a second time by the principal investigator using the same process. At no time was the investigator aware of the identity of the groups.

After the six-week treatment period, students in the mental practice method and unstructured mental practice groups were asked to complete a questionnaire about their attitudes and opinions regarding mental practice. Students were also asked to estimate how often they actually engaged in mental practice when requested to do so. The post-study questionnaire is presented in Appendix H.

Certain questions in the post-study questionnaire were modeled after the Sports Imagery Questionnaire (SIQ) developed and tested by Hall, Mack, Paivio, and

Hausenblas (1998). The SIQ asks subjects to rate 30 different items according to the frequency of imagery use and the concreteness, or ease, of imaging the item. Subjects are asked to rate the frequency with which they use the type of imagery in the item on a 7-point Likert-type scale ranging from 1 – "rarely" to 7 – "often". Subjects rate the concreteness or ease of imaging the item on a 7-point Likert-type scale ranging from 1 – "easy to image" to 7 – "difficult to image". An evaluation of the SIQ indicated high internal consistencies ranging from .70 to .88. In the post-study questionnaire designed for the present study, students were asked to rate the ease of imaging auditory, visual, and motor aspects of musical performance.

Statistical Analysis

Results of the individual student prepared and sight-reading performances were analyzed in terms of mean difference scores between the pretest and the posttest in each performance area. An analysis of variance was used to determine if a statistically significant difference existed among the four groups. A Scheffe test and *t* tests were used to determine the significance of the difference between each pair of groups.

Student scores were then analyzed in the subgroups of gender, grade level, and instrument (brass or woodwind) by comparing the mean gain scores of each subgroup. For gender and instrument, *t* tests were used to determine if a statistically significant difference existed between boys and girls or between woodwind and brass players in each treatment group. Finally, responses to the post-study questionnaire were examined by determining the frequency of the response to each question.

CHAPTER 4
RESULTS

Introduction

The four groups representing the four practice conditions were evaluated on three separate measures of musical performance: An individual student sight-reading measure, an individual student prepared performance measure, and an ensemble prepared performance measure. For the individual sight-reading and prepared performances, mean difference scores of students in each of the four groups (mental practice method, unstructured mental practice, physical practice, and control) were analyzed to determine if there were any significant differences among the practice conditions. Separate statistical analyses were conducted for three performance areas: pitch accuracy, dynamics, and rhythm.

The ensemble prepared performance was evaluated in a manner similar to that used by adjudicators at band contests and festivals in which the group performance of each ensemble is evaluated. The fact that intact groups were evaluated in this measure produced a small sample size ($N = 4$), and it was determined that statistical analysis would be inappropriate. Therefore only raw data in the form of difference scores and difference score percentages for each performance area were examined for the ensemble performance measure.

The results are presented in the following order: 1) analysis of inter-scorer reliability, 2) comparison of the experimental and control groups mean difference scores on the individual sight-reading measure, 3) comparison of the experimental and control

groups mean difference scores on the individual prepared performance measure, 4) comparison of the intact group performances on the ensemble performance measure, 5) comparison of student scores in the three experimental groups in terms of gender, grade level, and instrument (woodwind or brass), and 6) comparison of post-study questionnaire answers from students in the two mental practice groups.

Presentation of Data

Analysis of Inter-Scorer Reliability

The principal investigator and two independent evaluators scored twenty percent of the individual student recordings, marking errors for pitch accuracy, dynamics, and rhythm. Each independent evaluator was a music education graduate student at the University of Florida with successful experience as a school band director. Inter-scorer reliability between the principal investigator and the two independent evaluators was determined for each performance area using the Pearson Product-Moment Correlation. Table 4-1 shows the inter-scorer reliability coefficients for each variable. The average reliability was .90 for pitch accuracy, .79 for dynamics, and .90 for rhythm. Reliability coefficients ranged from .74 to .93. It was concluded that the high inter-scorer reliability between the independent evaluators and the principal investigator validated the principal investigator to score the remaining 80% of the recordings.

Reliability for the ensemble performance measure was determined using test-retest reliability. The ensemble recordings were placed into random order and the identity of each group was removed to prevent scoring bias. The principal investigator then scored all of the recordings in three performance areas: pitch accuracy, tone quality/intonation, and rhythmic accuracy. Each recording was listened to a minimum of five times, and each performance area was scored on a scale from 1 to 7, with 7 being superior and 1

Table 4-1. Inter-scorer reliability correlation coefficients for individual student performance scores

Performance Category	Judge			Average
	A and B	A and C	B and C	
Pitch Accuracy	.93	.91	.86	.90
Dynamics	.79	.74	.83	.79
Rhythm	.91	.90	.88	.90

being poor. The recordings were then randomly re-ordered and scored a second time by the principal investigator using the same process. Table 4-2 shows the test-retest reliability coefficients for the ensemble performance in each performance area. Reliability for each performance area ranged from .964 for tone quality/intonation to .994 for rhythmic accuracy.

Table 4-2. Ensemble performance test-retest reliability correlation coefficients

Performance Area	*r*
Pitch Accuracy	.983
Tone Quality/Intonation	.964
Rhythmic Accuracy	.994

Comparison of the Experimental and Control Groups Mean Difference Scores on the Individual Student Sight-Reading Measure

All raw data appears in Appendix H. Table 4-3 shows the mean pretest, posttest, and difference scores of the four groups on the sight-reading measure in each performance area. Difference scores were calculated by subtracting the pretest score from the posttest score. Difference percentages were calculated due to the fact that each performance area had unequal total possible points. There were 33 possible points each for pitch and rhythm, and 10 possible points for dynamics.

Table 4-3. Sight-reading performance: Means and standard deviations of the experimental and control groups pretest, posttest, and difference scores and difference percentages

	Pretest		Posttest		Difference		Percent Difference
Group	M	SD	M	SD	M	SD	
			Pitch Accuracy				
MP Method	28.6	3.21	29.2	3.21	.54	2.94	1.6%
Unstructured MP	25.2	6.6	25.17	6.02	-.04	4.19	-.1%
Physical Practice	29	3.32	29.21	3.08	.13	1.71	.3%
Control	29.31	3.30	29	3.07	-.31	2.41	-0.9%
			Dynamics				
MP Method	0.00	0.00	.83	2.82	.83	2.82	8.3%
Unstructured MP	.21	1.04	.21	1.04	0.00	0.00	0%
Physical Practice	.69	2.38	.43	1.47	-.26	1.73	-2.6%
Control	0.00	0.00	.56	2.25	.56	2.25	5.6%
			Rhythm				
MP Method	28.83	3.53	29.58	4.56	.75	4.19	2.2%
Unstructured MP	26.13	4.69	27	3.80	.86	4.77	2.6%
Physical Practice	28.2	4.1	30.13	2.8	1.91	3.07	5.78%
Control	27.9	2.5	29.5	3.16	1.56	2.70	4.7%

An examination of the difference scores indicates that the mental practice method group had a higher mean difference score in the areas of pitch and dynamics than the other groups. The physical practice group had the highest mean difference score in terms of rhythm. The three experimental conditions scored higher than the control group in pitch, but not in dynamics or rhythm.

A one-way analysis of variance was conducted to determine the significance of the difference among the groups in each performance area. Results of the analysis of variance

are shown in Table 4-4. Statistically nonsignificant F values of .291, 1.439, and .469 ($p >$ .05) were obtained for pitch accuracy, dynamics, and rhythm respectively. Because the effect of practice condition on sight-reading performance scores was not statistically significant, it was concluded that there was no difference in the mean difference scores of students taught using a designed method of mental practice, unstructured mental practice, physical practice, or no practice (control).

Comparison of the Experimental and Control Groups Mean Difference Scores on the Individual Student Prepared Performance Measure

Table 4-5 shows the mean pretest, posttest, and difference scores of the four groups on the individual prepared performance measure for each performance area. Again, difference scores were calculated by subtracting the pretest scores from the posttest scores. Difference percentages were calculated because for each performance area the total possible points were unequal. There were 67 possible points each for pitch and rhythm, and 10 possible points for dynamics.

An examination of the data shows that the mental practice method group had the highest difference scores and difference percentages in all three performance areas. The control group had the lowest difference scores among the groups in all performance areas.

A one-way analysis of variance was conducted to determine the significance of the difference among the groups. Results of the analysis of variance are shown in Table 4-6. Statistically significant F values were obtained for pitch accuracy ($F = 3.895$, $p = .012$), dynamics ($F = 4.627$, $p = .005$), and rhythm ($F = 8.013$, $p = .000$). These results indicate that there was a statistically significant difference among the four practice conditions on the measure of student prepared performance.

Table 4-4. Analysis of variance for experimental and control groups mean difference scores on the sight-reading performance measure

Source	SS	*df*	MS	*F*	*p*
		Pitch Accuracy			
Between Groups	7.876	3	2.625	.291	.832
Within Groups	738.961	82	9.012		
Total	746.837	85			
		Dynamics			
Between Groups	17.143	3	5.714	1.439	.238
Within Groups	325.706	82	3.972		
Total	342.849	85			
		Rhythm			
Between Groups	21.000	3	7.000	.469	.704
Within Groups	1222.872	82	14.913		
Error	1243.872	85			

Note. * $p < .05$, ** $p < .01$

Table 4-5. Individual prepared performance: Means and standard deviations of the experimental and control groups pretest, posttest, and difference scores and difference percentages

	Pretest		Posttest		Difference		Percent Difference
Group	M	SD	M	SD	M	SD	
			Pitch Accuracy				
MP Method	48	14.75	61.17	4.03	13.54	13.15	20.2%
Unstructured MP	43.13	15.08	51.17	11.60	8.04	11.05	12%
Physical Practice	50.47	10.92	61.82	5.04	11.34	9.95	16.9%
Control	53.75	8.74	55.93	11.34	2.18	7.29	3%
			Dynamics				
MP Method	.25	1.22	3.125	2.98	2.875	2.609	28.7%
Unstructured MP	0.0	0.0	1.04	2.16	1.04	2.16	10%
Physical Practice	.65	1.96	1.91	2.77	1.26	3.27	12.6%
Control	0.0	0.0	.06	.25	.06	.25	0.6%
			Rhythm				
MP Method	47.79	12.08	65.79	1.74	18	11.39	26.8%
Unstructured MP	44.47	12.94	61.43	6.22	16.95	11.26	25.2%
Physical Practice	52.73	11.96	65.56	1.75	12.82	11.46	19%
Control	48.06	8.28	50.37	8.98	2.31	7.25	3.4%

Table 4-6. Analysis of variance for experimental and control groups mean difference scores on the prepared performance measure

Source	SS	*df*	MS	*F*	*p*
		Pitch Accuracy			
Between Groups	1373.523	3	457.841	3.895*	.012
Within Groups	9638.570	82	117.544		
Total	11012.093	85			
		Dynamics			
Between Groups	84.128	3	28.043	4.627**	.005
Within Groups	496.954	82	6.060		
Total	581.081	85			
		Rhythm			
Between Groups	2773.232	3	924.411	8.013**	.000
Within Groups	9459.698	82	115.362		
Error	12232.930	85			

Note. * $p < .05$, ** $p < .01$

A Scheffe test was conducted for each performance area as a test of multiple comparisons to determine which groups presented significant differences. The results of the Scheffe test are shown in Table 4-7. For the performance variable of pitch accuracy, a significant difference was found between the mental practice method group and the control group ($p = .019$). No other significant differences were found for pitch among the three experimental groups or between the experimental groups and the control group. For dynamics, a significant difference was found between the mental practice method group

Table 4-7. Results of the Scheffe test of multiple comparisons of the experimental and control groups mean difference scores on the prepared performance measure

Group (A)	Group (B)	Mean Difference (A-B)	Std. Error	*p*
		Pitch Accuracy		
1 (MPM)	2 (UMP)	5.4982	3.16358	.394
1 (MPM)	3 (PP)	2.1938	3.16358	.923
1 (MPM)	4 (Control)	11.3542*	3.49916	.019
2 (UMP)	3 (PP)	-3.3043	3.19706	.785
2 (UMP)	4 (Control)	5.8560	3.52946	.436
3 (PP)	4 (Control)	9.1603	3.52946	.089
		Dynamics		
1 (MPM)	2 (UMP)	1.8315	.71834	.098
1 (MPM)	3 (PP)	1.6141	.71834	.177
1 (MPM)	4 (Control)	2.8125**	.79454	.008
2 (UMP)	3 (PP)	-.2174	.72594	.993
2 (UMP)	4 (Control)	.9810	.80142	.684
3 (PP)	4 (Control)	1.1984	.80142	.528
		Rhythm		
1 (MPM)	2 (UMP)	1.0435	3.13409	.990
1 (MPM)	3 (PP)	5.1739	3.13409	.441
1 (MPM)	4 (Control)	15.6875**	3.46654	.000
2 (UMP)	3 (PP)	4.1304	3.16725	.638
2 (UMP)	4 (Control)	14.6440**	3.49655	.001
3 (PP)	4 (Control)	10.5136*	3.49655	.035

Note. * $p < .05$, ** $p < .01$, MPM = mental practice method group, UMP = unstructured mental practice group, PP = physical practice group.

and the control group ($p = .008$). No other significant differences were found for dynamics among the three experimental groups or between the experimental and control groups. For rhythm, significant differences were found between the mental practice method group and the control group ($p < .01$), the unstructured mental practice group and the control group ($p < .01$), and the physical practice group and the control group ($p < .05$). No other significant differences were found among the three experimental groups.

In order to further examine the differences among the groups, the difference in the mean difference scores of the four groups was analyzed using separate *t* tests for each pair of groups and for each performance area. Although repeated *t* tests may not yield the most conservative estimates of statistical significance, they do provide additional information to help understand how the groups differed from each other.

The results of the *t* tests are shown in Table 4-8. Results indicate statistically significant differences between the mental practice method group and the control group in all three performance areas ($p < .01$). These results are similar to those obtained in the Scheffe test, with the exception of pitch, which had a *p* value of .019 in the Scheffe test. For pitch, a comparison of the unstructured mental practice group and the control group revealed a *t* value of 1.8523 ($p = .0720$).

The mental practice method group was significantly different from the unstructured mental practice group ($p < .05$) and the control group ($p < .05$) in terms of dynamics. A comparison of the mental practice method group and the physical practice group produced a *t* value of 1.8717 ($p = .0678$). A comparison of the unstructured mental practice group and the control group yielded a *t* value of 1.7983 ($p = .0803$). In terms of rhythm, all three experimental conditions were significantly different from the control

Table 4-8. Results of separate *t* tests of statistical significance of the experimental and control groups mean difference scores on the prepared performance measure

Group (A)	Group (B)	*t*	*df*	Std. Error of Difference	*p*
		Pitch Accuracy			
1 (MPM)	2 (UMP)	1.5487	45	3.550	.1284
1 (MPM)	3 (PP)	.6432	45	3.411	.5234
1 (MPM)	4 (Control)	3.1405**	38	3.615	.0033
2 (UMP)	3 (PP)	1.06	44	3.102	.2926
2 (UMP)	4 (Control)	1.8523	37	3.161	.0720
3 (PP)	4 (Control)	3.1367**	37	2.920	.0033
		Dynamics			
1 (MPM)	2 (UMP)	2.6134*	45	.701	.0121
1 (MPM)	3 (PP)	1.8717	45	.862	.0678
1 (MPM)	4 (Control)	4.2795**	38	.657	.0001
2 (UMP)	3 (PP)	.2654	44	.819	.7919
2 (UMP)	4 (Control)	1.7983	37	.546	.0803
3 (PP)	4 (Control)	1.4533	37	.825	.1546
		Rhythm			
1 (MPM)	2 (UMP)	.3155	45	3.307	.7538
1 (MPM)	3 (PP)	1.5515	45	3.335	.1278
1 (MPM)	4 (Control)	4.8751**	38	3.218	.0001
2 (UMP)	3 (PP)	1.2326	44	3.351	.2243
2 (UMP)	4 (Control)	4.5716**	37	3.203	.0001
3 (PP)	4 (Control)	3.2389**	37	3.246	.0025

Note. * $p < .05$, ** $p < .01$, MPM = mental practice method group, UMP = unstructured mental practice group, PP = physical practice group.

group ($p < .01$). The most important difference between the results of the Scheffe test and the separate *t* tests was that the *t* test found a significant difference between the mental practice method group and the unstructured mental practice group in terms of dynamics ($p = .0121$).

Comparison of the Intact Group Performances on the Ensemble Performance Measure

Each ensemble performance was scored in three performance areas (pitch accuracy, tone quality/intonation, and rhythmic accuracy) on a scale from 1 to 7, with 7 being superior and 1 being poor. Final scores for each category were obtained by averaging the two separate scorings of the groups. As discussed earlier, separate scorings of the ensemble performance were conducted to help determine reliability. Table 4-9 shows the mean pretest, posttest, and difference scores and percent differences among the groups for each performance area. Because the groups were scored as intact ensembles and not individual subjects, it was believed that statistical analysis for this data would be inappropriate. It was hoped that an examination of the raw scores might provide some information on the effect of the practice conditions on ensemble performance.

An examination of the pretest scores suggests that all four groups began the study with similar ability levels. In each performance area, the no practice control group scored considerably lower on the posttest and had lower difference scores and percentages than the three experimental groups. For pitch accuracy, the mental practice method group had the highest difference percentage at 53%, but this was not noticeably different than the difference percentages of the unstructured mental practice group and the physical practice group (50% each). For both tone quality and rhythmic accuracy, the physical practice group had the highest difference scores and percentages. However, examination of the

Table 4-9. Mean pretest, posttest, and difference scores and percent difference for experimental and control groups on the ensemble performance measure

Group	Pretest	Posttest	Mean Difference	Percent Difference
	Pitch accuracy			
Mental Practice Method	2.25	6	3.75	53%
Unstructured Mental Practice	2.75	6.25	3.5	50%
Physical Practice	3	6.5	3.5	50%
Control	2	3	1	14%
	Tone quality/Intonation			
Mental Practice Method	3	5.5	2.5	35%
Unstructured Mental Practice	3.5	5.75	2.25	32%
Physical Practice	3	6	3	43%
Control	2	3	1	14%
	Rhythmic accuracy			
Mental Practice Method	2.5	6	3.5	50%
Unstructured Mental Practice	2.5	6	3.5	50%
Physical Practice	2.5	6.5	4	57%
Control	2.5	2.75	.25	4%

mean difference scores for these two performance areas indicate that all three experimental groups made similar gains from pretest to posttest.

Comparison of Student Scores in the Three Experimental Groups in terms of Gender, Grade Level, and Instrument (Woodwind or Brass)

In order to further analyze the effect of practice condition on student performance, student scores were compared by gender, grade level, and instrument within each of the three experimental groups. Only prepared performance scores were compared due to the fact that significant differences were found among the groups in the prepared

performance measure. Sight-reading scores were not analyzed because there were no significant differences among the groups on the sight-reading measure.

Mean difference scores and difference percentages for students as grouped by gender, grade level, and instrument are presented in Tables 4-10 (mental practice method group), 4-11 (unstructured mental practice group), and 4-12 (physical practice group). Table 4-13 compares the mean difference percentages for all three experimental groups. Table 4-14 shows the results of separate *t* tests for statistical significance for the subgroups of gender and instrument within each of the three experimental groups.

In terms of dynamics, 12th-grade students in all three experimental groups made noticeably higher difference scores than their peers in lower grade levels. However, 9th- and 10th-graders in all three groups made higher difference scores in rhythm than did their older classmates.

As shown in Table 4-14, no significant differences were found for instrument in terms of dynamics or rhythm. However, in terms of pitch accuracy there was a significant difference between woodwind and brass players in all three groups ($p < .01$). Brass players in each group made a greater improvement in pitch accuracy scores than woodwind players. It is notable that the mental practice method group brass players had the highest difference scores for pitch accuracy, scoring significantly higher than woodwind players from the same group, and noticeably higher than brass players from the other two experimental groups. For pitch accuracy, the mental practice method group brass players made nearly twice as much improvement than brass players in the other two groups. Brass players in the mental practice method group also scored considerably higher than brass players from the other two groups in terms of dynamics. In addition,

Table 4-10. Comparison of mental practice method group mean difference scores and percentages by gender, grade level, and instrument

	Mean Difference Scores and Difference Percentages					
	Pitch Accuracy		Dynamics		Rhythm	
Characteristic	Score	Percentage	Score	Percentage	Score	Percentage
Gender						
Girls (*n* = 10)	5	7%	2.9	29%	22.3	33%
Boys (*n* = 14)	19.64	29%	2.85	29%	14.9	22%
Instrument						
Woodwind (*n* = 14)	3.78	5.6%	2.35	23%	16.57	25%
Brass (*n* = 10)	27.2	40.5%	3.6	36%	20	30%
Grade Level						
Ninth Grade (*n* = 2)	2.5	3.7%	0.5	5%	33.5	50%
Tenth Grade (*n* = 4)	20.25	30%	3.25	32.5%	20	30%
Eleventh Grade (*n* = 10)	10.4	16%	2	20%	16	24%
Twelfth Grade (*n* = 8)	17	25%	4.37	44%	15.6	23%

Table 4-11. Comparison of unstructured mental practice group mean difference scores and percentages by gender, grade level, and instrument

	Mean Difference Scores and Difference Percentages					
	Pitch Accuracy		Dynamics		Rhythm	
Characteristic	Score	Percentage	Score	Percentage	Score	Percentage
			Gender			
Girls (*n* = 13)	5.92	9%	1.07	11%	19	28%
Boys (*n* = 10)	10.8	16%	1	10%	14	21%
			Instrument			
Woodwind (*n* = 14)	4.92	7%	1.07	11%	18	27%
Brass (*n* = 9)	16	24%	1	10%	16	24%
			Grade Level			
Ninth Grade (*n* = 0)						
Tenth Grade (*n* = 13)	6.53	10%	.85	*8.5%*	20	30%
Eleventh Grade (*n* = 4)	10	15%	0.5	*5%*	15.25	23%
Twelfth Grade (*n* = 6)	10	15%	1.83	18%	11.5	17%

Table 4-12. Comparison of physical practice group mean difference scores and percentages by gender, grade level, and instrument

	Mean Difference Scores and Difference Percentages					
	Pitch Accuracy		Dynamics		Rhythm	
Characteristic	Score	Percentage	Score	Percentage	Score	Percentage
Gender						
Girls (*n* = 11)	9.54	14%	1	10%	11.54	17%
Boys (*n* = 12)	13	19%	1.5	15%	14	21%
Instrument						
Woodwind (*n* = 13)	6.61	10%	1	10%	16.69	25%
Brass (*n* = 10)	17.5	26%	1.6	16%	7.8	11.6%
Grade Level						
Ninth Grade (*n* = 3)	18.3	27%	.33	3%	21.6	32%
Tenth Grade (*n* = 11)	11.45	17%	.54	*5%*	15.54	23%
Eleventh Grade (*n* = 3)	5.66	8%	-.33	*-3%*	3.66	5%
Twelfth Grade (*n* = 6)	10.5	8%	3.83	38%	8	12%

Table 4-13. Comparison of student mean difference scores and percentages by gender, grade level, and instrument for the three experimental groups

	Mean Difference Scores and Percentages					
	MP Method		Unstructured MP		Physical Practice	
Characteristic	Score	Percentage	Score	Percentage	Score	Percentage
Pitch Accuracy						
Gender						
Girls	5	7%	5.92	9%	9.54	14%
Boys	19.64	29%	10.8	16%	13	19%
Instrument						
Woodwind	3.78	5.6%	4.92	7%	6.61	10%
Brass	27.2	40.5%	16	24%	17.5	26%
Grade Level						
Ninth Grade	2.5	3.7%	n/a*	n/a*	18.3	27%
Tenth Grade	20.25	30%	6.53	10%	11.45	17%
Eleventh Grade	10.4	16%	10	15%	5.66	8%
Twelfth Grade	17	25%	10	15%	10.5	8%
Dynamics						
Gender						
Girls	2.9	29%	1.07	11%	1	10%
Boys	2.85	29%	1	10%	1.5	15%
Instrument						
Woodwind	2.35	23%	1.07	11%	1	10%
Brass	3.6	36%	1	10%	1.6	16%
Grade Level						
Ninth Grade	0.5	5%	n/a*	n/a*	.33	3%
Tenth Grade	3.25	32.5%	.85	8.5%	.54	5%
Eleventh Grade	2	20%	0.5	5%	-.33	-3%
Twelfth Grade	4.37	44%	1.83	18%	3.83	38%
Rhythm						
Gender						
Girls	22.3	33%	19	28%	11.54	17%
Boys	14.9	22%	14	21%	14	21%

Table 4-13. Continued.

	Mean Difference Scores and Percentages					
	MP Method		Unstructured MP		Physical Practice	
Characteristic	Score	Percentage	Score	Percentage	Score	Percentage
			Rhythm			
Instrument						
Woodwind	16.57	25%	18	27%	16.69	25%
Brass	20	30%	16	24%	7.8	11%
Grade Level						
Ninth Grade	33.5	50%	n/a*	n/a*	21.6	32%
Tenth Grade	20	30%	20	30%	15.54	23%
Eleventh Grade	16	24%	15.25	23%	3.66	5%
Twelfth Grade	15.6	23%	11.5	17%	8	12%

Note. * There were no ninth grade students in the Unstructured Mental Practice Group

the mental practice method brass players also had the highest gain scores in terms of rhythm (30%), but these scores were not noticeably different than brass or woodwind players from the unstructured mental practice group. Brass players from the physical practice group had the lowest gain scores in rhythm, scoring 13% lower than brass players in the unstructured mental practice group and 19% lower than brass players in the mental practice method group. This information suggests that a structured method of mental practice may be especially useful to brass players in improving musical performance.

No significant differences were found for gender in any of the three performance areas. It is notable that for pitch accuracy, mental practice method group boys had a 22% higher mean difference score than girls in the same group. This may have been a result of gender differences in instrument selection. In the mental practice method group, seven of the nine girls played woodwind instruments. Boys were more evenly divided, with eight playing brass instruments and six playing woodwind instruments. Brass players had a far

Table 4-14. Results of separate *t* tests of statistical significance of the experimental groups mean difference scores grouped according to gender and instrument

Group (A)	Group (B)	*t*	*df*	Std. Error of Difference	*p*
		Pitch Accuracy			
Mental Practice Method					
Girls	Boys	1.5380	22	5.285	.1383
Woodwind	Brass	9.5467**	22	2.453	.0001
Unstructured Mental Practice					
Girls	Boys	1.0508	21	4.641	.3053
Woodwind	Brass	3.3468**	21	3.906	.0031
Physical Practice					
Girls	Boys	.8255	21	4.185	.4184
Woodwind	Brass	3.0521**	21	3.566	.0061
		Dynamics			
Mental Practice Method					
Girls	Boys	.0388	22	1.105	.9694
Woodwind	Brass	1.1588	22	1.072	.2589
Unstructured Mental Practice					
Girls	Boys	.0826	21	.931	.9349
Woodwind	Brass	.0755	21	.946	.9405
Physical Practice					
Girls	Boys	.3581	21	1.396	.7239
Woodwind	Brass	.4270	21	1.405	.6738
		Rhythm			
Mental Practice Method					
Girls	Boys	1.6158	22	4.562	.1204
Woodwind	Brass	.7188	22	4.770	.4798
Unstructured Mental Practice					
Girls	Boys	1.0699	21	4.724	.2968
Woodwind	Brass	.4320	21	4.905	.6702
Physical Practice					
Girls	Boys	.3581	21	1.396	.7239
Woodwind	Brass	1.9603	21	4.536	.0634

Note. * $p < .05$, ** $p < .01$

greater improvement in pitch accuracy than woodwind players, and because the majority of girls played woodwinds, this may have affected the gender comparison.

Comparison of Post-Study Questionnaire Answers from Students in the Two Mental Practice Groups

After the treatment period ended and all posttests had been completed, students in the two mental practice groups were asked to complete a post-study questionnaire (Appendix I). All students in the two mental practice ensembles were asked to complete the survey regardless of whether they were selected for individual testing. The purpose of this survey was to help estimate how much the students actually engaged in mental practice and to gather additional information regarding student opinions about mental practice. Students were also asked to estimate the amount of clarity and control they had while attempting the different types of imagery.

Table 4-15 shows the evaluations of mental practice by students in both mental practice groups for questionnaire items 1-5. Because mental practice is a covert activity, there is no way to know for certain if the students actually did the practice. Item 1 of the questionnaire was intended to help estimate how much the students actually engaged in mental practice. Students in both groups gave similar estimates of their participation in mental practice. For the mental practice method group, 78% of students stated that they either participated all of the time or almost all of the time. For the unstructured mental practice group, 86% of students stated that they either participated all of the time or almost all of the time. Based on these results, it was believed that the majority of students in both groups did participate in mental practice activities when they were asked to do so during the treatment period.

Table 4-15. Student evaluations of mental practice by participants in the two mental practice conditions

	Mental Practice Method Group (n = 55)		Unstructured Mental Practice Group (n = 51)	
Item	*n*	Percentage	*n*	Percentage
1. When you were asked to mentally practice the music, how often would you say you actually did the mental practice?				
A. None of the times	3	5%	0	0%
B. Very few times	4	7%	3	6%
C. About half the time	5	9%	4	8%
D. Almost all of the time, but not every single time	17	31%	18	35%
E. All of the time	26	47%	26	51%
2. How much do you think the mental practice you did as part of this study helped to improve your playing on the pieces?				
A. Did not help at all	6	11%	1	2%
B. Helped a little	33	60%	30	59%
C. Helped a great deal	16	29%	20	39%
3. In general, how helpful do you think mental practice is to improving your playing?				
A. Does not help at all	3	5%	4	8%
B. Helps a little	35	63%	27	53%
C. Helps a great deal	17	31%	20	39%
4. Do you think that you will use mental practice techniques in the future?				
A. No	4	7%	5	10%
B. Not Sure/Don't Know	26	47%	11	21.5%
C. Yes	25	45%	35	68.6%

Table 4-15. Continued

	Mental Practice Method Group (n = 55)		Unstructured Mental Practice Group (n = 51)	
Item	n	Percentage	n	Percentage
5. When do you think mental practice is most helpful to you? Check all that apply.				
Learning a new piece	42	76%	38	74.5%
Perfecting a piece you already know	38	69%	40	78%
Before sight-reading a piece you have never seen	42	76%	35	69%
When your face and hands Become physically tired	21	38%	23	45%
When your instrument is not available	44	80%	32	63%
When the band director is working with another section of the band	41	74.5%	40	78%
In the moments right before a performance	26	47%	23	45%
To help you be less nervous	23	42%	23	45%
I don't think it is helpful in any way	0	0%	0	0%

Items 2 and 3 indicate that students in both groups were not extremely confident that mental practice helped them to improve their playing. For both items, more students stated that mental practice "helped a little" than those who stated that it "helped a great deal." In Item 4, more students in the unstructured mental practice group predicted that they would use mental practice in the future than those in the mental practice method group. The mental practice method group was more evenly divided on this question, with

45% of the students indicating that they were unsure if they would use the techniques, and 47% stating that they were likely to use them in the future.

Student responses to items 6 and 7 are presented in Table 4-16 (mental practice method group) and 4-17 (unstructured mental practice group). Students in both groups reported similar and negative feelings toward visual imagery in mental practice. In the mental practice method group, only 9% of the students claimed that they would be likely to use visual imagery on their own. This is compared to the fact that 73% claimed that they would be likely to use auditory imagery ("hear myself playing the part") and 51% said they would use motor imagery ("imagine how my fingers/hands/embouchure feel"). Most students (87%) claimed that they would be likely to use an active imagery in which they fingered the notes, blew air into the instrument, and did the articulations while hearing the music in their head. In terms of visual imagery perspective, few students (9%) in the mental practice method group indicated that they preferred an external perspective.

Students in the unstructured mental practice group (Table 4-17) seem to have evaluated mental practice along similar lines with the mental practice method group. It should be noted that the questionnaire completed by the unstructured mental practice group differed slightly than the questionnaire completed by the mental practice method group. Because the unstructured mental practice group was not given specific instructions on how to mentally rehearse, the questionnaire attempted to determine which techniques they may have employed naturally. Item 6 indicates that less students (33%) chose to use visual imagery than they did auditory imagery (91%) or motor imagery (76%). Of those students who did use visual imagery, fewer students used an external perspective (14%) than an internal one (20%). Eighteen percent of students claimed that they used both. It

Table 4-16. Mental practice method group (n = 55) student evaluations of mental practice

Item	*n*	Percentage
6. If you were to do mental practice on your own, which techniques would you be most likely to use? (Check all that apply)		
Hear myself playing the part	40	73%
See a visual picture of myself playing the part	5	9%
Imagine how my fingers/hands/embouchure feel when playing the part	28	51%
Hear the music while I finger the notes or blow air/articulations	48	87%
7. When you visually see yourself playing the part, which perspective do you like best?		
Seeing from inside myself, from my own eyes (internal perspective)	29	53%
Seeing from outside myself, as if I were watching myself in a movie (external perspective)	5	9%
I like both perspectives equally	16	29%

Table 4-17. Unstructured mental practice group (n = 51) student evaluations of mental practice

Item	*n*	Percentage
6. When I did mental practice, I usually (Check all that apply)		
Heard myself playing the part	50	91%
Saw a visual picture of myself playing the part	17	33%
Imagined how my fingers/hands/embouchure feel when playing the part	39	76%
7. If you visually saw yourself playing the music, did you		
See from inside yourself, as if looking from your own eyes	10	20%
See from outside yourself, as if you were watching a movie of yourself	7	14%
Both	9	18%
I did not visually see myself playing the music	27	53%

should be noted that unlike the mental practice method group, students in the unstructured mental practice group were not given specific training regarding visual imagery or imagery perspective. It is possible that students in this group were less sure about how to answer this question than students in the mental practice method group.

Table 4-18 shows student self-evaluations of clarity and control during mental practice for both mental practice groups. Clarity refers to how clear the students could hear, see, or feel themselves playing during mental practice. Control refers to how much students felt they could control or manipulate the images in their heads.

Table 4-18. Student self-evaluations of clarity and control during mental practice

	Mental Practice Method Group (n = 55)		Unstructured Mental Practice Group (n = 51)	
Item	*n*	Percentage	*n*	Percentage
8. During mental practice, when you tried to hear the music in your head, how clearly could you hear the music?				
1 (not clear)	1	1.8%	0	0%
2	0	0%	2	4%
3	5	9%	7	14%
4	28	51%	26	51%
5 (very clear)	21	38%	16	31%
9. When you tried to visually see yourself playing, how clearly could you see the "movie" of yourself?				
1 (not clear)	3	5%	5	10%
2	6	11%	2	4%
3	22	40%	6	12%
4	17	31%	6	12%
5 (very clear)	7	13%	5	10%
10. When you tried to imagine the "feel" of your muscles moving during mental practice, how well were you able to feel your muscles move?				
1 (not well)	3	5%	1	2%
2	16	29%	3	6%
3	16	29%	15	29%
4	13	24%	6	12%
5 (very well)	7	13%	17	33%
11. How much control do you think you have over your mental practice?				
1 (very little control)	0	0%	1	2%
2	2	4%	5	10%
3	11	20%	13	25%
4	32	58%	22	43%
5 (a great deal of control)	10	18%	9	18%

Note. For items 8, 9, and 10, students in the unstructured mental practice group were instructed not to answer if they did not use that particular imagery type during mental practice.

Item 8 suggests that for both groups, the majority of students felt that they were able to hear the music clearly in their heads. In Item 9, only 13% of mental practice method students and 10% of unstructured mental practice students claimed they were able to see a "very clear" image of themselves playing their instruments.

In Item 11, students were asked to determine how much control they thought they had over their mental practice on a scale of 1 to 5, with 1 being "very little control" and 5 being "a great deal of control." In both groups, the majority of students rated their control at a 3 or higher. For the mental practice method group, only 4% of students rated their control at a 2 or lower. For the unstructured mental practice group, 12% rated their control at a 2 or lower. These results suggest that students in both groups were able to control mental images in order to participate in mental practice.

At the end of the questionnaire, students were invited to respond to several open-ended questions. In one of the questions, students in both groups were invited to give any additional thoughts on mental practice. Student responses to this question are listed in Appendix J. Thirty-six students (71%) from the unstructured mental practice group and 18 students (33%) from the mental practice method group chose to respond to this question. Of the 54 students who responded in both groups, only four students (7%) indicated that they either did not enjoy mental practice or that it was not helpful to their playing. One student stated: "It can be helpful but a bit boring." Another student observed that mental practice "needs to be in shorter blocks and not extremely long sections, less than 12 measures." Perhaps the most negative comment regarding mental practice was from a student who stated that mental practice "doesn't help as much as repeatedly playing. I also thought that it irritated me more 'cause I thought it kinda wasted time."

The majority of students responding to this question (93%) indicated that they had a positive experience with mental practice. Four students in the unstructured mental practice group stated that they did not like it at first, but that as they continued to become familiar with mental practice they liked it more and found it more helpful. One of these students responded: "At first I thought it was really dumb, but after we did it I was amazed at how much it really helped." Seven students recognized that they had naturally and perhaps subconsciously used mental practice before, although not to the extent requested in this study.

Student responses to this question indicate that students in both groups took the mental practice exercises seriously and had specific and thoughtful opinions about the technique. One student stated:

> It helped me grow as a musician. I learned to listen and pay attention to songs more. Instead of just playing the dynamics, when I mentally practiced I could hear it in my head and then actually play the dynamics well. Also, I play piano, so it even helped with my piano playing.

Another student remarked:

> I thought the idea of mental practice was a good one that I had never tried/used before. I believe the mental practice technique will greatly benefit my playing in the future because it helps me to stop and think about what I'm playing before I actually play it. Also, mental practice helps me to concentrate and be more productive in my practicing/rehearsals.

Mental practice method group students were also asked to list any techniques in the method that they thought were valuable or not valuable. Student comments, and the frequency that students made each comment, are summarized in Table 4-19. Student responses in this section seem to parallel student responses from other areas of the questionnaire. Active imagery (hearing in your head while fingering and/or blowing) was considered a valuable technique by a large number of students (42%). Thirty-three

Table 4-19. Summary of open-ended responses of mental practice method group students (n = 55) on the post-study questionnaire

Student Comment	Number of Students Listing The Comment	Percentage of Students Listing The Comment
Question: *Please list any mental practice techniques that you thought were valuable*		
1. Hearing the music while fingering the notes	12	22%
2. Hearing the music while fingering and blowing	11	20%
3. Hearing the music in your head	8	33%
4. Hearing the entire ensemble	3	5%
5. Imagining muscle movement	4	7%
6. Visualization/visual imagery	6	11%
7. All techniques were valuable	5	9%
Question: *Please list any mental practice techniques that thought were NOT valuable*		
1. Visualization/visual imagery	11	20%
2. Visualizing from an external perspective	12	22%
3. Imagining muscle movement	2	3.6%
4. Doing the fingering without blowing the articulations	1	1.8%
5. None of the techniques were not valuable	10	18

percent of students stated that hearing the music in their heads was a valuable technique. Three students (5%) commented that attempting to hear the entire ensemble mentally was helpful to their playing. One student remarked: "When asked to hear both the sound of your part and that of the entire band, it helped by letting you know what you need to work on alone and as a group."

Similar to previous questions in the survey, 42% of students stated that visualization was not a valuable technique, while 11% thought the technique was useful. Students stated that "the 'movie' was hard to imagine from an outside view" and "I could never really see myself in the 'movie' me." One student stated: "Watching yourself – that was stupid." Another student stated that they did not like one of the preliminary exercises that involved "seeing the different colors and stuff on my trumpet."

The students seemed to be divided on whether they thought motor imagery techniques were valuable. Four students (7%) thought the techniques were valuable while two students (3.6%) claimed that they were not valuable. One student remarked that "there were [no techniques] that were not valuable but the hardest one to imagine was feeling the muscles move."

CHAPTER 5
CONCLUSIONS

Summary

The purpose of this study was to develop and test the effectiveness of a structured method of mental practice on the musical performance of high school band students. The primary concern of the study was to investigate *how* mental practice techniques should best be taught to students, and how these techniques can be used in the band class setting to improve student performance.

Previous research involving mental practice in musical performance has focused on adult musicians in an individual (solo) performance setting. However, for younger musicians wind and percussion instruments are usually taught as an ensemble in American public school music programs. This study attempted to apply mental practice techniques to teaching situations involving high school-age musicians in an ensemble performance setting.

This study sought to determine the effectiveness of mental practice with high school band students. A pilot study using middle school band students indicated that younger musicians could use mental practice techniques effectively to improve their ensemble performance. The study suggested that more structure may be necessary when using mental practice with middle school students and that further research was necessary to determine the best method of teaching mental practice to younger musicians.

A review of the literature in mental practice found numerous exercises and techniques for using mental practice to enhance performance. Despite the presence of

these exercises, there appeared to be a lack of a structured method of utilizing mental practice. Previous studies have not allowed subjects to regularly practice mental rehearsal techniques, despite the fact that many experts in the field advocate regular practice in order to fully develop the skills of mental practice.

This study developed and tested a six-week structured method of teaching mental practice to high school band students. This method served as an attempt to synthesize various mental practice techniques into a structured method and to allow for the regular practice of mental rehearsal over a six-week period. The method was designed so that the school music teacher could apply the techniques during instruction of the instrumental ensemble. The method involved three components: 1) exercises designed to introduce, define, and practice auditory, visual, and motor imagery, 2) exercises that combined physical and mental practice simultaneously, and 3) exercises that alternated physical and mental practice.

Four concert bands from four different high schools in one Southwest Virginia county were selected to participate in the study. Each intact band was assigned to one of three practice conditions or to a no practice control condition. Each band practiced a unison etude and an excerpt from a concert band composition over the six-week treatment period for two days a week for approximately 15 minutes each day. Band A (mental practice method group) practiced the pieces using the structured method of mental practice designed for the study. Band B (unstructured mental practice group) practiced the pieces using unstructured mental practice similar to that used in the pilot study as well as previous research. Band C (physical practice group) practiced the pieces

using physical practice only. Band D (control group) did not practice the pieces at all over the six-week treatment period.

The design of the study was a pretest-posttest design with nonequivalent groups (Gall, Gall, and Borg, 1999). To measure ensemble prepared performance, each intact band was recorded performing the ensemble excerpt prior to the start of the treatment period as a pretest, and again at the end of the treatment period as a posttest. To measure individual student performance, a percentage of students were recorded individually performing a sight-reading piece and the prepared unison etude. Therefore, students were evaluated in three different performance measures:

1. individual student performance on a prepared etude
2. individual student performance on a sight-reading exercise
3. ensemble performance on a prepared concert band composition

A total of 86 students were recorded individually: 24 students from Band A, 23 students from Band B, 23 students from Band C, and 16 students from Band D.

Recordings were analyzed in terms of mean difference scores of both the ensemble and the individual student between the pretest and the posttest. Individual student performances were evaluated in three performance areas: pitch accuracy, dynamics, and rhythmic accuracy. Ensemble performances were evaluated in terms of pitch accuracy, rhythmic accuracy, and tone quality/intonation.

At the end of the treatment period, students in the two mental practice groups were asked to complete a questionnaire in order to gather information regarding their opinions about mental practice. The questionnaire asked students to rate the amount of clarity and control that they had when engaged in mental practice. Students were also asked to

estimate how often they actually participated in mental practice when asked to do so, and were invited to respond to several open-ended questions with their opinions on the effectiveness of mental practice.

Five basic questions were addressed in this study: 1) What is the effect of a structured method of mental practice in ensemble rehearsal on the sight-reading performance of high school band students? 2) What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of high school band students? 3) What is the effect of a structured method of mental practice in ensemble rehearsal on the prepared performance of a high school band performing as an ensemble? 4) What is the effect of mental practice on the musical performance of students in terms of grade level, gender, and performing instrument? 5) What are the opinions of high school band students regarding mental practice?

The research hypotheses were as follows:

1. Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in sight-reading performance than students using an unstructured method of mental practice, physical practice, or no practice (control).

2. Students who receive specific training in mental practice and whose mental practice sessions were structured by the teacher will make significantly greater improvement in prepared performance than students using an unstructured method of mental practice, physical practice, or no practice (control).

3. A band ensemble that receives specific training in mental practice and whose mental practice sessions were structured by the teacher will make considerably greater improvement in prepared performance than an ensemble using an unstructured method of mental practice, physical practice, or no practice (control).

4. Within each of the three experimental groups, there will be significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

The corresponding null hypotheses were as follows:

1. There will be no significant differences in the mean gain scores for sight-reading performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

2. There will be no significant differences in the mean gain scores for prepared performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

3. There will be no considerable difference in the mean gain scores for ensemble prepared performance of an ensemble that practices using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

4. Within each of the three experimental groups, there will be no significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

Results indicated that for individual sight-reading performance, the mental practice method group had the highest mean gain score in terms of pitch and dynamics, but had the lowest mean gain in terms of rhythm. However, an analysis of variance between the mean difference scores indicated no significant difference among the four groups in any of the three performance areas.

For individual prepared performance, the mental practice method group made the greatest mean gain scores in all performance areas. The mental practice method group made statistically significant gains over the control group in every performance area, and over the unstructured mental practice group in dynamics ($p < .05$). The physical practice group made significantly greater gains than the control group in rhythm ($p < .05$) and pitch accuracy ($p < .01$). The unstructured mental practice group made significant improvement over the control group in rhythm ($p < .01$).

The ensembles were evaluated as intact groups in the ensemble performance measure. This resulted in an extremely low N ($N = 4$), making statistical analysis of the results inappropriate. Therefore, analysis of the differences between the ensembles was based solely on raw scores. All three experimental groups had considerably higher gain scores than the control group for each of the three performance areas. However, there did not appear to be a noticeable difference in the gain scores among the three experimental groups for the three performance areas. The results from the individual and ensemble performance measures suggest that for the majority of performing areas, students taught using a structured method of mental practice perform better or just as well as those taught using either an unstructured form of mental practice or physical practice.

Comparison of students in terms of instrument, gender, and grade level suggest that brass players may be more likely to benefit from a method of mental practice than woodwind players. Brass players in the mental practice method group had higher mean gain scores than woodwind players from the same group and brass players in the other two groups in the areas of pitch accuracy and dynamics. Mental practice method group brass players also had the highest gain scores in terms of rhythm, but these scores were not noticeably different than brass or woodwind players from the other groups.

Responses to the post-study questionnaire by students in the two mental practice groups indicate that the students found visualization or visual imagery to be the least valuable technique in mental practice. Students in the mental practice method group rated active imagery techniques and auditory imagery techniques as the most valuable.

Discussion

The results of this study strongly support the concept of mental practice as a valuable rehearsal technique for use with the high school band. In both sight-reading and prepared performance, students taught using a structured method of mental practice performed statistically just as well or better than those taught using an unstructured method of mental practice or traditional physical practice. For intact ensemble performance, bands that rehearsed using either a method of mental practice or unstructured mental practice appear to have performed just as well as a band that rehearsed using traditional physical practice. Finally, the majority of student responses to a post-study questionnaire suggest that students enjoyed mental practice, took the process seriously, and considered the technique to be of value to improving their individual and group performance. For these reasons, it can be concluded with some confidence that mental practice techniques are of value to improving the performance of school band students and should be incorporated on a regular basis in rehearsal.

Examination of scores for the individual prepared performance measure reveals that the mental practice group had the highest mean gain scores in every performance area. For sight-reading, the mental practice method group had the highest gain scores for pitch and dynamics, but not rhythm. As shown in the results, not all of these differences were statistically significant. However, it can be reasonably concluded that mental practice was beneficial to student performance. Although mental practice may not necessarily be better than physical practice in all cases, it is at the very least just as effective as traditional physical practice.

Because mental practice is at the very least just as effective as physical practice, it should be added to the cache of rehearsal techniques from which music educators have to choose. If used appropriately, mental practice techniques can serve as an alternative to traditional rehearsal techniques. Rawlins (2004) recognizes the need for educators to provide multiple practice strategies for instrumental music students. He acknowledges that no single practice strategy can be used in all situations, but states that "teachers can do much more than they usually do to provide students with some basic strategies and an arsenal of techniques for mastering new music" (p. 44). Blocher and Miles (1999) state that various school class schedules are "dictating a need for more rehearsal variety, more creative teaching strategies, and/or more efficient use of time in rehearsals" (p. 17). Clearly there is a need for variety in teaching strategies. Mental practice helps to improve student performance while providing the educator with an alternative rehearsal strategy that adds variety to how concepts are addressed in rehearsal.

Mental practice provides an opportunity for a musician to practice when the instrument is not available or when injury prevents practice, and can prevent physical tiredness. Iltis (2002) warns that intense practicing that uses repetitive motions for many hours each day can lead to health problems such as dystonia, a condition that results in uncontrollable muscle contractions. He states: "Instrumental teachers should encourage anxious perfectionists to develop routines that encourage breaks and avoid the protracted repetitions of one movement" (pp. 39-40). Mental practice techniques should be a valuable component of such a routine, allowing musicians to continue practicing without placing strain on the muscles involved in physical performance.

In their discussion of various class scheduling models and their effect on school band programs, Blocher and Miles (1999) describe over 40 school music programs and the advantages and disadvantages to their scheduling. Several band directors that were on a block schedule claimed that student endurance was a problem due to the longer class period. The use of mental practice techniques during rehearsal could help students maintain their endurance. Mental practice could also help in other scenarios in which students are asked to perform for longer periods of time, such as band camps or honor band rehearsals. Additional benefits include the potential for enhancing memory of words or music, motivation, confidence, and concentration.

One of the reasons that mental practice is beneficial in the school ensemble is that it provides an opportunity for students to think about what they are physically attempting to do. One student may have said this best when she responded in the questionnaire with the statement: "I believe the mental practice technique will greatly benefit my playing in the future because it helps me to stop and think about what I'm playing before I actually play it." When rehearsal is restricted to exclusive physical practice, the student is forced to develop motor skills with little attention to developing the cognitive skills required for musical performance. In short, the student does not have an adequate enough opportunity to think about the task at hand.

The results of this study suggest that students perform better when both motor and cognitive skills are developed and used in rehearsal. The development of cognitive skills appears to be essential to the improvement of motor performance. When mental practice and physical practice are either combined or alternated, the student has an opportunity to

develop both the cognitive and motor skills necessary for a smooth and accurate performance.

One of the limitations of this study was that the treatment period was limited to six weeks, with sessions occurring two times a week for 15 minutes each day. During this time, students in the mental practice conditions engaged in a large amount of mental practice on the assigned compositions. It could be estimated that perhaps 30% to 40% of the treatment rehearsals involved some form of mental practice. It is the opinion of the researcher that real world application of mental practice should not ask students to engage in mental practice this frequently. When used too often, mental practice techniques could backfire and cause boredom and discipline problems. Mental practice should be used on a regular basis in order to continue to build student skills in the techniques, but music educators are cautioned against overusing the techniques. The frequency at which mental practice should be used will depend on teacher and student needs and attention spans. Perhaps two to four times a month is an adequate amount of time to employ mental practice in rehearsal. In addition, the use of a wide variety of different mental practice techniques may help to keep student interest and involvement with the activity.

This study suggests that both unstructured and structured forms of mental practice are beneficial to improving student performance. Although student responses to the post-study questionnaire indicated trends in student opinions on mental practice, they also suggested that students were different in the mental practice techniques they liked or disliked. The advantage to an unstructured method is that students may choose the mental practice technique that they like best during mental practice sessions. The advantage to a

structured method of mental practice is that students seem to be better educated about mental practice, and are provided with a wide variety of techniques to use when engaged in mental rehearsal.

It is the opinion of the researcher that perhaps a compromise between the unstructured and structured versions of mental practice may work best. Complete structure in the activity may stifle student interest and cause frustration. A complete lack of structure seems inappropriate for the attention span of students at this age level. An effective curriculum in mental practice would introduce and explain a wide variety of techniques, and allow students to practice and experiment with the techniques. During rehearsal of a musical passage, the music educator should alternate between a structured mental practice, in which the student is told a specific form of mental practice to use, and unstructured mental practice, allowing the student to choose the method they prefer. It appears that the results of this study do not support the finding of Geerlings (1998) that guided instruction in mental practice is better than rigid instruction. Rather, it seems that both forms of instruction are valuable to helping students apply mental practice in their regular practice routines.

Student responses and opinions regarding mental practice are valuable to determining an appropriate strategy for teaching and incorporating mental practice. Student comments suggest that every student is different with regards to their preferences for mental practice. One of the benefits of the structured method of mental practice is that when a variety of techniques are used, more students are able to identify with a technique that is of particular value to them personally. Results of the post-study questionnaire suggest that many students do not find value in visual imagery exercises. However,

several students indicated that they thought visual imagery was beneficial to their playing. This indicates that the use of only one type of mental practice will not and cannot meet the needs of every student, because each student has different tastes and strengths with regard to how they engage in the activity.

The opinions of students are important due to the fact that if they enjoy an activity or find it valuable, they will be more likely to participate in the activity when requested to do so. However, caution should be used when using student opinion to design instructional programs. Simply because students do not like an activity does not necessarily negate its value. Therefore, just because many students thought that visual imagery was of little value does not mean that it actually is of little value, and visual imagery should not be excluded from mental practice programs until empirical research suggests that it should be.

Results of this study found no statistically significant difference among the mean difference scores of the four groups in terms of sight-reading performance. Based on these results it would appear that mental practice does not help to improve sight-reading skills. However, this is not surprising considering the fact that during the six-week treatment period, mental practice was not applied to sight-reading strategies. The mental practice method dealt with improving performance on a prepared piece rather than in sight-reading situations, and this may have affected the results on the sight-reading measure. Therefore, this study does not provide adequate information for drawing conclusions regarding the effect of mental practice on sight-reading performance. More information is needed to more accurately determine this effect.

Conclusions

After examination of the results of this study, the following conclusions were made with respect to the null hypotheses:

Null Hypothesis A:

There will be no significant differences in the mean gain scores for sight-reading performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

Conclusion 1:

Based on an analysis of variance of the mean difference scores of students in the four practice conditions, there was no significant difference among the groups in terms of individual sight-reading performance. Therefore, Null Hypothesis A is accepted.

Null Hypothesis B:

There will be no significant differences in the mean gain scores for prepared performance of students who practice using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

Conclusion 2:

Based on an analysis of variance of the mean difference scores of students in the four practice conditions, significant differences were found among the groups in terms of individual prepared performance. Scheffe's test and repeated *t* tests indicate that there was a significant difference between the mental practice method group and the control group for all three performance variables, and between the mental practice method group and the unstructured mental practice group in terms of dynamics. Therefore, Null Hypothesis B is rejected.

Null Hypothesis C:

There will be no considerable difference in the mean gain scores for ensemble prepared performance of an ensemble that practices using a structured method of mental practice and those who engage in unstructured mental practice, physical practice, or no practice.

Conclusion 3:

No statistical tests were conducted on this data due to an extremely low *n*. The three experimental groups did not appear to be considerably different from each other in any of the three performance areas. All three experimental groups scored noticeably higher than the control group in all three performance areas. Therefore, Null Hypothesis C is rejected.

Null Hypothesis D:

Within each of the three experimental groups, there will be no significant differences in the mean gain scores of students with regards to gender, grade level, and instrument.

Conclusion 4:

Separate *t* tests indicated no significant differences among the subgroups for dynamics or rhythm. However, within each experimental group brass players made statistically significant improvement over woodwind players in pitch accuracy ($p < .01$). Because a significant difference was found between woodwind and brass players, Null Hypothesis D is rejected.

The following additional conclusions were made based on the analysis of the data:

Conclusion 5:

A structured method of mental practice may be especially useful to improving the performance of brass players, especially in terms of pitch accuracy.

Conclusion 6:

Students seem to feel that the use of visual imagery in mental practice is not valuable to improving their playing. Teaching strategies should be adjusted to reflect this trend.

Suggestions for Future Research

The purpose of this study was to design and test the effectiveness of a structured method of mental practice on the performance of high school band students. It was believed that this was the first study to apply specific mental practice techniques with the high school band. Further research is needed in this area in order to more completely understand the benefits, applications, and pedagogy of mental practice with student

musicians. Future research in the area of mental practice might include the following topics:

1. **The effect of mental practice on sight-reading performance.**

   As stated in Chapter 2, several researchers claim that mental practice may be beneficial to the sight-reading process (Brooks, 1995; Karpinski, 2000; McPherson, 1994; Prosser, 2000; Wirt, 1992). However, more empirical research findings are needed to determine the extent to which mental practice affects sight-reading. Results of this study found that mental practice had no significant effect on the sight-reading skills of high school band students. However, mental practice was never applied to sight-reading or suggested as a sight-reading strategy during the treatment period, so these results are not surprising. Future research should adapt the mental practice method used in this study for use as part of a sight-reading strategy.

2. **The effect of structured mental practice on the performance of additional instruments in the concert band, including percussion.**

   In this study, the assessment of individual performance was limited to only those instruments considered to be the most common and numerous in high school band classes. The instruments selected for individual testing were flute, clarinet, alto saxophone, trumpet, French horn, and trombone. Although percussion instruments are often common and numerous in the concert band, percussion students were not selected for individual testing due to time and logistical limitations. Future studies should test the effectiveness of mental practice on the other instruments of the modern concert band, including piccolo, oboe, bass clarinet, bassoon, tenor saxophone, baritone saxophone, baritone, tuba, and percussion.

3. **The effect of mental practice on band students at varying age levels.**

   Because this study focused on high school band students, the mental practice method developed for this study should be adapted for use with elementary and middle school band students, and tested for its effectiveness in improving student performance.

4. **The effect of mental practice on other instrumental and vocal ensembles.**

   The exercises developed for this study were designed for use with high school wind and percussion students. These exercises should be adapted for use with other school instrumental ensembles (orchestra, guitar) and vocal groups, and tested for their effectiveness in improving student performance.

5. **Qualitative studies examining student attitudes toward mental practice.**

   Student responses to the post-study questionnaire indicated that students were very thoughtful and serious in their opinions regarding mental practice. Because of the covert nature of mental practice, the only way to know if students are really engaging in the activity is to ask them about it. Qualitative research seems to be an ideal vehicle for gaining a deeper understanding about how students respond to and engage in mental practice activities.

6. **The effect of mental practice on teacher conducting and rehearsing.**

   Future research could attempt to adapt mental practice strategies for use by the music educator in conducting and rehearsing the ensemble. Mental practice techniques for educators might include aural imagery of the musical score, or hearing an aural image of the score while using visual and/or motor imagery of conducting gestures.

7. **Mental practice techniques in jazz improvisation training.**

   There is no known empirical research that investigates the effect of mental practice on jazz performance or jazz improvisation. Studies are needed that apply mental practice to jazz education, and in particular, jazz improvisation instruction. Mental practice techniques in this area could include providing students with an opportunity to create an aural image of a short solo or solo passage while listening to the chord changes, and then asking the student to physically play the solo. Students could also be asked to physically improvise a solo while aurally imaging the chord changes.

8. **Further analysis of the mental practice method developed for this study.**

   While the mental practice method developed for this study appears to have been successful in improving student performance, the effectiveness of each exercise is unclear. It is still not known which individual exercises in the method were the most or least beneficial to student performance. Students appear to have found active imagery, auditory imagery, and motor imagery to be far more valuable than visual imagery. However, additional research is needed to better understand the effectiveness of each of these techniques.

Summary and Implications of this Study

This study represents the only known empirical investigation of the use of mental practice in the high school band rehearsal. Previous research has focused on individual adult musicians, has not allowed for the regular rehearsal of mental practice, and has used

unstructured forms of mental practice. This study is unique in that it involved high school musicians taught as an ensemble, allowed the students to experience mental practice techniques prior to the study, provided structured techniques for use during mental practice, and provided a physical experience with the task prior to mental rehearsal. As the only known study to apply the concept of mental practice to high school bands, it was believed that this research was valuable to determining the extent to which the concept could benefit student performance.

Results of this study indicate that mental practice techniques are beneficial to student performance, appropriate for use in the ensemble classroom, and accepted by student musicians as a useful activity. Based on these findings, school band directors are encouraged to implement mental practice into their regular rehearsal routines. When traditional physical practice is supplemented with mental practice, students are able to experience music cognitively and physically. By experiencing music in these two domains, students are able to make a more complete commitment to the activity of musical performance. Students provided with an experience in mental practice will develop the mental and physical dimensions of musical performance – both of which are essential for performance in music.

A band curriculum that relies exclusively on physical practice can fail to develop essential cognitive skills necessary for quality performance. In this environment, the student produces a sound from the instrument and makes an attempt to improve that sound based on instructions from the teacher as well as physical trial and error. Here the student considers the current performance and attempts to make it better from a physical standpoint. This complete reliance on physical attributes often occurs at a time when

students are undergoing the physical and developmental changes associated with puberty, making physical coordination more difficult.

An environment that supplements physical practice with regular mental practice should operate under different conditions. Like the physical environment described above, the student produces a sound and attempts to improve it through instructions from the teacher and physical trial and error. Unlike the exclusive physical environment, students utilizing mental practice will hear the ideal performance in their minds and work to reproduce the ideal sound that exists within. Students are able to provide themselves with a mental model by which they constantly compare and adjust the existing performance. The student is allowed to isolate the mental component of performance, think through various issues and obstacles, and prepare the body for the correct action. In addition, the student is provided with an opportunity to focus on specific elements of performance without the distraction of physical action. The physical practice student does not have this opportunity to make mental adjustments. This student must concentrate completely on physical aspects while the mental dimension of performance, including a properly formed aural model, goes underdeveloped.

Based on these conclusions, band students should participate in and experience mental practice exercises on a regular basis. These exercises should focus on aural imagery but should also include visual and motor imagery. Active imagery exercises that combine physical and mental practice appear to be of great value as they allow the student to maintain some physical relationship with the activity during mental practice. To be effective, mental practice should be used as a supplement to physical practice, not a replacement.

There are numerous ways in which mental practice techniques may benefit the high school band. Despite a lack of empirical research, mental practice might be useful to helping students prepare for sight-reading. It seems reasonable to suggest that students who have mentally rehearsed rhythms or fingerings would be better prepared to sight-read a passage. Mental practice could be used when students are first learning a piece to work out technical difficulties with fingerings or rhythms. After students have made considerable progress with the piece, mental practice may be an excellent method of helping students to improve the efficiency of their performance. At this point, students should be physically adjusted to the music, and mental rehearsal can help them to continue to improve their overall performance so that it comes closer to the ideal mental model.

Students should be encouraged to use mental practice when the director is working with other sections or individuals in the ensemble. While some students may naturally do this already, the director should provide specific instructions to engage all students in the activity. For example, if the director is about to work with brass players on a certain passage of music, he or she should instruct the woodwinds to mentally practice a specific passage and inform them that they will be asked to play it momentarily. In addition to improving their performance, this provides a greater chance of keeping all students active in rehearsal and may reduce discipline problems that typically occur when the director is attending to other sections of the ensemble. If students are always provided with an assignment, they may be less likely to feel that their time is being wasted when the director is not addressing them. When the director instructs students to mentally practice a section of music, students should always be asked to perform the passage for the

director. It seems reasonable to believe that students will be more likely to mentally review their parts if know they are about to perform it as a section or as an individual.

Mental practice sessions may also be valuable in the days immediately prior to a performance. Many performers and music teachers believe that there is a time in which their performance "peaks" – that is, they achieve their very best performance and after that point the performance quality declines slightly. Whether this is actually true or a psychological phenomenon, mental practice could be used to keep students mentally sharp leading up to a performance. Often students do seem to reach a point in which they do not appear to make any improvement in their performance. Mental practice can help students to re-evaluate their playing and provide a new way to experience their performance, keeping them mentally attuned to the music and preventing them from simply "going through the motions" of performance.

One the day of the performance, many directors worry that a full rehearsal may be detrimental to the physical endurance of the students. Mental practice provides an opportunity for students to practice their parts without adversely affecting their endurance. Similar endurance concerns typically arise at band camps or weekend honor bands, in which students play their instruments for many hours each day. Applied brass teachers have often been known to instruct their students to take several days off from playing in order to release the tension from their bodies and allow the embouchure to heal. Mental practice techniques seem to be an ideal solution for providing a method of musical rehearsal that does not overextend students' physical capabilities.

At performance time, students are often excited and nervous to perform in front of an audience or adjudicators. The moments before a concert, which often take place in a

separate “warm-up room,” can be crucial to the quality of the performance. Many students and musicians operate under the assumption that during this time they need to take their minds off the upcoming performance, and will often engage in conversations unrelated to music. Students will often appear to be in an excited state in which they are excessively social and are completely unfocused on the task at hand. By adverting their attention from the task, students enter the concert stage with little to no mental focus, which can adversely affect performance quality. Rather than allow students to take their minds off the task, directors should train students to focus their minds on the upcoming performance. An ensemble that enters the concert stage with a high level of concentration and focus on the task seems much more likely to give a superior performance. It seems reasonable to suggest that students should be engaged in some form of mental practice in the moments leading up to a performance, and that students who participate in these techniques on a regular basis will be comfortable and confident in using them in this situation.

Mental practice can also be a valuable tool in helping students to focus on things that will go right in the upcoming performance, and prevents them from emphasizing things that could go wrong. Research suggests that visualizing or focusing on negative outcomes can be detrimental to performance (Buffington, 1989; Connolly and Williamon, 2004; Robinson and Althouse, 1995; Sisterhen, 2004; Taylor, 1995; Wilson, 1994). If students are anxious about their performance, they may be more likely to visualize a negative scenario in their heads. To prevent this the director must help students to focus their attention on the positive outcomes of performance during the warm-up period prior to the concert. Mental practice seems to be an ideal method of accomplishing this task.

When students use mental practice to experience a positive and successful performance, they enter the stage with an optimistic, confident demeanor that can improve the quality of their performance.

As a result of this study, it is believed that mental practice techniques should be added to the pedagogy of school band programs. These techniques should be a valuable addition to existing rehearsal techniques used by band directors with school ensembles. It is hoped that the use of mental practice in the school band rehearsal will help to improve student musicianship by utilizing both physical and cognitive dimensions of musical performance.

APPENDIX A
STUDENT INFORMATION FORM

STUDENT INFORMATION FORM

This information will be used to help analyze data in the study. This is a confidential form and will only be seen by the research team. Please answer each question as accurately as possible. Thank you for your participation in the study!!

Make sure to fill out the front and back of this form

First and Last Name:_____

Age:_____ Gender: MALE_____ FEMALE_____

Please circle your grade in school: 9th 10th 11th 12th

Concert Band Instrument:_____

At what age did you start playing your instrument?_____

What grade were you in when you started to play your instrument? _____

How many years did you play in the middle school band? _____

How many years, <u>including this one</u>, have you played in the high school band?_____

Do you currently take piano lessons? YES_____ NO _____

If you answered yes, about how many years have you taken piano lessons? _____

If you answered no, have you ever taken piano lessons? YES_____ NO _____

About how many years did you take them? _____

Do you currently take private lessons on your band instrument? YES ___ NO ___

If you answered yes, about how many years have you taken private lessons? _____

If you answered no, have you ever had private lessons on your band instrument? YES _____ NO _____

About how many years did you take them? _____

On average, about how long would you estimate that you practice your instrument at home each week?_____

How many of your brothers or sisters play a musical instrument?_____

Do you have a parent or guardian that plays a musical instrument?_____

If yes, please place a check next to all those that play a musical instrument:

_____Mother
_____Father
_____Stepmother
_____Stepfather
_____Guardian

Why do you play in the school band? <u>Check all that apply:</u>

_____ I like the band director
_____ My friends are in the band
_____ My parents made me
_____ It's fun
_____ I love playing and making music

Other than symphonic band/concert band, please place a check by the musical groups that you are a member of or have been a member of in the past year:

_____ School jazz band
_____ School marching band
_____ School guitar class
_____ School music theory class
_____ School instrumental ensemble/small ensemble
_____ All-county band
_____ All-district band
_____ All-state band
_____ Church choir
_____ Church instrumental ensemble/band
_____ Solo and ensemble festival
_____ Other (please list/describe):_____

If you play any other instruments other than the one you play in band class, please list them here:_____

***THANK YOU* FOR YOUR HELP WITH THIS STUDY!**

APPENDIX B
INSTITUTIONAL REVIEW BOARD DOCUMENTATION

1. **TITLE OF PROTOCOL:**

The development of a sequential mental practice method and its effect on the musical performance of secondary school band students

2. **PRINCIPAL INVESTIGATOR(s):** *(Name, degree, title, dept., address, phone #, e-mail & fax)*

Stephen Daniel Galyen, Doctoral Student, Music Education, [Personal contact information]

3. **SUPERVISOR** (IF PI IS STUDENT): *(Name, campus address, phone #, e-mail & fax)*

Dr. Russell Robinson, P.O. Box 117900, Gainesville, Florida, 32611-7900. 352-392-0223, ext 216, rlrob@ufl.edu

4. **DATES OF PROPOSED PROTOCOL:** From _August 15, 2005_ To _November 30, 2005_

5. **SOURCE OF FUNDING FOR THE PROTOCOL:**
(A copy of your grant proposal must be included with this protocol if DHHS funding is involved.)

No funding source

6. **SCIENTIFIC PURPOSE OF THE INVESTIGATION:**

The purpose of this investigation is to determine the effectiveness of a mental practice technique in the performance of secondary school music ensembles and student musicians.

7. **DESCRIBE THE RESEARCH METHODOLOGY IN *NON-TECHNICAL* LANGUAGE**. The UFIRB needs to know what will be done with or to the research participant(s).

Participants will be asked to rehearse a piece of music for 20 minutes a day, 2 days a week, for 6 weeks. During the rehearsal, they will be instructed to practice using either

physical or mental practice. Physical practice will involve traditional rehearsal techniques of playing and perfecting correct notes and rhythms. Mental practice will involve asking the participants to imagine themselves playing the piece.

8. POTENTIAL BENEFITS AND ANTICIPATED RISK. (If risk of physical, psychological or economic harm may be involved, describe the steps taken to protect participant.)

The benefits include the potential to learn a beneficial practice technique to improve performance and reduce problems of physical endurance during rehearsal.

Anticipated risk includes possible nervousness due to involvement in a study. The anticipated risk will be mitigated by the subject's verbal assent as well as removal from the study if discomfort impedes the subject's participation.

9. DESCRIBE HOW PARTICIPANT(S) WILL BE RECRUITED, THE NUMBER AND AGE OF THE PARTICIPANTS, AND PROPOSED COMPENSATION (if any):

Participants will be recruited from middle school band classes in Alachua County, Florida and high school band classes in Roanoke County, Virginia. The approximate age of the participants will range from 12-18. Approximately 250 students will be recruited. No compensation will be given.

10. **DESCRIBE THE INFORMED CONSENT PROCESS. INCLUDE A COPY OF THE INFORMED CONSENT DOCUMENT** (if applicable).

Parents will be asked to sign an informed consent form (attached), which will be distributed approximately two (2) weeks prior to the study. Voluntary agreement from students will be determined from a verbal assent script (attached) prior to participation in the study. Students will not be approached by the researcher until informed consent forms have been collected from parents.

Please use attachments sparingly.

_____
Principal Investigator's Signature

_____
Supervisor's Signature

I approve this protocol for submission to the UFIRB:

_____
Dept. Chair/Center Director Date

S. Daniel Galyen
PO Box 117900
University of Florida
Gainesville, FL 32611-7900

Dear Parent/Guardian,

I am a doctoral student in the Music Department at the University of Florida, conducting research on the effect of mental practice on the musical performance achievement of school bands. This study is under the supervision of Dr. Russell Robinson, chair of the department of music education. The purpose of this study is to compare the student's musical performance after receiving different teaching techniques, one using traditional rehearsal techniques and the other using a combination of traditional techniques with a procedure of mental practice. The results of the study may help music teachers better understand the application of a unique teaching technique and allow them to design instructional practices accordingly. These results may not directly help your child today, but may benefit future students. With your permission, I would like to ask your child to volunteer for this research.

Participating children will rehearse a piece of music using either traditional teaching techniques or techniques that incorporate mental practice. Mental practice involves asking the child to study the music silently, and asking them to hear the music in their head and think about each rhythm, note, and fingering. The music will be at a level easy enough for the child to perform successfully in a relatively short amount of time. The piece will be taught by your child's teacher during the normal Band class period. The study will take place two days a week for six consecutive weeks during the months of September, October, and November. With your permission, an audio recording will be made of the student individually performing the piece on the first and last day of the study. The audiotape will be accessible only to the research team for verification purposes. At the end of the study, the tape will be erased. The identity of the children will be kept confidential to the extent provided by law. Results will only be reported in the form of group data. Participation or non-participation in this study will not affect the children's grades or placement in any programs.

You and your child have the right to withdraw consent for your child's participation at any time without consequence. There are no known risks or immediate benefits to the participants. No compensation is offered for participation. Group results of this study will be available in May upon request. If you have any questions about this research protocol, please contact me at either (352) 392-0223 ext. 241 or *sdgalyen@ufl.edu,* or contact the faculty supervisor, Dr. Robinson, at (352) 392-0223 ext. 216. Questions or concerns about your child's rights as a research participant may be directed to the UFIRB office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

S. Daniel Galyen
sdgalyen@ufl.edu, (352) 392-0223 ext. 241

MENTAL PRACTICE STUDY PERMISSION FORM

I have read the procedure described above. I voluntarily give my consent for my child, _____, to participate in S. Daniel Galyen's study of mental practice on musical performance skills. I have received a copy of this description.

_____ _____
Parent / Guardian Date

_____ _____
2nd Parent / Witness Date

APPENDIX C
CORRESPONDENCE WITH TEACHERS

Letter to Treatment Group Teachers Outlining Responsibilities

Dear [Teacher Name],

Thank you so much for agreeing to help me with this project! I know how busy you are, especially during the marching band season. Please know that your time and effort are so greatly appreciated and that your help means a great deal to me personally.

This study is an investigation of the effect of specific practice techniques on the performance of high school bands and band students. You have been assigned to a specific practice condition, which I will ask you to use as you rehearse two short pieces with your band. The first piece, *Allegro,* is a unison etude of approximately 72 measures. The second piece is a 24-measure excerpt from the concert band composition *Fall River Overture* by Robert Sheldon. I am asking you to do one week of exercises prior to beginning rehearsal these pieces. Then you will rehearse the pieces in two 15-minute sessions each week, over a period of six weeks. I have provided a rehearsal script for you to follow during rehearsal, and I will contact you prior to the study to discuss these scripts.

[Test administrator's name] will come to your class during the week prior and the week following the study. He will first record students individually as they perform *Allegro*. Following this he will record the entire ensemble performing the short excerpt from *Fall River Overture*.

I will keep in close contact with you throughout the treatment period to help you and answer any questions. Please do not hesitate to contact me by phone or email at any time if any concerns or questions arise. I have tried to design this study so that it causes as little interference for you as possible. Please let me know if you have any suggestions or comments regarding any aspect of this study. Your input and feedback are very valuable to me!

The following packet contains all of the information that you should need for the project. In this packet you should find:

1. A tentative schedule for the study

2. Student permission forms (50) – These forms are required by the University of Florida as well as the Roanoke County School System, and students should not be pulled individually from class to be recorded until they have turned in this form.

3. Student information forms (50) – Information provided by students on this form is strictly confidential and will only be seen by me or other members of the research team.

4. *Allegro* – I have tried to include enough copies of the piece *Allegro* for every student in your band. Please feel free to copy parts if needed.

5. *Fall River Overture* – I have tried to include enough parts to cover the instrumentation of your band. You will only rehearse/perform an excerpt from this piece, beginning at measure 107 and going to the end of the piece (24 measures). Therefore, you have only been provided with the last page of this piece.

6. Teacher Manual (black binder) – This binder contains the following:

An additional copy of the tentative schedule
Teacher instructions
Teacher scripts
Conductor's score to *Allegro*
Conductor's score to *Fall River Overture*

I will contact you soon to discuss the schedule and teaching scripts and to provide more details regarding the project. Once again, I cannot thank you enough for your help with this study!

Thanks again,

Danny Galyen
[Personal contact information]

TENTATIVE SCHEDULE AND INSTRUCTIONS

1. Monday, August 29, 2005 – Pass out student permission forms (2 attached sheets). Please read the following to the students before passing out the information forms:
WE HAVE BEEN ASKED TO PARTICIPATE IN A RESEARCH PROJECT BEING DONE AT THE UNIVERSITY OF FLORIDA. THE STUDY WILL LOOK AT THE DIFFERENT WAYS THAT STUDENTS PRACTICE MUSIC. [TEST ADMINISTRATOR'S NAME] WILL BE COMING TO OUR CLASS IN A COUPLE OF WEEKS TO RECORD US SIGHT-READING A PIECE. FIRST HE WILL RECORD THE ENTIRE BAND SIGHT-READING, AND THEN HE WILL PULL SOME OF YOU OUT OF CLASS TO SIGHT-READ A COUPLE OF SHORT PIECES INDIVIDUALLY. THEN WE WILL HAVE A CHANCE TO PRACTICE THE MUSIC FOR ABOUT SIX WEEKS. [TEST ADMINISTRATOR'S NAME] WILL COME BACK AT THE END OF THE SIX WEEKS AND RECORD YOU PLAYING THE MUSIC AGAIN. THIS IS SO WE WILL KNOW HOW MUCH YOU HAVE IMPROVED ON THE PIECES AFTER PRACTICING THEM. NONE OF THIS IS FOR A GRADE! NO ONE WILL KNOW YOUR NAME, AND NO ONE WILL HEAR THE RECORDING EXCEPT FOR THE PEOPLE HELPING WITH THE RESEARCH. I AM GOING TO GIVE YOU A LETTER AND PERMISSION FORM THAT EXPLAINS THE STUDY. PLEASE TAKE THIS HOME AND HAVE YOUR PARENTS SIGN IT. YOU ALSO NEED TO SIGN IT. PLEASE TURN THE FORMS IN TO ME THIS THURSDAY, SEPTEMBER 1.

2. Thursday, September 1, 2005 – Student permission forms due. **Please accept any late forms from students. Students must turn in a form before [Test administrator's name] can pull them from class and ask them to play individually.**

3. Tuesday, September 6 – Please have students complete the <u>yellow student information forms</u> at the beginning of class, and collect these forms.

4. Tuesday, September 6 through Friday, September 16 – (Actual dates to be determined). Pretesting. [Test administrator's name] will record the band sight-reading *Fall River Overture*. He will then pull some students from class to sight-read a couple of short pieces individually. This should not take longer than two days.

5. Monday, September 12 – Begin Preliminary Exercises [Group 1 Only]

6. Monday, September 19 – Rehearsals begin, TREATMENT WEEK 1

7. Monday, September 26 – TREATMENT WEEK 2

8. Monday, October 3 – TREATMENT WEEK 3

9. Monday, October 10 – TREATMENT WEEK 4

10. Monday, October 17 – TREATMENT WEEK 5

11. Monday, October 24 – TREATMENT WEEK 6 – FINAL WEEK

12. Wednesday, October 26 through Friday, November 4 – (Actual dates to be determined). Posttesting. [Test administrator's name] will record the band performing *Fall River Overture*. He will then pull some students from class to sight-read a piece and perform *Allegro* individually. This should not take longer than two days.

Letter to Control Group Teacher Outlining Responsibilities

Dear [Teacher Name],

Thank you so much for agreeing to help me with this project! I know how busy you are, especially during the marching band season. Please know that your time and effort are so greatly appreciated and that your help means a great deal to me personally.

The study has changed slightly since we spoke last spring, and I think you will like this version better as it requires less time and effort! This study is an investigation of the effect of specific practice techniques on the performance of high school bands and band students. You have been assigned to the control group. [Test administrator's name] will come to your class during the week of September 6. He will first record students individually as they sight-read a couple of short etudes. Following this he will record the entire ensemble sight-reading an excerpt from the concert band piece *Fall River Overture* by Robert Sheldon. After a period of six weeks, [Test administrator's name] will return to record the same pieces as before. During the six-week interval you are free to teach your class as you normally would – there is no teaching assignment for you during this time. [Test administrator's name] will provide you with the music when he arrives.

Please do not hesitate to contact me by phone or email at any time if any concerns or questions arise. I have tried to design this study so that it causes as little interference for you as possible. Please let me know if you have any suggestions or comments regarding any aspect of this study. Your input and feedback are very valuable to me! At the end of the project, any rehearsal techniques that were discovered to be beneficial in the high school band rehearsal will be made available to you and your students.

The following packet contains all of the information that you should need for the project:

1. A tentative schedule for the study

2. Student permission forms (50) – These forms are required by the University of Florida as well as the Roanoke County School System, and students should not be pulled individually from class to be recorded until they have turned in this form. Please feel free to make additional copies if needed.

3. Student information forms (50) – Information provided by students on this form is strictly confidential and will only be seen by me or other members of the research team. Please feel free to make additional copies if needed.

I will contact you soon to discuss the schedule and to provide more details regarding the project. Once again, I cannot thank you enough for your help with this study!

Thanks again,

Danny Galyen

TENTATIVE SCHEDULE AND INSTRUCTIONS

1. Monday, August 29, 2005 – Please pass out student permission forms (2 attached sheets). Please read the following to the students before passing out the information forms:
WE HAVE BEEN ASKED TO PARTICIPATE IN A RESEARCH PROJECT BEING DONE AT THE UNIVERSITY OF FLORIDA. THE STUDY WILL LOOK AT THE DIFFERENT WAYS THAT STUDENTS PRACTICE MUSIC. [TEST ADMINISTRATOR'S NAME] WILL BE COMING TO OUR CLASS IN A COUPLE OF WEEKS TO RECORD US SIGHT-READING A PIECE. FIRST HE WILL RECORD THE ENTIRE BAND SIGHT-READING, AND THEN HE WILL PULL SOME OF YOU OUT OF CLASS TO SIGHT-READ A COUPLE OF SHORT PIECES INDIVIDUALLY. LATER IN THE SEMESTER, [TEST ADMINISTRATOR'S NAME] WILL COME BACK AND RECORD YOU PLAYING THE MUSIC AGAIN. THIS IS SO WE WILL KNOW HOW MUCH YOU HAVE IMPROVED ON THE PIECES AFTER PLAYING IN CLASS FOR SEVERAL WEEKS. NONE OF THIS IS FOR A GRADE! NO ONE WILL KNOW YOUR NAME, AND NO ONE WILL HEAR THE RECORDING EXCEPT FOR THE PEOPLE HELPING WITH THE RESEARCH. I AM GOING TO GIVE YOU A LETTER AND PERMISSION FORM THAT EXPLAINS THE STUDY. PLEASE TAKE THIS HOME AND HAVE YOUR PARENTS SIGN IT. YOU ALSO NEED TO SIGN IT. PLEASE TURN THE FORMS IN TO ME THIS THURSDAY, SEPTEMBER 1.

2. Thursday, September 1, 2005 – Student permission forms due. **Please accept any late forms from students. Students must turn in a form before [Test administrator's name] can pull them from class and ask them to play individually.**

3. Tuesday, September 6 – Please have students complete the <u>yellow student information forms</u> at the beginning of class, and collect these forms from students.

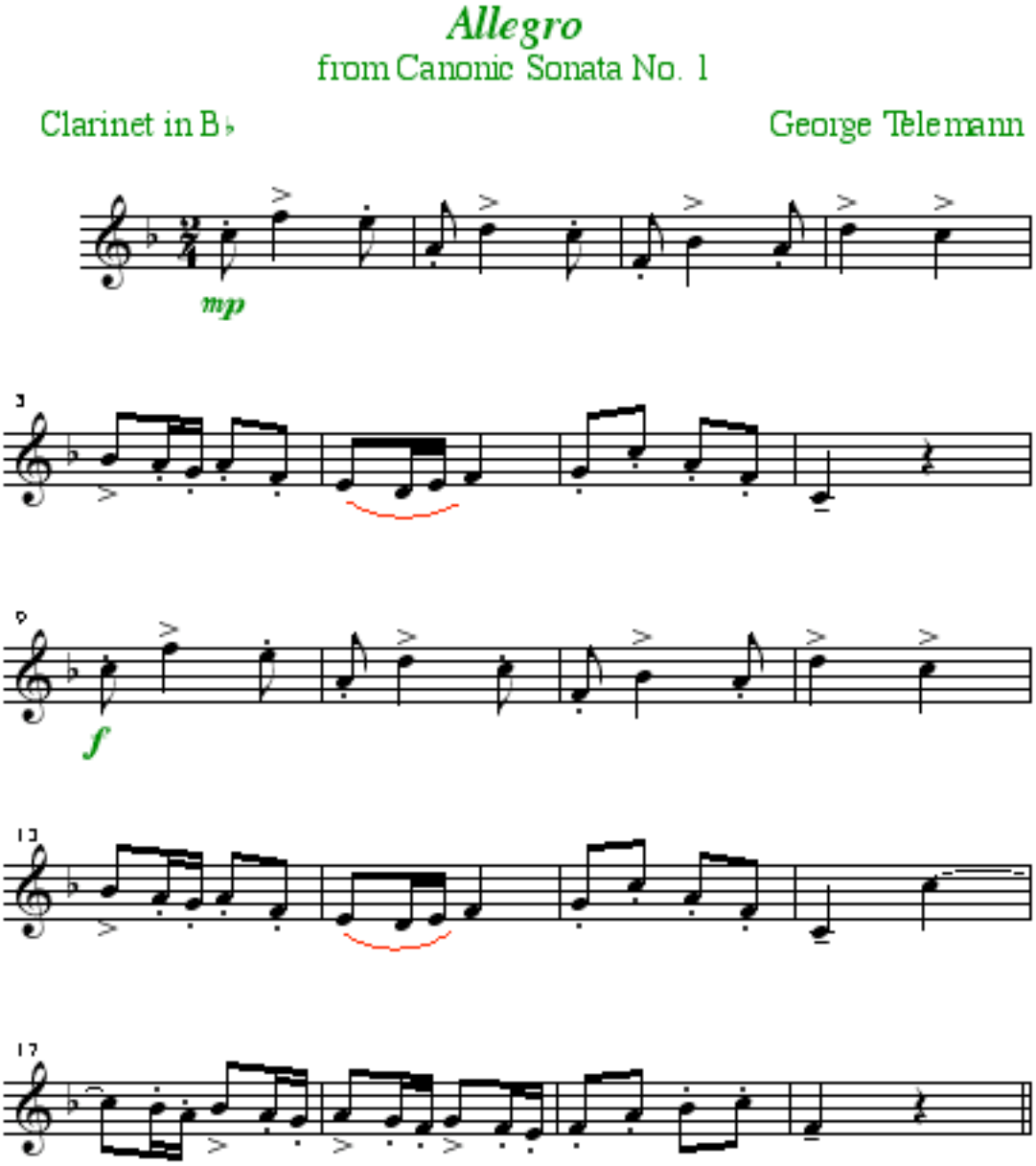
4. Tuesday, September 6 through Friday, September 16 – (Actual dates to be determined). Pretesting. [Test administrator's name] will record the band sight-reading *Fall River Overture*. He will then pull some students from class to sight-read a couple of short pieces individually. This should not take longer than two days.

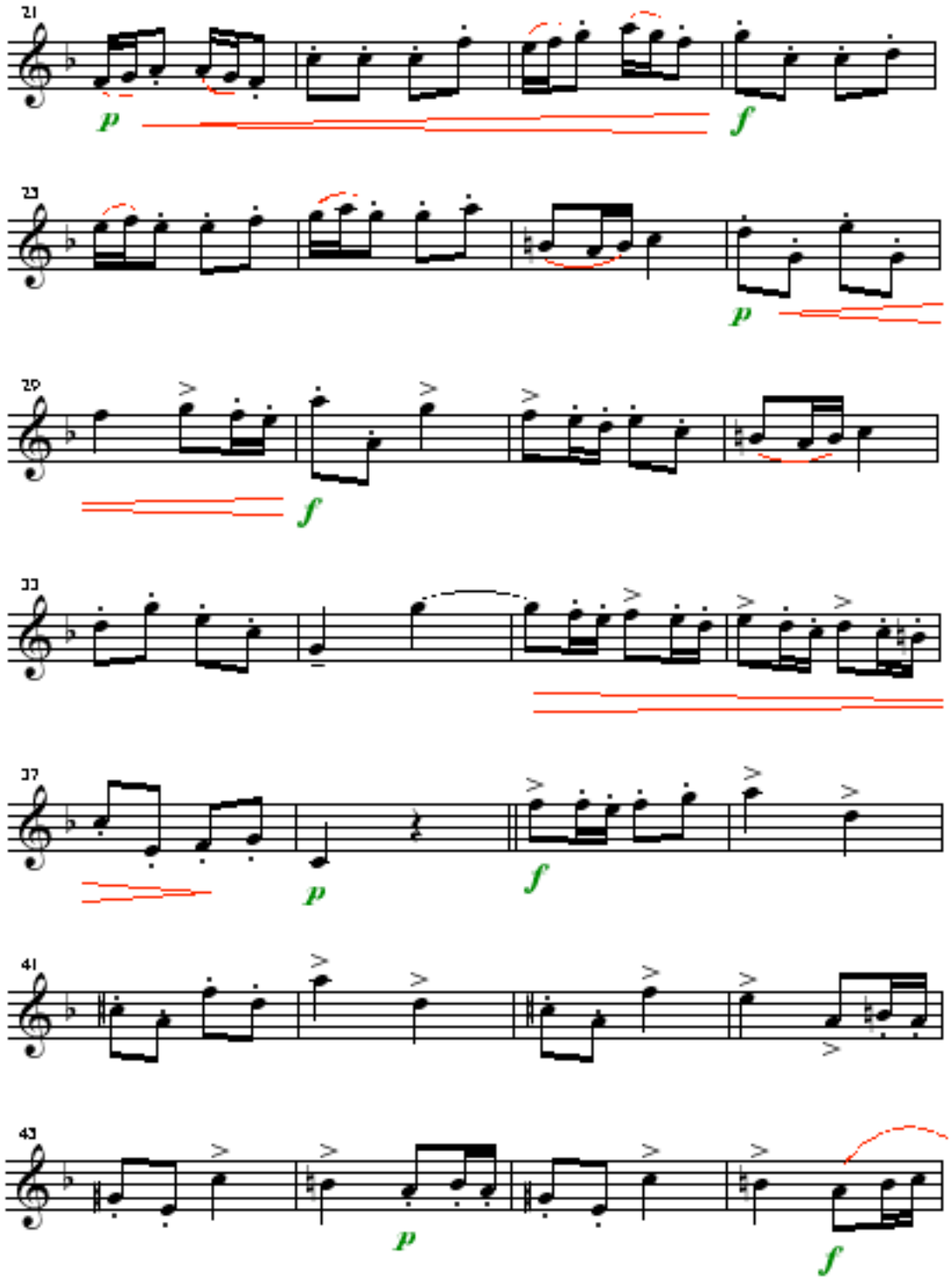
5. Wednesday, October 26 through Friday, November 4 – (Actual dates to be determined). Posttesting. [Test administrator's name] will record the band performing *Fall River Overture* He will then pull some students from class to sight-read a couple of short pieces individually. This should not take longer than two days.

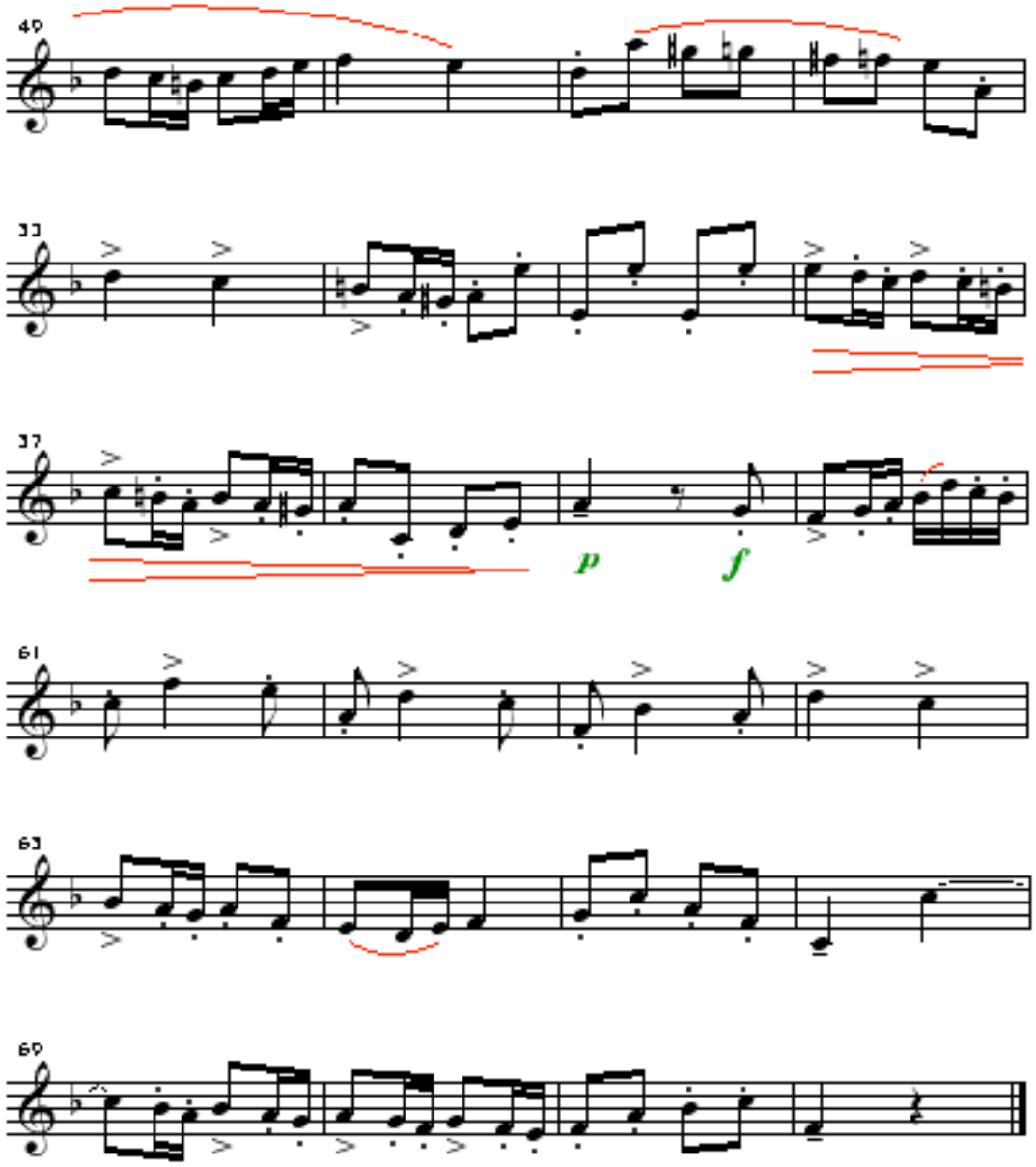
APPENDIX D
INDIVIDUAL PREPARED PERFORMANCE MEASURE

***Allegro* from Canonic Sonata No. 1 by George Telemann**

(Expression and articulation markings were added by the researcher)




21
p
f
23
p
29
f
33
37
p
f
41
43
p
f


49
33
37
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61
63
69

APPENDIX E
TEACHER REHEARSAL SCRIPTS

Teacher Script: Mental Practice Method Group (Group 1)

GROUP 1 TEACHER SCRIPT AND INSTRUCTIONS

Thank you once again for agreeing to participate in this research study. It is hoped that this study will provide information on various practice techniques that may be beneficial to high school bands. Please use the following guidelines when rehearsing the music during the study period:

1. Your involvement in the study will last approximately seven weeks.
2. Your activities are divided into two parts: a preliminary week of mental practice exercises, followed by six weeks of rehearsal using mental practice.
3. During the week of preliminary exercises, please take the ensemble through the exercises provided on the following pages. Each preliminary exercise takes about ten to fifteen minutes.
4. Over the six rehearsal weeks, please rehearse the music provided for two days each week for 20 minutes each day. If possible, spread out the rehearsals so that they are not on consecutive days. For example, an ideal schedule would be to rehearse the music on Tuesdays and Thursdays.
5. Please place the 20-minute rehearsal segment at the beginning of the class period, after the regular warm-up/tuning has taken place.
6. The two pieces being rehearsed for the study are *Allegro* by Telemann and an excerpt from *Fall River Overture* by Robert Sheldon. The *Fall River Overture* excerpt will be from measure 107 to the end of the piece (24 total measures).
7. The following teacher scripts are designed to guide you through each rehearsal. Instructions printed in all capital letters should be read to the student. Instructions in regular lettering serve to guide the teacher through the script.
8. Each 20-minute rehearsal segment is designed to divide the time evenly so that each piece is rehearsed for approximately ten minutes.
9. On the first day of rehearsal, please make the following statement:
   WE ARE GOING TO PLAY *ALLEGRO* AND *FALL RIVER OVERTURE* AS PART OF A RESEARCH STUDY. BASICALLY, WE HAVE 6 WEEKS TO PRACTICE THESE PIECES TO SEE HOW WELL WE CAN PLAY THEM. AT THE END OF SIX WEEKS, WE WILL BE RECORDED PLAYING THE PIECES.
10. Aside from this announcement, during rehearsals please do not draw extra attention to the fact that the music is being played for a research study.
11. If students ask what we are studying or inquire further about the study, please say:
    A RESEARCHER FROM THE UNIVERSITY OF FLORIDA IS LOOKING AT

DIFFERENT WAYS THAT PEOPLE PRACTICE. If possible, please do not elaborate further on the purpose of the experiment.

12. During the rehearsals, please do not draw any attention to the fact that you may be using rehearsal techniques that are different or unusual. During the study, if you are asked to use an unusual rehearsal technique, approach this as if it were a completely normal part of your own teaching and not a technique being requested of you by researchers.
13. During rehearsal, please do not single out any student to play individually. You may rehearse different sections (e.g., the clarinet section), but not individual students.
14. I will maintain close contact with you throughout the treatment period. If any concerns arise, please contact me immediately at [personal contact information].

GROUP 1
PRELIMINARY WEEK, DAY 1

INTRODUCTION TO MENTAL PRACTICE

Please read the following script to the students:

TODAY WE ARE GOING TO START TALKING ABOUT HOW TO USE MENTAL PRACTICE TO IMPROVE OUR PLAYING.

WHEN I SAY "MENTAL PRACTICE," I MEAN THAT YOU BASICALLY IMAGINE YOURSELF PLAYING YOUR INSTRUMENT WITHOUT ACTUALLY PLAYING IT.

WHEN YOU WATCH A PROFESSIONAL BASKETBALL GAME ON TV, AT SOME POINT IN THE GAME A PLAYER WILL STEP UP TO THE FOUL LINE TO SHOOT FOUL SHOTS. LOTS OF TIMES, YOU WILL SEE THE PLAYER STAND AT THE LINE AND PAUSE FOR A COUPLE OF SECONDS BEFORE SHOOTING THE BALL. WHAT DO YOU THINK IS GOING ON IN THE PLAYER'S MIND DURING THOSE SECONDS BEFORE THEY SHOOT THE BALL? THEY ARE WATCHING A MENTAL VIDEO OF THEMSELVES MAKING THE BASKET – IN OTHER WORDS, THEY ARE IMAGINING WHAT THE PERFECT FOUL SHOT LOOKS LIKE RIGHT BEFORE THEY TAKE THE SHOT.

THE SAME THING HAPPENS WHEN YOU WATCH A FOOTBALL GAME. WHEN THE KICKER COMES OUT TO KICK A FIELD GOAL, YOU USUALLY SEE HIM OFF BY HIMSELF, NOT SPEAKING TO ANYONE. HE LOOKS LIKES HE IS DEEPLY FOCUSED. DURING THIS TIME THE KICKER IS IMAGINING HIMSELF MAKING THE PERFECT KICK IN THE MOMENTS RIGHT BEFORE HE KICKS THE FIELD GOAL. GOLFERS DO IT BEFORE THEY DRIVE THE BALL, TENNIS PLAYERS DO IT BEFORE THEY SERVE THE BALL, AND BASEBALL PITCHERS DO IT BEFORE THEY THROW A PITCH.

ALL OF THESE ATHLETES ARE ABLE TO IMAGINE THEMSELVES PERFORMING THE TASK SUCCESSFULLY IN THEIR MINDS, AND BECAUSE OF THIS THEIR BODIES ARE BETTER ABLE TO DO WHAT THEY HAVE MENTALLY PRACTICED

WHY DO YOU THINK THIS WORKS? WHY DOES MENTAL PRACTICE HELP THEM PERFORM BETTER? (Allow students to respond).

HERE'S WHY MENTAL PRACTICE HELPS PEOPLE TO PERFORM: WHEN YOU PHYSICALLY DO SOMETHING, LIKE PLAYING AN INSTRUMENT, CERTAIN PARTS OF YOUR BRAIN ARE ACTIVATED.

WHEN YOU IMAGINE YOURSELF DOING SOMETHING AND YOU ARE REALLY CONCENTRATING ON IT, YOUR BRAIN IS ALSO ACTIVATED SIMILAR TO THE WAY THAT IT IS WHEN YOU ARE ACTUALLY DOING IT

SO YOUR BRAIN SHOWS SOME OF THE SAME ACTIVITY WHEN YOU ARE IMAGINING YOURSELF PLAYING YOUR INSTRUMENT THAT IT DOES WHEN YOU ARE ACTUALLY PLAYING.

OVER THE NEXT COUPLE OF DAYS, WE ARE GOING TO DO SOME EXERCISES THAT WILL HELP YOU TO MENTAL PRACTICE ON YOUR INSTRUMENT.

WE'LL DO ONE OF THOSE EXERCISES RIGHT NOW!

Imagery Exercise
The following exercise is designed to provide students with an initial experience with basic imagery. Please read the following instructions to the students:

FIRST, I WANT YOU TO IMAGINE WHAT AN ORANGE LOOKS LIKE. DO YOU HAVE THAT IMAGE IN YOUR HEAD? TRY TO MAKE IT AS CLEAR A PICTURE AS POSSIBLE. NOTICE ALL THE DETAILS OF THE ORANGE. (Pause briefly for students to imagine this picture).

NOW CHOOSE A FAMILY MEMBER, AND IMAGINE WHAT THEIR FACE LOOKS LIKE. TRY TO IMAGINE THE PERSON'S FACE IN GREAT DETAIL, AND TRY TO MAKE THE PICTURE AS CLEAR AS POSSIBLE. (Pause briefly for students to imagine this picture).

WHEN YOU CAN SEE SOMETHING IN YOUR HEAD WITHOUT IT ACTUALLY BEING HERE, THAT IS CALLED IMAGERY.

LET'S DO ANOTHER IMAGERY EXERCISE.

LOOK AT YOUR INSTRUMENT RIGHT NOW, AND TRY TO MEMORIZE EXCATLY WHAT IT LOOKS LIKE.

NOW CLOSE YOUR EYES. IMAGINE WHAT YOUR INSTRUMENT LOOKS LIKE. THIS SHOULD BE EASY BECAUSE YOU JUST LOOKED AT IT – NOW JUST RECALL THAT IMAGE.

NOW, KEEP IMAGINING THAT PICTURE OF YOUR INSTRUMENT, BUT I WANT YOU TO CHANGE ITS COLOR TO BLUE. (Pause), NOW CHANGE ITS COLOR TO RED. (Pause). NOW CHANGE IT TO GREEN. (Pause) NOW MAKE IT TURN BACK TO THE ORIGINAL COLOR.
GOOD.

NOW KEEP IMAGINING THAT PICTURE OF YOUR INSTRUMENT, BUT I WANT YOU TO MAKE IT SLOWLY GROW BIGGER AND BIGGER IN SIZE. IMAGINE THAT IT IS AS BIG AS A CAR. NOW SLOWLY SHRINK IT DOWN TO THE TINIEST SIZE. MAKE IT VERY TINY, ABOUT THE SIZE OF A PAPER CLIP, AND HOLD YOUR TINY INSTRUMENT IN YOUR HAND. (Pause).
GOOD! NOW OPEN YOUR EYES.

IMAGERY DOESN'T JUST HAPPEN WITH SEEING IMAGES. YOU CAN IMAGINE SOUND, SMELL, TOUCH, AND MOVEMENT.

LET'S PRACTICE HEARING MUSIC IN YOUR HEAD. THIS HAPPENS ALL THE TIME WHEN YOU SAY "I CAN'T GET THAT SONG OUT OF MY HEAD!"
IMAGINE A GROUP OF PEOPLE SINGING HAPPY BIRTHDAY. (Pause).
CAN YOU HEAR THE SONG IN YOUR HEAD?
NOW IMAGINE THE SONG AT THIS TEMPO – (Give the tempo for mm=120 with a metronome, and turn it off. Pause while the students imagine the song at that speed.)

GOOD. NOW IMAGINE THE SONG BEING SUNG AT A TERRIBLY SLOW TEMPO, AS IF ALL THE PEOPLE WERE MOVING IN SLOW MOTION. (Pause).

NOW IMAGINE THAT THOSE PEOPLE ARE SINGING HAPPY BIRTHDAY AT THE TOPS OF THEIR LUNGS - THEY ARE PRACTICALLY YELLING THE SONG. (Pause).
NOW IMAGINE THEM SINGING IT VERY SOFTLY, ALMOST A WHISPER. (Pause).
GOOD! TODAY WE TALKED ABOUT IMAGINING BOTH VISUAL IMAGES AND SOUND. TOMORROW WE WILL CONTINUE WITH SOME MORE MENTAL PRACTICE EXERCISES.

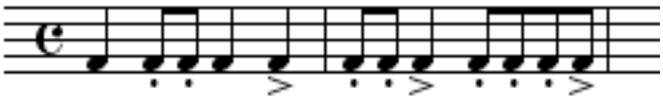
GROUP 1
PRELIMINARY WEEK, DAY 2

AURAL IMAGERY

Please read the following script to the students:

YESTERDAY WE TALKED ABOUT MENTAL PRACTICE. WE ALSO TALKED ABOUT DIFFERENT TYPES OF IMAGERY. WHEN YOU IMAGINE A VISUAL IMAGE, SUCH AS A PICTURE OF A FRIEND'S FACE, IT IS CALLED VISUAL IMAGERY. WHEN YOU IMAGINE SOUNDS, LIKE THE SOUND OF PEOPLE SINGING HAPPY BIRTHDAY, IT IS CALLED AURAL IMAGERY.
BECAUSE AURAL IMAGERY DEALS WITH SOUND, WE WILL USE IT A LOT IN PRACTICING MUSIC. LET'S PRACTICE SOME AURAL IMAGERY SKILLS NOW.

Write the following rhythm on the board:



Then say:

LET'S PLAY THIS RHYTHM ON AN F CONCERT PITCH.

Have the group play the rhythm while you conduct. Then say:

PLAY IT AGAIN, AND THIS TIME I WANT YOU TO TRY TO MEMORIZE THE SOUND OF THE BAND AS IT PLAYS.

Have the group play the rhythm while you conduct. Then say:

NOW THIS TIME, DON'T PLAY. I AM GOING TO CONDUCT AND I WANT YOU TO HEAR THE BAND PLAYING THE RHYTHM IN YOUR HEAD. IT'S LIKE PLAYING A MENTAL TAPE OF WHAT YOU JUST PLAYED.

Conduct the rhythm while the group tries to "play" it mentally. Then say:

WERE YOU ABLE TO HEAR THE BAND IN YOUR HEAD? COULD YOU HEAR THE ACCENTS AND STACCATO MARKS? TRY IT AGAIN.

Conduct the rhythm while the group tries to "play" it mentally. Then say:

THIS TIME I WANT YOU TO PLAY THE RHYTHM THREE TIMES IN A ROW. THE FIRST TIME, I WANT YOU TO PLAY IT, THE SECOND TIME, I WANT YOU TO IMAGINE IT WITHOUT PLAYING, AND THE THIRD TIME, I WANT YOU TO PLAY IT AGAIN. SO THE SEQUENCE IS PLAY – IMAGINE – PLAY. I WILL CONDUCT THE WHOLE TIME.

Conduct the rhythm three times in a row without stopping. Then say:

GOOD. LET'S TRY IT ONE MORE TIME.

Conduct the rhythm three times in a row without stopping. Then say:

NOW I WANT YOU TO TRY TO MEMORIZE WHAT CERTAIN INSTRUMENTS SOUND LIKE. FOR EXAMPLE, I WANT YOU TO BE ABLE TO IMAGINE THE DIFFERENCE BETWEEN A FLUTE SOUND AND A SAXOPHONE SOUND. LET'S PRACTICE IT NOW.

WE WILL DO THE SAME THING AS BEFORE – WE'LL DO THE RHYTHM THREE TIMES. WE WILL PLAY IT ONCE, IMAGINE IT ONCE, AND THEN PLAY IT AGAIN. THE DIFFERENCE IS, THIS TIME I'M GOING TO CHOOSE A SECTION OF THE BAND TO PLAY THE RHYTHM, AND ONLY THAT SECTION WILL PLAY. I WANT YOU TO LISTEN TO THAT SECTION AND MEMORIZE THE SOUND OF THE INSTRUMENT, AND WHEN YOU IMAGINE IT I WANT YOU TO REPRODUCE THAT SOUND IN YOUR MIND EXACTLY AS YOU HEARD IT.

THE FIRST INSTRUMENT TO PLAY WILL BE FLUTE.

Conduct the rhythm three times in a row without stopping. Only the flutes play the first time, the students imagine a flute sound the second time, and the flutes play the rhythm on the third and final time. Then say:

WAS EVERYONE ABLE TO HEAR THE SOUND OF THE FLUTE?
GOOD LET'S TRY ANOTHER.

Repeat the exercise with the following sections to play the rhythm.

Clarinet
Trumpet
Alto Sax
Trombone
Tuba
Mallet Percussion

Then say:
NOW I WANT TO REPEAT THIS EXERCISE WITH EVERYONE PLAYING THE RHYTHM. NOTICE HOW ALL THE SOUNDS THAT YOU JUST HEARD

COMBINE TO MAKE THE ENSEMBLE SOUND. MEMORIZE THIS ENSEMBLE SOUND.

Conduct the rhythm three times in a row without stopping. Then say:

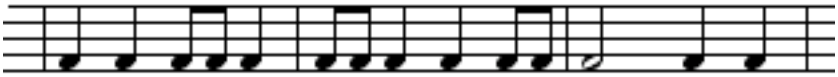
GOOD JOB! DURING THE REST OF THE DAY, TRY TO PRACTICE HEARING DIFFERENT SONGS IN YOUR HEAD. TRY TAKING A ROCK SONG YOU LIKE A LOT AND HEARING IT PLAYED BY DIFFERENT INSTRUMENTS. YOU COULD TRY IMAGINING THAT A ROCK SONG IS BEING PLAYED BY A SYMPHONY OR BY A MARCHING BAND. IF THE SONG IS SUNG BY A MAN, IMAGINE A WOMAN SINGING IT, AND VICE VERSA. YOU COULD ALSO IMAGINE THE SONG BEING PLAYED AT A REALLY SLOW OR REALLY FAST TEMPO. THE MORE YOU USE YOUR AURAL IMAGERY, THE BETTER YOU'LL BE AT IT! TOMORROW WE WILL TRY SOME DIFFERENT EXERCISES.

GROUP 1
PRELIMINARY WEEK, DAY 3

DEVELOPING AURAL AND VISUAL IMAGERY

In this exercise, students will be shown a rhythm, and then the rhythm will be removed. After a brief period of time, students will be asked to play the rhythm. The purpose of this exercise is that in order to remember the rhythm once it is taken away, students will have to either sing it in their heads, maintain a visual picture of the rhythm, or both. If the rhythms become too difficult for the students to remember, you may simplify this exercise by using only one or two measures of the three-measure rhythm.

Write the following rhythm on the blackboard or overhead:



Give the following instruction:

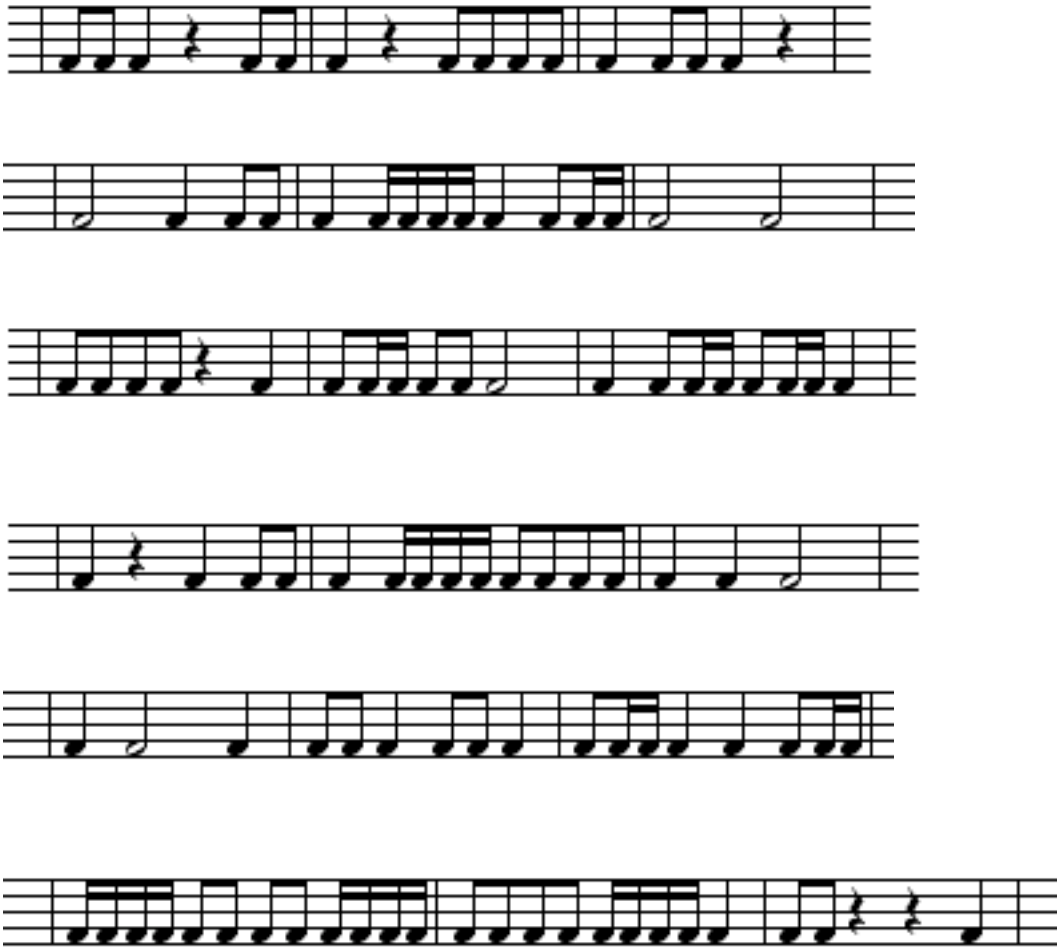
PLEASE LOOK AT THE RHYTHM ON THE BOARD. STUDY IT CAREFULLY, BECAUSE I AM ABOUT TO ERASE IT AND YOU ARE GOING TO HAVE TO PLAY IT!

Wait between fifteen to twenty seconds and erase the rhythm completely. Then wait approximately fifteen seconds, and then ask the students to play the rhythm on an F concert pitch. Then say:

GOOD. WE ARE GOING TO DO THIS SEVERAL MORE TIMES. I AM GOING TO GIVE YOU A RHYTHM AND YOU WILL HAVE A COUPLE OF SECONDS TO STUDY IT. TRY TO MEMORIZE WHAT IT LOOKS LIKE AND WHAT IT SOUNDS LIKE. THEN I WILL ERASE IT. I WILL WAIT FOR A PERIOD OF TIME BEFORE I ASK YOU TO PLAY IT. DURING THE TIME THAT YOU ARE WAITING TO PLAY, YOU SHOULD TRY TO SING THE RHYTHM OVER AND OVER IN YOUR HEAD, AND TRY TO CONTINUE TO SEE WHAT IT LOOKED LIKE.

HERE IS THE NEXT RHYTHM.

Write the next rhythm on the board. Give the students approximately fifteen to twenty seconds to study it and then erase it. Wait approximately fifteen seconds, and then ask the students to play the rhythm. If you feel that the rhythms are too difficult, you may use only the first two measures of each example. Use the following rhythms:



GROUP 1
PRELIMINARY WEEK, DAY 4

INTRODUCTION TO MOTOR IMAGERY

Please give the following instructions to the students:

THE PAST COUPLE OF DAYS, WE HAVE USED VISUAL IMAGERY TO IMAGINE PICTURES AND AURAL IMAGERY TO IMAGINE SOUNDS. TODAY, WE ARE GOING TO USE A THIRD TYPE OF IMAGERY CALLED MOTOR IMAGERY. MOTOR IMAGERY INVOLVES TRYING TO IMAGINE HOW SOMETHING FEELS WITHOUT ACTUALLY DOING IT. IF I ASKED A PROFESSIONAL BASKETBALL PLAYER TO IMAGINE WHAT IT FEELS LIKE TO MAKE A FOUL SHOT, HE OR SHE WOULD BE ABLE TO IMAGINE THE FEELING OF EACH MUSCLE USED TO MAKE THE BASKET. WE CAN DO SOMETHING SIMILAR IN MUSIC. LET'S DO AN EXERCISE WITH MOTOR IMAGERY NOW.

HOLD YOUR INSTRUMENT IN PLAYING POSITION.
NOW PLAY A Bb CONCERT SCALE.

Conduct the students in a Bb Concert scale.

NOW I WANT YOU TO JUST AIR AND FINGER THE SCALE – YOU WILL DO THE FINGERINGS, AND BLOW AIR THROUGH THE INSTRUMENT, BUT DO NOT PLAY. FOR PERCUSSIONISTS, YOU WILL MOVE THE MALLETS OVER THE RIGHT BARS AS IF YOU WERE GOING TO STRIKE THEM, BUT DON'T ACTUALLY HIT THEM. TRY TO HEAR THE SCALE IN YOUR HEAD AS WE DO THIS.

Conduct the students in a silent Bb Concert scale as they finger and blow air.

NOW CONTINUE TO HOLD YOUR INSTRUMENT UP AND LEAVE YOUR FINGERS ON THE KEYS BUT DON'T MOVE THEM AT ALL. WE WILL DO THE SCALE WITH AIR ONLY. TRY TO IMAGINE WHAT YOUR FINGERS WOULD FEEL LIKE AS THEY PLAY THE SCALE, BUT DON'T ACTUALLY MOVE THEM. HEAR THE SCALE IN YOUR HEAD AS WE DO THIS. CONCENTRATE ON IMAGINING THE FEELING OF YOUR HANDS AND FINGERS.

Conduct the students in a silent Bb Concert scale as they blow air only.

NOW PLACE YOUR INSTRUMENT IN YOUR LAP. REMOVE YOUR HANDS FROM THE INSTRUMENT SO THAT YOUR HANDS ARE NOT TOUCHING IT. I WILL SING THE SCALE, AND YOU WILL IMAGINE YOUR FINGERS MOVING. TRY TO FEEL THE MUSCLES TIGHTENING INSIDE YOUR FINGERS AS THEY ARE MOVED, BUT DON'T ACTUALLY MOVE THEM.

Conduct and sing the scale as students imagine the muscle movements.

WERE YOU ABLE TO IMAGINE THE FEELING OF YOUR FINGERS MOVING TO THE RIGHT POSITIONS? TRY PRACTICING THIS TECHNIQUE AT HOME. TOMORROW WE WILL TRY ANOTHER MENTAL PRACTICE EXERCISE.

GROUP 1
PRELIMINARY WEEK, DAY 5

INTERNAL AND EXTERNAL PERSPECTIVES

Please give the following instructions to the students:

WHEN A PROFESSIONAL BASKETBALL PLAYER IMAGINES MAKING A FOUL SHOT, HE OFTEN DOES MENTAL PRACTICE BY TRYING TO SEE HIMSELF MAKING THE SHOT. THERE ARE TWO WAYS THAT THE PLAYER CAN SEE HIMSELF. FIRST, HE CAN IMAGINE THE FOUL SHOT FROM OUTSIDE OF HIS OWN BODY, AS IF HE WERE WATCHING HIMSELF ON TV. OR, HE COULD IMAGINE THE FOUL SHOT FROM INSIDE HIMSELF, SEEING THE SHOT AS IT WOULD LOOK FROM HIS OWN EYES.

WHEN YOU SEE YOURSELF FROM OUTSIDE OF YOUR OWN BODY AS IF YOU WERE IN THE AUDIENCE WATCHING YOURSELF, IT IS CALLED EXTERNAL PERSPECTIVE.

WHEN YOU SEE YOURSELF DOING SOMETHING JUST AS YOU WOULD SEE IT FROM YOUR OWN EYES, IT IS CALLED INTERNAL PERSPECTIVE.

LET'S PRACTICE BOTH.

PLAY A Bb CONCERT SCALE.

Conduct the students in a Bb Concert scale.

NOW WE ARE GOING TO IMAGINE THAT YOU ARE ABOUT TO PERFORM THAT SCALE ON THE STAGE OF THE SCHOOL AUDITORIUM FOR A FULL AUDIENCE.

I WANT YOU TO IMAGINE THIS USING AN EXTERNAL PERSPECTIVE, SO IMAGINE IT AS IF YOU WERE AN AUDIENCE MEMBER WATCHING YOURSELF PERFORM ON STAGE. NOW CLOSE YOUR EYES. IMAGINE YOURSELF WALKING ONTO THE STAGE OF OUR SCHOOL AUDITORIUM. NOW IMAGINE YOURSELF PUTTING YOUR INSTRUMENT UP TO YOUR MOUTH, AND HEAR AND SEE YOURSELF PLAYING THE SCALE PERFECTLY.

Pause while students imagine this scene.

GOOD. WAS EVERYONE ABLE TO SEE AND HEAR THE PERFORMANCE? IT SHOULD BE LIKE WATCHING A MOVIE OF YOURSELF.

NOW I WANT YOU TO IMAGINE THAT SCENE FROM A DIFFERENT PERSPECTIVE, FROM THE INTERNAL OR 1ST PERSON PERSPECTIVE. TRY TO SEE THE WHOLE PERFORMANCE FROM YOUR OWN EYES. NOW, WALK ON THE STAGE AND LOOK OUT INTO THE AUDIENCE. NOW IMAGINE PLACING THE INSTRUMENT TO YOUR LIPS AND HEAR AND SEE YOURSELF PLAYING THE SCALE PERFECTLY.

Pause while students imagine this scene. Then say:

GOOD. THIS WEEK WE HAVE TALKED A LOT ABOUT MENTAL PRACTICE. WE HAVE DISCUSSED DIFFERENT TYPES OF IMAGERY- VISUAL IMAGERY, AURAL IMAGERY, AND MOTOR IMAGERY. WE HAVE TALKED ABOUT SEEING YOURSELF FROM AN INTERNAL PERSPECTIVE OR AN EXTERNAL PERSPECTIVE. WE HAVE ALSO PRACTICED HEARING MUSIC IN OUR HEADS. YOU CAN USE ALL OF THESE TECHNIQUES TO HELP YOURSELF PLAY YOUR INSTRUMENT BETTER. MAKE SURE TO TRY THEM ON YOUR OWN. THE MORE YOU USE THEM, THE BETTER YOU WILL BE AT THEM, AND THE MORE THEY CAN HELP YOU.

GROUP 1 - WEEK ONE, DAY ONE

Make sure that each student has a copy of the music to *Allegro* and *Fall River Overture*.

Allegro

1. Point out the key signature of *Allegro*.
2. Give the tempo (quarter note equals 92) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through the first reading.
4. When finished, go back and play through the entire piece. If possible, do not stop during this second reading.
5. Provide general comments on rhythms and pitches only. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
6. Play through *Allegro* a third and final time.

***Fall River Overture* Excerpt (107-end)**

1. Point out the key signature of *Fall River Overture* at 107.
2. Give the tempo (quarter note equals 116) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Do not provide comments at this time.
5. Play from 107 to the end again.

GROUP 1 - WEEK ONE, DAY TWO

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play through the first 20 measures of the piece and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of the first 20 measures during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms and pitches. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 1 - WEEK TWO, DAY THREE

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 21-38 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 21-38) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms, pitches, articulation, and dynamics. Do not isolate any instrument section or any passage of the music at this time.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 1 - WEEK TWO, DAY FOUR

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 38-72 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 38-72) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the piece. During this time, make sure to address the following concepts:
    a. Woodwind trills at 107, 111, and 124-126. Trills should start on the written note.
    b. Isolate the flute, oboe, and clarinet passage from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 1 - WEEK THREE, DAY FIVE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take 3-4 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. All dynamic markings.
    b. The octave jumps in measure 30 and 34, especially helping the brass players to make these leaps.
5. MENTAL REHEARSAL: Take about 2-3 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 1-20.
    b. Conduct as students play from measure 1-20. Then say:
    c. NOW THIS TIME, WOODWINDS WILL PLAY WHILE BRASS AND PERCUSSION SILENTLY PRACTICE. BRASS PLAYERS FINGER THE NOTES, BLOW AIR INTO THE INSTRUMENT AND TONGUE. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT. TRY TO FINGER AND TONGUE EVERY NOTE PERFECTLY WHILE WOODWINDS PLAY.
    d. Conduct measure 1-20 with woodwinds playing and brass players doing mental practice.
    e. Then have the entire ensemble play the passage.
    f. Then, reverse this by having brass and percussion play while woodwinds silently finger, air, and tongue the notes.
    g. Repeat this procedure for measure 21-38. Make sure to <u>conduct each mental practice trial.</u>
6. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 3 minutes to rehearse the piece. Make sure to address the following concepts:
    a. Isolate the trumpet part from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
    b. Isolate accompaniment (low woodwinds, low brass) from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations. Ask the ensemble to look back at measure 99 for the correct articulation to use in this section.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 107-115.

b. Conduct as students play from measure 107-115. Then say:
c. NOW THIS TIME, WOODWINDS WILL PLAYWHILE BRASS AND PERCUSSION SILENTLY PRACTICE. BRASS PLAYERS FINGER THE NOTES, BLOW AIR INTO THE INSTRUMENT AND TONGUE. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT. TRY TO FINGER AND TONGUE EVERY NOTE PERFECTLY WHILE WOODWINDS PLAY.
d. Conduct m. 107-115 with woodwinds playing and brass players doing mental practice.
e. Now have the entire ensemble play the passage.
f. Then, reverse this by having brass and percussion play while woodwinds silently finger, air, and tongue the notes.

5. Play through the *Fall River Overture* excerpt a final time.

GROUP 1 - WEEK THREE, DAY SIX

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-60.
4. OPEN REHEARSAL: Take 4 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Articulations in measure 60.
    b. The octave jumps in measure 55.
    c. The slurred sections from measure 48-52.
5. MENTAL REHEARSAL: Take about 3 minutes to mentally rehearse this section using the following script:
    a. PLEASE PLAY FROM MEASURE 39-48. STOP ON THE FIRST NOTE AT 48.
    b. Conduct as students play from measure 39-48. Then say:
    c. NOW, PLACE THE INSTRUMENT IN PLAYING POSITION, AND I WANT YOU TO FINGER THE NOTES, BLOW AIR INTO THE INSTRUMENT AND TONGUE. DO NOT PLAY – JUST FINGERS, AIR, AND TONGUE. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD AS IF IT WERE PLAYED PERFECTLY.
    d. Conduct measures 39-48 while students air, tongue, and finger the notes. Then say:
    e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
    f. NOW, I WANT YOU TO ONLY FINGER THE NOTES – NO AIR OR TONGUING. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT, JUST AS YOU DID BEFORE. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD.
    g. Conduct measures 39-48 while students finger the notes. Then say:
    h. NOW I WANT YOU TO PLACE YOUR INSTRUMENT IN YOUR LAP AND STAY PERFECTLY STILL. NO FINGERS, NO MALLETS – NOTHING MOVES. LOOK AT YOUR MUSIC AND AS I CONDUCT IT, I WANT YOU TO HEAR IT IN YOUR HEAD. TRY TO IMAGINE WHAT IT SOUNDS LIKE WHEN IT IS PLAYED PERFECTLY.
    i. Conduct measures 39-48 while students silently rehearse. Then say:
    j. GOOD. NOW PICK UP YOUR INSTRUMENTS AND PLAY THIS SECTION.
    k. Conduct the students while they physically play the section.
    l. Now repeat this mental rehearsal technique (steps A-J) for measures 46-60.
6. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 2 minutes to rehearse the piece. Make sure to address the following concepts:
    a. Rehearse the section from 114-118. Make sure the ensemble plays the crescendi in measure 115 and 117, as well as marcato eighth notes in measures 116-117.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 107 TO THE END.
    b. Conduct as students play from measure 107 to the end.
    c. NOW, PLACE THE INSTRUMENT IN PLAYING POSITION, AND I WANT YOU TO FINGER THE NOTES WHILE YOU BLOW AIR INTO THE INSTRUMENT AND TONGUE. DO NOT PLAY – JUST FINGERS, AIR, AND TONGUE. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD.
    d. Conduct measures 107 the end while students air, tongue, and finger the notes. Then say:
    e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
    f. NOW, I WANT YOU TO ONLY FINGER THE NOTES – NO AIR AND TONGUING. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT, JUST AS YOU DID BEFORE. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD.
    g. Conduct measure 107 to the end while students finger the notes. Then say:
    h. NOW I WANT YOU TO PLACE YOUR INSTRUMENT IN YOUR LAP AND STAY PERFECTLY STILL. NO FINGERS, NO MALLETS, NOTHING MOVES. LOOK AT YOUR MUSIC AND AS I CONDUCT IT, I WANT YOU TO HEAR IT IN YOUR HEAD. TRY TO IMAGINE WHAT IT SOUNDS LIKE WHEN IT IS PLAYED PERFECTLY.
    i. Conduct measures 107-118 while students silently rehearse. Then say:
    j. GOOD. NOW PICK UP YOUR INSTRUMENTS AND PLAY THIS SECTION.
    k. Conduct as students play from measure 107 to the end.
5. Play through the entire *Fall River Overture* excerpt.

GROUP 1 - WEEK FOUR, DAY SEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL INCORPORATING MENTAL PRACTICE: Take 6-7 minutes to rehearse this section (measures 1-38). During this time, make sure to address the following concepts:
    a. Make sure to rehearse the articulations, accidentals and dynamics in measures 35-38.
    b. During this rehearsal time, isolate 4 different sections of music (about 4-8 measures each) and ask students to mentally practice them using the same procedure as before. The procedure should be:
        - Air, tongue, and fingers (or air mallets for percussion)
        - Fingers only (no air)
        - Mental practice only with no movement.

        Continue to encourage students to focus on hearing the sound of the music as if it were being played perfectly.
    c. Disperse these 4 mental practice trials throughout the open rehearsal as you see fit. Always conduct during mental rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 2 minutes to rehearse measures 118-125. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the crescendi in measure 119 and 121
    b. Make sure all brass accents are observed. Quarter note accents should have a slight space in between them.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 118-130.
    b. Conduct as students play from measure 118-130. Then say:
    c. NOW, PLACE THE INSTRUMENT IN PLAYING POSITION, AND I WANT YOU TO FINGER THE NOTES WHILE YOU BLOW AIR INTO THE INSTRUMENT AND TONGUE. DO NOT PLAY – JUST FINGERS, AIR, AND TONGUE. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD.
    d. Conduct measures 118-130 while students air, tongue, and finger the notes. Then say:

   e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
   f. NOW, I WANT YOU TO ONLY FINGER THE NOTES – NO AIR AND TONGUING. PERCUSSION SHOULD MOVE THE MALLETS JUST ABOVE THE KEYBOARD WITHOUT TOUCHING IT, JUST AS YOU DID BEFORE. AS YOU DO THIS, TRY TO HEAR THE MUSIC IN YOUR HEAD.
   g. Conduct measures 118-130 while students finger the notes. Then say:
   h. NOW I WANT YOU TO PLACE YOUR INSTRUMENT IN YOUR LAP AND STAY PERFECTLY STILL. NO FINGERS, NO MALLETS, NOTHING MOVES. LOOK AT YOUR MUSIC AND AS I CONDUCT IT, I WANT YOU TO HEAR IT IN YOUR HEAD. TRY TO IMAGINE WHAT IT SOUNDS LIKE WHEN IT IS PLAYED PERFECTLY.
   i. Conduct measures 118-130 while students silently rehearse. Then say:
   j. GOOD. NOW PICK UP YOUR INSTRUMENTS AND PLAY THIS SECTION.
   k. Conduct as students play from measures 118-130.

5. Play through the entire *Fall River Overture* excerpt a final time.

GROUP 1 - WEEK FOUR, DAY EIGHT

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-60 and stop.
4. OPEN REHEARSAL INCORPORATING MENTAL PRACTICE: Take about 7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Isolate and rehearse m. 21-30, 35-38, 54-59, and measure 60 for correct notes, rhythms, dynamics, and articulations.
    b. During this time, you will use a slow motion method on the following five sections: m. 21-24, 25-30, 35-38, 54-59, and measure 60. The procedure you will use is as follows:
        i. Play the isolated section (e.g., m. 21-24) at a slower tempo close to mm=60.
        ii. Ask students to mental practice the section in slow motion by saying: NOW I WANT YOU TO MENTALLY PRACTICE THIS SECTION IN SLOW MOTION. HEAR IT PERFECTLY PLAYED IN YOUR HEAD, AND IMAGINE YOUR FINGERS MOVING TO THE CORRECT POSITIONS FOR EACH NOTE. BUT DO NOT MOVE ANY PART OF YOUR BODY. REMAIN COMPLETELY STILL AND PLAY A MENTAL RECORDING OF THE PASSAGE IN YOUR HEAD.
        iii. Then, physically play the section in slow motion.
        iv. Play the section at the correct tempo.
    c. Repeat this procedure for the remaining 4 sections. Disperse these 5 mental practice trials throughout the open rehearsal as you see fit. Stress correct notes, rhythms, dynamics, and articulations. Always conduct during mental rehearsal.
5. Conclude this session by playing through the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 2 minutes to rehearse measures 118-125. During this time, make sure to address the following concepts:
    a. Isolate the flute, oboe, clarinet, and alto sax line. Make sure the staccato articulations are observed.
    b. In measures 121 and 122, make sure that all woodwind accidentals are being played correctly.
    c. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.

d. MENTAL REHEARSAL: Take about 2 minutes to use the previous slow motion method on the following sections: m.107-113 and m. 114-117. The procedure you will use is as follows:
    i. Play the isolated section (e.g., m. 107-113) at a slower tempo close to mm=60.
    ii. Ask students to mental practice the section in slow motion by saying: NOW I WANT YOU TO MENTALLY PRACTICE THIS SECTION IN SLOW MOTION. HEAR IT PERFECTLY PLAYED IN YOUR HEAD, AND IMAGINE YOUR FINGERS MOVING TO THE CORRECT POSITIONS FOR EACH NOTE. BUT DO NOT MOVE ANY PART OF YOUR BODY. REMAIN COMPLETELY STILL AND PLAY A MENTAL RECORDING OF THE PASSAGE IN YOUR HEAD.
    iii. Then, physically play the section in slow motion.
    iv. Play the section at the correct tempo.

e. Repeat this procedure for the next section (m. 114-117). Stress for correct notes, rhythms, dynamics, and articulations. Always conduct during mental rehearsal.

4. Play through the entire *Fall River Overture* excerpt a final time.

GROUP 1 - WEEK FIVE, DAY NINE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take about 5 minutes to rehearse this section (measures 1-38). Correct student problems as you see fit. During this time, make sure to address the following concepts:
    a. Stress correct notes, rhythms, dynamics, and articulations in measures 15-20.
    b. Accented quarter notes measures 1-4 should have a very slight space in between them.
    c. Quarter notes in measures 8, 16 and 20 should be held for their full value.
5. MENTAL REHEARSAL: Take about 2 minutes to mental practice this section using the following procedure:
    a. Have students play measures 1-38.
    b. Now ask students to silently finger measures 21-38, on their own (no conducting). Tell them to look at the music and hear it in their head, <u>but to also watch their fingers/hands and memorize what they look like while they are playing.</u>
    c. Now say:
    PUT YOUR INSTRUMENT IN YOUR LAPS AND MALLETS DOWN. I WANT YOU LOOK AT THE MUSIC AND MENTAL PRACTICE MEASURES 21-38. TRY TO HEAR YOURSELF PLAYING THE MUSIC PERFECTLY IN YOUR HEAD. ALSO, TRY TO GET A VISUAL PICTURE OF WHAT YOUR HANDS AND FINGERS LOOK LIKE WHEN YOU ARE PLAYING. IMAGINE THEM MOVING TO THE RIGHT POSITIONS, BUT DON'T MOVE THEM.
    d. Conduct measures 21-38 while the students mentally practice a visual image of their fingerings.
    e. Play measures 21-38.
6. To close, play the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 5 minutes to rehearse measures 124-130. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the correct rhythm in measures 127-128.
    b. The accented notes in measures 127-128 should have a slight space between them.

   c. Make sure the ensemble plays a fp and crescendo in measure 129, and ff in measure 130. The crescendo should only be played in measure 129 and should not continue through bar 130.
   d. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.
4. MENTAL REHEARSAL: Choose a point in rehearsal to have students mental practice measures 124-130 using the same procedure as before, using the following script:
   a. Have students play measures 124-130.
   b. Now ask students to silently finger measures 124-130, on their own (no conducting). Tell them to look at the music and hear it in their head, <u>but to also watch their fingers/hands and memorize what they look like while they are playing.</u>
   c. Now say:
      PUT YOUR INSTRUMENT IN YOUR LAPS AND MALLETS DOWN. I WANT YOU LOOK AT THE MUSIC AND MENTAL PRACTICE MEASURES 124-130, BUT THIS TIME I WANT YOU TO DO TWO THINGS AT ONCE. FIRST, HEAR YOURSELF PLAYING THE MUSIC PERFECTLY IN YOUR HEAD. SECOND, GET A VISUAL PICTURE OF WHAT YOUR HANDS AND FINGERS LOOK LIKE WHEN YOU ARE PLAYING. IMAGINE THEM MOVING TO THE RIGHT POSITIONS, BUT DON'T MOVE THEM.
   d. Conduct measures 124-130 while the students mentally practice a visual image of their fingerings.
   e. Play measures 124-130.
5. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 1 - WEEK FIVE, DAY TEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-72.
4. OPEN REHEARSAL: Take about 5 minutes to rehearse this section (measures 39-72). During this time, make sure to address the following concepts:
    a. Correct notes, rhythms, articulations in measures 39-47.
    b. Accidentals: Point out to the students that this section has many accidentals. Warn them that after playing concert B naturals in measures 41 and 43, measure 45 goes back to B flat. Similarly, after playing many concert A naturals, we go back to A flat in measure 60.
5. MENTAL PRACTICE: Take about 2-3 minutes to mental practice this section using the following procedure:
    a. Give the following instructions: WE ARE GOING TO PLAY FROM 39-45, PLEASE FIND THIS SECTION OF THE PIECE. WHEN YOU PLAY THROUGH IT, I WANT YOU TO CONCENTRATE ON WHAT IT FEELS LIKE TO PLAY IT – THINK ABOUT WHAT YOUR FINGERS AND HANDS FEEL LIKE AS YOU PLAY EACH NOTE, AND WHAT YOUR EMBOUCHURE AND TONGUE FEEL LIKE AS YOU PLAY EACH NOTE.
    b. Play through measures 39-45. Then say:
    c. NOW I WANT YOU TO DO THE FINGERINGS ONLY FOR MEASURES 39-45. TRY TO MEMORIZE THE FEELING OF YOUR FINGERS AND HANDS AS YOU DO IT, AND TRY TO HEAR THE MUSIC IN YOUR HEAD.
    d. Conduct silently through measures 39-45 as students silently finger. Then say:
    e. NOW PUT YOUR INSTRUMENT IN YOUR LAP, AND MENTALLY PRACTICE THIS SECTION WITHOUT MOVING ANY MUSCLE. CONCENTRATE ON WHAT IT FEELS LIKE TO PLAY THIS SECTION. TRY TO FEEL YOUR FINGERS AS THEY MOVE TO THE RIGHT NOTES, BUT DON'T MOVE THEM! ALWAYS SING THE MUSIC IN YOUR HEAD.
    f. Conduct silently through measures 39-45. Then say:
    g. WERE YOU ABLE TO IMAGINE THE FEELING OF YOUR HANDS AND FINGERS? NOW DO IT AGAIN, BUT THIS TIME I WANT YOU TO ALSO IMAGINE YOUR EMBOUCHURE AND TONGUE. SO HEAR THE MUSIC IN YOUR HEAD AND IMAGINE WHAT YOUR FINGERS, EMBOUCHURE, AND TONGUE FEEL LIKE AS THEY PLAY.
    h. Conduct through measures 39-45 as students silently finger.
    i. Then physically play the passage.

    j. Repeat this procedure for measures 48-53 and measures 54-60. The procedure is
        i. PLAY
        ii. FINGER
        iii. IMAGINARY FINGER
        iv. IMAGINARY FINGER, EMBOCHURE, AND TONGUE
        v. PLAY
6. Conclude this session by playing through the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the excerpt. During this time, make sure to address the following concepts:
    a. The woodwind line in measures 129-130.
    b. The woodwind run in measure 117.
    c. The articulations in measure 117 at the end of the low brass and low woodwind descending line.
4. MENTAL PRACTICE: Take about 1-2 minutes to rehearse from 107-117 using the following procedure:
    a. NOW I WANT YOU TO DO THE FINGERINGS ONLY FOR MEASURES 107-117. TRY TO MEMORIZE THE FEELING OF YOUR FINGERS AND HANDS AS YOU DO IT, AND TRY TO HEAR THE MUSIC IN YOUR HEAD.
    b. Conduct silently through measures 107-117 as students silently finger.
    c. Then say: NOW PUT YOUR INSTRUMENT IN YOUR LAP, AND MENTALLY PRACTICE THIS SECTION WITHOUT MOVING ANY MUSCLES. CONCENTRATE ON WHAT IT FEELS LIKE TO PLAY THIS SECTION. TRY TO FEEL YOUR FINGERS AS THEY MOVE TO THE RIGHT NOTES, BUT DON"T MOVE THEM! ALWAYS SING THE MUSIC IN YOUR HEAD.
    d. Conduct silently through measures 107-117.
    e. Then physically play the passage from 107-117.
5. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 1 - WEEK SIX, DAY ELEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-72.
4. Take about 7 minutes to rehearse this section. During rehearsal, make sure to address the following concepts:
    a. Dynamics, including all crescendos/decrescendos and the "terraced" dynamics between measures 46-48.
    b. Making the staccato articulation light. It should be detached, not staccatissimo or choppy.
    c. Holding quarter notes for their full value at measure 34, 38, and 59.
    d. Accented quarter notes in measure 40, 42, 53 should have a very slight space in between them.
5. During this rehearsal session, disperse at least 3 mental practice trials as you see fit. Only do mental practice on between 4 and 8 measures at a time. Use this procedure, which simply alternates between physical and mental practice:
    a. PLAY FROM MEASURE ____ TO MEASURE ____.
    b. Conduct as the students play the passage.
    c. NOW PUT YOUR INSTRUMENTS IN YOUR LAP, AND DO A MENTAL RUN THROUGH OF THAT SECTION ON YOUR OWN. I AM NOT GOING TO CONDUCT, SO TAKE YOUR TIME AND THINK THROUGH THE MUSIC. YOU SHOULD HEAR IT IN YOUR HEAD. YOU CAN ALSO TRY TO SEE YOURSELF PLAYING THE PART. SEE YOUR FINGERS MOVING TO THE RIGHT NOTES, OR IMAGINE THE FEELING OF YOUR FINGERS AS YOU PLAY. DO NOT MOVE AT THIS TIME.
    d. Pause for several seconds while the students mental practice the passage.
    e. NOW PLAY FROM MEASURE ____ TO MEASURE ____.
    f. Conduct as the students play the passage.
6. Conclude this session by playing through the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the excerpt. During rehearsal, make sure to address the following concepts:
    a. Balance issues between trumpets, upper woodwinds, and accompaniment (low bras and low woodwinds).
    b. Quarter notes in measures 114-115 should be as written: full value quarters with no accents or staccato. Make a difference between this and the change to accents and marcato in measures 116-117.

4. During this rehearsal session, disperse at least 2 mental practice trials as you see fit. Only do mental practice on between 4 and 8 measures at a time. Use this procedure, which simply alternates between physical and mental practice:
    a. PLAY FROM MEASURE ____ TO MEASURE ____.
    b. NOW PUT YOUR INSTRUMENTS IN YOUR LAP, AND DO A MENTAL RUN THROUGH OF THAT SECTION ON YOUR OWN. I AM NOT GOING TO CONDUCT, SO TAKE YOUR TIME AND THINK THROUGH THE MUSIC. YOU SHOULD HEAR IT IN YOUR HEAD. IF YOU WANT TO, YOU CAN TRY TO SEE YOURSELF PLAYING THE PART. SEE YOUR FINGERS MOVING TO THE RIGHT NOTES, OR IMAGINE THE FEELING OF YOUR FINGERS AS YOU PLAY. DO NOT MOVE AT THIS TIME.
    c. NOW PLAY FROM MEASURE ____ TO MEASURE ____.
5. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 1 - WEEK SIX, DAY TWELVE

Allegro

1. Give the following instruction: NEXT WEEK, SOME OF YOU WILL BE RECORDED PLAYING THIS PIECE. SO TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT YOU FEEL COMFORTABLE WHEN YOU PERFORM IT.
2. Give the tempo of *Allegro* with a metronome.
3. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Now take students through the following mental practice procedure:
    a. ONE OF THE THINGS THAT HELPS MUSICIANS, ATHLETES, DANCERS, AND OTHER PERFORMERS IS TO IMAGINE THEMSELVES IN AN ACTUAL PERFORMANCE. FOR EXAMPLE, A BASKETBALL PLAYER MIGHT IMAGINE MAKING FOUL SHOTS IN AN ACTUAL GAME, AND IMAGINE HERSELF IN UNIFORM, WITH TEAMMATES AROUND, WITH A SCORE ON THE SCOREBOARD, AND WITH OPPOSING FANS TRYING TO DISTRACT HER FROM MAKING THE SHOT. WE ARE GOING TO DO THE SAME THING FOR NEXT WEEK'S "PERFORMANCE" THAT YOU WILL DO ON THIS PIECE.
    b. TO DO THIS, THE ROOM NEEDS TO BE ABSOLUTELY QUIET. PLACE YOUR HORNS IN YOUR LAPS, MALLETS DOWN, AND DO NOT MAKE A SINGLE SOUND. IF YOU HEAR SOMEONE ELSE MAKE A NOISE, IGNORE IT. DO NOT MOVE AT ALL. RELAX AND BREATHE SLOWLY AND DEEPLY.
    c. NOW I AM GOING TO WALK YOU THROUGH THE PERFORMANCE. I WANT YOU TO SEE YOURSELF IN THE PERFORMANCE – YOU CAN IMAGINE FROM OUTSIDE YOURSELF, AS IF SOMEONE ELSE WERE WATCHING YOU, OR FROM INSIDE YOURSELF, LIKE LOOKING THROUGH YOUR OWN EYES. OR YOU CAN TRY BOTH.
    d. NOW CLOSE YOUR EYES. IMAGINE YOURSELF SITTING IN BAND CLASS. THE DOOR OPENS AND SOMEONE CALLS YOU TO COME OUTSIDE TO PLAY FOR THE RECORDING. YOU GET UP, WALK OUT OF THE BAND ROOM AND ACROSS THE HALL TO THE AUDITORIUM. IN THE AUDITORIUM THERE IS A CHAIR AND A STAND WITH MUSIC ON IT. TRY TO GET A GOOD PICTURE IN YOUR HEAD OF THE MUSIC STAND AND CHAIR. IN THE ROOM THERE IS A TABLE WITH RECORDING EQUIPMENT ON IT, AND A MICROPHONE ON A STAND. THERE IS SOMEONE SITTING AT THE TABLE. TAKE A MOMENT AND IMAGINE THE TABLE, RECORDING EQUIPMENT, AND MICROPHONE.
    e. THE PERSON SITTING AT THE TABLE WELCOMES YOU AND TELLS YOU THAT YOU MAY SIT OR STAND. IMAGINE

YOURSELF EITHER SITTING OR STANDING, WHICHEVER YOU PREFER, AND ADJUST YOUR STAND AND MUSIC SO THAT IT IS COMFORTABLE FOR YOU. THE PERSON ASKS YOU TO PLAY *ALLEGRO* AND GIVES YOU THE TEMPO WITH A METRONOME. IMAGINE THE SOUND OF THE METRONOME AT THE CORRECT TEMPO. (Pause briefly)

f. IMAGINE HIM TURNING THE METRONOME OFF. IT IS NOW TIME TO PLAY. IMAGINE YOUR HANDS AND THEIR POSITION ON YOUR INSTRUMENT. TRY TO IMAGINE THE FEELING OF HOLDING YOUR INSTRUMENT BEFORE YOU PUT IT TO YOUR LIPS. NOW IMAGINE YOURSELF RAISING THE INSTRUMENT TO PLAYING POSITION. SEE THE INSTRUMENT. LOOK AT ITS COLOR. IMAGINE YOUR HANDS ON THE INSTRUMENT IN PLAYING POSITION.
g. WE ARE ABOUT TO PLAY THROUGH THE ENTIRE PIECE. WHEN YOU DO THIS, IMAGINE YOURSELF PLAYING THE PIECE PERFECTLY, WITH NO MISTAKES. IMAGINE A BEAUTIFUL SOUND, PERFECT DYNAMICS, AND ALL THE NOTES AND ARTICULATIONS. IMAGINE YOUR FINGERS SNAPPING TO THE CORRECT POSITIONS. WHAT DOES YOUR INSTRUMENT AND BODY FEEL LIKE AS YOU PLAY? I WILL SOUND THE METRONOME FOR YOU AND COUNT YOU OFF, THEN IMAGINE THE PERFORMANCE. I WILL LEAVE THE METRONOME ON FOR YOU DURING THE IMAGINARY PERFORMANCE.
h. Sound the metronome for 8 counts and then count off “ONE, TWO, READY, PLAY” – Leave the metronome on. Follow the score as the students imagine the performance.
i. After the last measure, turn off the metronome and say: GOOD, NOW IMAGINE YOURSELF PUTTING YOUR HORN DOWN. YOU HAVE PLAYED PERFECTLY. THE PERSON BEHIND THE RECORDING EQUIPMENT THANKS YOU. IMAGINE YOURSELF LEAVING THE AUDITORIUM AND RETUNING TO BAND CLASS.
j. OPEN YOUR EYES. LET’S NOW PLAY THROUGH THE PIECE, AND MAKE IT SOUND AS PERFECT AS IT DID IN YOUR IMAGINARY PERFORMANCE.
k. Play the piece from beginning to end. Then say:
l. TRY THIS TECHNIQUE THROUGHOUT THE DAY AND AT HOME THIS WEEKEND. NEXT WEEK, TRY TO DO MENTAL PRACTICE RIGHT BEFORE YOU GO IN TO PLAY FOR THE RECORDING. YOU CAN ALSO DO SOME OF THE MENTAL PRACTICE TECHNIQUES WE HAVE LEARNED WHEN YOU ARE ASKED TO STUDY THE SIGHT-READING PIECE.

***Fall River Overture* Excerpt (107-end)**

1. Give the following instruction: NEXT WEEK, WE WILL BE RECORDED DURING CLASS GIVING A PERFORMANCE OF THIS EXCERPT. TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT WE ARE PREPARED FOR THE RECORDING.
2. Give the tempo (quarter note equals 116) with a metronome.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Now take students through the following mental practice procedure:
    a. THE ROOM NEEDS TO BE ABSOLUTELY QUIET. PLACE YOUR HORNS IN YOUR LAPS, MALLETS DOWN, AND DO NOT MAKE A SINGLE SOUND. IF YOU HEAR SOMEONE ELSE MAKE A NOISE, IGNORE IT. DO NOT MOVE AT ALL. RELAX AND BREATHE SLOWLY AND DEEPLY.
    b. NOW I AM GOING TO WALK YOU THROUGH THE PERFORMANCE. I WANT YOU TO SEE YOURSELF IN THE PERFORMANCE – YOU CAN IMAGINE FROM OUTSIDE YOURSELF, AS IF SOMEONE ELSE WERE WATCHING YOU, OR FROM INSIDE YOURSELF, LIKE LOOKING THROUGH YOUR OWN EYES. OR YOU CAN USE BOTH.
    c. NOW CLOSE YOU EYES. IMAGINE YOURSELF SITTING IN BAND CLASS. RECORDING EQUIPMENT HAS BEEN SET UP TO RECORD YOU. IMAGINE EVERYONE IN THE CLASS SITTING AROUND YOU AND THAT I AM IN FRONT OF THE GROUP READY TO CONDUCT.
    d. WE ARE ABOUT TO MENTALLY PLAY THROUGH THE ENTIRE EXCERPT. WHEN YOU DO THIS, IMAGINE YOURSELF AND THE ENTIRE BAND PLAYING THE PIECE PERFECTLY, WITH NO MISTAKES. IMAGINE A BEAUTIFUL SOUND, PERFECT DYNAMICS, AND ALL THE NOTES AND ARTICULATIONS. IMAGINE YOUR FINGERS SNAPPING TO THE CORRECT POSITIONS. WHAT DOES YOUR INSTRUMENT AND BODY FEEL LIKE AS YOU PLAY? I WILL SOUND THE METRONOME FOR YOU AND COUNT YOU OFF. THEN IMAGINE THE PERFORMANCE. I WILL LEAVE THE METRONOME ON FOR YOU DURING THE IMAGINARY PERFORMANCE.
    e. Sound the metronome for 8 counts and then count off “ONE, TWO, READY, PLAY” – Leave the metronome on. Follow the score as the students imagine the performance.
    f. After the last measure, turn off the metronome and say: GOOD, NOW OPEN YOUR EYES. LET’S NOW PLAY THROUGH THE PIECE, AND MAKE IT SOUND AS PERFECT AS IT DID IN YOUR IMAGINARY PERFORMANCE.
    g. Play the excerpt from beginning to end. Then say:

h. GOOD JOB! NEXT WEEK, TRY TO DO THIS TECHNIQUE AT SOME POINT BEFORE WE PLAY FOR THE RECORDING.

Teacher Script: Unstructured Mental Practice Group (Group 2)

GROUP 2 TEACHER SCRIPT AND INSTRUCTIONS

Thank you once again for agreeing to participate in this research study. It is hoped that this study will provide information on various practice techniques that may be beneficial to high school bands. Please use the following guidelines when rehearsing the music during the study period:

1. Your involvement in the study will last approximately six weeks.
2. Please rehearse the music provided for two days each week for 20 minutes each day. If possible, please spread out the rehearsals so that they are not on consecutive days. For example, an ideal schedule would be to rehearse the music on Tuesdays and Thursdays.
3. Please place the 20-minute rehearsal segment at the beginning of the class period, after the regular warm-up/tuning has taken place.
4. The two pieces being rehearsed for the study are *Allegro* by Telemann and an excerpt from *Fall River Overture* by Robert Sheldon. The *Fall River Overture* excerpt will be from measure 107 to the end of the piece (24 total measures).
5. The following teacher scripts are designed to guide you through each rehearsal. Instructions printed in all capital letters should be read to the student. Instructions in regular lettering serve to guide the teacher through the script.
6. Each 20-minute rehearsal segment is designed to divide the time evenly so that each piece is rehearsed for approximately ten minutes.
7. On the first day of rehearsal, please make the following statement:
   WE ARE GOING TO PLAY *ALLEGRO* AND *FALL RIVER OVERTURE* AS PART OF A RESEARCH STUDY. BASICALLY, WE HAVE 6 WEEKS TO PRACTICE THESE PIECES TO SEE HOW WELL WE CAN PLAY THEM. AT THE END OF SIX WEEKS, WE WILL BE RECORDED PLAYING THE PIECES.
8. Aside from this announcement, during rehearsals please do not draw extra attention to the fact that the music is being played for a research study.
9. If students ask what we are studying or inquire further about the study, please say: A RESEARCHER FROM THE UNIVERSITY OF FLORIDA IS LOOKING AT DIFFERENT WAYS THAT PEOPLE PRACTICE. If possible, please do not elaborate further on the purpose of the experiment.
10. During the rehearsals, please do not draw any attention to the fact that you may be using rehearsal techniques that are different or unusual. During the study, if you are asked to use an unusual rehearsal technique, approach this as if it were a completely normal part of your own teaching and not a technique being requested of you by researchers.
11. During rehearsal, please do not single out any student to play individually. You may rehearse different sections (e.g., the clarinet section), but not individual students.
12. I will maintain close contact with you throughout the treatment period. If any concerns arise, please contact me immediately at [personal contact information].

GROUP 2 - WEEK ONE, DAY ONE

Make sure that each student has a copy of the music to *Allegro* and *Fall River Overture*.

Allegro

1. Point out the key signature of *Allegro*.
2. Give the tempo (quarter note equals 92) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through the first reading.
4. When finished, go back and play through the entire piece. If possible, do not stop during this second reading.
5. Provide general comments on rhythms and pitches only. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
6. Play through *Allegro* a third and final time.

***Fall River Overture* Excerpt (107-end)**

1. Point out the key signature of *Fall River Overture* at 107.
2. Give the tempo (quarter note equals 116) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Do not provide comments at this time.
5. Play from 107 to the end again.

GROUP 2 - WEEK ONE, DAY TWO

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play through the first 20 measures of the piece and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of the first 20 measures during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms and pitches. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 2 - WEEK TWO, DAY THREE

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 21-38 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 21-38) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms, pitches, articulation, and dynamics. Do not isolate any instrument section or any passage of the music at this time.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 2 - WEEK TWO, DAY FOUR

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 38-72 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 38-72) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the piece. During this time, make sure to address the following concepts:
    a. Woodwind trills at 107, 111, and 124-126. Trills should start on the written note.
    b. Isolate the flute, oboe, and clarinet passage from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK THREE, DAY FIVE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take 3-4 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. All dynamic markings.
    b. The octave jumps in measure 30 and 34, especially helping the brass players to make these leaps.
5. MENTAL REHEARSAL: Take about 2-3 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 1-20.
    b. Conduct as students play from measure 1-20. Then say:
    NOW WE'RE GOING TO DO SOME MENTAL PRACTICE ON THIS SECTION. WHEN YOU DO MENTAL PRACTICE, YOU SHOULD PLAY THROUGH THE MUSIC IN YOUR HEAD. RELAX, PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE PART AND PLAYING IT PERFECTLY. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. PERCUSSIONISTS SHOULD TRY TO SEE THE MALLETS HITTING THE CORRECT BARS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR WHAT IT SOUNDS LIKE IN YOUR HEAD.
    c. Then conduct from measure 1-20 while the students silently play their parts in their heads.
    d. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
    e. NOW PLAY FROM MEASURE 1-20.
    f. Conduct as students play from measure 1-20.
    g. Repeat this procedure for measures 21-38 (PLAY – MENTAL PRACTICE – PLAY). Make sure to <u>conduct each mental practice trial.</u>
6. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.

3. OPEN REHEARSAL: Take about 3 minutes to rehearse the piece. Make sure to address the following concepts:
    a. Isolate the trumpet part from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
    b. Isolate accompaniment (low woodwinds, low brass) from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations. Ask the ensemble to look back at measure 99 for the correct articulation to use in this section.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 107-115.
    b. Conduct as students play from measure 107-115. Then say:
    NOW WE'RE GOING TO DO SOME MENTAL PRACTICE ON THIS SECTION. WHEN YOU DO MENTAL PRACTICE, YOU SHOULD PLAY THROUGH THE MUSIC IN YOUR HEAD. RELAX, PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE PART AND PLAYING IT PERFECTLY. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR WHAT IT SOUNDS LIKE IN YOUR HEAD.
    c. Then conduct from measure 107-115 while the students silently play their parts in their heads.
    d. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
    e. NOW PLAY FROM MEASURE 107-115.
    f. Conduct as students play from measure 107-115.
5. Play through the *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK THREE, DAY SIX

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-60.
4. OPEN REHEARSAL: Take about 4 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Articulations in measure 60.
    b. The octave jumps in measure 55.
    c. The slurred sections from measure 48-52.
5. MENTAL REHEARSAL: Take about 3 minutes to mentally rehearse this section using the following script:
    a. PLEASE PLAY FROM MEASURE 39-48. STOP ON THE FIRST NOTE AT 48.
    b. Conduct as students play from measure 39-48. Then say:
    c. NOW WE'RE GOING TO DO SOME MENTAL PRACTICE ON THIS SECTION. WHEN YOU DO MENTAL PRACTICE, YOU SHOULD PLAY THROUGH THE MUSIC IN YOUR HEAD. RELAX, PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE PART. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR WHAT IT SOUNDS LIKE IN YOUR HEAD.
    d. Then conduct from measure 39-48 while the students silently play their parts in their heads.
    e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
    f. NOW LET'S PLAY FROM MEASURE 39-48. STOP ON THE FIRST NOTE AT 48.
    g. Now repeat steps A-E for measures 46-60.
6. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 2 minutes to rehearse the piece. Make sure to address the following concepts:

   a. Rehearse the section from 114-118. Make sure the ensemble plays the crescendi in measure 115 and 117, as well as marcato eighth notes in measures 116-117.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
   a. PLEASE PLAY FROM MEASURE 107 TO THE END.
   b. Conduct as students play from measure 107 to the end. Then say:
   c. NOW WE'RE GOING TO DO SOME MENTAL PRACTICE ON THIS SECTION. WHEN YOU DO MENTAL PRACTICE, YOU SHOULD PLAY THROUGH THE MUSIC IN YOUR HEAD. RELAX, PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE PART. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR WHAT IT SOUNDS LIKE IN YOUR HEAD.
   d. Then conduct from measure 107 to the end while the students silently play their parts in their heads.
   e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
   f. NOW LET'S PLAY FROM MEASURE 107 TO THE END.
5. Play through the entire *Fall River Overture* excerpt.

GROUP 2 - WEEK FOUR, DAY SEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL INCORPORATING MENTAL PRACTICE: Take 6-7 minutes to rehearse this section (measures 1-38). During this time, make sure to address the following concepts:
    a. Make sure to rehearse the articulations, accidentals and dynamics in measures 35-38.
    b. During this time, isolate 4 different sections of music (about 4-8 measures each) and ask students to mentally practice them using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY).
    c. Disperse these 4 mental practice trials throughout the open rehearsal as you see fit. Always conduct during mental rehearsal. Remind the students to put their horns in their laps during mental practice. Also remind students that they may try to hear their part, see their fingers moving to the right notes, and imagine what their hands/fingers/embouchures feel like while playing the music.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 2 minutes to rehearse measures 118-125. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the crescendi in measure 119 and 121.
    b. Make sure all brass accents are observed. Quarter note accents should have a slight space in between them.
4. MENTAL REHEARSAL: Take about 2 minutes to mentally rehearse this section by following this script:
    a. PLEASE PLAY FROM MEASURE 118-130.
    b. Conduct as students play from measure 118-130. Then say:
    c. NOW WE'RE GOING TO DO SOME MENTAL PRACTICE ON THIS SECTION. WHEN YOU DO MENTAL PRACTICE, YOU SHOULD PLAY THROUGH THE MUSIC IN YOUR HEAD. RELAX, PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE PART. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR

HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR WHAT IT SOUNDS LIKE IN YOUR HEAD.

d. Then conduct from measure 118-130 while the students silently play their parts in their heads.
e. COULD YOU HEAR THE MUSIC IN YOUR HEAD? TRY TO HEAR IT IN YOUR HEAD AS IF YOU WERE PLAYING IT PERFECTLY.
f. NOW LET'S PLAY FROM MEASURE 118-130.

5. Play through the entire *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK FOUR, DAY EIGHT

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-60 and stop.
4. OPEN REHEARSAL INCORPORATING MENTAL PRACTICE: Take about 7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Isolate and rehearse m. 21-30, 35-38, 54-59, and measure 60 for correct notes, rhythms, dynamics, and articulations.
    b. MENTAL PRACTICE: Rehearse measures 21-24, 25-30, 35-38, 54-59, and measure 60 using the same mental practice procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 4 mental practice trials throughout the open rehearsal when appropriate.
    c. Always conduct during mental rehearsal. Remind the students to put their horns in their laps during mental practice. Also remind students that they may try to hear their part, see their fingers moving to the right notes, and imagine what their hands/fingers/embouchures feel like while playing the music.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse measures 118-125. Make sure to address the following concepts:
    a. Isolate the flute, oboe, clarinet, and alto sax line. Make sure the staccato articulations are observed.
    b. In measures 121 and 122, make sure that all woodwind accidentals are being played correctly.
    c. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.
    d. MENTAL REHEARSAL: Rehearse measures 107-113 and 114-117 using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 2 mental practice trials throughout the open rehearsal when appropriate.
4. Play through the entire *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK FIVE, DAY NINE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take about 7 minutes to rehearse this section (measures 1-38). Correct student problems as you see fit. During this time, make sure to address the following concepts:
    a. Stress correct notes, rhythms, dynamics, and articulations in measures 15-20.
    b. Accented quarter notes measures 1-4 should have a very slight space in between them.
    c. Quarter notes in measures 8, 16 and 20 should be held for their full value.
    d. MENTAL REHEARSAL: Rehearse measures 1-8, 21-27, and 28-32 using the same mental practice procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 3 mental practice trials throughout the open rehearsal when appropriate.
    e. Always conduct during mental rehearsal. Remind the students to put their horns in their laps during mental practice. Also remind students that they may try to hear their part, see their fingers moving to the right notes, and imagine what their hands/fingers/embouchures feel like while playing the music.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 5 minutes to rehearse measures 124-130. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the correct rhythm in measures 127-128.
    b. The accented notes in measures 127-128 should have a slight space between them.
    c. Make sure the ensemble plays a fp and crescendo in measure 129, and ff in measure 130. The crescendo should only be played in measure 129 and should not continue through bar 130.
    d. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.
    e. MENTAL REHEARSAL: Choose a point in rehearsal to have students mental practice measures 124-130 using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY).
4. Play through the entire *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK FIVE, DAY TEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-72.
4. OPEN REHEARSAL: Take about 7 minutes to rehearse this section (measures 39-72). During this time, make sure to address the following concepts:
    a. Correct notes, rhythms, articulations in measures 39-47.
    b. Accidentals: Point out to the students that this section has many accidentals. Warn them that after playing concert B naturals in measures 41 and 43, measure 45 goes back to B flat. Similarly, after playing many concert A naturals, we go back to A flat in measure 60.
5. MENTAL REHEARSAL:
    a. Rehearse measures 39-45, 48-53, and 54-60 using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 3 mental practice trials throughout the open rehearsal when appropriate.
    b. Always conduct during mental rehearsal. Remind the students to put their horns in their laps during mental practice. Also remind students that they may try to hear their part, see their fingers moving to the right notes, and imagine what their hands/fingers/embouchures feel like while playing the music.
6. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 5 minutes to rehearse the excerpt. During this time, make sure to address the following concepts:
    a. The woodwind line in measures 129-130.
    b. The woodwind run in measure 117.
    c. The articulations in measure 117 at the end of the low brass and low woodwind descending line.
    d. MENTAL REHEARSAL: Choose a point in rehearsal to have students mental practice measures 114-117 and 127-130 using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY).
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 2 - WEEK SIX, DAY ELEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-72.
4. Take about 7 minutes to rehearse this section. During rehearsal, make sure to address the following concepts:
    a. Dynamics, including all crescendos/decrescendos and the "terraced" dynamics between measures 46-48.
    b. Making the staccato articulation light. It should be detached, not staccatissimo or choppy.
    c. Holding quarter notes for their full value at measure 34, 38, and 59.
    d. Accented quarter notes in measure 40, 42, 53 should have a very slight space in between them.
    e. MENTAL PRACTICE: During this rehearsal session, disperse at least 3 mental practice trials as you see fit. Only do mental practice on between 4 and 8 measures at a time, using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 3 mental practice trials throughout the open rehearsal when appropriate.
    f. Always conduct during mental rehearsal. Remind the students to put their horns in their laps during mental practice. Also remind students that they may try to hear their part, see their fingers moving to the right notes, and imagine what their hands/fingers/embouchures feel like while playing the music.
5. Conclude this session by playing through the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the excerpt. Make sure to address the following concepts:
    a. Balance issues between trumpets, upper woodwinds, and accompaniment (low bras and low woodwinds).
    b. Quarter notes in measures 114-115 should be as written: full value quarters with no accents or staccato. Make a difference between this and the change to accents and marcato in measures 116-117.
4. MENTAL PRACTICE: During this rehearsal session, disperse at least 2 mental practice trials as you see fit. Only do mental practice on between 4 and 8 measures at a time, using the same procedure as before (PLAY – MENTAL PRACTICE – PLAY). Disperse these 3 mental practice trials throughout the open rehearsal when appropriate.
5. Play through the *Fall River Overture* excerpt a final time.

GROUP 2 - WEEK SIX, DAY TWELVE

Allegro

1. Give the following instruction: NEXT WEEK, SOME OF YOU WILL BE RECORDED PLAYING THIS PIECE. SO TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT YOU FEEL COMFORTABLE WHEN YOU PERFORM IT.
2. Give the tempo of *Allegro* with a metronome.
3. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Now take students through the following mental practice procedure:
    a. WE HAVE DONE A LOT OF MENTAL PRACTICE OVER THE PAST COUPLE OF WEEKS. THE MENTAL PRACTICE WE HAVE DONE HAS BEEN ON SMALL SECTIONS OF THE MUSIC. NOW I WANT YOU TO DO A MENTAL RUN THROUGH OF THE ENTIRE PIECE FROM BEGINNING TO END.
    b. REMEMBER TO PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE ENTIRE PIECE AND PLAYING IT PERFECTLY. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR THE PERFECT PERFORMANCE IN YOUR HEAD.
    c. Conduct the entire piece while students mentally perform it.
    d. GOOD. NOW LET'S PLAY THE ENTIRE PIECE ONE LAST TIME FROM BEGINNING TO END. TRY TO MAKE IT SOUND JUST LIKE IT DID IN YOUR HEAD.
    e. Play the piece from beginning to end. Then say:
    f. NEXT WEEK, TRY TO DO MENTAL PRACTICE RIGHT BEFORE YOU GO IN TO PLAY FOR THE RECORDING. YOU CAN ALSO DO SOME OF THE MENTAL PRACTICE TECHNIQUES WE HAVE LEARNED WHEN YOU ARE ASKED TO STUDY THE SIGHT-READING PIECE.

***Fall River Overture* Excerpt (107-end)**

1. Give the following instruction: NEXT WEEK, WE WILL BE RECORDED DURING CLASS GIVING A PERFORMANCE OF THIS EXCERPT. TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT WE ARE PREPARED FOR THE RECORDING.

2. Give the tempo (quarter note equals 116) with a metronome.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Now take students through the following mental practice procedure:
    a. NOW I WANT YOU TO DO A MENTAL RUN THROUGH OF THE ENTIRE EXCERPT FROM MEASURE 107 TO THE END.
    b. REMEMBER TO PUT YOUR HORN IN YOUR LAP, AND REMAIN AS STILL AS POSSIBLE. AS I CONDUCT THE MUSIC, TRY TO IMAGINE YOURSELF PLAYING THE ENTIRE PIECE AND PLAYING IT PERFECTLY. FEEL YOUR FINGERS MOVING TO THE RIGHT NOTES. FEEL YOUR EMBOUCHURE AND TONGUE (LIPS, FACE MUSCLES, ETC.) MOVING TO THE RIGHT POSITIONS. TRY TO HEAR WHAT THE RHYTHM SOUNDS LIKE. TRY TO HEAR WHAT THE MELODY SOUNDS LIKE IN YOUR HEAD. DON'T TOUCH YOUR INSTRUMENT WITH YOUR HANDS AND DON'T MOVE ANY MUSCLES. JUST THINK ABOUT PLAYING THE MUSIC AND TRY TO HEAR THE PERFECT PERFORMANCE IN YOUR HEAD.
    c. Conduct the entire excerpt while students mentally perform it.
    d. GOOD. NOW LET'S PLAY THE ENTIRE EXCERPT ONE LAST TIME FROM BEGINNING TO END. TRY TO MAKE IT SOUND JUST LIKE IT DID IN YOUR HEAD.
    e. Play the piece from beginning to end.
6. Play through the *Fall River Overture* excerpt a final time.

Teacher Script: Physical Practice Method Group (Group 3)

GROUP 3 TEACHER SCRIPT AND INSTRUCTIONS

Thank you once again for agreeing to participate in this research study. It is hoped that this study will provide information on various practice techniques that may be beneficial to high school bands. Please use the following guidelines when rehearsing the music during the study period:

1. Your involvement in the study will last approximately six weeks.
2. Please rehearse the music provided for two days each week for 20 minutes each day. If possible, please spread out the rehearsals so that they are not on consecutive days. For example, an ideal schedule would be to rehearse the music on Tuesdays and Thursdays.
3. Please place the 20-minute rehearsal segment at the beginning of the class period, after the regular warm-up/tuning has taken place.
4. The two pieces being rehearsed for the study are *Allegro* by Telemann and an excerpt from *Fall River Overture* by Robert Sheldon. The *Fall River Overture* excerpt will be from measure 107 to the end of the piece (24 total measures).
5. The following teacher scripts are designed to guide you through each rehearsal. Instructions printed in all capital letters should be read to the student. Instructions in regular lettering serve to guide the teacher through the script.
6. Each 20-minute rehearsal segment is designed to divide the time evenly so that each piece is rehearsed for approximately ten minutes.
7. On the first day of rehearsal, please make the following statement:
   WE ARE GOING TO PLAY *ALLEGRO* AND *FALL RIVER OVERTURE* AS PART OF A RESEARCH STUDY. BASICALLY, WE HAVE 6 WEEKS TO PRACTICE THESE PIECES TO SEE HOW WELL WE CAN PLAY THEM. AT THE END OF SIX WEEKS, WE WILL BE RECORDED PLAYING THE PIECES.
8. Aside from this announcement, during rehearsals please do not draw extra attention to the fact that the music is being played for a research study.
9. If students ask what we are studying or inquire further about the study, please say: A RESEARCHER FROM THE UNIVERSITY OF FLORIDA IS LOOKING AT DIFFERENT WAYS THAT PEOPLE PRACTICE. If possible, please do not elaborate further on the purpose of the experiment.
10. During the rehearsals, please do not draw any attention to the fact that you may be using rehearsal techniques that are different or unusual. During the study, if you are asked to use an unusual rehearsal technique, approach this as if it were a completely normal part of your own teaching and not a technique being requested of you by researchers.
11. During rehearsal, please do not single out any student to play individually. You may rehearse different sections (e.g., the clarinet section), but not individual students.
12. I will maintain close contact with you throughout the treatment period. If any concerns arise, please contact me immediately at [personal contact information].

GROUP 3 - WEEK ONE, DAY ONE

Make sure that each student has a copy of the music to *Allegro* and *Fall River Overture*.

Allegro

1. Point out the key signature of *Allegro*.
2. Give the tempo (quarter note equals 92) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through the first reading.
4. When finished, go back and play through the entire piece. If possible, do not stop during this second reading.
5. Provide general comments on rhythms and pitches only. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
6. Play through *Allegro* a third and final time.

***Fall River Overture* Excerpt (107-end)**

1. Point out the key signature of *Fall River Overture* at 107.
2. Give the tempo (quarter note equals 116) with a metronome. Allow the metronome to sound for 16 beats.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Do not provide comments at this time.
5. Play from 107 to the end again.

GROUP 3 - WEEK ONE, DAY TWO

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play through the first 20 measures of the piece and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of the first 20 measures during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms and pitches. You may sing or count any rhythm. Do not ask the students to sing or count, and do not fix any dynamics or articulations at this point.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 3 - WEEK TWO, DAY THREE

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 21-38 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 21-38) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. Take a moment to make general comments on rhythms, pitches, articulation, and dynamics. Do not isolate any instrument section or any passage of the music at this time.
4. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 3 - WEEK TWO, DAY FOUR

Allegro

1. Give the tempo of *Allegro* with a metronome for 16 beats.
2. Play through *Allegro* from start to finish. Do not stop for mistakes – however, if the group is unable play through the entire piece, stop and restart at a logical place. If necessary, you may slow the tempo down in order to make it through this reading.
3. Then play from measure 38-72 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to provide instruction regarding rhythms, pitches, articulation, and dynamics. You should have students play portions of this section (measures 38-72) during this time of instruction, in the manner of a normal rehearsal.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the piece. During this rehearsal time, make sure to address the following concepts:
    a. Woodwind trills at 107, 111, and 124-126. Trills should start on the written note.
    b. Isolate the flute, oboe, and clarinet passage from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK THREE, DAY FIVE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take 6-7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. All dynamic markings.
    b. The octave jumps in measure 30 and 34, especially helping the brass players to make these leaps.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4-5 minutes to rehearse the piece. During this time, make sure to address the following concepts:
    a. Isolate the trumpet part from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations.
    b. Isolate accompaniment (low woodwinds, low brass) from 107-115. Listen to this section and fix any problems with rhythms, pitches, or articulations. Ask the ensemble to look back at measure 99 for the correct articulation to use in this section.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK THREE, DAY SIX

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-60.
4. OPEN REHEARSAL: Take 6-7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Articulations in measure 60.
    b. The octave jumps in measure 55.
    c. The slurred sections from measure 48-52.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the piece. Make sure to address the following concepts:
4. Rehearse the section from 114-118. Make sure the ensemble plays the crescendi in measure 115 and 117, as well as marcato eighth notes in measures 116-117.
5. Play through the *Fall River Overture* excerpt a second and final time.

GROUP 3 - WEEK FOUR, DAY SEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take 6-7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Articulations, accidentals and dynamics in measures 35-38.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse measures 118-130. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the crescendi in measure 119 and 121.
    b. Make sure all brass accents are observed. Quarter note accents should have a slight space in between them.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK FOUR, DAY EIGHT

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-60 and stop.
4. OPEN REHEARSAL: Take 6-7 minutes to rehearse this section. During this time, make sure to address the following concepts:
    a. Isolate and rehearse m. 21-30, 35-38, 54-59, and measure 60 for correct notes, rhythms, dynamics, and articulations.
5. To close, play the entire piece from beginning to end.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse measures 118-125. Make sure to address the following concepts:
    a. Isolate the flute, oboe, clarinet, and alto sax line. Make sure the staccato articulations are observed.
    b. In measures 121 and 122, make sure that all woodwind accidentals are being played correctly.
    c. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK FIVE, DAY NINE

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 1-38.
4. OPEN REHEARSAL: Take about 7 minutes to rehearse this section (measures 1-38). During this time, make sure to address the following concepts:
    a. Stress correct notes, rhythms, dynamics, and articulations in measures 15-20.
    b. Accented quarter notes measures 1-4 should have a very slight space in between them.
    c. Quarter notes in measures 8, 16 and 20 should be held for their full value.
5. To close, play the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 5 minutes to rehearse measures 124-130. During this time, make sure to address the following concepts:
    a. Make sure the ensemble plays the correct rhythm in measures 127-128.
    b. The accented notes in measures 127-128 should have a slight space between them.
    c. Make sure the ensemble plays a fp and crescendo in measure 129, and ff in measure 130. The crescendo should only be played in measure 129 and should not continue through bar 130.
    d. Make sure that there is an appropriate balance between the brass and woodwinds in measures 119 and 121-123.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK FIVE, DAY TEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 39-72.
4. OPEN REHEARSAL: Take about 7 minutes to rehearse this section (measures 39-72). Correct student problems as you see fit. During this time, make sure to address the following concepts:
    a. Correct notes, rhythms, articulations in measures 39-47
    b. Accidentals: Point out to the students that this section has many accidentals. Warn them that after playing concert B naturals in measures 41 and 43, measure 45 goes back to B flat. Similarly, after playing many concert A naturals, we go back to A flat in measure 60.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 5 minutes to rehearse the excerpt. Make sure to address the following concepts:
    a. The woodwind line in measures 129-130.
    b. The woodwind run in measure 117.
    c. The articulations in measure 117 at the end of the low brass and low woodwind descending line.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK SIX, DAY ELEVEN

Allegro

1. Give the tempo of *Allegro* with a metronome.
2. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
3. Play from measure 21-72.
4. Take about 7 minutes to rehearse this section. During rehearsal, make sure to address the following concepts:
    a. Dynamics, including all crescendos/decrescendos and the "terraced" dynamics between measures 46-48.
    b. Making the staccato articulation light. It should be detached, not staccatissimo or choppy.
    c. Holding quarter notes for their full value at measure 34, 38, and 59.
    d. Accented quarter notes in measure 40, 42, 53 should have a very slight space in between them.
5. Conclude this session by playing through the entire piece.

***Fall River Overture* Excerpt (107-end)**

1. Give the tempo (quarter note equals 116) with a metronome.
2. Play through *Fall River Overture* from 107 to the end at the correct tempo.
3. OPEN REHEARSAL: Take about 4 minutes to rehearse the excerpt. During rehearsal, make sure to address the following concepts:
    a. Balance issues between trumpets, upper woodwinds, and accompaniment (low bras and low woodwinds).
    b. Quarter notes in measures 114-115 should be as written: full value quarters with no accents or staccato. Make a difference between this and the change to accents and marcato in measures 116-117.
4. Play through the *Fall River Overture* excerpt a final time.

GROUP 3 - WEEK SIX, DAY TWELVE

Allegro

1. Give the following instruction:
   NEXT WEEK, SOME OF YOU WILL BE RECORDED PLAYING THIS PIECE. SO TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT YOU FEEL COMFORTABLE WHEN YOU PERFORM IT.
2. Give the tempo of *Allegro* with a metronome.
3. Play through the entire piece. Do not stop for mistakes. Use the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Play through the entire piece again.
6. Take a moment to provide instructions and make general comments.
7. Play through the piece one last time.

***Fall River Overture* Excerpt (107-end)**

1. Give the following instruction:
   NEXT WEEK, WE WILL BE RECORDED DURING CLASS GIVING A PERFORMANCE OF THIS EXCERPT. TODAY, WE WANT TO GO THROUGH IT SEVERAL TIMES SO THAT WE ARE PREPARED FOR THE RECORDING.
2. Give the tempo (quarter note equals 116) with a metronome.
3. Play through *Fall River Overture* from 107 to the end at the correct tempo.
4. Take a moment to provide instructions and make general comments.
5. Play through the *Fall River Overture* excerpt a second time.
6. Take a moment to provide instructions and make general comments.
7. Play through the *Fall River Overture* excerpt a third and final time.

APPENDIX F
TEST ADMINISTRATION INSTRUCTIONS

I. INDIVIDUAL TESTING

Individual testing should take place in a room free of extraneous noise or other distractions. The student should be provided with a chair and music stand, as well as adequate lighting. The student may choose to sit or stand while playing.

After the student has entered the room, read the following statements:

HELLO. YOU ARE WELCOME TO SIT OR STAND. I AM GOING TO RECORD YOU PLAYING A COUPLE OF EXERCISES. MAKE SURE YOU READ EACH EXERCISE EXACTLY AS WRITTEN. HOLD EACH NOTE FOR ITS CORRECT VALUE AND OBSERVE ALL MARKINGS AND SIGNS IN THE MUSIC. PLAY THROUGH EACH EXERCISE WITHOUT STOPPING, EVEN IF YOU MAKE A MISTAKE.

PLEASE TAKE 15 SECONDS* TO LOOK AT (EXERCISE ONE). I WILL LET YOU KNOW WHEN TO BEGIN PLAYING.

Wait 15 seconds and say:

(EXERCISE ONE) SHOULD BE PLAYED AT THIS TEMPO.

Turn on the metronome at the correct speed of the exercise for 4-5 counts. Then, with the metronome still on, count two measures for the student ("1-2-3-4" etc.). Then turn off the metronome.

Then say: PLEASE BEGIN PLAYING THE EXERCISE.

After the student has played, tell him or her that they have done well, and proceed to the next exercise by repeating steps B through E for *Allegro*.

At the end of the testing session, tell the student that they have done well and thank them for participating.

* Students should be given 15 seconds to study exercise one (sight-reading example) and 30 seconds to study *Allegro*

II. ENSEMBLE TESTING

Ensemble testing should take place in the regular band classroom, after the band director has warmed-up the ensemble and after the ensemble has tuned.

Pass out *Fall River Overture* to the ensemble.

Give the following instructions:

YOU WILL BE PLAYING FROM MEASURE 107 TO THE END. PLEASE FIND MEASURE 107 NOW.

I WILL GIVE YOU ONE MINUTE TO LOOK AT THIS PIECE. YOU MAY NOT PLAY, SING, OR TALK DURING THIS TIME. YOUR BAND DIRECTOR WILL NOT BE ABLE TO MAKE COMMENTS TO YOU.

YOU MAY BEGIN STUDYING THE MUSIC NOW.

Give the ensemble 45 seconds to study the piece.

Then say: TIME IS UP, PLEASE PLAY THE PIECE NOW, STARTING AT MEASURE 107 AND PLAYING TO THE END.

Thank the ensemble for their time.

After the pretest, all groups should keep their music except the control group.

Please ask the control group to return the music to you at the end of the pretest. For the posttest, pass the music back out to the control group. At the end of the posttest, the control group may keep the music.

Inform the other three groups that they will be rehearsing this piece over the next several weeks, so they will need to keep the music.

APPENDIX G
INSTRUCTIONS FOR SCORING INDIVIDUAL STUDENT PERFORMANCES

Individual Performance Evaluation Instructions

You will grade each performance in three performance areas: pitch accuracy, dynamics, and rhythm. The unit of scoring is the beat – the beat will be counted wrong if an error occurs within the beat. For each beat, you will indicate the type of error made in the blank below each beat. If multiple errors occur on the same beat, all types of errors should be listed in or below the blank. The possible errors and indication marking are as follows:

1. Pitch Accuracy (P)

- Indicate pitch accuracy errors by placing a P in the blank.
- Pitch accuracy errors should be indicated if the note played is not the correct pitch.
- Tone quality, intonation errors, and fuzzy attacks are NOT to be marked as pitch errors.

2. Dynamics (D)

- Indicate dynamic errors by placing a D in the blank.
- Dynamics errors should be marked if the indicated dynamic marking is not observed within the beat. Beats with no dynamic marking should be performed with the previous dynamic indication. If the student adjusts the volume too much or too little it should not be counted as an error. Be concerned only that the student has seen the dynamic marking, knows what it means, and responds to it in the performance.

3. Rhythm (R)

- Indicate rhythm errors by placing an R in the blank.
- Rhythm errors should be marked for each beat the student plays an incorrect rhythm.
- Rhythm errors should also be marked if the student does not hold the note for the full value. For example, a whole note should be held for four beats. A whole note held for three beats is incorrect. The note must be held over into the beginning of the fourth count. If the note extends past the fourth count it is incorrect.
- If the student ignores a rest or fails to observe a rest for its full value, a rhythm error should be marked.
- If there is a noticeable increase or decrease in the tempo, all beats played during the fluctuation of tempo should be marked as an error.
- Pauses between beats or between notes are to be counted as rhythm errors.

APPENDIX H
RAW DATA

Table H-1. Pretest, posttest, and difference scores for students in the mental practice method group on the sight-reading measure in terms of pitch accuracy

	Sight-reading Measure Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	29	30	1
2	33	32	-1
3	24	30	6
4	30	31	1
5	26	30	4
6	33	32	-1
7	32	33	1
8	32	31	-1
9	30	30	0
10	28	31	3
11	30	27	-3
12	28	32	4
13	32	31	-1
14	33	32	-1
15	23	21	-2
16	28	24	-4
17	23	26	3
18	25	29	4
19	30	29	-1
20	29	31	2
21	30	25	-5
22	26	32	6
23	24	23	-1
24	30	29	-1
Mean	28.6	29.2	.54

Note. Total points possible = 33

Table H-2. Pretest, posttest, and difference scores for students in the mental practice method group on the sight-reading measure in terms of dynamics

	Sight-reading Measure Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	10	10
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	10	10
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
Mean	0	.83	.83

Note. Total points possible = 10

Table H-3. Pretest, posttest, and difference scores for students in the mental practice method group on the sight-reading measure in terms of rhythm

	Sight-reading Measure Rhythm Score		
Student	Pretest	Posttest	Difference
1	25	16	-9
2	33	32	-1
3	31	29	-2
4	25	30	5
5	23	27	4
6	32	33	1
7	29	31	2
8	32	31	-1
9	32	33	1
10	25	33	8
11	26	31	5
12	28	30	2
13	29	33	4
14	22	29	7
15	25	28	3
16	25	23	-2
17	32	26	-6
18	27	19	-8
19	32	32	0
20	33	33	0
21	31	33	2
22	31	33	2
23	31	33	2
24	33	32	-1
Mean	28.8	29.6	.75

Note. Total points possible = 33

Table H-4. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the sight-reading measure in terms of pitch accuracy

	Sight-reading Measure Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	18	25	7
2	33	30	-3
3	25	18	-7
4	22	27	5
5	32	31	-1
6	30	23	-7
7	29	29	0
8	26	31	5
9	28	25	-3
10	29	30	1
11	31	31	0
12	16	12	-4
13	33	32	-1
14	32	27	-5
15	30	30	0
16	23	21	-2
17	31	30	-1
18	23	29	6
19	26	27	1
20	11	20	9
21	22	22	0
22	18	16	-2
23	12	13	1
Mean	25.2	25.1	-.04

Note. Total points possible = 33

Table H-5. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the sight-reading measure in terms of dynamics

	Sight-reading Measure Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	5	5	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
Mean	.22	.22	0

Note. Total points possible = 10

Table H-6. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the sight-reading measure in terms of rhythm

	Sight-reading Measure Rhythm Score		
Student	Pretest	Posttest	Difference
1	20	26	6
2	27	30	3
3	23	23	0
4	33	26	-7
5	25	27	2
6	25	26	1
7	24	24	0
8	27	30	3
9	14	29	15
10	32	33	1
11	33	32	-1
12	19	21	2
13	31	33	2
14	27	20	-7
15	29	30	1
16	27	24	-3
17	28	22	-6
18	27	31	4
19	27	26	-1
20	27	24	-3
21	28	27	-1
22	29	31	2
23	19	26	7
Mean	26.1	27	.87

Note. Total points possible = 33

Table H-7. Pretest, posttest, and difference scores for students in the physical practice group on the sight-reading measure in terms of pitch accuracy

	Sight-reading Measure Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	30	31	1
2	30	32	2
3	33	33	0
4	31	30	-1
5	31	32	1
6	28	29	1
7	32	32	0
8	30	31	1
9	32	31	-1
10	32	31	-1
11	30	29	-1
12	30	28	-2
13	26	26	0
14	30	29	-1
15	24	24	0
16	23	26	3
17	25	24	-1
18	29	31	2
19	29	25	-4
20	32	33	1
21	30	32	2
22	32	30	-2
23	20	23	3
Mean	29	29.2	.13

Note. Total points possible = 33

Table H-8. Pretest, posttest, and difference scores for students in the physical practice group on the sight-reading measure in terms of dynamics

	Sight-reading Measure Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	0	0
2	0	0	0
3	0	0	0
4	0	4	4
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	6	0	-6
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	10	6	-4
21	0	0	0
22	0	0	0
23	0	0	0
Mean	.69	.43	-.26

Note. Total points possible = 10

Table H-9. Pretest, posttest, and difference scores for students in the physical practice group on the sight-reading measure in terms of rhythm

	Sight-reading Measure Rhythm Score		
Student	Pretest	Posttest	Difference
1	26	33	7
2	28	32	4
3	22	23	1
4	28	32	4
5	31	28	-3
6	19	27	8
7	32	32	0
8	28	31	3
9	33	33	0
10	26	30	4
11	24	28	4
12	21	29	8
13	26	29	3
14	33	33	0
15	30	32	2
16	31	30	-1
17	27	24	-3
18	30	32	2
19	31	31	0
20	33	33	0
21	32	32	0
22	33	32	-1
23	25	27	2
Mean	28.2	30.1	1.91

Note. Total points possible = 33

Table H-10. Pretest, posttest, and difference scores for students in the control group on the sight-reading measure in terms of pitch accuracy

	Sight-reading Measure Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	32	32	0
2	33	29	-4
3	29	31	2
4	28	27	-1
5	30	31	1
6	30	31	1
7	33	29	-4
8	30	25	-5
9	27	28	1
10	31	32	1
11	31	32	1
12	29	27	-2
13	22	24	2
14	22	23	1
15	32	30	-2
16	30	33	3
Mean	29.3	29	-.31

Note. Total points possible = 33

Table H-11. Pretest, posttest, and difference scores for students in the control group on the sight-reading measure in terms of dynamics

	Sight-reading Measure Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	0	0
2	0	0	0
3	0	0	0
4	0	9	9
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
Mean	0	.56	.56

Note. Total points possible = 10

Table H-12. Pretest, posttest, and difference scores for students in the control group on the sight-reading measure in terms of rhythm

	Sight-reading Measure Rhythm Score		
Student	Pretest	Posttest	Difference
1	29	33	4
2	25	26	1
3	24	27	3
4	30	32	2
5	30	29	-1
6	26	31	5
7	29	29	0
8	24	27	3
9	28	30	2
10	32	33	1
11	31	32	1
12	27	21	-6
13	27	28	1
14	25	31	6
15	30	31	1
16	30	32	2
Mean	27.9	29.5	1.56

Note. Total points possible = 33

Table H-13. Pretest, posttest, and difference scores for students in the mental practice method group on the prepared performance measure in terms of pitch accuracy

	Prepared Performance Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	65	64	-1
2	57	65	8
3	56	65	9
4	61	62	1
5	52	56	4
6	61	64	3
7	64	66	2
8	60	60	0
9	47	65	18
10	59	65	6
11	51	59	8
12	62	62	0
13	63	61	-2
14	65	62	-3
15	21	48	27
16	31	56	25
17	45	59	14
18	25	61	36
19	38	59	21
20	30	63	33
21	30	59	29
22	31	63	32
23	34	63	29
24	34	60	26
Mean	47.6	61.1	13.54

Note. Total points possible = 67

Table H-14. Pretest, posttest, and difference scores for students in the mental practice method group on the prepared performance measure in terms of dynamics

	Prepared Performance Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	5	5
2	0	0	0
3	0	5	5
4	0	0	0
5	0	1	1
6	0	5	5
7	0	5	5
8	0	0	0
9	0	1	1
10	0	6	6
11	0	2	2
12	0	0	0
13	0	2	2
14	0	1	1
15	0	1	1
16	0	2	2
17	0	2	2
18	0	2	2
19	6	10	4
20	0	10	10
21	0	1	1
22	0	7	7
23	0	5	5
24	0	2	2
Mean	.25	3.12	2.9

Note. Total points possible = 10

Table H-15. Pretest, posttest, and difference scores for students in the mental practice method group on the prepared performance measure in terms of rhythm

	Prepared Performance Rhythm Score		
Student	Pretest	Posttest	Difference
1	40	65	25
2	47	67	20
3	39	67	28
4	36	67	31
5	31	67	36
6	57	67	10
7	60	66	6
8	52	65	13
9	52	67	15
10	60	66	6
11	59	65	6
12	55	65	10
13	59	64	5
14	42	63	21
15	19	60	41
16	36	64	28
17	62	67	5
18	24	65	41
19	50	67	17
20	56	67	11
21	47	67	20
22	47	67	20
23	57	67	10
24	60	67	7
Mean	47.79	65.79	18

Note. Total points possible = 67

Table H-16. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the prepared performance measure in terms of pitch accuracy

	Prepared Performance Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	44	56	12
2	54	61	7
3	51	48	-3
4	48	57	9
5	57	63	6
6	50	46	-4
7	52	55	3
8	47	60	13
9	55	61	6
10	35	63	28
11	53	62	9
12	12	35	23
13	64	63	-1
14	48	58	10
15	62	60	-2
16	41	45	4
17	55	36	-19
18	31	47	16
19	32	55	23
20	16	36	20
21	40	33	-7
22	36	54	18
23	9	23	14
24	44	56	12
Mean	43.13	51.17	8.04

Note. Total points possible = 67

Table H-17. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the prepared performance measure in terms of dynamics

	Prepared Performance Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	1	1
2	0	0	0
3	0	0	0
4	0	8	8
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	1	1
10	0	0	0
11	0	7	7
12	0	0	0
13	0	2	2
14	0	2	2
15	0	1	1
16	0	0	0
17	0	0	0
18	0	0	0
19	0	2	2
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	1	1
Mean	0	1.04	1.04

Note. Total points possible = 10

Table H-18. Pretest, posttest, and difference scores for students in the unstructured mental practice group on the prepared performance measure in terms of rhythm

	Prepared Performance Rhythm Score		
Student	Pretest	Posttest	Difference
1	30	67	37
2	58	63	5
3	36	65	29
4	48	67	19
5	50	67	17
6	54	55	1
7	51	62	11
8	41	65	24
9	31	55	24
10	51	67	16
11	62	67	5
12	16	56	40
13	64	66	2
14	46	66	20
15	43	53	10
16	28	62	34
17	35	51	16
18	53	67	14
19	59	66	7
20	38	48	10
21	42	55	13
22	61	67	6
23	26	56	30
24	30	67	37
Mean	44.47	61.4	16.95

Note. Total points possible = 67

Table H-19. Pretest, posttest, and difference scores for students in the physical practice group on the prepared performance measure in terms of pitch accuracy

	Prepared Performance Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	54	67	13
2	55	64	9
3	62	64	2
4	66	67	1
5	55	65	10
6	57	49	-8
7	64	65	1
8	57	60	3
9	61	64	3
10	51	64	13
11	37	59	22
12	56	62	6
13	42	53	11
14	47	66	19
15	38	60	22
16	40	63	23
17	32	64	32
18	45	54	9
19	37	62	25
20	59	67	8
21	51	65	14
22	65	65	0
23	30	53	23
24	54	67	13
Mean	50.47	61.82	11.34

Note. Total points possible = 67

Table H-20. Pretest, posttest, and difference scores for students in the physical practice group on the prepared performance measure in terms of dynamics

	Prepared Performance Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	2	2
2	0	0	0
3	0	0	0
4	0	6	6
5	1	0	-1
6	3	0	-3
7	0	0	0
8	0	0	0
9	0	2	2
10	0	5	5
11	0	2	2
12	0	0	0
13	0	0	0
14	0	6	6
15	0	0	0
16	0	1	1
17	0	0	0
18	0	2	2
19	0	0	0
20	9	2	-7
21	2	10	8
22	0	6	6
23	0	0	0
24	0	2	2
Mean	.65	1.91	1.26

Note. Total points possible = 10

Table H-21. Pretest, posttest, and difference scores for students in the physical practice group on the prepared performance measure in terms of rhythm

	Prepared Performance Rhythm Score		
Student	Pretest	Posttest	Difference
1	58	67	9
2	59	67	8
3	38	61	23
4	63	66	3
5	56	64	8
6	31	66	35
7	62	64	2
8	48	65	17
9	60	67	7
10	57	67	10
11	31	67	36
12	43	63	20
13	26	65	39
14	62	67	5
15	55	67	12
16	51	64	13
17	59	63	4
18	65	67	2
19	52	67	15
20	67	67	0
21	63	66	3
22	64	67	3
23	43	64	21
24	58	67	9
Mean	52.7	65.56	12.8

Note. Total points possible = 67

Table H-22. Pretest, posttest, and difference scores for students in the control group on the prepared performance measure in terms of pitch accuracy

	Prepared Performance Pitch Accuracy Score		
Student	Pretest	Posttest	Difference
1	65	61	-4
2	56	62	6
3	56	61	5
4	63	60	-3
5	58	62	4
6	57	61	4
7	60	58	-2
8	59	65	6
9	54	59	5
10	63	66	3
11	57	63	6
12	45	60	15
13	38	23	-15
14	42	46	4
15	49	40	-9
16	38	48	10
Mean	53.75	55.93	2.81

Note. Total points possible = 67

Table H-23. Pretest, posttest, and difference scores for students in the control group on the prepared performance measure in terms of dynamics

	Prepared Performance Dynamics Score		
Student	Pretest	Posttest	Difference
1	0	0	0
2	0	0	0
3	0	0	0
4	0	1	1
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
Mean	0	.06	.06

Note. Total points possible = 10

Table H-24. Pretest, posttest, and difference scores for students in the control group on the prepared performance measure in terms of rhythm

	Prepared Performance Rhythm Score		
Student	Pretest	Posttest	Difference
1	64	66	2
2	53	46	-7
3	42	38	-4
4	57	58	1
5	41	43	2
6	48	56	8
7	39	42	3
8	40	41	1
9	35	43	8
10	55	61	6
11	54	58	4
12	45	46	1
13	47	42	-5
14	58	47	-11
15	40	60	20
16	51	59	8
Mean	48	50.37	2.31

Note. Total points possible = 67

APPENDIX I
POST-STUDY QUESTIONNAIRES

Post-study questionnaire completed by the mental practice method group

Mental Practice Questionnaire

This information will be used to help analyze data in the study. This is a **confidential form** and will only be seen by the research team. Please answer each question as accurately as possible. **Thank you** for your participation in the study!!

General Information

First and Last Name:_____

Age:_____ **Gender: MALE**_____ **FEMALE**_____

Please circle your grade in school: 9th 10th 11th 12th

Concert Band Instrument:_____

At the beginning of the school year, you filled out an information form in which you were asked if you take private lessons on your band instrument.

If you answered YES , are you still taking private lessons? YES NO

If you answered NO, have you started taking private lessons since September?

YES NO

Mental Practice Questions

1. When you were asked to mentally practice the music, how often would you say you actually did the mental practice? Please circle only one answer.

A. None of the times
B. Very few times
C. About half the time
D. Almost all of the time, but not every single time
E. All of the time

2. How much do you think the mental practice you did as part of this study helped to improve your playing on the pieces? Please circle only one answer.

A. Did not help at all B. Helped a little C. Helped a great deal

3. In general, how helpful do you think mental practice is to improving your playing?

A. Does not help at all B. Helps a little C. Helps a great deal

4. Do you think that you will use mental practice techniques in the future?

A. No B. Not Sure/Don't Know C. Yes

5. When do you think mental practice is most helpful to you? CHECK ALL THAT APPLY

_____Learning a new piece
_____Perfecting a piece you already know
_____Before sight-reading a piece you have never seen
_____When your face and hands become tired of physically playing
_____When your instrument is not available
_____When the band director is working with another section of the band
_____In the moments right before a performance
_____To help you be less nervous
_____I don't think it is helpful in any way
_____Other:_____

6. If you were to do mental practice on your own, which techniques would you be most likely to use? CHECK ALL THAT APPLY

_____ Hear myself playing the part
_____ See a visual picture of myself playing the part
_____ Imagine how my fingers/hands/embouchure feel when playing the part
_____ Hear the music while I finger the notes or blow air/articulations

7. When you visually see yourself playing the part, which perspective do you like best?

_____ Seeing from inside myself, from my own eyes (internal perspective)
_____ Seeing from outside myself, as if I were watching myself in a movie (external perspective)
_____ I like both perspectives equally

In the next three questions, you will be asked to rate how clearly you could imagine yourself playing the music during mental practice on a scale from 1 to 5, with 1 being not clear and 5 being very clear.

8. During mental practice, when you tried to hear the music in your head, how clearly could you hear the music?

1	2	3	4	5
(not clear)				(very clear)

9. When you tried to visually see yourself playing, how clearly could you see the "movie" of yourself?

1	2	3	4	5
(not clear)				(very clear)

10. When you tried to imagine the "feel" of your muscles moving during mental practice, how well were you able to feel your muscles move?

1	2	3	4	5
(not well)				(very well)

Some people are able to control their mental practice better than others:
• Having good control over your mental practice means that you control the images and sounds in your head very well.
• Some people have a hard time controlling the images and sounds, meaning that they see and hear them, but can't always control what they do. For instance, you might hear the music, but not be able to control exactly how you want the music to sound.

11. How much control do you think you have over your mental practice?

1	2	3	4	5
(very little control)				(a great deal of control)

12. Please list any mental practice techniques that you thought were valuable:

13. Please list any mental practice techniques that you thought were NOT valuable:

14. Do you have any other thoughts regarding mental practice? If so, please make additional comments here (you may use the back of this form if necessary):

***THANK YOU* FOR YOUR HELP WITH THIS STUDY!**

Post-study questionnaire completed by the unstructured mental practice group

Mental Practice Questionnaire

This information will be used to help analyze data in the study. This is a **confidential form** and will only be seen by the research team. Please answer each question as accurately as possible. **Thank you** for your participation in the study!!

General Information

First and Last Name:_____

Age:_____ **Gender: MALE**_____ **FEMALE**_____

Please circle your grade in school: 9th 10th 11th 12th

Concert Band Instrument:_____

At the beginning of the school year, you filled out an information form in which you were asked if you take private lessons on your band instrument.

If you answered YES, are you still taking private lessons? YES NO

If you answered NO, have you started taking private lessons since September?

YES NO

Mental Practice Questions

1. When you were asked to mentally practice the music, how often would you say you actually did the mental practice? Please circle only one answer.

A. None of the times
B. Very few times
C. About half the time
D. Almost all of the time, but not every single time
E. All of the time

2. How much do you think the mental practice you did as part of this study helped to improve your playing on the pieces? Please circle only one answer.

A. Did not help at all B. Helped a little C. Helped a great deal

3. In general, how helpful do you think mental practice is to improving your playing?

A. Does not help at all B. Helps a little C. Helps a great deal

4. Do you think that you will use mental practice techniques in the future?

A. No B. Not Sure/Don't Know C. Yes

5. When do you think mental practice is most helpful to you? CHECK ALL THAT APPLY

_____Learning a new piece
_____Perfecting a piece you already know
_____Before sight-reading a piece you have never seen
_____When your face and hands become tired of physically playing
_____When your instrument is not available
_____When the band director is working with another section of the band
_____In the moments right before a performance
_____To help you be less nervous
_____I don't think it is helpful in any way
_____Other:_____

6. When I did mental practice, I usually CHECK ALL THAT APPLY

_____ Heard myself playing the part
_____ Saw a visual picture of myself playing the part
_____ Imagined how my fingers/hands/embouchure feel when playing the part

7. If you visually saw yourself playing the music, did you

_____ See from inside yourself, as if looking from your own eyes
_____ See from outside yourself, as if you were watching a movie of yourself
_____ Both
_____ I did not visually see myself playing the music

In the next three questions, you will be asked to rate how clearly you could imagine yourself playing the music during mental practice on a scale from 1 to 5, with 1 being not clear and 5 being very clear. If you did not do the mental practice technique listed, leave the question blank.

8. During mental practice, IF you tried to hear the music in your head, how clearly could you hear the music? (IF YOU DID NOT HEAR THE MUSIC IN YOUR HEAD, DO NOT CIRCLE AN ANSWER)

1	2	3	4	5
(not clear)				(very clear)

9. IF you tried to visually see yourself playing, how clearly could you see the "movie" of yourself? (IF YOU DID NOT VISUALLY SEE YOURSELF, DO NOT CIRCLE AN ANSWER)

1	2	3	4	5
(not clear)				(very clear)

10. IF you tried to imagine the "feel" of your muscles moving during mental practice, how well were you able to feel your muscles move? (IF YOU DID NOT IMAGINE THE FEEL OF YOUR MUSCLES, DO NOT CIRCLE AN ANSWER)

1	2	3	4	5
(not well)				(very well)

Some people are able to control their mental practice better than others.
• Having good control over your mental practice means that you control the images and sounds in your head very well.
• Sometimes people have a hard time controlling the images and sounds, meaning that they see and hear them, but can't always control what the images and sounds do. For instance, you might hear the music, but not be able to control exactly how you want the music to sound.

11. How much control do you think you have over your mental practice?

1	2	3	4	5
(very little control)				(a great deal of control)

12. Do you have any other thoughts regarding mental practice? If so, please make additional comments here:

***THANK YOU* FOR YOUR HELP WITH THIS STUDY!**

APPENDIX J
STUDENT OPINIONS REGARDING MENTAL PRACTICE

Mental Practice Method Group Student Comments on the Post-Study Questionnaire

The following comments were made by students in the mental practice method group in response to the question: *Do you have any other thoughts regarding mental practice? If so, please make additional comments here:*

1. "I didn't enjoy it much."

2. "I think it is alright but to do it after play[ing] the piece once or twice instead of four or five times like we did."

3. "It helped with music I was having a hard time with."

4. "I thought it was alright but it wasn't helpful to me."

5. "It helped me be more in tune with music around me and I could write or play things by ear."

6. "When asked to hear both the sound of your part and that of the entire band, it helped by letting you know what you need to work on alone and as a group."

7. "I think mental practice is done by all absentmindedly but put in a more useful, practical manner helps a great deal."

8. "I like the idea [of mental practice] and think that it is definitely effective."

9. "I liked imagining how my muscles/embouchure fell when playing. I think that [it] is an effective technique for mental practicing. It is a sort of imagined muscle memory, almost the same kind of muscle memory you develop in sports."

10. "I think mental practice helped our band quite a bit as a whole."

11. "[I] like [mental practice] but it gets boring."

12. "Listening to the band as a whole helps you hear what you should sound like – helps with balance and listening."

13. “It might not be good for a class that has a set time for class. It takes a lot of time if the students don’t listen and might be better in college or extra-curricular activities where pupils are mature.”

14. “I think [mental practice] works well especially when working with a new piece.”

15. “Works very good for practicing at home or without a horn.”

16. “I thought mental practicing really helped. We actually do it a lot not meaning to, like when other sections are being worked with.”

17. “I think it helped my practice and ability to play better.”

18. “It’s cool. Do it more often.”

Unstructured Mental Practice Group: Student Comments on the Post-Study Questionnaire

The following comments were made by students in the unstructured mental practice group in response to the question: *Do you have any other thoughts regarding mental practice? If so, please make additional comments here:*

1. “I subconsciously did this already, especially before sight-reading or beginning a piece we haven’t played in a while. I could hear an improvement in the band as a whole after we practiced as a group. I didn’t really see myself playing, but I could picture just my fingers, so I didn’t circle the seeing myself because it was only fingers I saw. A lot of people saw this as stupid and helpless, but I don’t think they paid attention to how they sounded before mental practice and after.”

2. “[Mental practice] doesn’t help as much as repeatedly playing. I also thought that it irritated me more ‘cause I thought it kinda wasted time.”

3. “Mental practice can help a musician in many ways.”

4. “It helped me imagine how the song should go and I played better after.”

5. “I liked it. I kill any music I have to sight [read] by myself but as a result of mental practice it helped me count rhythms and not be so nervous. My sight-reading improved some but it will only become better as time goes by.”

6. “Wow, it works!”

7. “When in mental practice I make sure to try and see that I’m doing things precise.”

8. “I thought it really helped me and I will definitely use it in the future.”

9. “[Mental practice] seemed to better my understanding of the piece.”

10. “I believe it’s a great way for you to understand mistakes that you make after already sight-reading.”

11. “I thought it was very helpful. I now use it all the time.”

12. “I thought the idea of mental practice was a good one that I had never tried/used before. I believe the mental practice technique will greatly benefit my playing in the future because it helps me to stop and think about what I’m playing before I actually play it. Also, mental practice helps me to concentrate and be more productive in my practicing/rehearsals.”

13. “I think it is a great idea. It really does work and helps you remember how to play and you can feel yourself playing.”

14. “I think mental practice is good if an individual is sight-reading. In a group, it’s helpful after the first run through, because it helps everything make sense. I will definitely use it later on in music.”

15. “[Mental practice] needs to be in shorter blocks and not extremely long sections, less than 12 measures.”

16. “At first, I didn’t like the mental practice, but as I became more familiar with the piece, mental practice became more and more helpful.”

17. “Mental practice was odd to do at first, but I think it is a cool method.”

18. “It helped when I was getting ready to play with the band, but when I was about to play it by myself and I was nervous I couldn’t do it. It was as if all of a sudden I was back to square one when I was just learning my music. All of a sudden the things I had worked up and could play well, I couldn’t. I’ve always done some sort of mental practice. But I found it difficult to mentally practice a different part from what another group was practicing out loud. I can’t hear my part in my head. I’ve noticed it seems to deal with how well I know a certain piece. The more I do, the easier it is. But I did enjoy the whole survey. At first I thought it was stupid, but I realized that I do it all the time! Thank you!”

19. “For me, it was easiest to use mental practicing in short spurts. If I had to do it for more than maybe 10 measures or if there are a lot of rests, I start listening [in my head] to the other parts and lose mine. But then again I’m bad at doing two things at one time.”

20. “I normally use mental practice before I sight-read. When I’m really concentrating I can always picture, hear, and feel myself playing.”

21. “Personally I’ve been doing mental practice for a long time but I only find it helpful in finding rhythms I’m having problems with.”

22. “It was OK, but did not help sometimes.”

23. “I like mental practice.”

24. “It helped me grow as a musician. I learned to listen and pay attention to songs more. Instead of just playing the dynamics, when I mentally practiced I could hear it in my head and then actually play the dynamics well. Also, I play piano, so it even helped with my piano playing.”

25. “At first I thought it was really dumb, but after we did it I was amazed at how much it really helped.”

26. “I enjoyed doing mental practices. It was nice to just sit there, very relaxed and just focus everything on the music. It really helped me have a better understanding of what I was playing.”

27. “I think that it helps for the immediate future, but not the long run.”

28. “I didn’t really like the choice of music, but with every song that you play, you get sick of every song sometimes. I liked the idea of this experiment.”

29. “I think it’s a very good idea, and I will surely use it in the future.”

30. “I had tried it to a degree before on my own time, but never to this extent.”

31. “I feel that mental practice helps when one is learning a new instrument. He/she may not feel muscle movement exactly but it creates a better feel than he/she had before.”

32. “I think it’s a good idea for sight-reading but in most other cases, it was rather useless.”

33. “I thought it is a good idea. I didn’t mind it. I thought as long as people were serious about it, it helped.”

34. “I think it is a very good system. I would like to apply it to practicing for piano. Very helpful!”

35. “It can be helpful but a bit boring.”

36. “I think it is a good idea [unreadable word] that will grow.”

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BIOGRAPHICAL SKETCH

Stephen Daniel Galyen was born in Richmond, Virginia. He received the Bachelor of Arts in music education from Virginia Tech in 1995, and served as band director at Northside High School in Roanoke, Virginia from 1995-2001. Under his leadership the band program more than doubled in size, and both the Marching Band and Symphonic Band received consistent Superior ratings at state and local festivals. The bands at Northside performed for two Virginia Governors, including an invitation to the 1998 Governor's Inauguration Parade. Mr. Galyen was a presenter at the 1997 Virginia Music Educators Association Conference.

In 2003 Mr. Galyen received the Master of Music in music education at Syracuse University in Syracuse, New York. He specialized in wind conducting and literature, and was a graduate assistant in the Syracuse Band department where he was conductor of the University Concert Band and graduate conductor of the Wind Ensemble and Symphonic Band. He also worked with the Marching Band, Basketball Pep Band, and conducting classes. While at Syracuse, he studied conducting with Dr. James Tapia, Dr. John Laverty, and Dr. Brad Ethington.

In 2003 Mr. Galyen began coursework for the Ph.D. in music education with an emphasis in wind conducting at the University of Florida, where he was a doctoral conducting associate in the University Band Department. He served as conductor of both the Symphonic Band and Concert Band, and as graduate conductor of the Wind Symphony. In addition, he was the instructor for the Instrumental Materials and Methods

course, observed student teachers, and assisted with the conducting classes. At Florida he studied conducting with Dr. David Waybright.

Mr. Galyen is active as a guest conductor and clinician. He also arranges drill for several high school bands in Virginia and North Carolina, and serves as drill designer for the University of Northern Iowa Marching Band. In the Spring of 2005 he was the graduate recipient of the David Wilmot Award for excellence in music education. Mr. Galyen has published articles in *The Instrumentalist, Research Perspectives in Music Education, Update: Applications of Research in Music Education,* and *The Music Educators Journal*. He is a member of Pi Kappa Lambda Music Honor Society, Kappa Delta Pi Honor Society for Education, Golden Key International Honour Society, the Music Educators National Conference, College Band Directors National Association, the College Music Society, and is an honorary member of both Kappa Kappa Psi Honorary Band Fraternity and Tau Beta Sigma Honorary Band Sorority.

After graduation Mr. Galyen will serve as Director of Bands and Instrumental Music at Bridgewater College in Bridgewater, Virginia. He currently resides in Gainesville with his wife, Kelley and daughter, Kate.