THE EFFECT OF RHYTHM PATTERN INSTRUCTION ON THE SIGHT-READING ACHIEVEMENT OF WIND INSTRUMENTALISTS

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Doctor of Philosophy

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by
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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

THE EFFECT OF RHYTHM PATTERN INSTRUCTION ON THE SIGHT-READING ACHIEVEMENT OF WIND INSTRUMENTALISTS

Presented by Daniel Laing,

a candidate for the degree of doctor of philosophy

and herby certify that, in their opinion, it is worthy of acceptance.

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Dedication

This dissertation is lovingly dedicated to my wife Kristen for her sacrifice, patience, and love during the entire process.

Acknowledgements

I would like to thank the University Band and Dori Waggoner for their cooperation in providing data for this study. I would also like to thank Brian Koerner for his help collecting data. Finally, I would like to thank Dr. Martin Bergee and Wendy Sims for their help and insight during this project.

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ABSTRACT

This study investigated the effects of rhythm pattern instruction on the sight-reading achievement of woodwind and brass instrumentalists. Subjects were members of the University Band concert ensemble (N = 50) at the University of Missouri-Columbia. Participants in this study volunteered to participate in a six-week treatment that included four weeks of rhythm pattern instruction. Assessment took place at the individual and ensemble levels. Three musical aspects of the ensemble's performance were evaluated: facility, ensemble, and flow.

The results of the statistical analyses revealed no significant differences between experimental and control groups. There were, however, statistically significant differences between pretest and posttest scores, with improvement in all aspects from pretest to posttest. There were no statistically significant interactions. The ensemble assessments showed a similar pattern. There was significant improvement in all three areas (facility, ensemble, and flow) from pretest to posttest, but there were no statistically significant interactions between testing (pretest-posttest) and condition.

Results of this study suggest that students' sight-reading of rhythmic patterns might improve through the ensemble experience alone. There was no evidence that teaching isolated rhythmic patterns over a brief period of time affected the students' sight-reading achievement. Further research should employ the approaches used in this study in more extensive time frames and with a larger number of participants.

CHAPTER 1

INTRODUCTION

MENC: National Association of Music Education has recently developed nine National Standards for Music Education (MENC, 1994). These standards were developed to help music educators deliver a comprehensive music education to all students in music programs. While all of these standards are important, Standard Five: Reading and Notating Music requires special consideration, because it is emphasized daily in most music ensemble classrooms. To participate meaningfully in any modern instrumental performing ensemble, a student must posses the ability to read and decipher musical notation. Despite this, a prevalent lack of rhythmic understanding exists among students (McPherson, 1994; Nolker, 2001).

Rhythmic training begins with an extensive emphasis on rhythm in the elementary music classroom, often through movement and singing (Bebeau,1982). Once students have completed their first year of instrumental music training, this rhythmic emphasis tends to diminish (Conway, 2003). Therefore, many music students lack the rhythmic vocabulary necessary to perform the complex rhythms found in many instrumental music pieces.

Rhythmic instruction usually takes place during the large ensemble (Nolker, 2001). This type of instruction uses a modest amount of rehearsal time, but can also conceal rhythmic problems of individual students. This becomes especially evident when a large ensemble sight-reads. Large ensembles tend to sight-read better than individual students performing the same material alone (Nolker, 2001). Researchers have studied the group effect, but little research has been conducted on why individuals are not able to

sight-read successfully by themselves (Nolker, 2001). Ensemble sight-reading is not a reliable predictor of an individual's sight-reading ability.

In order to be effective, rhythmic instruction must be maintained throughout the student's musical career. Once students have acquired the requisite rhythmic vocabulary, then sight-reading of complex rhythmic patterns should improve.

Background of the Study

In instrumental and choral music curricula, rhythmic instruction largely takes place in the large ensemble setting (Demorest & May, 1995; Nolker, 2001). While this type of instruction positively affects the large ensemble, researchers have yet to isolate specific instructional strategies that make individual students better sight-readers. This lack of research is present in the instrumental as well as the choral area (Demorest & May, 1995; Nolker, 2001), which has led to the present study. Research needs to be conducted to develop instructional strategies for the large instrumental ensemble that foster more successful sight-readers.

The two most common approaches to teaching sight-reading to instrumentalists include teaching individual rhythms, and reading an immense amount of literature to improve rhythmic vocabulary (Whaley, 2004). Although both have produced some results, two fundamental problems arise. First, both instructional strategies allow individual students to "hide." Also, reading a vast amount of repertoire emphasizes only the rhythms that students already know. It does not address the issue of learning and retaining rhythms that are new to individual students, but still commonly found in the literature. Students will not be able to perform rhythms correctly unless they first are

taught these patterns outside of music contexts, and later, encouraged to integrate the patterns into these contexts (Whaley, 2004).

Current Strategies for Teaching Rhythm

Several music educators have written articles that suggest instructional strategies for teaching rhythm (Brown & Chesnutt, 2001; Conway, 2003; Dalby, 2005; Hicks, 1980; Strouse, 2007; Whaley, 2004). Dalby (2005) focused on helping music teachers address crucial questions about teaching rhythm. He recommended these general principles for teaching rhythm:

1. Identify meters on the basis of audiation – how music sounds – not notation.
2. Use a good rhythm-syllable system.
3. Use syllables primarily for verbal association, not verbal analysis.
4. Use rhythmic movement that is consistent with the structure of meter and rhythm as audiated.

Brown and Chestnutt (2001) suggested four strategies for teaching rhythm. The first incorporated a mathematical approach. Students learn to count rhythms using numbers to represent each rhythmic pulse. This approach is commonly used in many instrumental music classes. The second approach has students connect the division of beats with the foot strokes. The downward motion of the foot represents downbeats, and the upward motion represents the "ands." A third suggestion utilizes mnemonic devices to help students remember how to perform the rhythmic example. For example, Brown and Chestnutt used "Mississippi" to represent four consecutive sixteen notes. Finally, they suggested singing in rehearsal to emphasize musical ideas and rhythms. Because

students often remember what they sing, singing reinforces newly-learned rhythmic patterns.

Hicks (1980) recommended the following outline when teaching beginning instrumentalists the principles of music notation:

1. Use non-notational instructional strategies when teaching new melodies.
2. Play simple melodies, but change time, meter, and dynamics during each repetition of the melody,
3. After the first two skills have been mastered, introduce line notation to the students for these melodies.
4. Teach students rhythms first using only one line, and then expand the staff to use all lines and spaces.
5. The instructor should incorporate rhythm, meter, and tempo into daily class routine.
6. Add timbre and dynamics to the daily instruction.

Whaley (2004) believed that rhythm is often neglected as a daily component of band and orchestra rehearsals. Through his own experiences, he found that there were few methods that effectively taught rhythms to students. To address this, Whaley wrote a short rhythmic example to help one of his students with a difficult passage. He asked the student to count and clap the rhythmic example, which allowed this instrumentalist to transfer the knowledge to the performance of a difficult passage.

Later, Whaley introduced this method to all of his students. By using rhythmic materials found in the music the ensemble was performing, he constructed difficult rhythmic patterns and distributed them to each student. He asked his students to count

and clap each of the difficult rhythms, and then had the students perform them on a single unison pitch. The students then were able to perform the same rhythmic passage in the music more correctly. This process seemed to lead to fewer rhythmic errors.

According to Conway (2003), accurate rhythm is a component that should be emphasized immediately in beginning band. A few simple learning procedures can accomplish this. First, the students must establish a strong sense of beat using steady-beat movement activities. One activity that Conway suggested requires the students to find larger beats, or macro beats, by either foot-tapping or tapping their leg with their hand. After this, she recommended that students try to find smaller beat units, or micro beats, using another part of their body. Conway believed that this process helps students to subdivide.

Conway also stressed that when students are able to feel the beat and subdivide, rhythmic notation should then be introduced. While students are moving to the macro beat, short rhythmic examples are written on the board and the students are asked to imitate the pattern using any syllable. This process continues until students can confidently perform the rhythms without using the syllables.

Strouse (2007) suggested that a count-chant process be used to improve rhythmic reading in middle school band ensembles. This system requires the students to perform a rhythmic line by chanting the rhythms using count subdivisions. The author suggested that whole, half, and quarter notes are to be chanted using an eighth-note subdivision. For sixteenth note patterns, she recommended using sixteenth-note subdivisions.
To introduce this system, Strouse recommended a five-step process:

1. Write a rhythmic example on the board and perform the line using a count chant.
2. Ask the students to describe what you just did.
3. Ask the students to imitate what you just performed.
4. Have the students perform the example on their instruments using a single pitch.
5. Using similar rhythms, have the students perform similar exercises, allowing students enough time to mentally determine the sequence. Students should count-chant the exercises and then perform them.

After this sequence becomes familiar to the students, it becomes incorporated into the normal rehearsal routine. During each rehearsal, the ensemble should perform some type of rhythmic etude to reinforce the materials that the students have learned during the course of the semester. Strouse recommended that this process begin early.

Although the above recommendations have been made, they are rarely integrated into a pedagogical approach in which outcomes are tested for effectiveness. This study attempted to meet this need.

Need for the Study

Little research has been conducted on the effect of rhythmic instruction on wind players' abilities to sight-read music accurately. This is interesting, as instrumental music education has historically shown a great interest in rhythmic reading. Evidence for this includes sight-reading at festivals and the sight-reading component of many auditions. Many researchers (Boyle, 1970; Brown & Chesnutt, 2001; Conway, 2003; Ferrin, 2003; Gromko, 2004; Hewson, 1966; McGuire, 2003; Parisi, 2004; Pierce, 1992;

Rodgers, 1996; Sink, 1984; Whaley, 2004) agree on the importance of rhythmic instruction and its value in the classroom setting; however, they do not all agree on how to teach this concept. While it would be most effective to teach each student on an individual basis, this is not always a practical solution, because this would require an increased amount of instructional time and staff.

Purpose of the Study

The purpose of this study is to investigate the effect of teaching specific rhythm patterns on the sight-reading achievement of wind instrumentalists. The patterns were presented in a large ensemble similar to what many music students encounter. As part of the procedure, instrumentalists performed isolated rhythms individually and as a group. This study examined the effects of group instruction on the individual's ability to sight-read music effectively. Because group instruction is the most common style of teaching, specific attention was paid to assure that each individual learned and retained these rhythmic patterns within the group setting.

Specific rhythmic patterns were isolated so that the students could easily comprehend them. The intention was that isolating these patterns might help to improve rhythmic retention in the instrumentalist (Boyle, 1970). The instructional strategy used in this study involved students learning small rhythmic groupings, which might increase their ability to retain and recall these groupings.

In this study, three main aspects of sight-reading were incorporated into the instructional procedures. These components are commonly associated with Gordon (1971) and studied by other researchers (Dalby, 2005). The first component is the ability to visually recognize the individual rhythms. Students must be able to visualize how a

rhythm looks before they can produce this rhythm on their instruments. The second component is audiation. Audiation is the ability to recreate the sound of the rhythm in the mind. The last step of sight-reading is to perform the rhythm. When students are able to master and combine these three skills, they should be able to reproduce the rhythmic patterns on their instruments. The research questions addressed in this study are as follows:

1. What effect, if any, does a treatment program of isolating specific rhythmic patterns have on the improvement of sight-reading ability of individual wind instrumentalists?
2. What effect, if any, does a treatment program of isolating specific rhythmic patterns have on the improvement of the overall ensemble performance skills of facility, ensemble, and flow?

CHAPTER 2

REVIEW OF LITERATURE

Rhythm is undeniably one of the most important aspects of music. It is rhythm that helps to impel music forward, and it also serves as an organizer for melodic, harmonic, and timbral materials. Improper rhythmic performance, however, can be a problem at every level of individual and ensemble instruction.

Rhythm in Music

Rhythm has an effect on many aspects of music. Boisen (1981) investigated whether the accuracy of students' aural perception of rhythmic completeness and incompleteness is influenced by melodic context. A total of 2,207 public school students from Wisconsin public schools were administered a 42-item data collection instrument containing 14 rhythmic units. Seven of these units were complete, and seven were incomplete. Students heard each unit on one pitch only, as part of a melody in which the pitch sequence matched the rhythm and was complete or incomplete, and as part of a non-matching melody. His results revealed that rhythmic accuracy was influenced by melodic context; however, there was no difference in the accuracy between single-pitch melodies and matching melodies.

Similarly, Wang (1984) studied the effects of rhythmic pattern, texture, beat location of tempo change, and direction of tempo change on the needed time to perceive change. College students (N = 88) listened to 32 versions of Dvorak's *Humoresque* and were asked to identify the onset of tempo change. Results indicated that it took more

time to identify tempo increases than tempo decreases, uneven rhythms more than even rhythms, and melody alone rather than melody with accompaniment.

The effect of tempo differences on a listener's ability to recognize previously heard rhythm patterns has also been examined. Duke (1994) investigated the effect of audible beat on subjects' response accuracy. His subjects were 320 third-, fourth-, and fifth-grade students and non-music major undergraduates. Each of the participants heard one of two versions of a 20-item paired-comparison test and indicated whether the second rhythm in each pair was the same or different from the first rhythm. Rhythm performances at 100 beats per minute were compared to performances at different rates of speed. The response accuracy for all groups was affected significantly by the comparison tempo and the direction of tempo change between the first and second test item. Slower tempos yielded less correct responses than faster tempos.

There has been some research on the effects of teaching music reading in the classroom. Hewson (1966) emphasized that students learn best through musical explanations and activities. Six elementary classes were used to compare the traditional approach to teaching music reading versus a new experimental method that Henson had developed. The conventional approach included a vocal warm-up, solfege, and ear training, while the experimental group focused more on musical experiences before introducing written notation. Hewson concluded that rhythmic experiences must be focused around the learning of rhythms through repetition.

Gromko (2004) investigated relationships among music sight-reading and tonal audiation, visual field articulation, spatial orientation and visualization, and achievement in math concepts and reading comprehension. Students at one of four high schools

(*N* = 98) in the American midwest participated in the study. Students were individually tested for tonal and rhythmic audiation, spatial orientation, mental rotation ability, and pattern perceptions. Gromko developed a model illustrating that music reading draws from a variety of cognitive skills, including reading comprehension, audiation, spatial-temporal reasoning, and a visual perception of patterns. She found that these factors accounted for 48% of the variability in her participants' music sight-reading scores.

Other research has explored the effects of teaching musical notation to improve the music reading abilities of music students. Rodgers (1996) attempted to determine whether instruction using colored rhythmic notation would affect first and second-grade students' reading skills. Participants in his study were first and second-graders (*N* = 134) that participated in a general music class. About half (64) of the students underwent a treatment that included reading, clapping, and vocalizing rhythms notated in color. A control group (*N* = 70) participated in a similar style of instruction that did not include colored notation. After a 23-week treatment period, results revealed that the experimental group scored slightly higher when reading both colored and uncolored notation. In general, the treatment group scored significantly higher than the control group in all areas of rhythm reading. Rodgers also noted that 78% of the participants favored the colored notation task as the exercise they enjoyed performing the most.

During early stages of musical instruction, some educators delay the introduction of notated rhythms in music. Bebeau (1982) conducted two experiments to compare the effectiveness of teaching rhythm using a traditional approach versus a simplified speech cue method, which implemented aspects of both the Orff and Kodaly method of teaching. Results of the first experiment indicated the advantage of the speech cue method.

Experiment Two was then conducted to determine whether the speech cue method could be used with minimal teacher training. Bebeau administered a 23-item rhythm-reading test to 107 third graders before and after rhythmic instruction by each of the two methods. In both experiments, the speech cue group made significantly greater gains than did the traditional group.

Kim (2001) attempted to understand the relationship between music achievement and learning-relevant variables in the young adult beginner learning how to play the piano. Subjects were undergraduate (N = 20) non-music majors between the ages of 18 and 22. Each student was given two 40-minute lessons per week for 10 weeks, taught by the researcher, on a one-to-one basis. The researcher developed an instructional program and measurement tool used to teach and observe each of three types of music achievement: keyboard fluency, music reading, and independent interpretation. Findings revealed that characteristics related to learning (motivation, attitude, and emotion) played a large part in the learning of piano versus physical capacity, intelligence, and musical background. Kim suggested that the teacher should provide a variety of materials along with cognitive and affective experiences, according to the nature of the student.

Students with learning disabilities also have the ability to read and understand rhythms (Atterbury, 1983). Atterbury investigated differences in rhythm reading abilities between 40 normal and learning-disabled readers ages 7 and 8. She tested rhythm performance using three modes of presentation: tapped, melodic, and tapped while spoken (ta, ti-ti, etc.). Three responses, recognition (same and different), join-in performance and echo performance, were measured. The rhythm section of the *Primary Measures of Music Audiation*, (Gordon, 1979) was modified for the exceptional students.

Atterbury found significant differences in rhythm pattern ability between the two reading-ability groups. These differences were greater at age 7 than at age 8. Group differences were found on the join-in and echo performance measures, but not on the recognition test. Significant group differences were found on the *PMMA*.

Sight-Reading Ability

A solid foundation of music instruction includes rhythm (Elliot, 1982). Elliot (1982) investigated the relationships among instrumental sight-reading ability and seven predictor variables: (a) technical proficiency, (b) rhythm reading ability, (c) sight singing ability, (d) cumulative grade point average, (e) cumulative music theory grade point average, and (f) major instrument grade point average. Subjects were 33 undergraduate instrumentalists, selected at random from undergraduate music theory classes at the University of South Carolina. During a spring semester, students participated in examinations designed to measure their abilities in sight-reading, technical proficiency, sight singing, and rhythm reading. Elliot drew several conclusions. First, a strong positive relationship was found between instrumentalists' general sight-reading ability and their ability to sight-read rhythms. Next, rhythm-reading ability was the best predictor of sight-reading scores. Finally, rhythm reading ability and performance jury scores combined best predicted sight-reading performance scores.

Thackray (1968) tested one hundred first-year students for their aural and visual perceptions of rhythm. The students were tested on four separate aspects of rhythmic ability: (a) Rhythmic perception – aural, (b) rhythmic perception – visual, (c) rhythmic performance – finer movements, and (d) rhythmic movement – gross body movements. Thackray concluded that there was a positive correlation between all three forms of

rhythmic ability. He also found a higher correlation between rhythmic perception and rhythmic performance than between rhythmic movement and either rhythmic perception or rhythmic performance. He found a slightly higher correlation between rhythmic movement and rhythmic performance than between rhythmic movement and rhythmic perception.

Rhythm and Movement

Past research has shown that young children possess the ability to comprehend rhythms within a musical context. Music educators at the elementary level, however, sometimes believe that younger students do not possess the ability to fully comprehend rhythms. Based on this belief, music educators may delay the instruction of rhythms with their younger students (Bebeau, 1982). This philosophy of teaching can and will hinder the musical growth of the student, because rhythmic vocabulary tends to improve over time and with experience.

One common component of rhythmic instruction is movement. Many music educators use movement to teach rhythms (Boyle, 1970; Ferrin, 2003). Ferrin (2003) conducted an experiment to determine the effect of a consistent and regular sight-reading regimen and to determine the effect of Educational Kinesiology upon the music sight-reading skills of high school instrumental music students. Two advanced band classes were chosen to participate in the study. Following a pretest to assess each student's sight-reading ability, control group (n = 26) participants sight-read predetermined selections of music each class period over a 6-week treatment period comprising of 13 class sessions. In addition to the same sight-reading regimen, the experimental group (n = 25) participated in six Educational Kinesiology activities prior to engaging in the reading

experience. Following the treatment period, the subjects were again assessed to evaluate any improvement in sight-reading skills. Ferrin found that using movement in rhythmic instruction helped to improve an individual's perception of pulse, and made rhythmic performance more accurate.

Boyle (1970) investigated the effect of prescribed rhythmical movements on the ability to read music at sight. He examined students in 22 junior high bands in the Topeka, Lawrence, and Kansas City areas (N = 191). Twenty-four bands were divided into two matched groups of twelve on the basis of the amount of rehearsal time, years of directors' teaching experience, and the size of the band. Only 23 percent of the total students participating in this study were administered both the pretest and posttest examination. All of the participating bands used the same instructional book, Hudadoff's *A Rhythm a Day*. Each control group band director was instructed not to use any movement when teaching rhythms, including foot tapping or clapping. The other directors were instructed to incorporate various types of movement in their instruction.

Boyle found that both the control and experimental groups made considerable gains in their scores; however, the experimental group's scores on both criterion measures were significantly higher than those made by the control group. Analysis of the data revealed that, even though the experimental group improved 23 percent more than the control group, the difference in percentage improvement was not statistically significant. Further analysis revealed that students' participation in private lessons and their prior musical experiences accounted for improved test scores.

To accommodate younger students, some researchers have recommended introducing a rhythm's sound before sight when teaching music reading. Hicks (1980)

focused on the importance of teaching sound before introducing the written notation. He recommended a six-step process that allowed students to be more successful music readers. His first step was to introduce a non-notational style of playing to the students. In Stage Two, the students performed patterns using familiar melodies. Then, line notation was used to teach students new melodies and rhythms. The fourth step included expanding the staff, which introduced new notes and lines to the students. When the students had mastered these steps, then rhythm, meter, and tempo were introduced. Finally, the sixth step introduced timbre and dynamics to the individuals. Hicks concluded that we need to update our pedagogy and relax our insistence on tradition to improve the skills of new musicians.

Palmer (1976) investigated the effectiveness of two approaches to rhythm reading for fourth-grade students. She compared two commonly used approaches for teaching rhythm in the classroom. The first method, based on the Kodaly system of rhythmic learning, was developed by Mary Helen Richards. The other system used in the study was that of Edwin Gordon, whose approach to rhythmic instruction is an outgrowth of his interest in the measurement of music aptitude and achievement. Subjects in Palmer's study were fourth-grade students (N =136) attending elementary school in Florida. Participants were divided into one of four groups. Two groups, which attended the same school, were designated as control groups. The other two were randomly assigned to either the Richards or the Gordon approach. Each of the treatment groups received 20 minutes of instruction three times a week for five weeks. The control groups underwent no special instruction. Students were tested for written and performance aptitude in music with Gordon's *Musical Aptitude Profile*. The results demonstrated a significant

improvement for the treatment groups. Palmer did not find statistically significant differences between the methods.

Movement when teaching rhythms is a crucial component of rhythmic instruction. Students that encountered kinesthetics in rhythmic education improved rhythmic reading ability (Ferrin, 2003) Other researchers investigated the use of foot tapping and clapping during rhythmic instruction (Boyle, 1970). Students that used these learning devices during rhythmic instruction significantly improved their rhythmic reading ability. One researcher, however, cautions about the use of foot tapping during sight-reading exercises (Parisi, 2004). Whatever the approach to rhythmic learning, movement has been found to aid in the learning of rhythmic materials in music.

The Work of Edwin Gordon

One pioneer of rhythm reading study is Edwin Gordon. In two of his many publications (Gordon, 1971, 1976), he stated that rhythm is composed of three basic elements: tempo, meter, and melodic rhythm. According to Gordon, when combined, these elements interact in a composite polyrhythmic manner referred to as rhythm.

Tempo provides the foundation on which all other rhythmic relationships are based. Tempo, which Gordon refers to as tempo beats, is the feeling in the music that allows one to tap one's foot steadily or to walk to a piece of music. It is tempo that helps to drive music forward. Meter, the second rhythmic component, moves in groups of twos or threes. Gordon stated that when you group together tempo beats, meter beats are achieved. Melodic rhythm, the final element, is composed of both meter and tempo beats. This component is based on the melodic ideas of the music or the text from which

the music is derived. Without the sensation of rhythm, melody would be difficult to organize.

Gordon (1971, 1976) recommended a specific organization of rhythmic patterns to be used when teaching rhythms. He separated these patterns into the following eight groupings:

1. Basic Duple – basic patterns include rests, syncopation, and upbeats
2. Basic Triple – basic patterns include rests, syncopation, and upbeats
3. Uncommon Duple – includes notes and rests of longer duration and also ties
4. Uncommon Triple – includes notes and rests of longer duration and also ties
5. Basic Mixed – when patterns contrast with meter, for example, duplets in triple meter
6. Uncommon Mixed – patterns that incorporate a quintuplet, sextuplet, or septuplet.
7. Basic Unusual – tempo beats are inconsistent with time
8. Uncommon Unusual – polyrhythmic patterns

According to Gordon, students develop a firm rhythmic understanding by engaging in eurhythmic activities. When tempo, meter, and melodic rhythm are all mastered, musicians then have the ability to learn the complex rhythmic patterns that lead to rhythmic readiness. Students' ability to read and write rhythms is directly related to their ability to feel kinesthetically what they see in notational form. Finally, Gordon stated that for rhythmic instruction to be beneficial, a student's individuality must be taken into consideration during the learning process.

Sight-reading

Generally, musicians consider sight-reading to be the first performance of a piece. Effective sight-reading includes a number of components. The first feature is that acquired music knowledge has a direct correlation with the ability to sight-read music. As stated earlier, musicians will improve with experience in rhythmic reading. On the other hand, a student's sight-reading ability does not directly correlate with his or her musical ability, and a strong musician may not possess a strong sight-reading aptitude (McPherson, 1994). McPherson stated some guidelines for successful sight-reading:

1. A performer must scan the music ahead of time and notice such items as the time signature, key signature, and other relevant musical entities.
2. Mental rehearsal is a key to success.
3. The performer must keep focused during the performance and be able to anticipate any problems that might occur.
4. The musician must be able to correlate the visual images of the music with the aural sounds.

Another component of successful sight-reading is that the musician must encounter a vast amount of rhythmic materials and musical structures in order to be successful. Many music educators believe that any deficiencies in music reading are caused by a lack of understanding of rhythmic patterns (Boyle, 1970). Some music educators believe that the regular practice of reading rhythmic patterns will improve sight-reading skills (Elliot, 1982). Whaley (2004) even has suggested that teaching rhythms in the classroom should become an integral part of the daily class routine.

Rhythmic reading is arguably the most important sight-reading issue. More than half of music reading errors in a performance are rhythmically related (Boyle, 1970). These errors can commonly be attributed to how the eye "tracks" music. Musicians that have a greater knowledge of music are able to read further ahead than musicians with less understanding (Parncutt & McPherson, 2002). The ability to anticipate music typically makes for better sight-readers.

Error Detection

Error detection in sight-reading is another issue that may hinder the music-reading ability of musicians. Fortunately, error detection can be practiced. When pianists were asked to practice error detection presented in piano scores, their skills improved (Kostka, 2000). Error detection is a skill that students possess even at a relatively early age. Mistakes in rhythm are the easiest for younger musicians to identify (Hewitt, 2005; Sheldon, 1998).

Sheldon (1998) examined the effects of contextual sight-singing and aural skills training on pitch and rhythm error detection abilities. Subjects were undergraduate instrumental music education majors (N =30), who were randomly divided into two equal groups. Experimental subjects received 50 minutes of sight-singing experiences and ear training per week over 11 weeks, using materials from various band repertoire. Subject response to errors in one, two, and three-part homorhythmic and polyrhythmic examples were examined. Results showed that students who received the extensive ear training treatment were better at detecting errors. Rhythmic errors were more easily identified than pitch errors.

Hewitt (2005) examined the self-evaluation accuracy among high school and middle school instrumentalists. He investigated four factors potentially affecting self-evaluation: (a) whether grade level differences exist on self-evaluation tendencies over time; (b) whether grade level differences and evaluation differences exist, alone and in combination, on music performance evaluation; (c) whether relationships exist between student self-evaluation and expert evaluation of music performance by grade level; and (d) whether differences exist between grade level and music performance sub-areas on self-evaluation accuracy. The test subjects were middle school (N =92) and high school (N =51) instrumentalists participating in one of two summer music programs. Each student self-evaluated their performance during rehearsals, while expert evaluators judged individuals' final performance. The results demonstrated that high school students were more accurate in their self-evaluation than middle school students except for melody and rhythm. Middle school students' scores correlated more highly with the experts' than did high school students' scores. Both groups were most accurate with their evaluation of melody and least accurate in their evaluation of technique and articulation.

Research has also explored the spacing of rhythmic notation and whether this spacing has an effect on reading errors. Gregory (1972) sought to identify error differences resulting from four different representations of rhythmic stimuli. These rhythmic stimuli included notation spaced conventionally with regard to rhythm, notation spaced conventionally with regard to rhythm but with the beats indicated, notation spaced in proportion to its rhythmic durations, and notation incorporating stemless note heads elongated in proportion to the notes' durations. The subjects were 63 B-flat soprano clarinet players drawn from grades 7 through 12. Participants, who had varying degrees

of experience on their instruments, were placed into one of four groups by random selection. Each group was assigned to one of the rhythmic notations stated earlier. During the first week, participants received rhythmic instruction for fifteen minutes individually and as a group. Over the following three weeks, participants were asked to practice part B of the *Watkins-Farnum Performance Scale*. They were then tested at the end of the fourth week using part A of this scale. Gregory found that the fourth style of rhythmic notation, incorporating stemless note heads elongated in proportion to the notes' durations, was most useful for the younger students. She recommended that incorporation of nontraditional notation might be an effective way to teach rhythm to students, especially for those who are just beginning to develop their musical skills.

The aural component is crucial to mastering sight-reading skills. Some music educators believe that students must have extensive aural training to improve their music reading ability (Sheldon, 1998). Sheldon found that subjects who have developed these skills were able to correct errors more effectively than those who were not adept to this.

Ramsey (1979) developed a program of study to train the ability to detect errors. This program included seven phases: (a) determining typical errors, (b) selecting the music, (c) assigning the errors, (d) taping the program items, (e) validating the program items, (f) establishing the difficulty continuum, and (g) constructing the three program sequences. After the program of error detection was developed, Ramsey recorded 153 music excerpts incorporating pitch or rhythm errors. The expert musicians were then asked to review each of the 153 examples that were recorded. Of the 153 recorded excerpts, 135 were deemed satisfactory. After a pilot study was administered, students (N =85) currently enrolled in one of four major universities participated in the study.

These students were administered booklets and instructions intended to improve their error detection skills. From the posttest data, Ramsey determined that that programmed instruction was effective in error detection skills, and that the longer forms of the program resulted in greater gains. Similarly, Kostka (2000) investigated three methods of teaching sight-reading to undergraduate keyboard music majors. Students (N =69) enrolled in six piano classes were divided randomly among three conditions: (a) error-detection practice plus silently playing the notes on top of the keys, (b) silently playing the notes on top of the keys, and (c) unguided independent practice. Using a pretest-post-test design, Kostka assessed students on achievement in five selected sight-reading assignments during a 15-week semester. Although no significant differences were found in overall sight-reading improvement among groups, the error-detection method plus silently playing the notes on top of the keys allowed the subjects to achieve modest gains. Rhythm was the most improved category, followed by notes and reading fluency.

Although research on sight-reading focuses on many different areas of performance, a common thread can be found. Highly trained musicians will be better sight-readers because of their ability to recognize rhythmic patterns in the music. To improve this skill, educators must continue to train students to recognize rhythms both aurally and visually. When students understand these rhythms at a higher level, they will be able to perform more correctly at sight.

Choral Instruction

There is strong concern among choral music educators about choral students' ability to read rhythms (Nolker, 2001). Researchers in choral music education have identified several factors that are related to sight-reading and the importance of teaching rhythm in the choral music classroom (Daniels, 1986; Demorest & May, 1995). Demorest and May examined individual sight-singing skills of choir members in relation to their private musical training, their choral experience, the difficulty of the melodic material, and the system used for group instruction. Subjects (N =414) were drawn from the first and second choirs of four Texas high schools. Two schools used a fixed-*do* system, while the other two used a movable-*do* system of instruction. Students were randomly assigned to two melodies of varying difficulty. The number of years of school choir experience emerged as the strongest predictor of individual success, followed by years of piano instruction, instrumental experience, and vocal lessons respectively.

Daniel (1986) investigated the relationships among sight-reading abilities in the high school mixed chorus and selected variables in four categories: school, music curriculum, chorus teacher, and choral students. Twenty high school mixed choirs and chorus teachers participated in this study. Data collection consisted of four parts: (a) teacher questionnaire, (b) student questionnaire, (c) sight-reading test, and (d) adjudication. A sight-reading test was administered to choirs in each of the 20 schools, which five qualified adjudicators rated. Based on the results, the following combinations were found to be the best predictors of sight-reading: the ethnic makeup of the school, a choir with a large percentage of members with a piano at home, a large school, an occasional use of rote procedures, a high participation of students in all-state choir, and a

chorus teacher who believed in the importance of sight-reading instruction in the classroom.

Nolker (2001) studied the relationship of the assessment setting to sight-reading success of the individual student in relation to past sight-singing ratings, school size, and a group of selected factors. These factors included instrumental experience, piano experience, lessons on either piano or another instrument, and years of choir experience. Subjects were members of eight Illinois high school choirs (N =220) who had participated in a large ensemble within at least two years of the study. Student's sight-singing abilities were tested individually and within a large ensemble. Results revealed a significant difference between the act of sight-singing in isolation and sight-singing within the ensemble, with higher mean scores for singing in the ensemble setting.

Research pertaining to choral sight-reading instruction has indicated that there are several factors that help to determine sight-reading abilities of choral students. Most of these factors are contingent on experience, including instrumental experience, piano experience, private instrumental music lessons, and experiences in performing ensembles.

Instrumental Instruction

The sight-reading abilities of wind instrumentalists are a prime focus of instrumental music education in the United States. Music students that participate in an instrumental music program are often expected to sight-read on a regular basis, occasionally for a grade or a rating. Spohn (1977) studied the learning of rhythms and how it may affect the performance of rhythmic patterns. In his study, a group of subjects (n = 71) took a pretest on which they performed duple rhythmic patterns. Another group of subjects (n = 75) took a pretest that consisted of triple rhythmic patterns. An item

analysis of the data provided a relative ordering of difficulty of rhythms. Spohn stated that recognition of these difficult patterns enhanced a student's ability to learn rhythms.

Students who are exposed to a regimen of rhythmic instruction build their rhythmic vocabulary and gain valuable experience that will allow them to sight-read better (Bobbitt, 1970). Bobbit discussed the importance of the development of music reading skills. During the 1965-1966 school year he conducted an experiment in the Brookline School District in Massachusetts. Subjects ($N = 20$) were selected after preliminary testing of members of two sixth-grade homerooms. Once a week, students were administered rhythmic instruction during a 35-minute instructional period. His results determined that sixth-grade students who were previously unable to consistently recognize any intervals at all were able to identify and sing various intervals. Because of this instruction, students were able to also combine these intervals in a melodic situation and to recognize their structure in a two-part framework. Bobbit suggested that teaching aids be geared to handle large groups of children with varying abilities. Also, he stated that all instructional sessions in music reading should be introduced on a limited routine, and must be separated from a fun–and-games atmosphere.

McPherson (1994) sought to replicate existing literature by determining the factors and abilities that influence sight-reading skills in music. Subjects were high-school-aged instrumentalists ($N = 101$) preparing for the Australian Music Examinations Board performance examination. The study was intended to answer four research questions:

1. What is the strength of relationship between sight-reading and performing a repertoire of rehearsed music?

2. What are the most common types of mistakes that musicians make when they sight-read?
3. Do instrumentalists of varying levels of proficiency make different types of mistakes as they sight-read?
4. What strategies distinguish subjects of differing ability to sight-read?

Using Form A of the *Watkins-Farnum Performance Scale,* the sight-reading abilities of the subjects were assessed. McPherson concluded that sight-reading is largely dependent on the capacity to read and comprehend rhythm. Equally important are the musician's strategies that they use as they sight-read.

Colley (1987) investigated the effect of three syllabic recitation systems on skills associated with the ability to read rhythms. Subjects (N = 160) were second and third grade children enrolled in a public school in southern Maine. Twelve different rhythmic patterns were combined into complete measures of 4/4 and 6/8 time signatures. Subjects were tested on their ability to recognize, write, and clap these patterns. A pretest-posttest design was implemented. Results demonstrated that a syllabic system differentiating between duple and triple subdivisions of the beat improved recognition skills better than no syllabic system at all. A system in which specific words were assigned to intact rhythm patterns improved performance and notation skills better than did the systems that used monosyllables.

A student must be able to physically perform the rhythms they are learning. Sink (1984) recommended that students perform prescribed rhythms on a single pitch for a more accurate performance. She investigated the psychological dimensions underlying auditory processing of monotonic and melodic-rhythmic patterns and influences of

musical experiences on dimensionality. Participants in her study were university music students (N = 38) asked to listen to 91 pairs of 13 musical patterns. These patterns focused on six rhythmic processing devices: (a) listening to, extracting and organizing pairs, (b) detecting dimensions contained in the first pattern, (c) remembering the first pattern while listening to the comparison pattern, (d) detecting dimensions contained in the comparison pattern, (e) remember both patterns while judging rhythm dissimilarity between patterns in a pair and, (f) indicating dissimilarity judgments via magnitude estimation procedures for scaling dissimilarities. Sink attempted to integrate sensory, perceptual, memory, and cognitive processes into subjects' rhythmic processing. Results indicated that subjects' performing medium and classification of major performing medium significantly affected the dimensionality of subjects' rhythmic processing. There was a small but noticeable effect of generic style music listening preference, music course experience, and the hours of music listening on rhythmic processing.

The ability of students to attain an internal pulse perception and subdivide correctly is another important aspect of reading rhythms accurately. One concept that improves a performer's internal pulse perception is the breath impulse technique, which utilized breath pulsing to help performers properly subdivide rhythmic patterns. Middleton (1967) suggested that the adoption of this method would benefit all wind instrumentalists. In his study, Middleton investigated the effects of using the breath impulse method on wind instrumentalists' internal pulse perception. Subjects were band students in the Norman, Oklahoma Public Schools. At each site, one class received instruction that used the breath impulse method while another did not. Seven adjudicators evaluated performance tests at the end of the seven-month treatment period.

Judges were asked to score each individual on five categories: (a) intonation, (b) tone quality, (c) rhythm reading, (d) sight-singing, and (e) sight-reading. Middleton concluded that the use of the breath impulse method during the early part of an instrumentalist's instruction had a positive effect on subjects' performing ability.

Internal pulse perception is often reinforced by instructing students to tap their foot to the beat (Conway, 2003). Brown and Chesnutt (2001) also have recommended that students tap their feet while singing the rhythm, suggesting that this emphasizes the pulse of the music. Brown and Chesnutt encouraged the use of foot tapping to teach sub-division of rhythmic patterns. These games may include clapping, dancing, or simply chanting simple phrases to help students learn rhythms.

On the other hand, foot tapping has also been shown to have some adverse effects on students' ability to read music. Parisi (2003) found that foot tapping was not beneficial to the students when reading rhythms. He investigated the effect of foot-tapping on rhythmic sight-reading accuracy in instrumental performance. Subjects were undergraduate instrumental music majors ($N = 60$) at a Midwest conservatory. Participants were selected from a university concert band and were asked to read four rhythmic sight-reading exercises deemed to be of the same difficulty by a panel of experts. Using an ABAB design, foot-tapping was incorporated during the B interval. Parisi found that the total number of measures performed correctly with foot-tapping was not significantly higher than those without. Foot-tapping also caused more pauses, and the tempo fluctuated more frequently.

Pierce (1992) examined the effects of learning procedure and performance tempo on the ability of middle-school instrumentalists to perform previously learned rhythmic

passages in novel test melodies. The subjects were advanced and intermediate level middle school band students (N = 64). Each of the participants practiced four three-measure rhythmic passages, using one of four learning procedures for each rhythmic passage. These learning procedures included counting, clapping, sizzling (the act of articulating out loud, with the students using air stream and tongue to produce the articulation), and clapping and counting the rhythm simultaneously. Performance was evaluated on the basis of tempo accuracy, rhythm accuracy, and pitch accuracy. Pierce found that there was no significant effect attributed to learning procedures. On the other hand, there were significant differences among performance tempi. There was a significant difference between the tempo in which a student learned an etude and the performance of the etude.

As students age and gain more experiences in music, their musical vocabulary tends to increase. Shehan (1987) examined the effects of aural and visual approaches to rhythm reading and short-term retention. Twenty-five second-grade and twenty-four sixth-grade students (N = 49) enrolled in parochial schools in the suburban midwest were subjects. They were presented with two-measure rhythm patterns in four modes: audio-rhythm, audio-mnemonics, (audio) visual-rhythm, and (audio) visual-mnemonics. Each subject was tested individually during a 15-minute session. The students were then asked to listen to different rhythmic examples on tape and were instructed to replicate the rhythmic examples on a woodblock. Each student was provided with 10 chances to replicate each rhythmic example correctly. During the listening phase, students were presented with both an aural representation and a visual example of the rhythm. Shehan found that the simultaneous use of auditory and visual channels facilitated learning and

retention of the rhythms at both grade levels. The older students learned and retained the rhythms much more quickly than did the younger students.

Kopiez, Weihs, Ligges, and Lee (2006) investigated relevant factors of sight-reading, including practice-related variables, speed of information processing, and psychomotor speed. The subjects in this study were German piano students (N = 52) attending a German music school. After analyzing sight-reading performances of the participants in terms of the recommended factors, they found that the sight-reading achievements of these expert pianists were determined by an acquired expertise and invariant factors such as the speed of information processing and psychomotor skills.

Chapter Summary

There seems to be a consensus regarding the importance of rhythmic instruction, although music educators disagree on which techniques should be used to teach rhythm. A separation exists between using rhythms embedded in musical examples versus introducing individual rhythm patterns alone to teach music reading to students. It is not clear which technique is more effective.

A large amount of research exists on how to improve music-reading skills. An ensemble member is more likely to sight-read successfully when performing with the ensemble than alone (Nolker, 2001). Further investigation is necessary on the effect of the individual on the ensemble's ability to sight-read. If individuals sight-read better, then perhaps the ensemble as a whole will sight-read better.

The challenge of finding ways to teach individuals how to sight-read rhythms effectively poses key research questions: (a) How can the teacher assure that individual students learn to perform rhythms without the influence of the group? (b) Does it help

ensemble members perform rhythmic patterns in isolation? and (c) To what extent does the teacher need to reinforce newly-learned rhythm patterns? It is not enough just to teach the rhythmic device once and assume students will remember. Patterns need to be reinforced regularly.

It is not clear learning rhythm in a group setting affects the student. The group may affect music reading because the individual relies on others to properly perform the rhythm. Research needs to be conducted on how to improve the individual's reading abilities with standard group teaching techniques that emphasize the three main components of (a) recognizing the rhythm visually, (b) hearing the rhythm internally, and (c) recreating the rhythm on an instrument. Perhaps as individual students increase their rhythmic vocabulary, they become better music readers.

CHAPTER 3

METHODOLOGY

This study was designed to examine the effect of rhythmic instruction on individuals ability to sight-read rhythmic patterns. The following research questions were posed:

1. What effect, if any, does a treatment program of isolating specific rhythmic patterns have on the improvement of sight-reading ability for individual wind instrumentalists?
2. What effect, if any, does a treatment program of isolating specific rhythmic patterns have on the improvement of overall ensemble performance skills?

Participants

Participants in this study were collegiate instrumentalists enrolled in the University Band at the University of Missouri-Columbia. This ensemble consisted of 68 wind and percussion instrumentalists, most of whom were non-music majors seeking a concert band ensemble experience. Of the 68 members of the ensemble, only 50 members elected to participate. Each of the participants was randomly assigned to one of two groups. The control (n = 25) and experimental (n = 25) groups consisted of both woodwind and brass players who were members of the ensemble. Percussionists were not included in this study.

A total of 37 students completed this study. Originally, 50 students had volunteered to participate. Two students later withdrew owing to what they said was the stress of performing the pretest individually. Both students stated that they would not be

able to contribute effectively to the study. Furthermore, owing to illness and participants not attending class for the pretest or posttest examination, others had to be eliminated. Ultimately, a majority of the students participating in this investigation were female (66%) and woodwind instrumentalists (70%) predominated. The participants' collegiate band experience ranged from one to six years of participation. Of the participants, two were graduate students, and the rest were undergraduate students.

Protection of Anonymity and Confidentiality

Prior to administering the pretest, students were asked to participate in the study. Each member of the ensemble was introduced in detail to the extent of the study, the commitment needed, and the expectations of all participating individuals. A consent form was handed out to all 68 members of the ensemble. These forms were collected at the end of rehearsal (Appendix A). It was stressed to the students that participation in this study was completely voluntary and would not affect their course grade. Individuals were made aware that at the end of each week's treatment period, the practice examination would be tape-recorded so that the results could be reviewed and analyzed at a later date. This information would remain anonymous and would not be available to anyone except the test administrator. Finally, students were assigned a testing number that replaced the individual's name. At no time was the personal information of the participants available to anyone but the researcher.

Variables

For this study, the independent variable was the testing conditions, either the treatment group or control group. In addition, data were collected on two variables: (a) years of collegiate experience, and (b) chair placement within the ensemble. Previous

research (McPhearson, 1994; Demorest & May, 1995, Nolker, 2001) had found that these two variables influenced rhythmic reading achievement. The dependent variable was the pretest and posttest scores of sight-reading examinations administered at the beginning and the end of the testing procedure. Data were collected on both individual and ensemble bases.

For this study, students were classified according to the number of years of participation in a collegiate music ensemble. Classification varied from one to five years of performing within a concert band at the university level.

At the beginning of the semester, students auditioned individually for chair placement within the ensemble. Students prepared a short musical etude of their choice, each of which was judged by one of five graduate students. Each judge was responsible for adjudicating one or more sections of the ensemble. Students played an excerpt that best represented their playing ability. No scales or other materials were performed for the audition process. Each student played for approximately one minute. Judges then individually scored each student based on the judge's perception of the strength of performance. No standard adjudicating form or criterion was used. Judges ranked the students based on their performance and then gave the results to the conductor of the ensemble. The results were posted the same evening so that music could be distributed and the ensemble could begin rehearsing.

University Band met on Tuesday evenings from 7:00 to 9:00. The ensemble met once a week and was directed by a PhD in Music Education candidate.

Pretest and Posttest Testing Procedures

Week one: Individual Pretesting

At the beginning of the week one rehearsal, the investigator distributed an information and schedule sheet to the student participants. This handout included their name, identification number, to what group they had been assigned (either experimental or control), the time of their pretest examination and the testing room number.

During the two-hour rehearsal period, participants were individually administered the pretest examination. At their designated time, students left for one of two rooms that were being used for the testing procedure. The student was greeted by the test administrator, was asked to sit down, and then received the testing instructions. The test administrators read the following statement to each of the participants:

Thank you again for your participation in this experiment. In a moment, you will be asked to read a piece of music at sight. A tempo will be given with a metronome to help you establish the tempo of the work. The metronome will remain on during the entire performance of the etude. When instructed, you will perform the etude at sight. During the process, please do not speak. If mistakes are made, please do your best to continue in a timely manner. Again, thank you for your participation in this experiment.

After these instructions were read, the participants were given the opportunity to ask questions. After all inquiries were answered, the test administrator pressed *record* on the provided recording equipment. The control group tester used an AKG C 1000 S Condenser microphone in conjunction with a Superscope PSC340 CD Recording Device. The experimental tester used an AKG C 1000 S Condenser microphone and a Sony RCD-W10 Compact Disc Recorder. When the device began recording, the investigator

announced the participant's identification number. A metronome set at 80 beats per minute was used. On the stand, face down, was a 28-measure sight-reading etude that the investigator had composed for the project (Appendix B). This etude consisted of rhythmic patterns within a musical context, which ensured that the student's sight-reading experience closely resembled a typical band classroom environment. The selected rhythmic patterns were influenced by the rhythmic etudes found in *101 Rhythmic Rest Patterns* (Yaus, 1985). At this time, the instructor asked the student to turn over the paper and begin sight-reading the material. After the examination was completed, the recording device was stopped and the participant was excused. Each student was assigned a two-minute time slot, and most participants used all of the allotted time.

Group Pretesting

During the final 20 minutes of the regularly scheduled rehearsal, both groups underwent the group testing procedure. This examination was the same etude that the students performed during the individual testing process. All non-participating ensemble members were excused from this procedure. When all non-participants had left, the treatment group was asked to leave and wait for the control group to finish their group testing procedure. Music was then passed out to all of the instrumentalists within the ensemble. All music was to be placed face down on the music stand. The investigator read the aforementioned statement to the participants. They were instructed that four preparatory beats would be given to begin the examination. At this time, after activating the recording device, the instructor identified the performing group, and the metronome was started at 80 beats per minute. When all students were ready to begin, they were instructed to turn over their music. Four preparatory beats were given and the group

performed the examination. At the end of the test, the recording device was stopped and the students were excused from class. The treatment group then entered the room and the same testing procedures were repeated. When the experiment was completed, these students were dismissed.

The posttest examination was administered during the final week of the six-week period of the study (Appendix L). The pretest and posttest procedures for the group and the individual were identical because there were no changes made to any of the previous testing procedures. The posttest was rhythmically identical to the pretest; however, the melodic material was slightly altered.

Treatment Procedure

Week One

The first of four experimental treatments was implemented during the second of the process. All experimental group participants were excused from the last fifteen minutes of the regularly scheduled rehearsal. As a group, these students left rehearsal and went to a different room. Those students entered the experimental treatment room and sat in assigned seats. Each student was provided with the materials corresponding to the week's instruction.

The week two musical example consisted of four short rhythmic examples (Appendix C). These rhythms consisted of four eighth-note rhythmic patterns commonly found in band literature. Each of these rhythms was labeled 1 through 4. Underneath each of these rhythms was a brief rhythmic example to help reinforce the specific rhythm pattern.

Prior to beginning the treatment, the students were given a brief introduction to the counting system that would be used in this process. This system consisted of using a traditional approach to counting rhythms commonly used in many secondary instrumental music programs (Appendix D). A Sony Digital Mini-DV camera was used to record all of the treatment process. The treatment condition consisted of a four-step process. First, an individual was asked to count and clap the first rhythmic example on the page. Underneath the rhythmic example was a short rhythmic etude. The second step involved asking an individual to volunteer to count and clap the corresponding rhythmic etude example. The entire class then counted and clapped the same rhythmic example. In the third step, the students were asked to sizzle and articulate the rhythmic example while holding their instruments in the playing position. When the students were comfortable with this procedure, they were asked to perform the short rhythmic etude on concert F. This was the fourth and final step. When the example was performed correctly, these four steps were repeated an additional three times.

During the final three to four minutes of the instructional time, the students were asked to perform an 18-measure musical etude (Appendix E). When the participants were ready, they turned over their worksheets to reveal the practice etude. The investigator started the metronome at 80 beats per minute and began recording the examination. The investigator gave four preparatory beats to start the ensemble. After completion of the sight-reading etude, the video recording device was stopped and the participants were excused. The videotaped etude was analyzed for errors later, at the end of the third week of instruction.

Week Two

During the second week of treatment, experimental group students were taught rhythms that focused on sixteenth note patterns (Appendix F). These patterns were taught in the same manner as previously described. At the end of this instructional period, students sight-read the second of three 18-measure musical etudes (Appendix G).

Week Three

The third week of treatment consisted of teaching rhythms to the participants that were based on dotted rhythmic patterns (see Appendix H). The teaching process for this treatment group was identical to the previous weeks. This instructional period also concluded with the performance of the last of three 18-measure musical etudes (Appendix I).

Week Four

Prior to the fourth and final week of treatment, the investigator listened to and analyzed the performance of the three previous treatment etudes. The most common incorrectly performed rhythms were used to create a review worksheet for the fourth instructional period (Appendix J). These rhythms were presented in the same manner as described above. The primary difference in this week's instructional period was that it concluded with a practice etude that was almost identical to the pretest and posttest (Appendix K). The etude was of the same length and rhythmically similar to the pretest, but the melodic content was very slightly altered. After performing this etude, the participants were excused.

Control Group

The control group consisted of the remaining participants. During the four-week instructional period, students in the control group participated in regularly scheduled class activities, which consisted of rehearsing music for future performances. Both groups received two hours of instructional time each week, and the experimental and control groups were separated for only 15 minutes of each rehearsal.

Scoring

After the completion of the pretest and posttest, five judges were asked to listen to each individual and group performance. Each of the judges was a highly qualified music education graduate student at the University of Missouri-Columbia. The judges had an average of eight years of teaching experience in either public school or college. All but one of the judges had teaching experience in the state of Missouri. Four of the judges were pursuing a PhD in Music Education, and the remaining judge was working toward his Master of Music Education degree. The scoring for both the pretest and posttest was performed on separate occasions. Each evaluator received a packet that contained a recording of the individual and group performances, scoring sheets, and an instructor's guide to scoring (Appendix M).

Kendall's coefficient of concordance, *W*, was used to test interjudge reliability of both the pretest and the posttest. Pretest interjudge reliability was .91, $p < .001$. Posttest interjudge reliability was .94, $p < .001$.

After the judges completed the group and individual pretest and posttest examination, the judges received their packets. These packets included a scoring guide, instructions (Appendix N), and recordings of the performances. The judges were asked

to read the directions before scoring the individual tests. When the evaluators were comfortable with the directions, they began listening to the provided CD recording. Each recording consisted of the individual performance tracks and two group performance tracks. At the beginning of each track, the participant's identification number was announced. This number was written in the provided space at the top of the evaluation sheet. The judges were asked to listen to each of the individual performances and cross out any measures in which the rhythms were not performed correctly. The judges were informed that one wrong rhythm made the entire measure incorrect. Also, the evaluators were made aware that they were to focus on rhythmic errors only. If individuals did not play in the correct key signature or did not play the correct melody, but did play all of the rhythms correctly, then the score would still reflect a perfect performance.

After each participant's scores were complete, the judges were asked to listen to the group performance and respond to eight items grouped in three areas: (a) facility, (b) ensemble, and (c) flow (Appendix O). Using a Likert-type scale, the evaluators were asked to agree or disagree with eight statements. The rating scale was from 1(strongly disagree) to 5 (strongly agree), with 3 being neutral.

To test for pretest and posttest interjudge reliability for the ensemble evaluation, Kendall's *W* was used. The pretest facility items for the experimental group revealed a *W* of .96, $p = .02$. For posttest experimental group facility, *W* was .39, $p = .32$. The pretest facility control group *W* was a .67, $p = .09$. The posttest facility *W* for the control group was .42, $p = .28$.

The *W* for the experimental group's ensemble pretest items was .96, $p = .11$. For the experimental posttest ensemble *W* was .70, $p = .23$. The control group *W* for the

ensemble item for the pretest was 1.00, $p < .05$ and the posttest *W* for the control group was .82, $p = .16$.

Finally, for the experimental group flow items, pretest *W* was .45, $p = .25$. The posttest *W* for the experimental group was .39, $p = .32$. The control group's flow item *W* for the pretest examination was .86 $p = .04$ and the control group's flow items a *W* of .65, $p=10$.

CHAPTER 4

RESULTS

The study was designed to investigate whether there were any differences in sight-reading abilities among students who received rhythmic instruction (the treatment group) and those who did not (the control group). This study assessed sight-reading both individually and in a large ensemble setting.

Analysis at the Individual Level

Analysts (Bock, 1975; Schafer, 1981; Cox & McCullagh, 1982; Laird, 1983; Weinfurt, 2000) usually recommend against analyzing gain scores directly. Instead, they recommend using pretest scores as a covariate and analyzing posttest scores only. Previous literature has pointed to experience and achievement level as additional influences on rhythm reading (McPherson, 1994; Demorest & May, 1995, Nolker; 2001). Therefore, for this study I added two additional covariates: (a) chair placement within the section, and (b) years of performing experience in a college level ensemble. The correlation between the two (.54) justified using both covariates.

The following null hypothesis was developed for the individual-level analysis:

H_o: Controlling for pretest scores, chair placement within the section, and years of experience in a college-level ensemble, there is no statistically significant difference between experimental group and control group posttest scores.

Analysis at the Individual Level

An analysis of covariance (ANCOVA) was used to test for statistical significance, with three covariates employed. Covariates in the analysis were (a) pretest scores, (b)

chair placement within the section, and (c) years of collegiate performance experience. The independent variable was group status, either experimental or control, and the dependent variable was the posttest scores. The data revealed that there were no statistically significant differences between the two groups, F (1,32) =. 24, p = .63. Together, the three covariates accounted for 69% of the variance in test scores between the two groups. Group membership accounted only for an additional .003%. Analysis was based on each participant's number of correctly played measures. For the pretest examination, the scores ranged from 4 to 28 correctly performed measures, 28 maximum points. The posttest results ranged from 7 to 28 correctly performed measures, 28 maximum points.

Analysis at the Group Level

The groups level items describing the facility and flow concepts exhibited low interjudge reliability. As a result, I removed them from the group level analysis. Because they demonstrated acceptable interjudge reliability, I retained the two group level items describing the "ensemble" concept. I used two-way mixed ANOVA with one within factor (pretest-posttest) and one between (experimental-control).

Ensemble Items

For the first ensemble item, "The woodwind section performed the rhythms using an ideal sound concept," there was a statistically significant difference between the pretest and the posttest, F (1,8) = 13.52, p < .006 (M = 1.9, SD = .876). There were statistically significant differences between groups F (1,8) = .247.714, p < .001 (M = 3.2, SD = .63), but no significant interaction between the two main effects.

The second ensemble item, “The brass section performed the rhythms using an ideal sound concept,” also resulted in a statistically significant difference between pretest and the posttest, F (1,8) = 16.133, p < .004 (M = 2.0, SD = .943). There was also a statistically significant difference between the two groups, F (1,8) = 192.667, p <. 000 *(M* = 3.1, SD = .876), but again no significant interaction between the main effects.

CHAPTER 5

DISCUSSION

Summary

The present study was designed to assess whether teaching rhythms to students in a large ensemble setting would improve sight-reading ability. Assessments took place at both the individual and group levels. The posttest scores were compared to see if sight-reading abilities differed between an experimental group that underwent a program of rhythmic reading instruction and a control group that did not. The pretest scores, chair placement within the ensemble, and years of collegiate musical ensemble experience served as covariates.

Individual pretest and posttest examinations and group pretest and posttest examinations were administered. Scores for individuals were based on the number of correct measures that each individual performed. If one rhythm within the measure was performed incorrectly, the measure was scored as incorrect. The individual had to perform each rhythm in the measure correctly to receive full credit for that measure.

As terms of group-level evaluations, only two ensemble items were analyzed due to low interjudge reliability outcomes on flow and facility items. For the ensemble items, judges were asked to rate the extent to which the woodwind and brass sections performed the examples correctly.

Conclusions

Comparison of the pretest and posttest scores for the individual performances yielded no significant differences between the experimental and control groups.

Individuals from both groups however, achieved similar gains in sight-reading achievement from pretest to posttest.

In reference to the group-level evaluation, no statistically significant interactions were found between time (pretest and posttest scores) and group (control or experimental). Ensemble items addressed whether both the woodwind and the brass sections performed the rhythms using an "ideal sound concept". There was however, a statistically significant main effect difference between pretest and posttest scores on both items, as well, there was a statistically significant difference between experimental and control groups on both items.

The present study yields information similar to research that has already been conducted on rhythmic reading abilities of musicians. Like other researchers have found (Bebeau, 1982; Boyle, 1970; Hewson, 1966; McPhearson, 1994; Middleton, 1967;), the results of the present study indicate that a student's rhythmic reading ability improves with instruction. However, this study's results were also consistent with previous research, which has found that rhythmic reading abilities will improve over time and with experience (Hewson, 1966; McPhearson, 1994). Results of this study also support the findings of Nolker (2001), which indicate that an individual's sight-reading ability is not a good predictor of a group's sight-reading ability.

One of the most interesting outcomes of this study is that all of the participants, including the control group, improved from pretest to posttest. While the reason remains unclear, this finding could be attributed to several factors. Perhaps isolating and focusing on specific rhythms are enough to improve the ensemble member's concentration, and therefore their performance. Perhaps ensemble experience alone may be enough to

improve sight-reading ability. Regardless, it seems clear that students might improve their rhythmic reading abilities by performing in ensembles and undergoing regular rehearsals.

During execution of this study's procedures, a number of unanticipated issues arose. Interestingly, as stated earlier, two students opted not to continue to participate in the study, because performing individually proved too stressful. Many other students expressed this same concern, but continued to participate in the study. This suggests additional research questions about individual instrumentalists' performance experience. Does a student's inexperience with a rhythmic vocabulary lead to fear of individual performance? Can this fear be attributed to a lack of individual performance opportunities and if so, how can these problems be resolved?

There were varied reactions from the students with regard to participation in this study. Some individuals were excited about the possibility of learning how to read rhythms better, especially some who had performed the pretest rhythmic etude with considerable difficulty. Other students seemed anxious and seemed to know beforehand that they would struggle to play the etude correctly. Many expressed disappointment with their performance. Could improving a student's rhythmic vocabulary concurrently improve his or her self-confidence? Do certain personality factors cause some individuals to see individual performance as arduous? Perhaps one solution is rhythmic instruction from the very beginning of students' instrumental music experience (Conway, 2003).

During pretest and posttest examinations, a metronome was used to maintain a consistent tempo. Students often had difficulty performing with the metronome. Some

students appeared to have a minimal concept of pulse and beat stability. Because most students seem more comfortable with a conductor than a metronome, would performance with a conductor and no metronome have yielded different results? The use of a metronome apparently is not part of most students' normal practice routine. Would a pedagogical intervention emphasizing use of the metronome improve students' sight-reading skills?

One participant in this study performed the pretest examination with no errors. When asked after the performance if she had encountered a great deal of rhythmic instruction in high school, she responded that her band director had prioritized learning different rhythmic examples daily in band. This band's approach to practicing sight-reading might serve to illustrate the impact of regular rhythmic instruction on an individual's sight-reading ability. Would this type of instruction benefit all instrumentalists in an ensemble, or only a select few?

Finally, of the 50 students who originally volunteered to participate in the study, only 37 completed both the pretest and posttest examinations. Although 27% is a substantial participation morality, I had no reason to think that the overall outcomes would have been different had these individuals remained in the study.

Discussion and Observations

During the first week of instruction, many of the participants seemed eager to begin the treatment. At first, many students seemed to approach the task light-heartedly, but as the rhythmic mistakes increased, the students' concentration level also increased. Most students appeared apprehensive about volunteering to perform rhythms in front of the class. As time passed, however, and the students became more confident and

comfortable with the process, almost everyone participated. After the first week of instruction, students were clearly enjoying their newly acquired rhythmic knowledge. For some students, this was the first formal rhythmic instruction that they had ever received.

During performance of the practice etude, the ensemble's precision with the metronome was quite good, unlike the group pretest administered at the beginning of the experiment. Few seemed to rely on foot-tapping. Rather, they relied on the metronome for tempo and time. This observation is consistent with the findings of Parisi (2004), who observed that foot-tapping has adverse affects on instrumentalists' ability to read rhythms. Instead, he encouraged the development of an internal pulse perception.

The second week of instruction proved to be more difficult. The sixteenth note patterns were a challenge for the students to count and clap. The students apparently had difficulty subdividing the sixteenth note patterns within a steady pulse. This raises issues of ability to subdivide correctly. Can all individuals learn to subdivide rhythmic patterns, or do some persons have an innate ability to do this? Additionally, as with all skills, there is inevitably a variety of skill levels in subdividing rhythmic patterns. This week's practice test was challenging, and students often became frustrated with the rhythmic inaccuracies.

During Week Three, the students focused on learning dotted rhythmic patterns. Subdivision skills became crucial to learning these rhythms. The students became disheartened if a mistake was made. Interestingly, a competitive atmosphere among the participants seemed to be developing. It seemed important for the students to avoid

making mistakes in front of their peers, which contradicted the encouraging and supportive environment exhibited to that point in the process.

Prior to the fourth week of instruction, the investigator viewed the previously recorded materials to create the appropriate review sheet for the participants. During the viewing, several issues needed further attention. Interestingly, the first week's performance of eighth-note rhythms yielded the most mistakes out of the three weeks. Errors on the performance tests actually decreased as the weeks progressed. Week Three of the instructional period had the least amount of group errors during the performance. Perhaps the students' concentration level increased as the materials became more difficult, or perhaps students became increasingly comfortable with the task.

After the posttest, the investigator made a few key observations. Although this study did not test a student's ability to perform melodies correctly, students had difficulty performing with the correct key signature. This may have occurred because the students were focused on performing the rhythms correctly.

One surprise to the investigator was the students' enthusiasm for learning new rhythms. Most of the participants in the treatment groups were pleased with the experience, and some expressed that they were excited about learning new patterns each week. Some stated to the investigator that they believed they had made significant improvements in their playing ability and truly enjoyed the experience. The pretest and posttest examinations were rhythmically identical to one another, but both possessed different melodic components. Through both testing procedures, only one participant seemed to realize this fact, which leads to questions about a students' ability to transfer these patterns to actual music. Would it be more effective to teach rhythm patterns in

conjunction with other musical aspects, or is teaching rhythm patterns in isolation more effective?

Suggestions for Further Research

Further research is necessary to develop teaching strategies that will continue to improve the rhythmic reading abilities of instrumentalists. The present study should be replicated with a different set of individuals in settings where rhythmic instruction is administered as part of an ensemble's daily instruction. Also, the current study was limited to a brief treatment period, only once a week for four weeks. Perhaps rhythmic instruction that had taken place more regularly or over a longer time period would have led to greater gains.

It is also important to conduct further investigations into how to improve sight-reading performance among individuals. Also, investigators should study whether more frequent opportunities to perform individually could improve a performer's self-confidence, and if this in turn would have an effect on sight-reading performance.

Finally, research is needed on the effect of using a metronome on a students' sight-reading ability. Initially, students had difficulty performing with the device, but this skill clearly improved over time. The investigator found that both the experimental and control groups' abilities to play with a metronome improved over the entire treatment period. It is important to note that only the experimental group utilized the metronome through the treatment period; the control group did not. Furthermore, it would be beneficial to study whether a visual component, like a conductor, would improve students' reading abilities, perhaps in conjunction with a metronome.

Closing

Music educators agree that rhythm and rhythm instruction are crucial components of any instrumental music curriculum. Results of this study suggest that student's sight-reading ability seems to improve through varied musical experiences alone. It remains important, however, to focus as much attention as possible on individual as well as group achievement. In the present study, it was apparent that individuals were less likely to perform well individually than as ensemble members (Nolker, 2001). This may owe to a lack of confidence in playing ability, or the performer's lack of experience with playing alone. Regardless, it is important to provide students with the tools for good rhythmic reading, whether performing individually or in an ensemble. Music educators will continue to enrich students' lives with a comprehensive music program whose components include developing a comprehensive rhythmic vocabulary.

Appendix A

Consent Form

January 23, 2007

TO: Members of the University Band

FROM: Dan Laing

SUBJECT: Project to test the effect of rhythmic instruction on the sight-reading abilities of wind instrumentalists.

One of the challenges of being a good musician is the development of good sight-reading skills. I would like to do a research project that examines the effectiveness of teaching specific rhythmic examples to improve musicians overall sight-reading abilities. Researchers in the past have found that this approach improves sight-reading. If you agree to participate and if you are randomly selected into the experimental group, I would like to spend part of four class periods (20 minutes per class period) working with you on an approach to rhythm reading involving a vocal subdivision of rhythmic patterns while clapping and tapping. Afterward, you will simulate playing while articulating the pattern with just air. Finally, you will perform the patterns. This instructional time will be video recorded to assure that the instruction is consistent each week. At the beginning and end of the designated instructional period, you will be asked to perform a brief etude as an individual and as part of a group. These two performances will be recorded. If you are randomly selected into the control group, you will only perform the brief etude as an individual and as a group at the beginning and end of the designated instructional period.

You will participate in this project only if you agree to participate. In no way will participation or nonparticipation affect your grade in the course. There are no negative consequences for nonparticipation. You will be asked to perform as individuals and as a group, and findings will be reported in aggregate form only. At no time will individual students' names be used. If you would like more information, please speak with Dan Laing, your instructor, or contact Dr. Martin Bergee at bergeem@missouri.edu or 882-0939. If you have questions about the rights of human subjects in research, please contact the campus institutional review board at http://irb.missouri.edu.

I agree to participate. _____

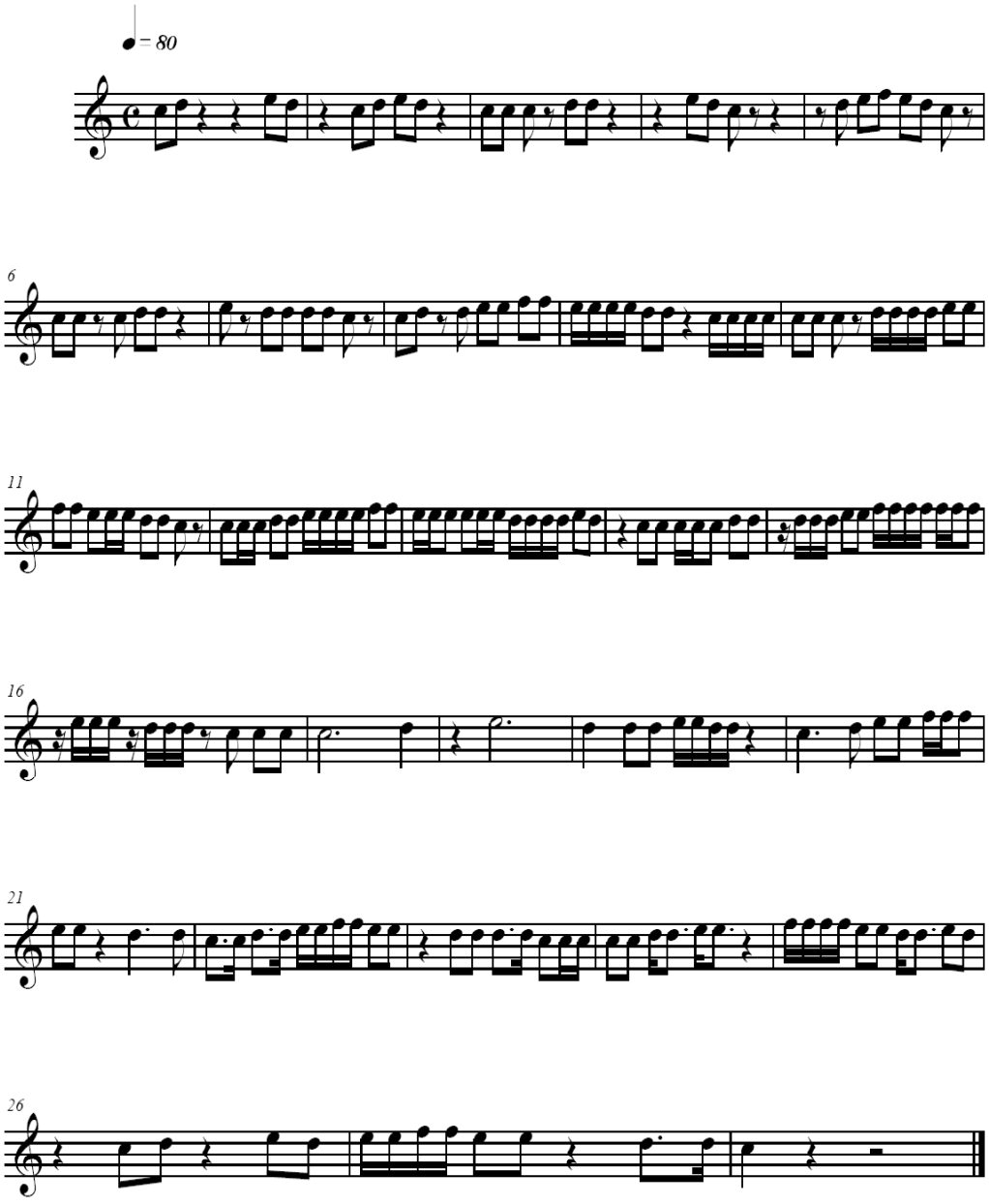
Appendix B

Pretest

Flute

Pre Test

Test A

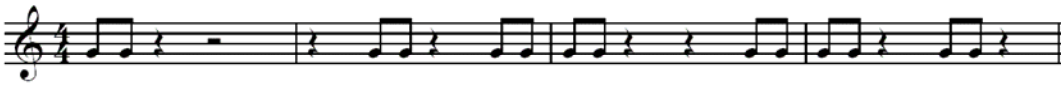


Appendix C

Week Two rhythmic examples

Eighth Notes

1



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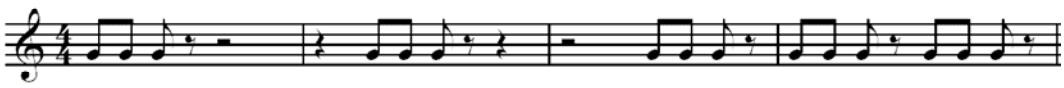

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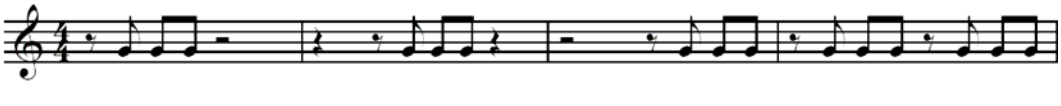

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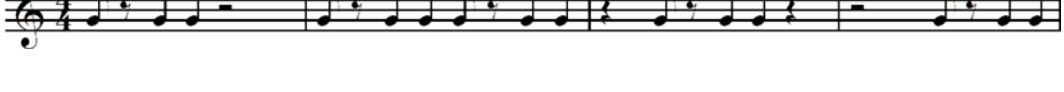
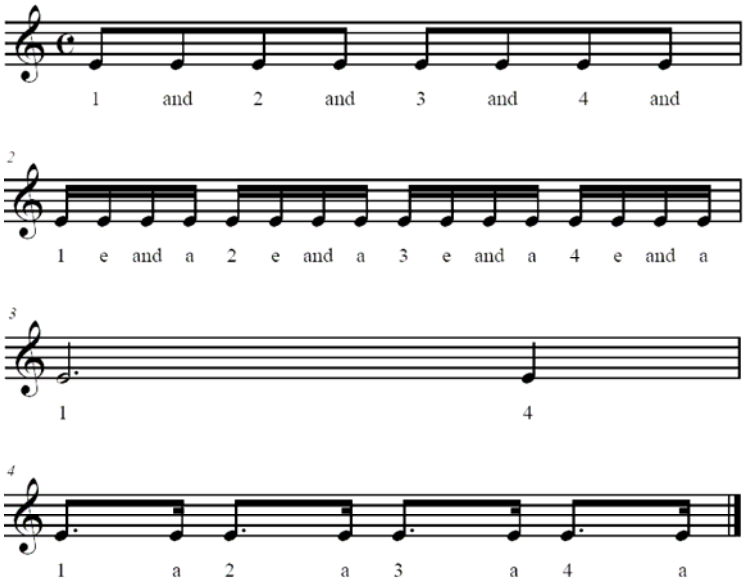


Appendix D

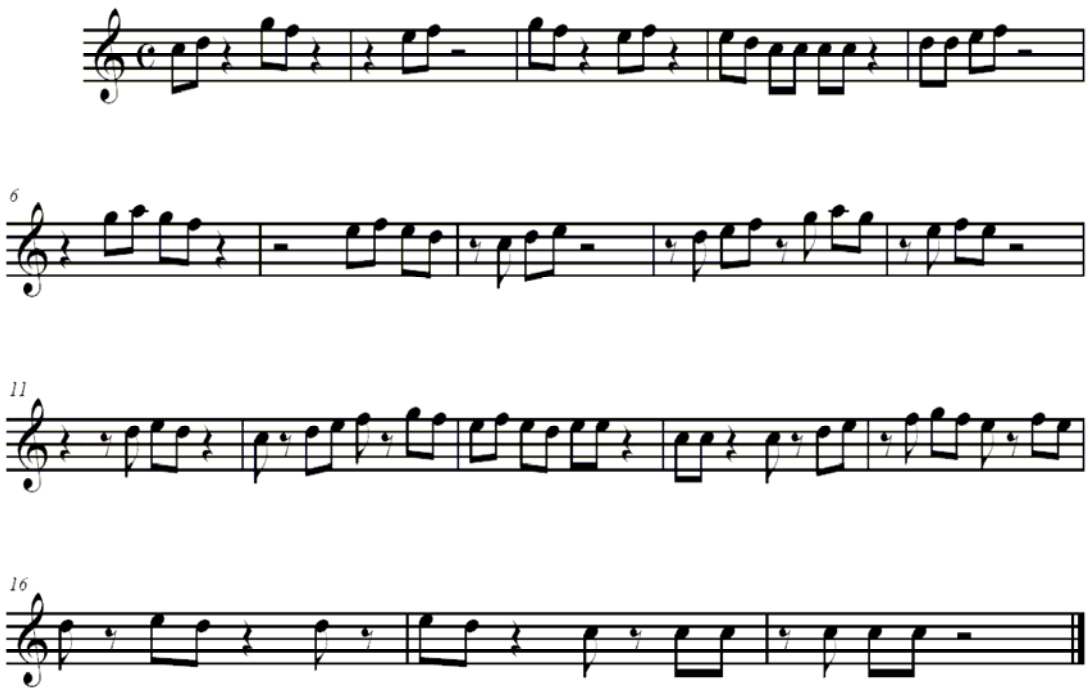
Counting System

Counting System Examples



Appendix E

Week Two practice etude

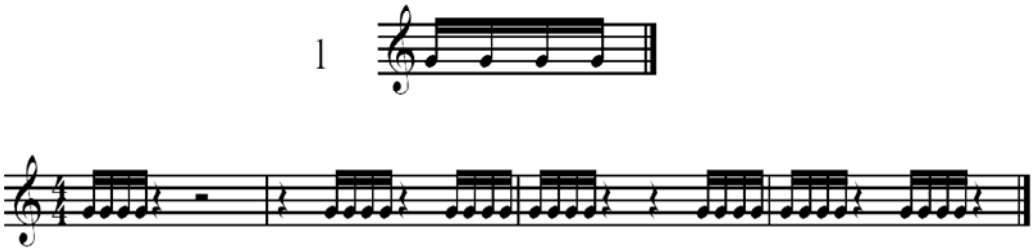

6
11
16

Appendix F

Week Three rhythmic examples

Sixteenth Notes

1



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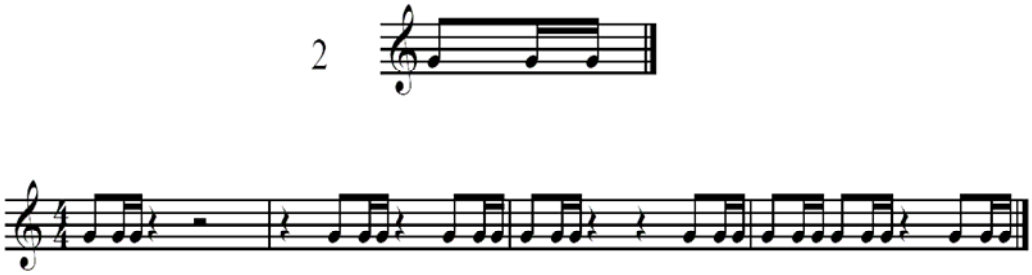

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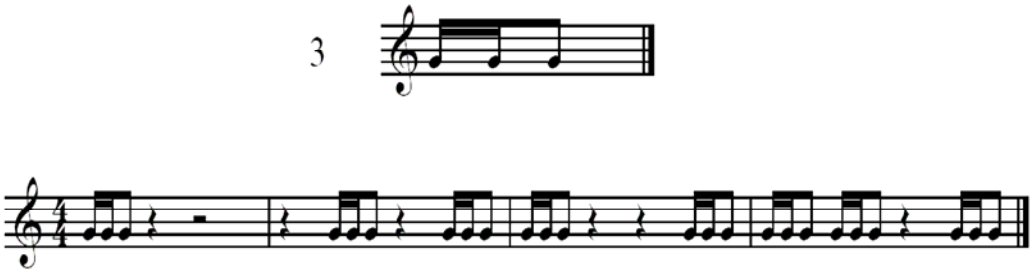

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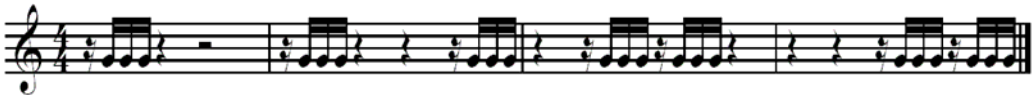
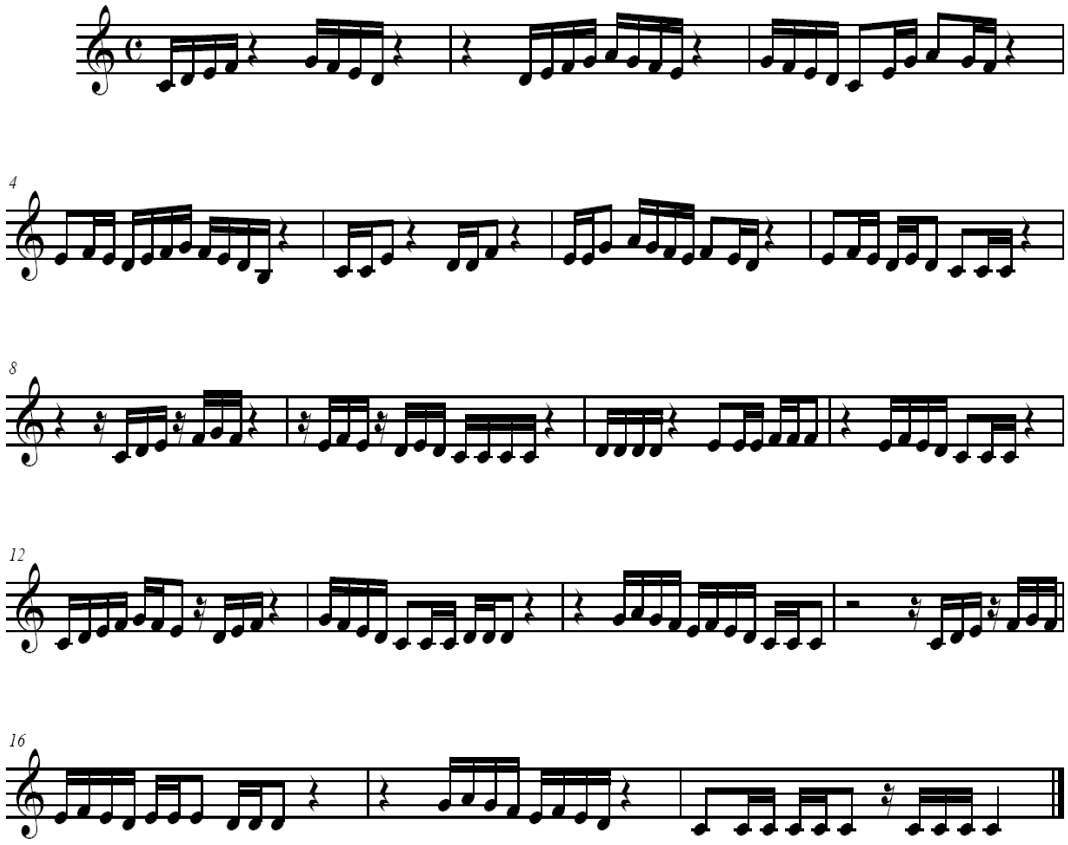


Appendix G

Week Three practice etude

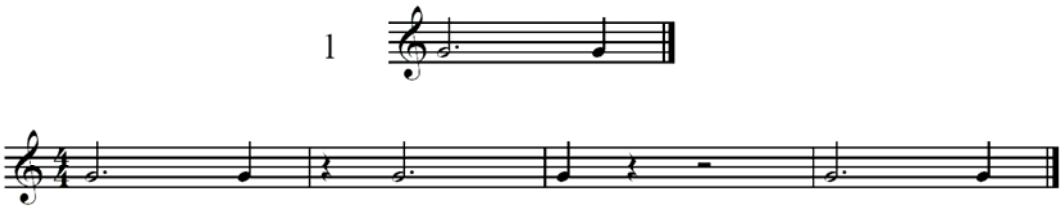


Appendix H

Week Four rhythmic examples

Dotted Rhythms

1



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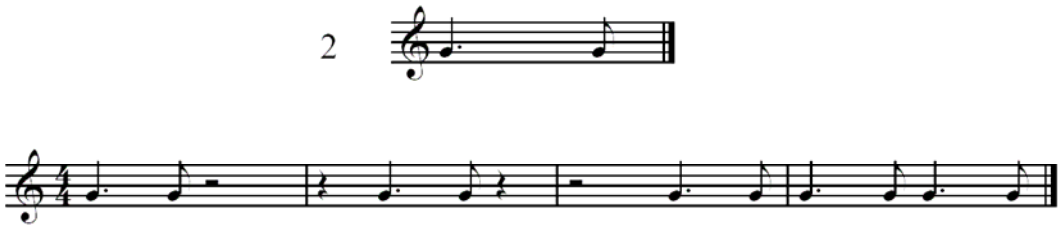

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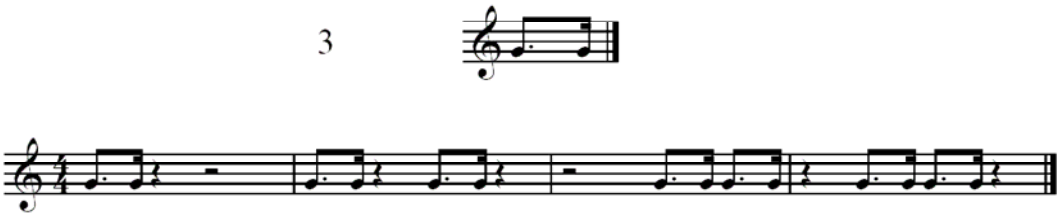

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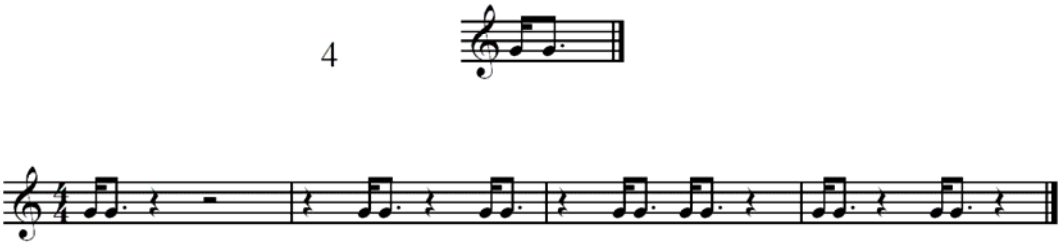
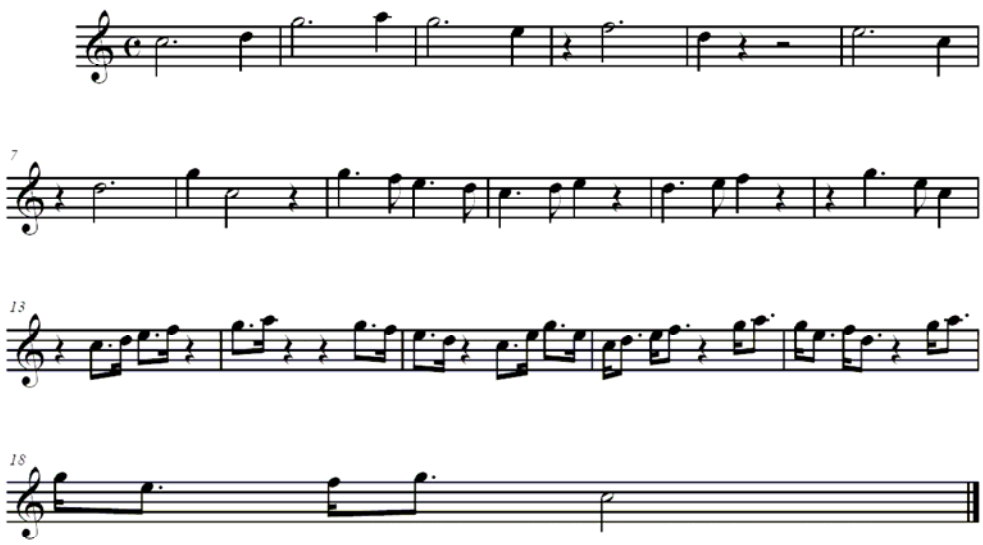


Appendix I

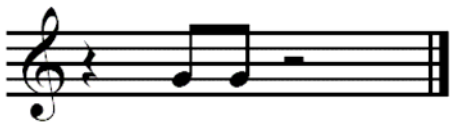
Week Four practice etude

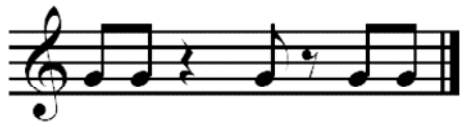


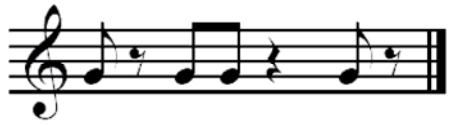
Appendix J

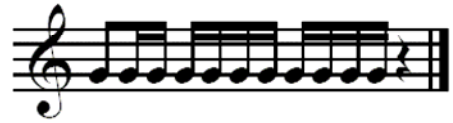
Week Five rhythmic examples

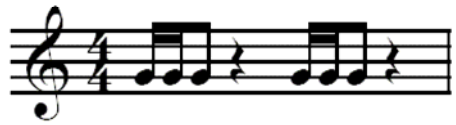
Rhythm Review

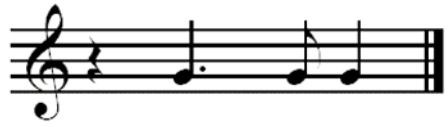
1 

2 

3 

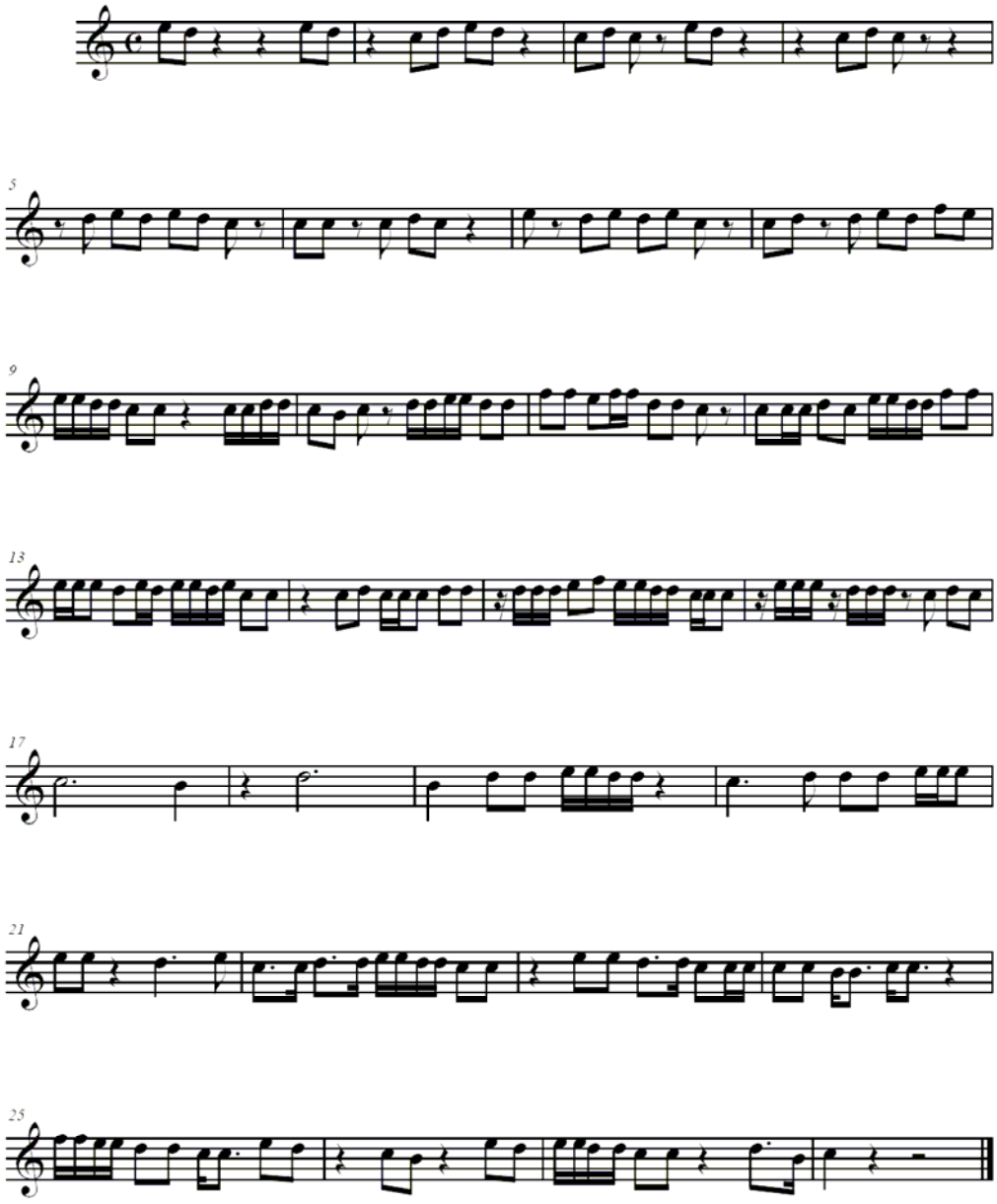
4 

5 

6 

Appendix K

Week Five practice etude

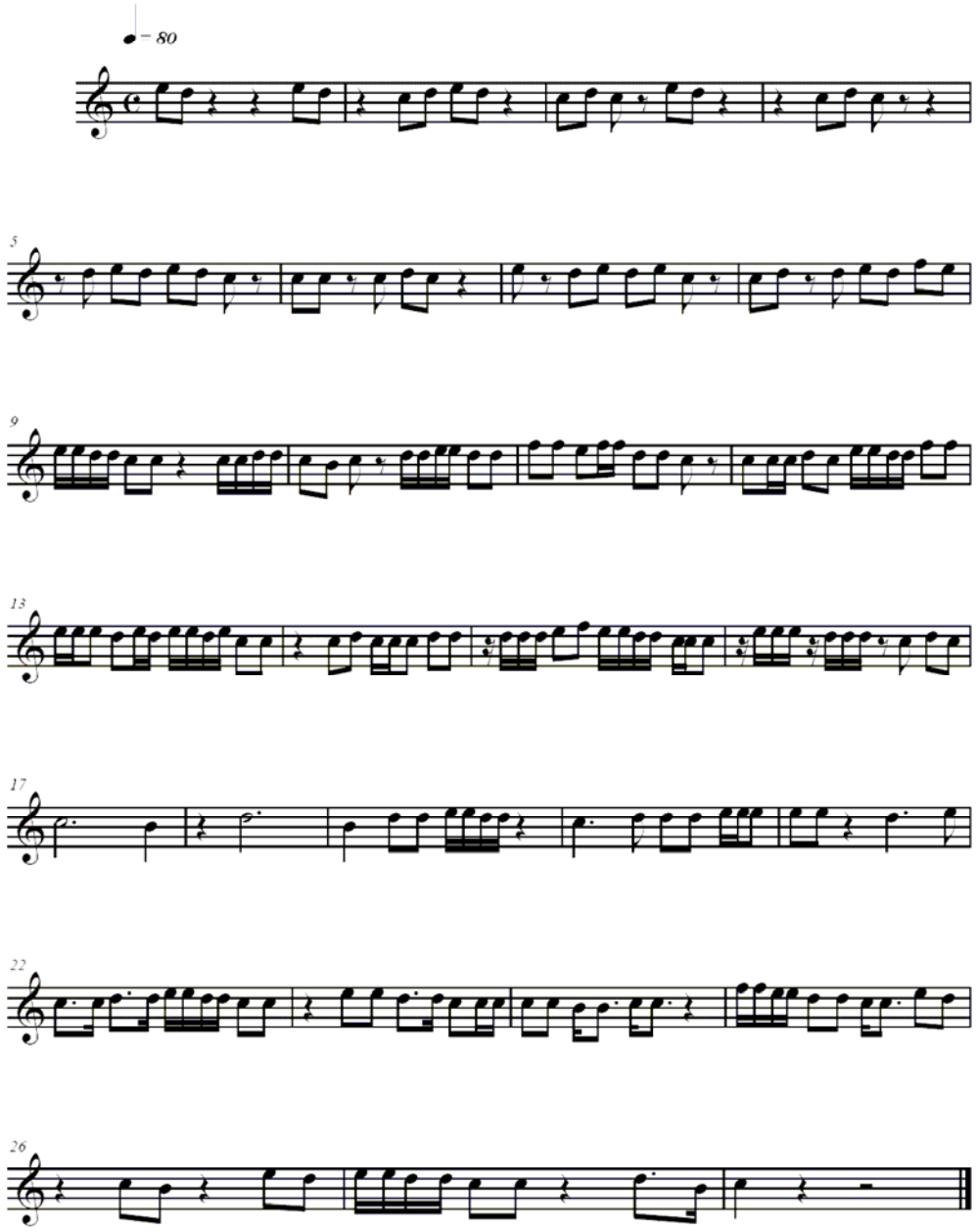


Appendix L

Posttest

Posttest

Test C



Appendix M

Adjudicators guide to scoring

Judges Listening Procedures

Thank you once again for helping me with this study. Listed below are your instructions for this part of the exam. This should take a little over an hour. I really appreciate the help.

1. PLACE THE CD IN THE PLAYER.

2. TURN TO THE FIRST ETUDE PAGE.

3. USING YOUR SUPPLIED RED PEN, WRITE THE NUMBER OF THE PARTICIPANT ON THE APPROPRIATE LINE. THIS IS VERY IMPORTANT. THE NUMBER WILL BE STATED AT THE BEGINNING OF THE TRACK.

4. LISTEN TO THE EXAMPLE. USING THE RED PEN, PLEASE CROSS OFF ANY MEASURES THAT ARE NOT PERFORMED CORRECTLY. (IT IS ALL OR NOTHING, NO HALF CREDIT) ALSO, PAY NO ATTENTION TO THE METRONOME. ONLY FOCUS ON THE RHYTHMS IN THE MEASURE. SOME INDIVIDUALS PERFORM THE RHYTHM RIGHT, BUT ARE NOT IN TIME WITH THE METRONOME.

5. LISTEN TO THE NEXT PLAYER AND DO THIS FOR THE NEXT 48 EXAMPLES.

6. FOR THE LAST TWO GROUP EXAMPLES, LISTEN TO THE CD TRACK AND ANSWER THE SHORT QUESTIONAIRE THAT IS PROVIDED. DO THIS FOR BOTH GROUPS A AND B.

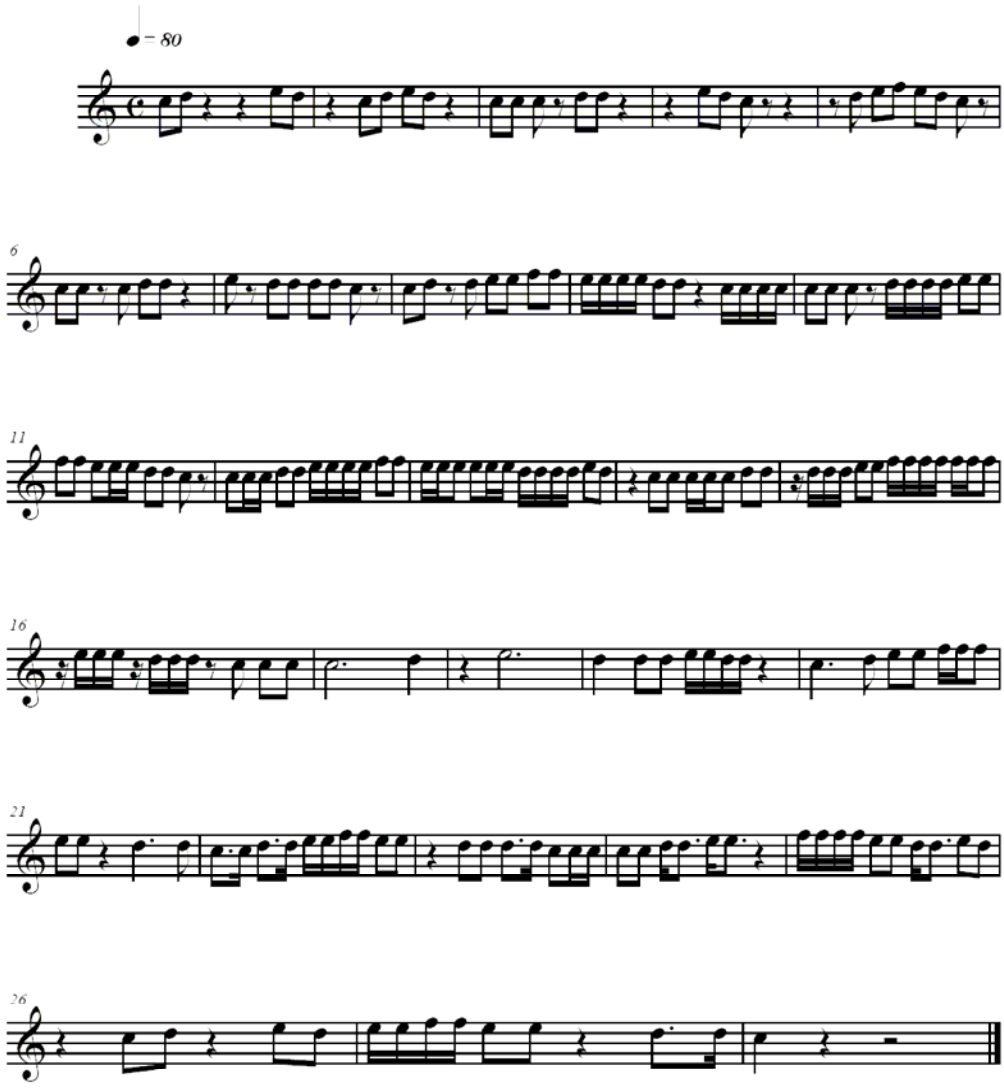
7. TURN IN YOUR RESULTS.

Appendix N

Pretest and Posttest scoring sheet

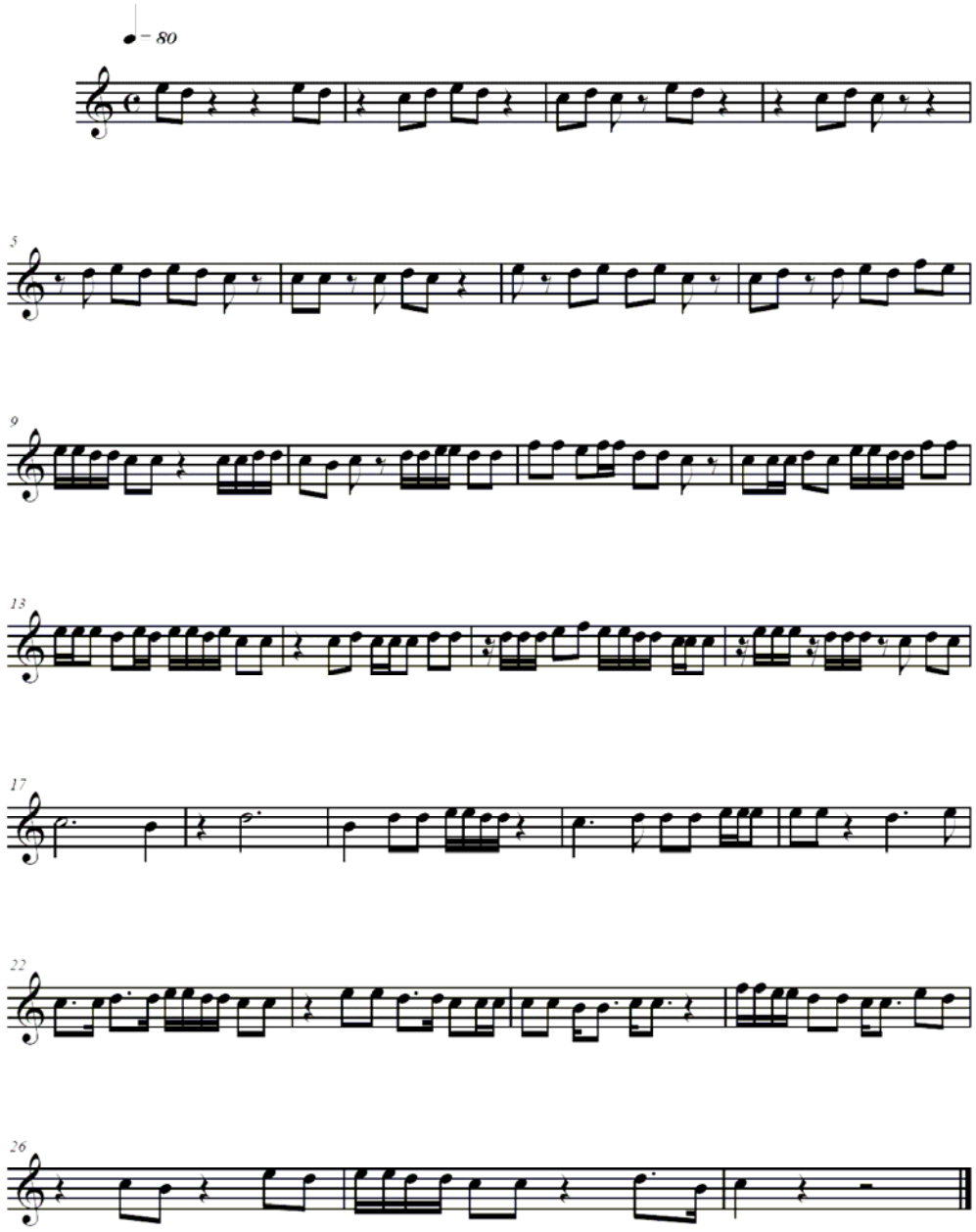
Pretest

Test A



Posttest

Test C



Appendix O

Group Testing Scoring Guide

Sight-Reading Study Scoring Sheet

Facility:

1. Does the ensemble perform the rhythms correctly?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

2. Does the woodwind section perform the rhythms correctly?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

3. Does the brass section perform the rhythms correctly?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

Ensemble:

1. Does the woodwind section perform the rhythms using an ideal sound concept?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

2. Does the brass section perform the rhythms using an ideal sound concept?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

Flow:

1. Does the ensemble perform the rhythms with a smooth and connected sound?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

2. Does the ensemble perform the rhythms with ease?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

3. Does the ensemble perform with a balanced sound concept? (From low to high)

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

INDEX OF STATISTICAL TABLES

TABLE 1

Tests of Between-Subjects Effects

Source	*SS*	*df*	*MS*	*F*	*Sig.*
Pretest score	13352.4	1	13352.4	46.002	.000
Chair placement	1210.05	1	1210.05	4.171	.049
Years of College Experience	1291.23	1	1291.23	4.451	.043
Expcont	69.845	1	69.845	.241	.627
Error	9284.138	32	290.129		
Total	380663	37			

TABLE 2

Ensemble 1 Tests of Within-Subjects Effects

Source		*SS*	*df*	*MS*	*F*	*Sig.*
Test	Sphericity	8.45	4	8.45	13.52	.006
	Greenhouse-Geisser	8.45	4	8.45	13.52	.006
	Huynh-Feldt	8.45	4	8.45	13.52	.006
	Lower-Bound	8.45	4	8.45	13.52	.006
Test*Group	Sphericity Asummed	.050	1	.050	.080	.784
	Greenhouse-Geisser	.050	1	.050	.080	.784
	Huynh-Feldt	.050	1	.050	.080	.784
	Lower-Bound	.050	1	.050	.080	.784
Error	Sphericity Asummed	5	8	.825		
	Greenhouse-Geisser	5	8	.825		
	Huynh-Feldt	5	8	.825		
	Lower-Bound	5	8	.825		

TABLE 3

Ensemble 1 Tests of Between-Subjects Effects

Source	*SS*	*df*	*MS*	*F*	*p*
Intercept	130.05	1	130.05	247.714	.000
Group	1.250	1	1.250	2.381	.161
Error	4.200	8	.525		

TABLE 4

Ensemble 2 Tests of Within-Subjects Effects

Source		*SS*	*df*	*MS*	*F*	*Sig.*
Test	Sphericity	6.05	1	6.05	16.133	.004
	Greenhouse-Geisser	6.05	1	6.05	16.133	.004
	Huynh-Feldt	6.05	1	6.05	16.133	.004
	Lower-Bound	6.05	1	6.05	16.133	.004
Test*Group	Sphericity Asummed	.450	1	.450	1.2	.305
	Greenhouse-Geisser	.450	1	.450	1.2	.305
	Huynh-Feldt	.450	1	.450	1.2	.305
	Lower-Bound	.450	1	.450	1.2	.305
Error	Sphericity Asummed	3	8	3.75		
	Greenhouse-Geisser	3	8	3.75		
	Huynh-Feldt	3	8	3.75		
	Lower-Bound	3	8	3.75		

TABLE 5

Ensemble 2 Tests of Between-Subjects Effects

Source	*SS*	*df*	*MS*	*F*	*p*
Intercept	130.050	1	130.050	192.667	.000
Group	6.050	1	6.050	8.963	.017
Error	5.4	8	.675		

References

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