The Law of Entrainment: Implications for Developing Internal Pulse and Performance Accuracy in the General Music Classroom

Maria Kolonsky
972 Spa Road, Apt. 203
Annapolis, MD 21403

June 26, 2015

Marc Dicciani, Director of the School of Music

Elizabeth Sokolowski, Division Head of Music Education

University of the Arts
College of Performing Arts
School of Music

Master of Music in Music Education

The Law of Entrainment: Implications for Developing Internal Pulse and Performance Accuracy in the General Music Classroom

Maria Kolonsky

Approved as to style and comment by:

_____

Elizabeth Sokolowski, Division Head Music Education

_____

Marc Dicciani, Director of the School of Music

_____

James Savoi, Associate Provost who oversees Graduate Studies

The Law of Entrainment: Implications for Developing Internal Pulse and Performance Accuracy in the General Music Classroom

Statement of Purpose

The purpose of this empirical study is to determine and evaluate the effect of applying the law of entrainment in the general music classroom. The goal of this application is to develop internal pulse and performance accuracy. Two classes of 1st grade students at Odenton Elementary School will receive instruction on the same musical concepts; however, one class will follow the traditional instructional model, while the other will incorporate activities that strive to develop entrainment. Results will be based on whole-class ensemble performances and will be measured using teacher-generated assessment rubrics. A group of four non-participant music teachers will assess student growth using these rubrics.

Rationale

Establishing internal pulse is a priority for ensemble development (Lisk). By establishing and developing internal pulse in the general music classroom, teachers can capitalize on building a sense of cohesive ensemble from a young age, helping students to develop more refined musical abilities before they ever enter an authentic performing ensemble setting.

This study serves to inform elementary music teachers of the effect of utilizing entrainment in the music classroom with regard to developing internal pulse and performance accuracy. The purpose of this study is to consider ways in which classroom music teachers can incorporate the law of entrainment as a seamlessly integrated component of their daily music teaching in order to better develop musicianship beginning at a young age.

Table of Contents

Chapter 1:

The Law of Entrainment: Implications for Developing Internal Pulse and Performance Accuracy in the General Music Classroom

Statement of Purpose

The purpose of this empirical study is to determine and evaluate the effect of applying the law of entrainment in the general music classroom. The goal of this application is to develop internal pulse and performance accuracy. Two classes of 2nd grade students at Odenton Elementary School will receive instruction on the same musical concepts; however, one class will follow the traditional instructional model, while the other will incorporate activities that strive to develop entrainment. Results will be based on whole-class ensemble performances and will be measured using teacher-generated assessment rubrics. A group of four non-participant music teachers will assess student growth using these rubrics.

Rationale

Establishing internal pulse is a priority for ensemble development (Lisk). By establishing and developing internal pulse in the general music classroom, teachers can capitalize on building a sense of cohesive ensemble from a young age, helping students to develop more refined musical abilities before they ever enter an authentic performing ensemble setting.

This study serves to inform elementary music teachers of the effect of utilizing entrainment in the music classroom with regard to developing internal pulse and performance accuracy. The purpose of this study is to consider ways in which classroom music teachers can incorporate the law of entrainment as a seamlessly integrated component of their daily music teaching in order to better develop musicianship beginning at a young age.

Expected Findings

The teacher-researcher predicts that both the traditional class and the entrainment class will make will make gains within the realm of playing and performing as an ensemble. Both curriculums are addressing the same skills and concepts, which include identifying and responding to a steady beat, identifying and performing rhythms (quarter note and rest, connected eighth notes), form (AB, ABA, Question-and-Answer, Rondo, Verse and Refrain), improvisation and composition, and whole-class ensemble performances. The researcher's hypothesis is that the entrainment class will make more substantial gains in developing and synchronizing internal pulse than the traditional class, resulting in more cohesive and musical ensemble performances. The teacher-researcher will gather student data at the beginning and end of the study, as well as during mid-point assessment periods. All student performance data will be based on the same performances and evaluated using the same assessment rubrics.

Chapter 2;

Definitions of Entrainment

During the 17th Century, Dutch mathematician Christian Huygens debatably invented the pendulum clock in response to his astronomical studies and a call for a time keeping piece for ships. According to *The Life of Christian Huygens*, he strived to find a method for the pendulum to withstand the movement of a ship while sailing at the behest of the East India Companies. In his efforts to redesign his pendulum clock to determine longitude while at sea, Huygens determined to place two pendulums within the same housing, thereby providing a backup should one fail. Years later, watching a clock as he lay sick in bed, Huygens observed that, regardless of where they started, both pendulums would eventually begin to swing towards and away from one another in synchrony, providing the basis for the laws of mechanics.

Entrainment across domains today can be defined as "spatiotemporal coordination resulting from rhythmic responsiveness to a perceived rhythmic signal" and "is based on the capacities for perception and production of rhythmic information, and the real-time transmission of this information between sensory and motor systems" (Phillips-Silver, Aktipis, & Bryant 6). Edward W. Large has conducted a number of recent studies regarding neural entrainment and synchronized movements with regard to a musical stimulus. He posits that "when humans 'synchronize' musical interactions, we enter into a form of temporal coordination that is among the most elaborate observed in nature" ("Resonating to Musical Rhythm" 2). Perhaps the most discussed musical stimuli for Large is rhythm. As he states in his article, "Pulse and Meter as Neural Resonance," a fundamental aspect of a musical experiences, in particular in coordinating performing music and dance, is rhythm perception (1). Throughout his studies and observations, Large determined that "listeners attend to multiple levels of temporal structure under a wide

variety of task conditions" ("Pulse and Meter as Neural Resonance" 3). That is, it is not simply a motor or aural stimulation that leads to entrainment. It is a combination of multiple stimuli in a variety of modalities that lead to successful entrainment in individuals.

In order to break this process down, Phillips-Silver, Aktipis, and Bryant list 3 building blocks which are critical to the simplest form of entrainment:

> 1) the ability to detect rhythmic signals in the environment, 2) the ability to produce rhythmic signals (including rhythmic signals that are the byproducts of other functions, such as locomotion or feeding behavior), 3) the ability to integrate sensory information and motor production which enables adjustment of motor output based on rhythmic input (7).

With these building blocks in place, entrainment can move into social domains; specifically self-entrainment and social entrainment. Self-entrainment is when we respond rhythmically to self-generated rhythmic signals and can be seen in individual practice and performance (Phillips-Silver, Aktipis, & Bryant 8). Phillips-Silver, Aktipis, and Bryant posit that it may "involve similar feedback as do respiration and locomotion, capacities that could provide a biomechanical basis for nuances of timing in music production and perception" (8). Social entrainment, on the other hand, is characterized by an individual or individuals responding to rhythmic signals generated by others. This unique form of entrainment can occur when the input for one organism's rhythmic signal processing system is created by the rhythmic output from another organism (Phillips-Silver, Aktipis, & Bryant 9). Social entrainment can be further broken down into two related categories: mutual social entrainment and collective social entrainment.

Mutual social entrainment occurs between two individuals when their rhythmic responsiveness "results in a 'loop' where the output of each individual's rhythmic production provides input for the other's rhythmic processing system" (Phillips-Silver, Aktipis, & Bryant 9). This can be observed between individuals playing duets or taking turns in a conversation.

Collective social entrainment, while similar to mutual social entrainment, differs in that "it is characterized by a network of input/output connections among individuals as a group" (Phillips-Silver, Aktipis, & Bryant10). This may be part of the foundation for certain forms of both formal and informal ensemble music production. These processes may promote higher-level functions across a variety of domains, such as dance and music (Phillips-Silver, Aktipis, & Bryant 10).

Within the realm of music, entrainment can be seen in a variety of forms. One such example is that of tuning forks. "When a tuning fork produces a frequency of 440Hz and is brought into the vicinity of another tuning fork, the second tuning fork will begin to oscillate at 440Hz. The first tuning fork has entrained the second, or caused it to resonate" (Lisk 18). This is also true in the case of timpani, where placing a tuning fork on or singing directly into the head of a perfectly in tune drum will cause it to produce sympathetic vibrations.

Entrainment can also be observed in jazz settings. The musicians in a jazz group become connected via the music, aware of and responding to the subtle changes in the tempo, time, style, and melodic and harmonic changes that occur as they play. This allows them to play in the moment as cohesive parts of the whole, spontaneously creating pleasing improvisations and accompaniment across a wide range of styles and moods (Lisk 19). This process is readily evident when musicians "trade-fours," or take turns soloing every four measures, and seamlessly transition from one solo to the next, creating a cohesive musical conversation.

Importance of This Study

General music is often the first formal music experience that most students will have. As such, it is important to set students up for both immediate and lasting success from the moment of inception. By developing internal pulse at the beginning of their musical education, and

continuing to utilize and refine it as they progress, students will be able to engage in more immersive and personal musical experiences as they grow in their musicianship. As their first formal music learning experience, the general music classroom can serve as a powerful preparation and recruitment vehicle for school performing ensembles. By exposing students to ensemble playing in their primary years, they begin to develop and refine their ability to listen and play as a cohesive part of a whole long before stepping into the band, chorus, or orchestra classroom.

This experience is vital to students because, as Ed Lisk states in *The Creative Director: Alternative Rehearsal Techniques*,

> Ensemble, by definition, requires "entrainment." The meaning of the word "ensemble" is far more than "a group of musicians playing together." There are three aspects of the word *ensemble:* (1) the individual player, (2) the section player, and (3) how the individual and the section contribute to the "whole" ensemble, resulting in the superior musical qualities of an organization. (19)

By developing entrainment in the general music classroom, students will develop their internal pulse and become more accurate performers in classroom ensemble settings. This will allow them to be a part of valuable musically accurate and validating ensembles in their primary years, and provide them with the tools to be musically successful, both as individuals and as part of an ensemble, when the opportunity to join school performing ensembles presents itself.

The development of internal pulse is not only important for students musically, but also in terms of their perceptions of self and self-confidence. "A student develops self-confidence knowing his or her internal pulse is correct and connected to all ensemble members...It establishes and expands the student's musical mind and solidifies their musical decisions with accuracy" (Lisk 22).

By building collective social entrainment, students will gain a sense of ensemble with both their peers and their teacher, leading to accurate and musically fulfilling ensemble performances.

Chapter 3:

Definition of Traditional and Entrainment Tracks

The purpose of this study is to evaluate the impact of incorporating activities to build entrainment on developing internal pulse and performance accuracy. Two first grade classes at Odenton Elementary School, a part of Anne Arundel County Schools in Odenton, Maryland, were chosen to be the subjects of this study. The traditional class participated in activities such as:

1. Patting the steady beat while listening to folk songs and other compositions
2. Singing folk songs
3. Reading and performing rhythms from flash cards
4. Matching rhythms to spoken words and phrases
5. Playing music games
6. Performing in whole class ensembles

The entrainment class participated in activities such as:

1. Beginning each class with warm-ups designed to build social entrainment
2. Performing the steady beat or rhythm while singing folk songs
3. Using self- and group-created movements to demonstrate the steady beat and rhythms
4. Matching rhythms to spoken words or phrases
5. Playing music games
6. Performing in whole class ensembles

School Background Information

This study was conducted using two second grade classes at Odenton Elementary School, a part of the Arundel Feeder system of Anne Arundel County Public Schools in Odenton, Maryland. Odenton Elementary is considered a high poverty school and has a diverse student population. The school population is approximately 450 students, encompassing both the comprehensive and regional school programs. The comprehensive school program serves students from the local community, with class sizes ranging from 18-28 students. The regional

school program encompasses any students from the northern half of Anne Arundel County in grades K-5 that are identified as having an emotional disability. These classes average between 2-7 students, and fluctuate depending upon students being mainstreamed into general education classrooms and new students being entered into the program.

Odenton Elementary currently has four second grade classes: Mr. Morris, Ms. Hudson, and Mrs. Sylvester in the comprehensive program, and Mr. Hughes in the regional program.

Class Background Information

Mr. Hughes' class combines three first graders and four second graders, and comes to Cultural Arts with Mrs. Sylvester's class. In order to best meet the needs of both the comprehensive school students and the students in the regional school program with IEPs, this class is co-taught by the teacher-researcher and Mrs. Hawk, the part-time general music teacher at Odenton Elementary. For this reason, Mrs. Sylvester and Mr. Hughes' class will not be included as a part of this study.

The two classes that participated in this study were Mr. Greg Morris' and Ms. Judi Hudson's second grade classes. Both classes meet twice a week for thirty minutes each. When classes come to Cultural Arts on these days, they spend thirty minutes in music and thirty minutes in physical education, back-to-back. Mr. Morris' class meets every Monday and Wednesday from 3:00-3:30, while Ms. Hudson's class meets every Tuesday and Wednesday from 2:30-3:00.

Ms. Hudson is an energetic and engaging teacher. She has participated in an Arts Integration cohort and is a firm believer in the importance of incorporating movement in all aspects of education. Her classroom slogan is "Where movement matters." In this class, there are

a number of students who require frequent teacher redirection. In Ms. Hudson's class, the student population consists of eighteen students, of which nine are girls and nine are boys. Of those eighteen students, seven are Caucasian, five are African-American, four are Hispanic, and two are multi-racial. Five of those eighteen students qualify for Free and Reduced Meals (FARMS) and two have Limited English Proficiency (LEPs).

Mr. Morris also has an interest in Arts Integration, and has used music as a way to present and reinforce classroom expectations, as well as to streamline classroom management. The students in Mr. Morris' class tend to be more focused and on task, and require less teacher redirection. In Mr. Morris' class, the student population consists of nineteen students; ten girls and nine boys. Of those nineteen students, nine are Caucasian, four are African-American, two are Hispanic, and four are multi-racial. Three of those eighteen students are FARMS and one has a learning disability (SWD).

Study Information and Procedures

This study was implemented in September 2014, when students completed a performance based pre-assessment. Students were first introduced to a recording of "Country Gardens," by Percy Aldridge Grainger, where they patted along with the beat in order to establish the tempo. Students were then provided with iconic notation for rhythmic parts to accompany the piece, which they read and echo-clapped as a full class. The rhythms were then transferred to rhythm sticks, triangles, and hand drums and performed with the previously heard recording of "Country Gardens." The performances from both classes were recorded and shown to a group of local music teachers, who evaluated each performance using a twelve point rubric created by the teacher-researcher. The performance assessment rubric focused on each group's ability to

maintain a steady beat, perform rhythms accurately, and perform in synchronicity as part of a whole-class ensemble. The study lasted four months.

The purpose of this study was to examine the effects of implementing activities specifically designed to build social entrainment on students' abilities to perform in time with an established beat, perform rhythms accurately within the context of that steady beat, and perform in synchronicity with their classmates as a whole-class ensemble.

During the course of this study, students received direct instruction in steady beat, rhythm, tempo, and form (phrases, call-and-response, echo songs, AB, ABA) as we progressed through our Rhythm and Form units. Throughout these two units of study, both knowledge and skills were practiced. Students gained factual knowledge through exploration of musical concepts, then applied that knowledge to demonstrate growth and mastery of those skills through classroom performances. As they progressed through these two units of study, students were assessed through various means. They completed written listening assessments focusing on known musical forms, individual and group composition activities to gauge their ability to use learned rhythms accurately, and performance assessments where either their singing or playing were assessed. This study focuses exclusively on performance assessments where students were asked to play instruments as part of a whole-class ensemble to accompany known folk songs.

Class Assignments to Traditional and Entrainment Tracks

Classes were assigned to the traditional track and the entrainment track based on pre-assessment data. In order to determine which class would be assigned to each track, both classes performed a percussion accompaniment to "Country Gardens," by Percy Aldridge Grainger. Neither class received any direct instruction prior to performing the piece. Students in both

classes were presented with iconic rhythmic notation in their *Spotlight on Music* textbooks, and were given five minutes to look at the notation and practice, both individually and with those around them. Students were then assigned to their instrument group: rhythm sticks, triangles, or hand drums. Once all students were seated with their assigned group and instruments, they performed their percussion accompaniment with "Country Gardens."

Mr. Morris' class received a lower cumulative score on their performance assessment rubric, and so was chosen to be assigned to the entrainment track. This was done so that the teacher-researcher could chart their growth with the inclusion of entrainment building activities in comparison to Ms. Hudson's class, who scored higher on the pre-assessment performance. By using the lower scoring of the two classes, this teacher-researcher hopes to document accelerated growth in the production of a steady beat and rhythmic accuracy due to building collective social entrainment in Mr. Morris' class.

Activities and Materials Included in Traditional Track

Mrs. Hudson's class focused on using traditional approaches to teaching rhythm and form. Each day, their class began by discussing our composer of the month, and then launched immediately into the class material for that day. When focusing on rhythm, students learned rhythmic patterns by looking at notation either in their textbooks or on the board, then using ta-ka-di-mi rhythm syllables or speech patterns as they broke them down and performed them. Rhythms were practiced on body percussion before they were transferred to instruments. The type of body percussion varied depending on what instrument it would later be transferred to. Below, each specific performance piece that was used as a mid- or post- assessment is detailed as it was presented and learned by Ms. Hudson's class.

"Land of the Silver Birch" was the first performance assessment undertaken after the initial pre-assessment. This took place during the Rhythm unit, after students had been introduced to the notation for half notes. Students first listened to the song and patted along with the steady beat, trying to identify the two animals named in the song (beaver and moose). Students then learned the refrain by echo singing and performed it with the recording, providing them with a second opportunity to hear the verse. Students learned the first verse by reading standard music notation from their textbooks and echo singing with piano accompaniment, then performed the song in its entirety with the recording. Instrument parts for "Land of the Silver Birch" were learned using body percussion and speech patterns. They included xylophones, metallophones, triangles, and drums. After practicing these body percussion patterns, students were assigned to an instrument by the teacher-researcher based on how accurately they performed the body percussion in a whole-class setting.

The second song used as a mid-point assessment was "Willowby," which is an American folk song found in the *Spotlight on Music* second grade textbooks. This performance assessment took place during the Form unit, as students discussed the concept of ABA form. Students first listened to the song and patted along with the steady beat with their eyes closed, and were asked to show whether they were hearing the A section or the B section using American Sign Language. Once they heard the entire song and identified the form as ABA, students opened their textbooks and learned "Willowby" by reading standard music notation and echo singing with piano accompaniment. Students then learned the percussion parts through body percussion and speech patterns. Percussion parts for "Willowby" included bass and alto xylophones, Joia tubes, drums, tambourines, and glockenspiels in the A section, and soprano xylophones, drums, woodblocks, and tambourines in the B section. Students were assigned to an instrument by the

teacher-researcher after observing how accurately they performed the body percussion for each instrument.

"Animal Fair," found in the second grade *Spotlight on Music* texts, served as the post-assessment performance. This performance assessment took place during the Form unit to help reinforce the concepts of introduction, interlude, and coda. Students first listened to the song and patted along with the steady beat while listening for all of the animals that were at the fair (birds, beasts, baboon, monkey, elephant). Students were then led to discover that there was extra music at the beginning and end of the song, as well as in-between the singing. They listened again, this time placing the beat on their heads for the introduction, interlude, and coda, while continuing to pat the beat on their legs for the verse. Students then learned the song by reading standard music notation from their textbooks and echo singing with piano accompaniment. The instrument part for "Animal Fair" was learned through clapping and using rhythm syllables – "ta ta ta-ki-ta ta." The percussion accompaniment for "Animal Fair" was performed in unison using rhythm sticks. Students held their rhythm sticks in rest position on their shoulders during the introduction, interlude, and coda, then performed their rhythm pattern during the verses.

Activities and Materials Included in Entrainment Track

Mr. Morris' class focused on using a blended approach to teach rhythm and form – one that incorporated both traditional methods, as well as activities designed to build collective social entrainment. Each day, their class began by discussing our composer of the month, followed by a brief warm-up designed to help build social entrainment. These warm-ups were short, lasting approximately one minute, and were picked specifically for each class. Each warm-up featured a different song, specifically chosen either for its meter or tempo. The students then followed a

simple stepping pattern: right foot out, close, left foot out, close. By moving their feet to match the established steady beat, students were able to move in synchronicity with both the teacher-researcher and their classmates. This kinesthetic connection to the steady beat and collective synchronicity provided an opportunity for students to align their internal pulses to one established beat. Once students were capable of doing this completely in synchronicity, they echo clapped and spoke rhythms modeled by the teacher-researcher. As students were first introduced to these warm-ups, they were led by the teacher-researcher. However, as they grew more comfortable with this process, one student, the class "Super Singer" from the previous day, was invited to lead the warm-up.

Mr. Morris' class also played games designed to help them internalize a steady beat, and then align the resulting internal pulse as an entire class. Their favorite game to play was disappearing numbers. As a class, they count to eight, clapping together on eight. One number is gradually taken away until the only number that is left is one. Their goal is to silently count the rest of the numbers at the same rate, so that they all clap number eight at the same time.

When focusing on learning rhythms, students read notation either from their textbooks or the board, then used ta-ka-di-mi rhythm syllables and speech patterns as they broke them down and performed them. Rhythms were practiced on body percussion before being transferred to instruments. The type of body percussion varied depending on what instrument it would later be transferred to. Below, each specific performance piece that was used as a mid- or post-assessment is detailed as it was presented and learned by Mr. Morris' class.

"Land of the Silver Birch" was the first performance assessment undertaken after the initial pre-assessment. This took place during the Rhythm unit, after students had been introduced to half note notation. Students first listened to the song and patted along with the

steady beat, trying to identify the two animals named in the song (beaver and moose). Students then learned the refrain by echo singing and performed it with the recording, providing them with a second opportunity to hear the verse. As they sang this part, they also patted their legs each time they sang the word "boom," preparing them for the drum part that they would be adding to the song. Students learned the first verse by reading standard music notation from their textbooks and echo singing with piano accompaniment, then performed the song in its entirety with the recording. Instrument parts for "Land of the Silver Birch" were learned using body percussion and speech patterns. They included xylophones, metallophones, triangles, and drums. After practicing these body percussion patterns at their seats, students participated in a movement activity where they had to align their body percussion rhythms to a steady beat in their feet. Students were then assigned to an instrument by the teacher-researcher based on how accurately they performed the body percussion in conjunction with the established steady beat.

The second song used as a mid-point assessment was "Willowby," which is an American folk song found in the *Spotlight on Music* second grade textbooks. This performance assessment took place during the Form unit, as students discussed the concept of ABA form. Students first listened to the song and patted along with the steady beat with their eyes closed, and were asked to show whether they were hearing the A section or the B section using American Sign Language. Once they heard the entire song and identified the form as ABA, students opened their textbooks and learned "Willowby" by reading standard music notation and echo singing with piano accompaniment. Students then learned the percussion parts through body percussion and speech patterns. Percussion parts for "Willowby" included bass and alto xylophones, Joia tubes, drums, tambourines, and glockenspiels in the A section, and soprano xylophones, drums, woodblocks, and tambourines in the B section. After practicing these parts at their seats, students

were split into small groups to play a guessing game. Each group was assigned a different instrument part by the teacher-researcher, and had to perform it for the class without using and of the speech patterns or rhythm syllables that were used to learn it. The rest of the class had to guess which instrument part they were performing based on how it fit with "Willowby." After the game, students were assigned to an instrument by the teacher-researcher after observing how accurately they performed the body percussion for each instrument.

"Animal Fair," found in the second grade *Spotlight on Music* texts, served as the post-assessment performance. This performance assessment took place during the Form unit to help reinforce the concepts of introduction, interlude, and coda. Students first listened to the song and patted along with the steady beat while listening for all of the animals that were at the fair (birds, beasts, baboon, monkey, elephant). Students were then led to discover that there was extra music at the beginning and end of the song, as well as in-between the singing. They listened again, this time placing the beat on their heads for the introduction, interlude, and coda, while continuing to pat the beat on their legs for the verse. Students then learned the song by reading standard music notation from their textbooks and echo singing with piano accompaniment. The instrument part for "Animal Fair" was prepared using movement. Students learned a movement pattern – "skip, skip, tip-py-toe, skip" – and moved around the room to the recording of "Animal Fair." Once they had this opportunity to learned through clapping and using rhythm syllables – "ta ta ta-ki-ta ta" – as well as student created words that matched the rhythm: "fair, fair, animal fair!" The percussion accompaniment for "Animal Fair" was performed in unison using rhythm sticks. Students held their rhythm sticks in rest position on their shoulders during the introduction, interlude, and coda, then performed their rhythm pattern during the verses.

While the first three pieces featured three or more instrument parts, “Animal Fair” featured an entirely unison percussion accompaniment. By choosing a rhythmically complex piece that was performed in unison as their final performance assessment, it became easier to see and hear the differences between the entrainment track and the traditional track.

Chapter 4:

Discussion of Results: Pre-Assessment Data

The pre-assessment data for both Mr. Morris and Ms. Hudson's classes came from a performance assessment using "Country Gardens" by Percy Aldridge Grainger. This performance assessment was done in early September 2015. Both classes were recorded sight-reading percussion parts from a graphic score. These recordings were then watched and evaluated by four music teachers using a teacher-researched created rubric. The rubric contained three categories – Steady Beat, Rhythmic Accuracy, and Ensemble, where Ensemble stands for students' ability to perform in synchronicity with the whole-class ensemble. For each category, there were four score points possible, totaling twelve points for the entire performance evaluation. Scores from each music teacher were added together and divided by four to find the average.

On the pre-assessment performance rubric, Mr. Morris's class scored 1.75/4.0 for Steady Beat, 1.25/4.0 for Rhythmic Accuracy, and 1.25/4.0 for Ensemble. The students in Mr. Morris's class struggled to find and play with a steady beat, and also displayed difficulty distinguishing rhythm from beat. In contrast, Ms. Hudson's class scored 2.25/4.0 for Steady Beat, 2.0/4.0 for Rhythmic Accuracy, and 2.25/4.0 for Ensemble. Her class was considerably more successful in identifying and playing with the established beat, as well as reading and playing the graphically notated rhythms in their books.

The scores on the pre-assessment performance determined which class would be assigned to the entrainment and traditional tracks. Due to their initially higher scores, Ms. Hudson's class was chosen to follow the traditional track, while Mr. Morris's class was picked to participate in the entrainment track.

Discussion of Results: Mid-Point Assessment Data

Two mid-point assessments were given to each class. The first, using "Land of the Silver Birch," was given in late September 2015. On their "Land of the Silver Birch" playing assessment, Mr. Morris's class scored 2.25/4.0 for Steady Beat, 1.5/4.0 for Rhythmic Accuracy, and 2.0/4.0 for Ensemble. They showed moderate growth in Steady Beat (an increase of 0.5 points) and Ensemble (an increase of 0.75 points), and slight growth in Rhythmic Accuracy (an increase of 0.25 points). The second mid-point assessment, "Willowbee," was done in late October. Mr. Morris's class scored 3.0/4.0 for Steady Beat, 2.5/4.0 for Rhythmic Accuracy, and 2.5/4.0 for Ensemble. Mr. Morris's class showed even more substantial increases between these two mid-point assessments, with an increase of 0.75 in Steady Beat, 1.0 in Rhythmic Accuracy, and 0.5 in Ensemble.

Ms. Hudson's class showed a moderate decline in scores on their first performance assessment. For "Land of the Silver Birch," Ms. Hudson's class scored 2.0/4.0 for Steady Beat, 1.5/4.0 for Rhythmic Accuracy, and 1.75/4.0 for Ensemble. These scores showed a decrease by -0.25, -0.5, and -0.5 for Steady Beat, Rhythmic Accuracy, and Ensemble, respectively.

The mid-point performance assessments both featured increasingly difficult percussion parts as we progressed through our Rhythm and Form units. As the parts became more difficult, Ms. Hudson's class struggled to play them accurately in time with a steady beat. In contrast, Mr. Morris's class showed steady progress in all categories.

Discussion of Results: Post-Assessment Data

One post-assessment was given to each class. This post-assessment occurred in mid-November, prior to Thanksgiving break. This post-assessment used the song "Animal Fair" and a

unison ostinato – “ta ta ta-ki-ta ta” or “1 2 3-trip-let 4.” On their post-assessment, Mr. Morris’s class showed considerable gains. They scored 3.25/4.0 for Steady Beat, 2.5/4.0 for Rhythmic Accuracy, and 3.0/4.0 for Ensemble. Compared to their pre-assessment scores, this was an increase of 1.5 points in Steady Beat, 1.25 points in Rhythmic Accuracy, and 1.75 points in Ensemble.

Ms. Hudson’s class had minimal improvements from their pre-assessment to their post-assessment. They scored 2.5/4.0 for Steady Beat, 2.25/4.0 for Rhythmic Accuracy, and 2.25/4.0 for Ensemble. Her class improved by 0.25 points in Steady Beat, 0.25 points in Rhythmic Accuracy, and 0 points in Ensemble from their pre-assessment scores.

It is interesting to note that both classes struggled with the triplet rhythm in this particular piece. Ms. Hudson’s class lost the beat several times over the course of the song, and their triplet rhythm, which should have been played on beat three, had a tendency to wander to other beats as they compensated for it. In contrast, Mr. Morris’s class always managed to come back together on beat one of every measure, regardless of whether their triplet slowed down or not. Their ability to stay true to the established beat as a full ensemble despite their difficulty with the triplet rhythm was a remarkable testament to their progress in feeling and playing in time with the steady beat.

While Mr. Morris’s class initially scored well below Ms. Hudson’s class, over the course of this study they made more substantial gains in all three scoring categories, while Ms. Hudson’s class showed decline during the mid-point, and only slight improvement on their post-assessment.

Teacher Discussion

While teaching concepts in the Rhythm and Form units to both classes, I felt that Mr. Morris's class eventually began to grasp concepts more easily and were able to perform increasingly complex rhythms with more ease than Ms. Hudson's class. Both classes received equal instruction in concepts, such as recognition of various rhythm notation and musical forms, but Ms. Hudson's class was not able to put those concepts into practice and perform them as well as Mr. Morris's class. I feel that by continuously developing their sense of internal pulse in tandem with their classmates, the students in Mr. Morris's class became stronger, more independent musicians. They were able to better feel how each part of an ensemble fits together to create a whole, leading to a greater sense of musical cohesion and ensemble when they were playing together.

The activities designed to help build social entrainment were not time consuming, and were easily added to our normal thirty minute class routine. By incorporating these activities as warm-ups, students were able to internalize the pulse and tempo from the start of class, which I feel made it easier for them to accurately learn and perform increasingly difficult rhythms. This also worked incredibly well in terms of behavior management. By establishing this warm-up routine, students were immediately engaged in the music process as soon as they walked into my classroom. Once they were accustomed to it, students were also able to take on leadership roles and have a change to lead their class in rhythmic warm-ups. The kinesthetic, aural, and visual aspects of these warm-ups ensured that students were not just entraining to me, but also with their peers.

How This Study Informs Current and Future Endeavors

Based on the growth witnessed in students who followed the entrainment track, I will continue to implement these activities in my general music classroom. After seeing the success with my second graders, I began implementing similar activities with my fourth and fifth grade chorus students. The students enjoyed the kinesthetic element of these warm-ups, and it helped them to internalize the steady beat and more accurately perform a rhythmically complex Zambian folk song.

Throughout this study, I have learned that making a concerted effort to help students develop their sense of internal pulse is well-worth the time and effort. While it took a few minutes away from the meat of the lesson at the beginning of each class, it did not in any way detract from the concepts that we were learning. Rather, it served to invigorate and enhance the music-making that took place in our lessons. My students that partook in the entrainment track developed a much stronger sense of ensemble and musical solidarity. This led to a strengthened sense of community in our classroom, which resulted in better cooperation and teamwork not only when performing as a whole-class ensemble, but throughout the learning process. The students in the entrainment track were more likely to help their classmates as we learned instrument parts that fit together and displayed increased leadership as they peer-taught their classmates who needed extra support.

I will continue to find ways to help my students to develop their sense of internal pulse within the context of my units of study and general music lessons. It did not take so much time away from my class that we were unable to complete everything that was scheduled for each lesson, and led to substantial student growth and improvement. The gains of spending a few

minutes per class focusing on this far out-weighed any cons as my students developed and refined their playing and ensemble skills.

Appendix A: Diagrams of Entrainment

Figure 1: The capacity for entrainment*

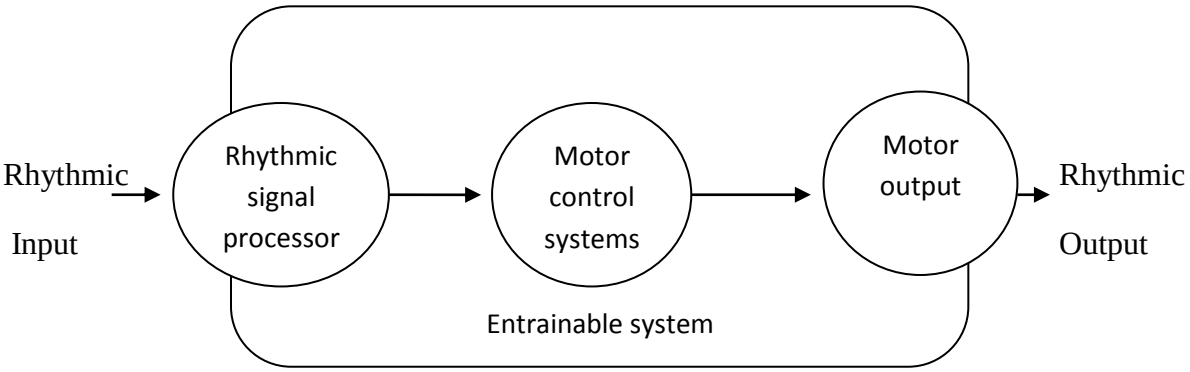


Figure 2: Self-Entrainment*

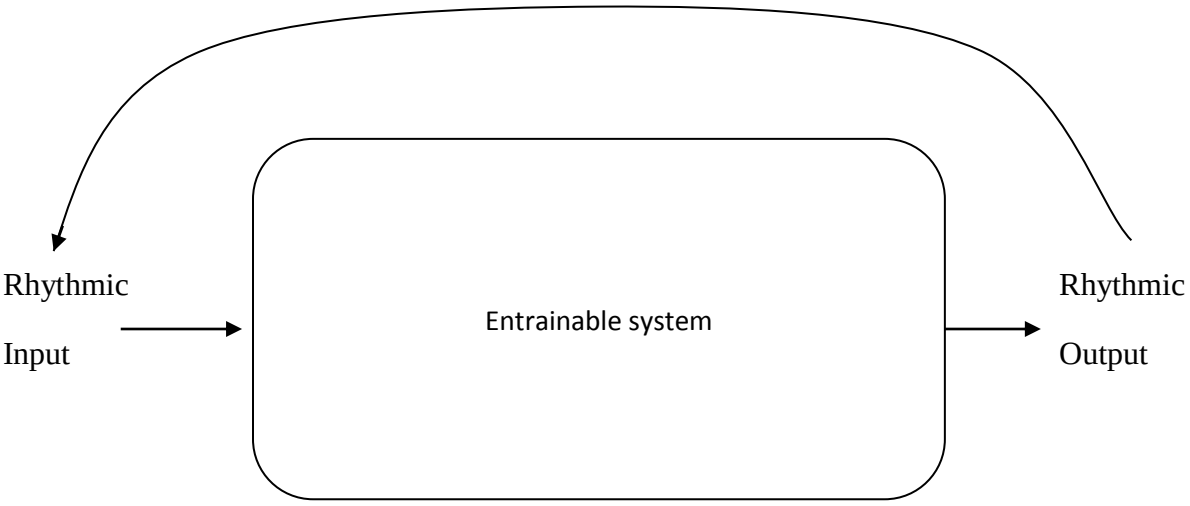


Figure 3.a: Social Entrainment*

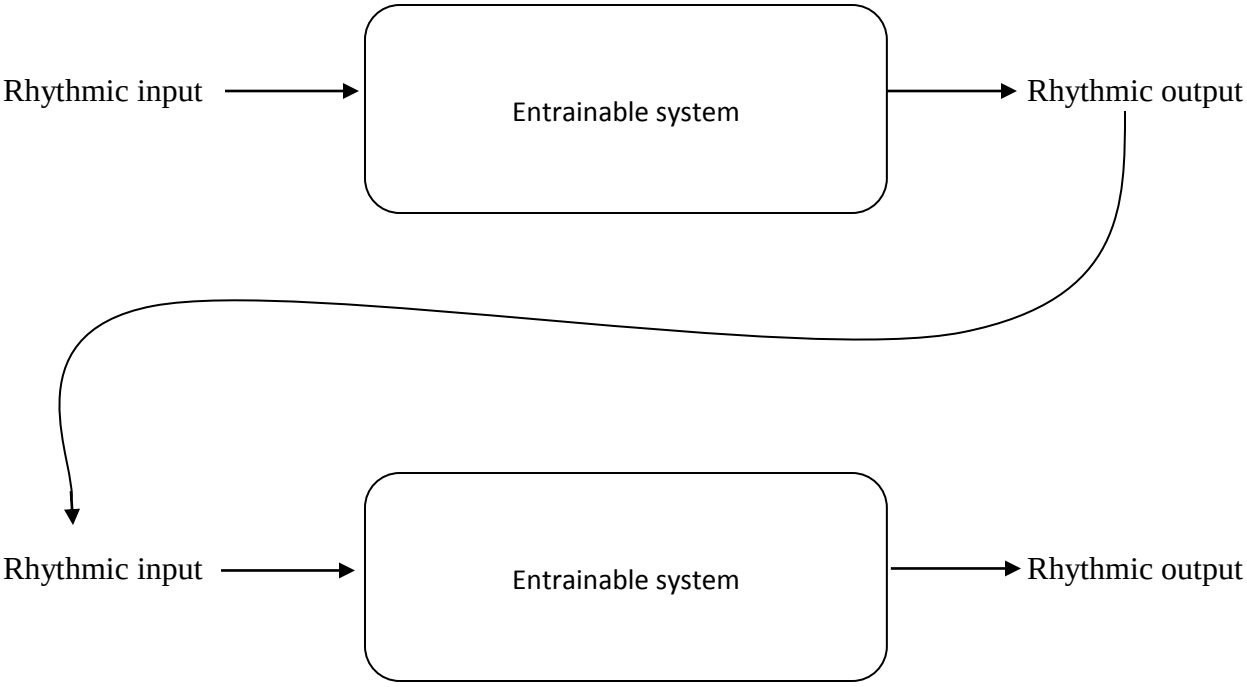


Figure 3.b: Mutual Social Entrainment*

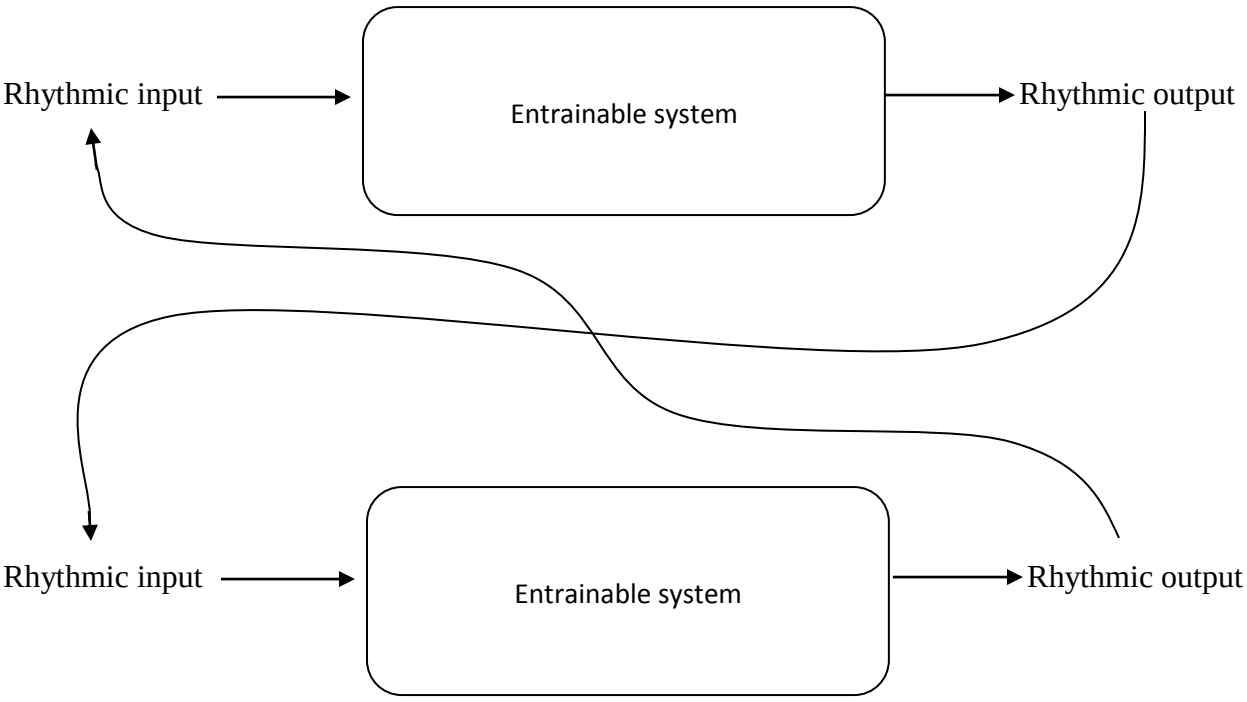
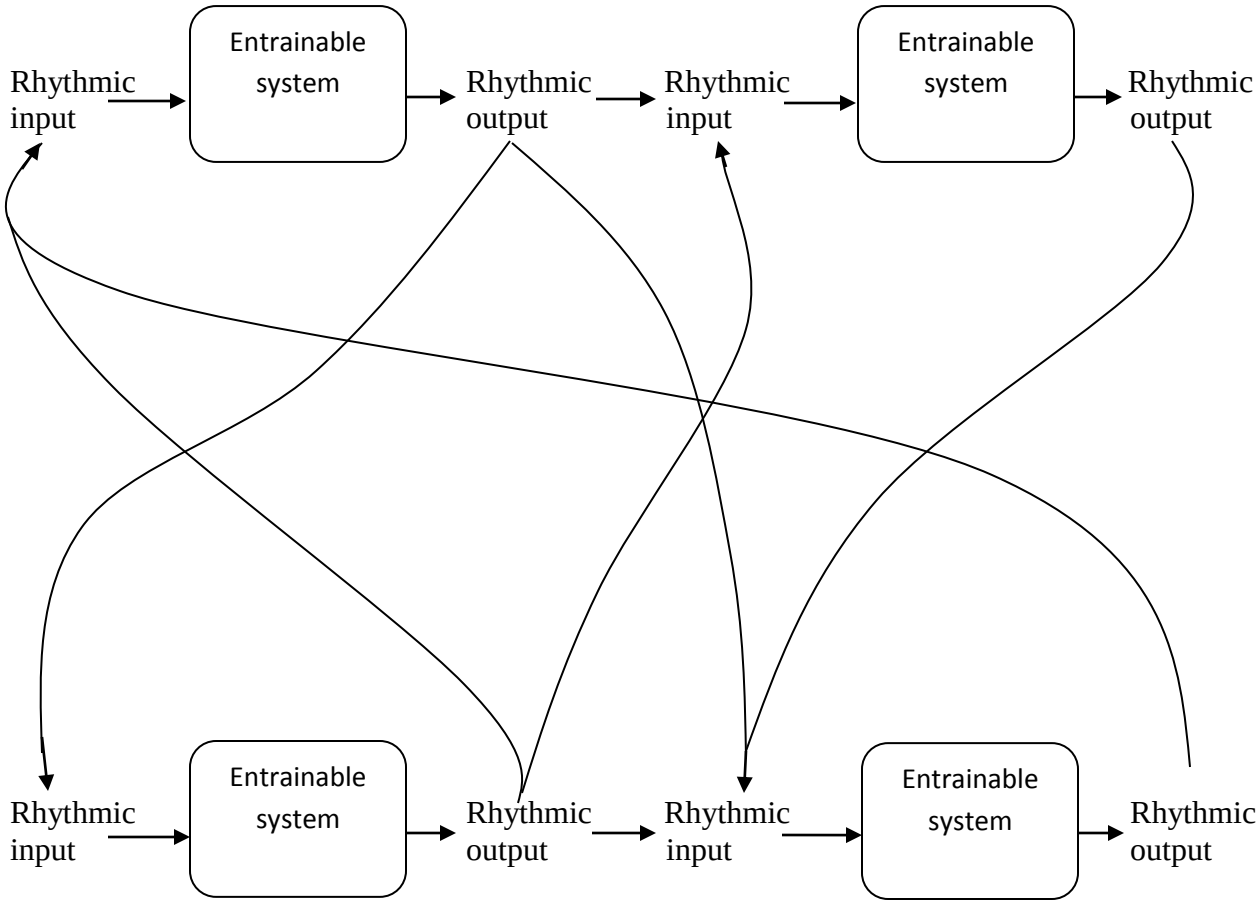
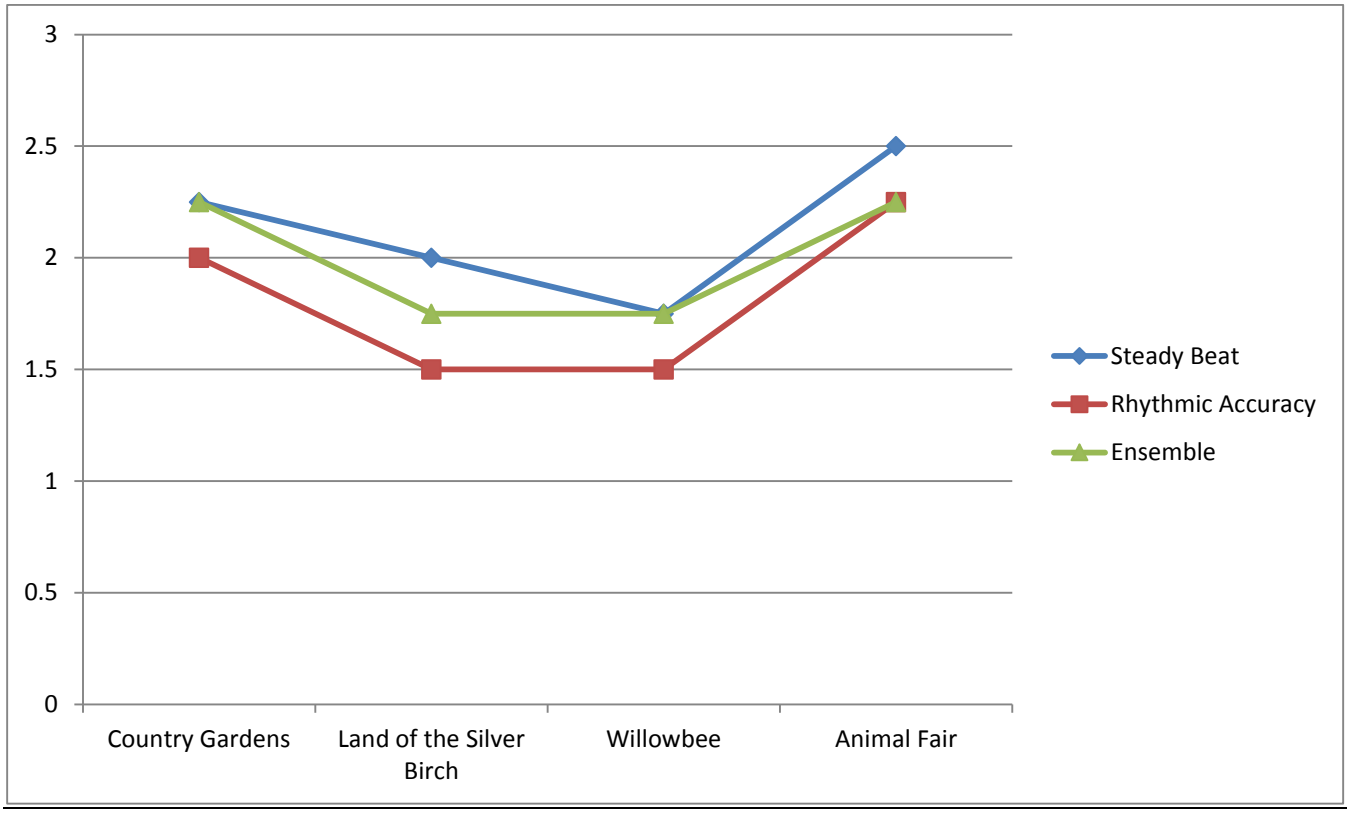


Figure 3.c: Collective Social Entrainment



*Diagrams adapted from *The Ecology of Entrainment: Foundations of Coordinated Rhythmic Movement* by Phillips-Silver, Aktipis, & Bryant

Appendix B: Performance Score Data – Mrs. Hudson's Class



HUDSON

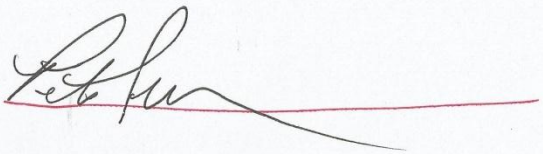
Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Country Gardens (Hudson)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	**Ensemble mostly performs in time with the established beat.**	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	**Ensemble accurately performs most rhythms as notated.**	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	**Most students are performing in synchronicity with the ensemble.**	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: 

Hudson

Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: K Wh

HUDSON

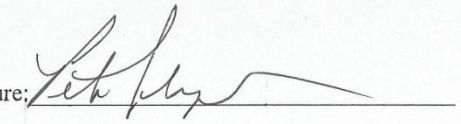
Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat. ✓
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated. ✓
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble. ✓	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Land of the Silver Birch (Hudson)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	**Ensemble sometimes performs in time with the established beat.**	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	**Ensemble accurately performs some rhythms as notated.**	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	**Few students are performing in synchronicity with the ensemble.**

Signature: 

Hudson

Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: K Why

Hudson

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Willowbee (Hudson)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ~~ensemble~~.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: K Wilkey

Hudson

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat. ✓	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated. ✓	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble. ✓	Few students are performing in synchronicity with the ensemble.

Signature: _____

Hudson

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

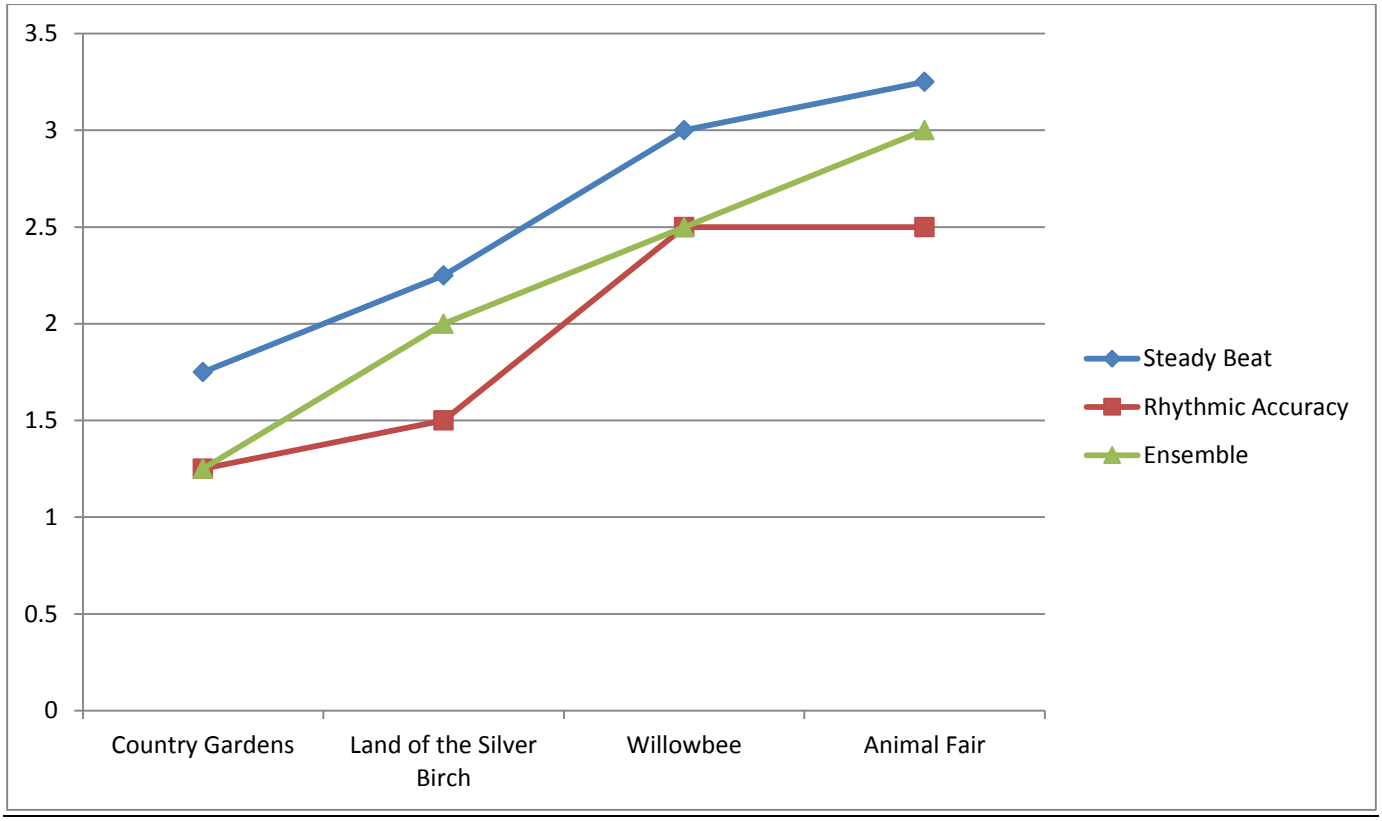
Hud

Thesis Project Grading Rubric – Animal Farm

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: K Wh

Appendix C: Performance Score Data – Mr. Morris's Class



MORRIS

Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Country Gardens (Morris)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	**Ensemble sometimes performs in time with the established beat.**	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	**Ensemble accurately performs some rhythms as notated.**	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	**Some students are performing in synchronicity with the ensemble.**	Few students are performing in synchronicity with the ensemble.

Signature:

Norris

Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: Erin Norris

Morris

Thesis Project Grading Rubric – Country Gardens

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

MORRIS

Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat. ✓	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated. ✓
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble. ✓	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Land of the Silver Birch (Morris)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	**Ensemble mostly performs in time with the established beat.**	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	**Ensemble accurately performs some rhythms as notated.**	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	**Most students are performing in synchronicity with the ensemble.**	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: 

Morris

Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Morris

Thesis Project Grading Rubric – Land of the Silver Birch

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: K Why

Morris

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Thesis Project Grading Rubric – Willowbee (Morris)

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: 

Morris

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: [signature]

Morris

Thesis Project Grading Rubric – Willowbee

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Morris

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat. ✓	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated. ✓	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble. ✓	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Morris

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Morris

Thesis Project Grading Rubric – Animal Fair

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: [illegible]

Thesis Project Grading Rubric – Animal Farm

MoC

	4	3	2	1
Steady Beat	Ensemble consistently performs in time with the established beat.	Ensemble mostly performs in time with the established beat.	Ensemble sometimes performs in time with the established beat.	Ensemble rarely performs in time with the established beat.
Rhythmic Accuracy	Ensemble accurately performs all rhythms as notated.	Ensemble accurately performs most rhythms as notated.	Ensemble accurately performs some rhythms as notated.	Ensemble accurately performs few, if any, rhythms as notated.
Ensemble	All students are performing in synchronicity with the ensemble.	Most students are performing in synchronicity with the ensemble.	Some students are performing in synchronicity with the ensemble.	Few students are performing in synchronicity with the ensemble.

Signature: _____

Appendix D: Lesson Plans

Teacher Miss Maria Kolonsky **Grade** 2

Unit Rhythm **Lesson Date(s)** Week 3

Type of Lesson _x_ **Acquisition** _x_ **Refining/Extending** __ **Mastery/Application**

Essential Question	How many beats does a quarter note get? Eighth note?
Vocabulary	Quarter note, quarter rest, eighth note
Activating Strategy	Gershwin – fact 3
Teaching Strategies/ Activities **visual (v), aural (a), and kinesthetic (k)* *National Music Standards Achieved:* - **Singing, alone and with others, a varied repertoire of music** - **Performing on instruments, along and with others, a varied repertoire of music** - Improvising melodies, variations and accompaniments - **Composing and arranging music within specific guidelines** - **Reading and notating music** - **Listening to, analyzing, and describing music** - Evaluating music and music performances - **Understanding relationships between music, the other arts and disciplines outside the arts** -**Understanding music in relation to history and culture** *Bloom's Taxonomy:* **-Creating (Evaluation)** **-Evaluating (Synthesis)** **-Analyzing (Analysis)** **-Applying (Application)** **-Understanding (Comprehension)** **-Remembering (Knowledge)**	1. "Country Gardens" (a, v, k) (pg 16, CD1:24) a. Assign rows to rhythm sticks, hand drums, triangles, woodblocks b. Play along with recording by following listening map c. Why do some beat bars not have anything over them? Rest d. Rotate through instrument stations e. Morris dance

Summarizing Strategy	Answer Essential Question
Assessment(s)	SWBAT accurately perform quarter notes, quarter rests, and eighth notes from symbolic notation SWBAT perform a dance using known rhythms to the steady beat
Resources/Materials	CD1 Spotlight Grade 2 Rhythm sticks Woodblocks Hand drums Triangles

Delivery Strategies & Prompts	**Assessment Types**
_x_ Direct Instruction **__ Numbered Pairs** **__ Pairs Checking** **__ Think-Pair-Share** **__ Cues/Questions (High Level)** **_x_ Guided Practice** **_x_ Graphic Organizer/Visuals** **_x_ Independent Practice** **__ Laboratory Activity** **_x_ Teacher Demonstration** **_x_ Vocabulary Building** **_x_ Whole Group Discussion** **__ Technology Integration** **__ Lecture** **_x_ Review** **__ Other**	**_x_ Authentic Performance** **_x_ Class Participation** **__ Classwork** **__ Project** **__ Laboratory** **__ Summarizing Strategy/Activity** **__ Oral Presentation** **_x_ Self Assessment** **_x_ Teacher Observation** **__ Homework** **__ Quiz** **__ Test** **__ Other**

Last Revised ___9/3/14___

Teacher Miss Maria Kolonsky **Grade** 2

Unit Rhythm **Lesson Date(s)** Week 6

Type of Lesson _x_ **Acquisition** _x_ **Refining/Extending** __ **Mastery/Application**

Essential Question	How many beats does a half rest get? Dotted half note?
Vocabulary	Half rest, dotted half note
Activating Strategy	Fact 1
Teaching Strategies/ Activities **visual (v), aural (a), and kinesthetic (k)* *National Music Standards Achieved:* - **Singing, alone and with others, a varied repertoire of music** - **Performing on instruments, along and with others, a varied repertoire of music** - Improvising melodies, variations and accompaniments - Composing and arranging music within specific guidelines - **Reading and notating music** - **Listening to, analyzing, and describing music** - Evaluating music and music performances - **Understanding relationships between music, the other arts and disciplines outside the arts** -**Understanding music in relation to history and culture** *Bloom's Taxonomy:* **-Creating (Evaluation)** **-Evaluating (Synthesis)** **-Analyzing (Analysis)** **-Applying (Application)** **-Understanding (Comprehension)** **-Remembering (Knowledge)**	2. "Land of the Silver Birch" (a, v, k) (pg 88, CD5:5) Sylvester a. Listen – pat beat b. Learn refrain and clapping ostinato c. Listen again – clap ostinato during verse, sing refrain d. Learn in phrases e. Learn Orff parts 3. "Oma Rapeti" (a, v, k) (pg 108, CD6:6) a. Listen – pat beat b. Practice tapping pattern c. Id half rest d. Learn in phrases e. Sing while playing stick game f. Learn half note ostinato from Wallaby 4. "Hello, Hello There" (a, v, k) (pg 126, CD7:4) a. Listen – pat snap snap b. How many beats in each measure? 3 c. How many beats does a dotted half note get? 3 d. Learn in phrases e. Ss and T switch as part 1 and part 2 5. "Adagio from Concerto for Violin and Oboe" (a, v, k) (CD7:7) a. Learn clap circle circle pattern b. Half of class does it for violin, half for oboe

Summarizing Strategy	
Assessment(s)	SWBAT perform an ostinato using half notes and half rests SWBAT perform movement patterns to show 3 beats
Resources/Materials	CD6 Spotlight Grade 2 Listening map

Delivery Strategies & Prompts	**Assessment Types**
_x_ Direct Instruction **__ Numbered Pairs** **__ Pairs Checking** **__ Think-Pair-Share** **__ Cues/Questions (High Level)** **_x_ Guided Practice** **_x_ Graphic Organizer/Visuals** **_x_ Independent Practice** **__ Laboratory Activity** **_x_ Teacher Demonstration** **_x_ Vocabulary Building** **_x_ Whole Group Discussion** **_x_ Technology Integration** **__ Lecture** **_x_ Review** **__ Other**	**_x_ Authentic Performance** **_x_ Class Participation** **_x_ Classwork** **__ Project** **__ Laboratory** **__ Summarizing Strategy/Activity** **__ Oral Presentation** **_x_ Self Assessment** **_x_ Teacher Observation** **__ Homework** **__ Quiz** **__ Test** **__ Other**

Last Revised ___9/26/14___

Teacher Miss Maria Kolonsky **Grade** 2

Unit Form **Lesson Date(s)** Week 12

Type of Lesson _x_ **Acquisition** __ **Refining/Extending** __ **Mastery/Application**

Essential Question	What is the form for our song today?
Vocabulary	ABA
Activating Strategy	Sousa – fact 2
Teaching Strategies/ Activities **visual (v), aural (a), and kinesthetic (k)* *National Music Standards Achieved:* - **Singing, alone and with others, a varied repertoire of music** - **Performing on instruments, along and with others, a varied repertoire of music** - Improvising melodies, variations and accompaniments - Composing and arranging music within specific guidelines - **Reading and notating music** - **Listening to, analyzing, and describing music** - Evaluating music and music performances - **Understanding relationships between music, the other arts and disciplines outside the arts** -**Understanding music in relation to history and culture** *Bloom's Taxonomy:* **-Creating (Evaluation)** **-Evaluating (Synthesis)** **-Analyzing (Analysis)** **-Applying (Application)** **-Understanding (Comprehension)** **-Remembering (Knowledge)**	6. "Clog" (a, v, k) (pg 68, CD4:10) a. Learn clog step b. Walk to A, clog step to B c. Label form 7. "Willowbee" (a, v, k) (pg 69, CD4:11) a. Listen – pat beat b. Id form c. Learn in phrases d. Learn patterned movement e. Learn instrument parts

Summarizing Strategy	
Assessment(s)	SWBAT aurally id AB and ABA forms SWBAT move to show changes in musical form
Common Core and Cross-Curricular Standards Addressed	
Resources/Materials	CD4 Spotlight Grade 2 UTP Orff instruments

Delivery Strategies & Prompts	**Assessment Types**
_x_ Direct Instruction **__ Numbered Pairs** **__ Pairs Checking** **__ Think-Pair-Share** **__ Cues/Questions (High Level)** **_x_ Guided Practice** **_x_ Graphic Organizer/Visuals** **_x_ Independent Practice** **__ Laboratory Activity** **_x_ Teacher Demonstration** **_x_ Vocabulary Building** **_x_ Whole Group Discussion** **_x_ Technology Integration** **__ Lecture** **_x_ Review** **__ Other**	**_x_ Authentic Performance** **_x_ Class Participation** **_x_ Classwork** **__ Project** **__ Laboratory** **__ Summarizing Strategy/Activity** **__ Oral Presentation** **_x_ Self Assessment** **_x_ Teacher Observation** **__ Homework** **__ Quiz** **__ Test** **__ Other**

Last Revised ___11/5/14___

Teacher Miss Maria Kolonsky **Grade** 2

Unit Form **Lesson Date(s)** Week 15

Type of Lesson _x_ **Acquisition** _x_ **Refining/Extending** _x_ **Mastery/Application**

Essential Question	What is an interlude? What is rondo form?
Vocabulary	Interlude, rondo
Activating Strategy	Joplin – fact 2
Teaching Strategies/ Activities **visual (v), aural (a), and kinesthetic (k)* *National Music Standards Achieved:* - **Singing, alone and with others, a varied repertoire of music** - **Performing on instruments, along and with others, a varied repertoire of music** - Improvising melodies, variations and accompaniments - Composing and arranging music within specific guidelines - **Reading and notating music** - **Listening to, analyzing, and describing music** - Evaluating music and music performances - **Understanding relationships between music, the other arts and disciplines outside the arts** -**Understanding music in relation to history and culture** *Bloom's Taxonomy:* **-Creating (Evaluation)** **-Evaluating (Synthesis)** **-Analyzing (Analysis)** **-Applying (Application)** **-Understanding (Comprehension)** **-Remembering (Knowledge)**	8. "Animal Fair" (a, v, k) (pg 214, CD11:8) a. Listen – pat. Walking or skipping? b. Skip to beat c. Learn in phrases d. Learn ostinato 9. "Shoo, Fly" (a, v, k) (pg 222, CD11:22) a. Listen – pat beat b. Stand for B c. Label form d. Learn in phrases e. Add movements f. Discuss rondo form g. Add speech piece for C and perform in rondo 10. "Rondo a capriccio, Op. 129" (a, v, k) a. Follow using ILM and label rondo form b. Create movements for each section

Summarizing Strategy	
Assessment(s)	SWBAT aurally id contrasting sections in a song SWBAT move to show changes in musical form
Common Core and Cross-Curricular Standards Addressed	
Resources/Materials	Spotlight Grade 2 ILM CD11

Delivery Strategies & Prompts	**Assessment Types**
_x_ Direct Instruction **__ Numbered Pairs** **__ Pairs Checking** **__ Think-Pair-Share** **__ Cues/Questions (High Level)** **_x_ Guided Practice** **_x_ Graphic Organizer/Visuals** **_x_ Independent Practice** **__ Laboratory Activity** **_x_ Teacher Demonstration** **_x_ Vocabulary Building** **_x_ Whole Group Discussion** **_x_ Technology Integration** **__ Lecture** **_x_ Review** **__ Other**	**_x_ Authentic Performance** **_x_ Class Participation** **_x_ Classwork** **__ Project** **__ Laboratory** **__ Summarizing Strategy/Activity** **__ Oral Presentation** **_x_ Self Assessment** **_x_ Teacher Observation** **__ Homework** **__ Quiz** **__ Test** **__ Other**

Last Revised ___12/2/14___

Works Cited

Bell, Arthur E. *Christian Huygens and the Development of Science in the Seventeenth Century*. London: Arnold Edward & Co., 1950. Web.

Large, Edward W. "On Synchronizing Movements to Music." *Human Movement Science* 19.4 (2000): 527-66. *JSTOR*. Web. 29 July 2014.

---, and Joel S. Snyder. "Pulse and Meter as Neural Resonance." *Annals of the New York Academy of Sciences* 1169.1 (2009): 46-57. *JSTOR*. Web. 29 July 2014.

---. "Resonating to Musical Rhythm: Theory and Experiment." *Psychology of Time*. Ed. Simon Grondin. Bingley, UK: Emerald, 2008. 189-232. *Selected Publications*. Florida Atlantic University. Web. 29 July 2014.

Lisk, Edward S. *The Musical Mind of the Creative Director*. Galesville, MD: Meredith Music Publications, 2010. Print.

Percellin, Diane C. "Brain-Based Education in Music: A New Science or Science-Fiction?" *The Orff Echo* Spring (2009): 22-26. *AOSA*. American Orff-Schulwerk Association. Web. 28 July 2014.

Phillips-Silver, Jessica, C. A. Aktipis, and Gregory A. Bryant. "The Ecology of Entrainment: Foundations of Coordinated Rhythmic Movement." *Music Perception: An Interdisciplinary Journal* 28.1 (2010): 3-14. *JSTOR*. University of California Press. Web. 01 Aug. 2014.