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The Effect of Visual Performance on Music Performance Evaluation in High School Marching Band

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THE EFFECT OF VISUAL PERFORMANCE ON MUSIC PERFORMANCE EVALUATION IN HIGH SCHOOL MARCHING BAND

By

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THESIS SUMMARY

Football teams and marching bands are active on Friday nights in the fall around the United States. Both football teams and competitive marching bands work hard throughout their respective seasons to score points but for marching bands, Friday night football games are just a dress rehearsal. A football team's ability to score points is what decides the outcome of a game, but determining a marching band's rating is much more complicated. At marching band competitions, bands are judged on a variety of factors including how they look and sound on the field. Judges for marching band competitions are generally considered experts in their fields. They judge musical ability, visual ability, percussion, and colorguard, assigning scores to bands in their different captions. Scores are then totaled and weighted which produce a band's final score.

Marching band competitions take place across the United States and internationally. Although there is not an internationally standardized set of marching band judging criteria, many competitions use similar protocol in which the judges all watch and listen to the show, regardless of what caption they are judging. This protocol, though, creates a dilemma. If a judge is only supposed to be rating music, could watching the show potentially interfere with their scores? The McGurk Effect (McGurk & MacDonald, 1976) shows that when it comes to visual versus aural information, vision reigns supreme. This idea of conflicting visual and aural information raises questions of judge reliability in marching band contests.

In this study, I examined the potential effects that visual information could have on the judging of musical factors during a pre-recorded marching band show. I used the following research questions to guide my study: (1) What are the effects of visual stimuli on composite music performance ratings? (2) What are the effects of visual stimuli on individual music

performance element ratings (Clarity and Uniformity of Style and Interpretation, Balance and Blend, Tone and Intonation, Precision and Vertical Alignment, and Musicianship and Artistry)?

To investigate these factors, I randomly divided collegiate music education majors into two groups. One group listened to the show (control group: audio-only) while the other group listened to and watched the show (experimental group: audio-visual). The students rated the show on a scale from 1 to 10 in a variety of musical categories. Scores were totaled to create a composite score out of 50. Composite scores and individual music category scores were examined to investigate any statistically significant differences between the two groups.

Although McGurk and MacDonald (1976) found that visual information trumps aural information, results of the present study did not support this idea. Participants who only listened to the show assigned similar ratings to those who listened to and watched the marching band show. These results suggest that vision may not be the dominant sense in some circumstances. These results are also important because they show that trained marching band adjudicators may be resilient to visual influences.

ABSTRACT

At marching band contests, bands are usually judged on both their music performance (ensemble, individual, and general effect) and visual performance (ensemble, individual, and general effect). Phenomena such as the McGurk effect (McGurk & MacDonald, 1976) indicate that people often prioritize visual information over aural information; however, until now there have not been empirical investigations of how this phenomenon might affect high school marching band evaluation. The purpose of this study was to examine the effects of visual performance on the music performance evaluation of high school marching bands. To study this effect, I recruited college students who were randomly assigned to two groups to evaluate a recorded marching band show. One group received the aural stimulus, and the other group received the same aural stimulus paired with the visual stimulus. Results indicated that the visual stimulus did not influence the composite and individual performance ratings. Participants who observed the audiovisual stimulus provided similar ratings to those who observed the audio stimulus. Implications for music performance evaluation and marching band pedagogy are discussed.

Keywords: marching band, visual performance, performance evaluation, audio-visual, music performance evaluation, McGurk Effect

CHAPTER 1

INTRODUCTION

Introduction and Background

Although Friday nights in the fall are commonly known for football games, fewer are familiar with the Saturday tradition of marching band competitions. Marching bands have been around since ancient times with origins in military bands used in battle to signal attacks and for parades. Since then, marching bands have become a staple of high school athletic events, while also competing on the field with high levels of musicianship and artistry. High school marching bands can range in size from small ensembles to groups numbering in the hundreds with each member playing an important role in the band's success. Marching band draws students from a variety of different backgrounds and interests who work together to support their high schools while also competing themselves for scores and feedback (Marching Band, 2014).

Created in 1975, Music for All is one of the major governing bodies of high school marching band. This organization provides clinics throughout the year and helps to facilitate regulated marching band competitions across the nation (Bands of America, Music for All, n.d.-a). They host regional marching band competitions throughout the fall, culminating in Bands of America Grand National Championships, which is held every November in Indianapolis, Indiana. At this competition, the best high school marching bands from around the nation gather to compete in musical and visual captions (Bands of America, Music for All, n.d.-b). Grand Nationals is the pinnacle of high school marching band competition, and many students and directors place a lot of emphasis on the results of this competition. At "Grand Nationals," just like at other marching band competitions, organizers hire a highly-esteemed panel of judges to offer their knowledge, feedback, and evaluations to the competing bands. These judges are

experts in their fields of music, design, and visual effect. They each bring their own experiences and opinions to judging, which can offer bands diverse feedback.

At marching band competitions, judges have two main jobs: to judge bands on different performance elements and to offer critiques of the performances (West, 2016). Judges' scores are used to rank bands at contests and offer band directors ways to improve their marching band shows and band programs as a whole. Scores at contests and festivals can also affect how schools, district boards, parents, and even students perceive their band program, all of which can influence band budgets, community support, and student retention (Hash, 2012). There is a large emphasis placed on judges' scores, which means that reliability of these scores is of the utmost importance. Though judges are trained on how to best judge a marching band show, a variety of factors can affect how a judge performs that duty. In Music for All's Bands of America Adjudication handbook, there is mention of the various backgrounds that judges come from and their varying experiences in the marching band world. Although consistency in judging is very important, judges do have opinions and preferences that are revealed in their scores (Bands of America, Music for All, n.d.-a).

Judges must consider many categories when scoring a marching band. Despite attempts to standardize contest scoring, many different variables can affect scores, many of which that are unrelated to the performance being judged (Rickels, 2012). Variables that can influence score outcomes include director's enjoyment of marching band, budget, rehearsal hours per week, number of certified staff, and number of concert band students also in marching band (Rickels, 2012). Rickels (2006) also found that the size of a band can have a significant effect on their scores. The effects of these variables can change scores, sometimes leading to skewed scores and rankings.

Many factors can affect judge reliability. It has been found that as the size of a judging panel increases, reliability increases (Brakel, 2006). In addition, a panel of three judges can help to ensure greater reliability of ratings than a panel of two judges (Hash, 2012). Some studies have indicated that judges can be very reliable within captions and with final scores across statewide competitions (King & Burnsed, 2009), but this is not always the case. Scores can sometimes reflect the judges more than they reflect the performance itself (Engelhard, 2002). In addition, results of one study indicated that approximately 50% of scoring variance could be predicted without even observing the performance (Rickels, 2012). With this being the case, score variability can be very high among judges.

Conceptual Framework

Medina (2008) emphasized the dominant role of vision in multisensory experiences. In fact, he stated that "Vision trumps all other senses" (Medina, 2008, p. 221). Researchers have indicated repeatedly that vision is perhaps the most elite of the senses (McGurk & MacDonald, 1976; Medina, 2008; Pocock, 1981). The results of a meta-analysis of studies using audio-video crossmodality (Platz & Kopiez, 2012) indicated that the visual aspect influenced the perception of music/aural performances. We perceive many of our experiences through the eyes, including sound. In fact, McGurk and MacDonald (1976) found that people prioritized visual information in the form of lip shape when watching people speak. Participants' abilities to aurally recognize syllables were skewed when focusing on the visual stimulus when the audio stimulus provided incongruent information. Researchers have also found that the mere presence of the speaker's face can increase a listener's ability to identify the speaker's dialogue (Sumby & Pollock, 1954). Previous findings indicate that when aural and visual input compete against each other, the visual input often takes precedence when a person is perceiving an event.

Sensory input helps us to perceive our environment, and often our different senses work together to interpret and respond to it. This concept of crossmodal sensory integration is present in many facets of our everyday lives (Kayser & Logothetis, 2007). The human brain processes visual and auditory information from the environment in different parts of the brain. Visual and auditory neurons in the brain work separately to understand the information that the eyes and ears are giving them. In addition to these separate processing systems, there are multisensory neurons that overlap, which allow these neurons to have an enhanced response to the stimuli (Kayser & Logothetis, 2007). Pekkola, Ojanen, Autti, Jaaskelainen, Mottonen, and Sams (2005a) indicated that there is a direct link between auditory cortex activation and the observation of human speech. It is possible that there is an even more direct link between the auditory cortex and visual input through the superior temporal sulcus, which sends converging information to the auditory cortex (Pekkola et al., 2005a).

Need for the Study

Previous research findings have indicated that marching band adjudicators display varied levels of reliability in their scoring. As discussed previously, a multitude of factors can influence marching band contest scores (Rickels, 2012). Many of these factors have little to do with the live performance of a marching band show such as budget and staff size, but what confounding variables within the live marching band performance itself could also affect marching band scoring? In common practice, marching band judges both watch and listen to a performance, regardless of the caption they are judging. With this being the case, it is possible that visual elements could influence musical (aural) scores and rankings. Research in visual perception suggests that vision is a dominant sense (Medina, 2008). Previous research indicates that the McGurk effect is present in situations where audio and visual stimuli are competing (McGurk &

MacDonald, 1976), but how does this effect impact the perception of musical performances, especially those with strong visual components? Researchers have studied how visual stimuli can affect the evaluation of rock guitar performances (Lehmann & Kopiez, 2013), introduce bias in young pianists' performances (Ryan & Costa-Giomi, 2004), and result in lower ratings of string orchestra performances (Pope & Barnes, 2015). Researchers have also found that sight trumps sound in the evaluations of musical performances (Griffiths & Reay, 2017; Tsay, 2013), but none have studied how this effect might influence the musical performance evaluations of high school marching bands.

Purpose and Research Questions

The purpose of this study was to examine the effects of visual performance on the music performance ratings of high school marching bands. The following research questions guided the study: (1) What are the effects of visual stimuli on composite music performance ratings? (2) What are the effects of visual stimuli on individual music performance element ratings (Clarity and Uniformity of Style and Interpretation, Balance and Blend, Tone and Intonation, Precision and Vertical Alignment, Musicianship and Artistry)?

CHAPTER 2

REVIEW OF LITERATURE

In the following review of literature, I summarize previous research investigating the effect of visual stimuli on music performance evaluations. I discuss the physical appearances and bodily movements of both performers and conductors, and their effects on performance evaluations. Because the literature in performance evaluation is so pervasive, this overview is limited to only certain visual effects: performer attractiveness, race, gender, age, conductor expressivity, conductor facial expression, and performer movement.

Performer and Conductor Appearance

Performer attractiveness. Many different physical aspects can affect how adjudicators perceive and evaluate performers. Physical attractiveness, clothing, jewelry, hair, and makeup can effect how performers and conductors are rated musically (Howard, 2012; Ryan & Costa-Giomi, 2004; VanWeelden, 2002; Wapnick, Darrow, Kovacs, & Dalrymple, 1997; Wapnick, Mazza, & Darrow, 1998). In one study, researchers (Wapnick, Darrow, Kovacs, & Dalrymple, 1997) studied the effects of attractiveness on performance evaluations of soloists by comparing participants' responses in an audio-only condition to those in an audio-visual condition. They found that attractive male vocalists were rated higher than less-attractive male vocalists in the audio-visual condition. The attractive female vocalists were rated higher in both the audio-only and audio-visual conditions.

Ryan and Costa-Giomi (2004) found that more-attractive female pianists received higher ratings than less-attractive female pianists but that less-attractive male pianists received higher ratings than more-attractive male pianists. Most notably, the unattractive male pianists had the highest ratings while unattractive female players had the lowest ratings. In addition, physical

appearance had the largest effect on the high performing pianists. The high-performing pianists who were also attractive received the highest performance ratings. Attractiveness did not have an effect on the medium and low-level players' ratings.

Wapnick, Mazza, and Darrow (1998) found that attractiveness, based on facial structure and body type, had a significant effect on the ratings of violinists, with more-attractive violinists receiving higher ratings. The attractiveness of the performer had an effect not only on overall ratings, but also all six of the individual musical categories rated (Intonation, Dynamic Range, Phrasing, Sound Quality, Overall Performance (1-9), and Overall Performance (1-100)). In contrast, performer attire only influenced three (musical phrasing and the two overall ratings) of the six musical categories. In addition, ratings were higher overall for the audio-visual condition than for the audio-only condition. Taken together, the results of these studies show that performer attractiveness can have a positive effect on music performance scores.

Race. People often prefer performers like themselves, favoring musicians and conductors with whom they share the same race and gender (Bermingham, 2000; McCrary, 1993; VanWeelden, 2002). Race, like other physical attributes, carries with it certain stereotypes. These stereotypes, though not musical in nature, can affect how musical performances are rated (Elliott, 1995/1996; Harrington, 2016; McCrary, 1993; Rickels, 2012, VanWeelden, 2004; Wapnick et al., 1997, Wapnick, Mazza, & Darrow, 2000).

There are certain expectations for performance abilities of certain races within certain genres of music. For example, Clauhs (2013) examined the perceived differences between white and black pianists playing both classical and jazz pieces. Respondents heard one white female, one black female, one white male and one black male under each condition. The participants—applied music professors in the United States—were then asked to predict what the

jury grade would be for each performer. In the classical condition, there was not a significant difference between gender or race for the distribution of grades. However, the respondents did predict that white performers would receive higher jury grades than their black counterparts overall. In addition, participants predicted white males to have higher jury grades than black males in the jazz condition.

Elliott (1995/1996) studied the effect of race and gender on music performance scores of solo trumpet and flute players. Music education majors watched video tapes of one white female, one black female, one white male, and one black male perform the same etude on trumpet or a different etude on the flute. The audio for the trumpet condition remained the same, and the audio for the flute condition remained the same. There was a significant effect due to the race of the performer on musical ratings, with black musicians scoring lower than white musicians. Black male musicians scored lower than black female musicians. In contrast, white female musicians scored lower than white male musicians. Because the performances were the same, differences in ratings could have been due to racial bias.

Racial biases can also affect ensemble conductors. VanWeelden (2004) studied how the race of a conductor can influence the evaluation of a musical performance. In this study, three white and three black males were videotaped conducting Felix Mendelssohn's "When God Commanded Angels" and William Dawson's "Ezekiel Saw de Wheel." The two songs were chosen because they both fit in with Western music practice and are also spirituals. VanWeelden (2004) found a significant difference in evaluations of the ensemble based on the race of the conductor. Participants rated the ensembles with black conductors higher than the ensembles with white conductors, even though the audio was consistent throughout all conditions.

Gender. Both amateur and professional musicians understand that gender stereotypes are present, affecting perceptions of instruments as well as occupations (Abeles, 2009). Instruments such as the harp and flute are often associated with females, while drums and tuba are often associated with males. Likewise, choral conductors are typically associated with females and instrumental conductors are associated with males. Associations between gender and instruments also differ between music majors and non-music majors (Griswold & Chroback, 1981). These gender stereotypes can affect the perception of musical performances, and as noted previously, gender differences can have a large effect on the ratings of musicians (Elliott, 1995/1996; Harrington, 2016; Howard, 2012; Ryan & Costa-Giomi, 2004; Wapnick, Mazza, & Darrow, 2000). For example, Harrington (2016) found that overall, male performers were rated higher than female performers in a variety of evaluation categories including rhythm, overall performance, and tone.

Howard (2012) found that the gender of the adjudicator had an effect on the scores of high school singers. In general, female judges tended to give higher ratings than male judges. Wapnick, Mazza, and Darrow (2000) found similar results in a study of children's piano performances. Female judges were found to score less harshly than their male counterparts when rating nonmusical factors such as physical attractiveness, behavior, and dress. Both male and female judges also rated the male pianists higher than the female pianists, with the female judges rating the males significantly higher than the females.

Age. The perceived age of a performer and the age of a judge can have an effect on music performance scores and ratings (Clauhs, 2013; Harrington, 2016). There are some negative stereotypes associated with old age. These stereotypes can be brought upon by society or by one's own thoughts and actions (Levy, 2009). Harrington (2016) paired photos of young adults

and older adults with recorded audio to test these stereotypes. She found that older adults were rated higher in seven evaluation conditions—rhythm, phrasing, overall, expressivity, tone, intonation, dynamics, and vibrato—during a "good-quality" performance than young adults (Harrington, 2016). The older adults also had the highest mean ratings of the poor-quality performances. The participants in this study were also asked to rate the older adults and young adults on their ability to improve as musicians. A significant difference was found in the perceived ability of the young adults to improve, being more positive in comparison with the older adults.

Performer and Conductor Behaviors

Conductor expressivity. Music and movement are inextricably linked. Movement is a large part of a live musical performance with both performer and conductor movements affecting how audiences perceive a performance (Davidson, 2007). Movements have become an important part of how musical expressivity is conveyed to audience members and judges through movements like swaying (Davidson, 2007). The movements that conductors utilize to communicate expressivity to their ensemble can have an effect on how musical groups are rated as well (Morrison & Selvey, 2014; Morrison, Price, Geiger, & Cornacchio, 2009; Price, 2011; Price & Chang, 2005).

Morrison, Price, Geiger, and Cornacchio (2009) studied the direct effect of conductors' physical expressivity on ensemble performance evaluations. For this study, two male conductors each conducted a wind band twice, once while using expressive gestures and once while not using expressive gestures. The wind band played along with a high-quality recording so that the videos used in the study could have identical audio, created by removing the live audio and replacing it with the high-quality audio. Participants in the study rated the conductor and the

ensemble on their expressivity. The researchers found that conducting expressivity had a significant effect on the evaluations of the wind band. The performances with high-expressivity conductors consistently scored higher than the performances with low-expressivity conductors, despite identical audio across all the conditions.

Price and Chang (2005) also evaluated the effect of conductor and ensemble expressivity on high school, state festival ratings. They used nine recordings of high school bands at festival who earned a rating of good (n = 3), excellent (n = 3), or superior (n = 3). The audio and visual elements of these performances were separated. Participants were asked to rate the expressivity of the conductor on a scale from 1 to100 while watching the conductor with no audio component. The participants were then asked to rate the ensemble on their expressivity from 1-100 while only hearing the ensemble. There were very few connections found between ensemble expressivity ratings, festival ratings, and conductor expressivity ratings. Price and Chang did find that the highest scoring ensembles at festival had conductors with the lowest expressivity scores. This may mean that high-performing ensembles needed less physical expressivity from their conductors to achieve expressive playing.

Lastly, Morrison and Selvey (2014) examined how conductor expressivity affects the evaluation of collegiate choir performances. Using two male conductors, they created four videos, two with high-expressivity conducting and two with low-expressivity conducting. Once again, the researchers made the audio consistent for all four videos. Morrison and Selvey used a control group to rate the audio-only condition on expressivity while an experimental group rated the four different audio-visual conditions for conductor and ensemble expressivity. They found that the conductors using highly-expressive conducting styles were rated higher than conductors using less-expressive styles. In addition, choirs with a high-expressivity conductor were rated as

significantly more expressive than ensembles with low-expressivity conductors. This shows that conductor expressivity can have an effect on music evaluation.

Conductor facial expression. Conductors can influence ensemble ratings through their physical movements (Morrison & Selvey, 2014) but there is also research on how conductor facial expressions can influence ensembles (Silvey, 2013; VanWeelden, 2002; Whitaker, 2011). Eye contact, a large part of facial expressions, is vital to inter-human communication. Eye contact can help people across a room to communicate a message without words. It can also be used in both positive and negative ways to communicate attentiveness (Davidhizar, 1992). Eye contact and facial expressions between performers and a conductor can affect how performances are perceived (Silvey, 2013; VanWeelden, 2002; Whitaker, 2011).

Silvey (2013) studied the effect of approving, neutral, and disapproving facial expressions on students' evaluations of expressivity. Three male college students from a collegiate opera department were videotaped conducting along to one-minute recordings of band music with approving, neutral, and disapproving facial expressions. High school participants watched 9 one-minute videos (one of each conductor under each condition) and were asked to rate the expressivity of the conductors on a scale from 1 to 10. Silvey found that the facial expressions did have a significant effect on the expressivity ratings of the musical excerpts. Excerpts paired with approving facial expressions were rated as more expressive overall than disapproving and neutral facial expressions.

VanWeelden (2002) observed the relationship between conductor effectiveness and ensemble performance. For this study, six women—three with a thin body build (ectomorphic) and three with a large body build (endomorphic)—were videotaped conducting a recording of "The Coolin" by Samuel Barber. Participants were asked to rate the ensemble on musical

qualities (intonation, tone quality, attacks and releases, phrasing, dynamics, balance and blend, and diction). Participants also rated the conductor on her performance and overall effectiveness (eye contact, facial expression, posture, and overall effectiveness). VanWeelden found that ectomorphic conductors were seen as more effective than endomorphic conductors, although only slightly. Conductor's posture and facial expressions had a moderate effect on perceived conductor effectiveness. Ensembles who were conducted by those who were rated highly for facial expressions and posture had higher performance scores than those who were conducted by those who were rated lower for facial expressions and posture.

Performer movement. Although conductors are important in musical performances, the performers themselves are arguably more seen than the conductor. Some types of performances, such as rock and roll concerts, do not use conductors. Lehmann and Kopiez (2013) found that both musicians and non-musician listeners' ratings of the difficulty of a rock guitar solo were based not only on audio but also visual cues. The guitarist's perceived performance difficulty was enhanced by the addition of the visual stimulus. The visual performance had a positive effect on the perceived difficulty of the piece.

A performers' movements can also include their eye contact, facial expressions, and general body movement. Howard (2012) studied how these physical movements could affect music performance scores of solo vocalists. The conditions for this study included audio and audio-visual situations. Two male and two female vocalists were recorded wearing formal stage attire and casual clothing while performing with proper stage behavior and improper stage behavior. Participants rated the performances on "overall musical performance quality." Howard found that the soloists engaging in proper stage behavior and movements were rated significantly higher than soloists engaging in poor stage behavior and unnecessary movements.

Vocalists and instrumentalists both use movements while performing to communicate their musical intentions to the audience (Dahl & Friberg, 2007; Davidson, 2007; Howard, 2012; Juchniewicz, 2005). Juchniewicz (2005) asked undergraduate and graduate music majors to rate a pianist's performance based on four categories (phrasing, dynamics, rubato, and overall musical performance). The pianist used in the study was asked to perform the same piece along with a recording using no movement, head and facial movement, and full body movement. Juchniewicz found that the pianist's physical movements had a significant effect on the performance ratings. Participants rated the "full body condition" the highest overall and in each individual category. The "head and facial movement" condition was rated the second highest overall and the "no movement" condition was rated lowest overall.

Davidson (2007) conducted a similar study in which a male pianist created three audio-visual conditions: projected, deadpan, and exaggerated. The pianist was recording playing the piano live for each condition. In the projected condition, the pianist played with his normal amount of expression. In the deadpan condition, the pianist played with limited expressions. Lastly, in the exaggerated condition the pianist over emphasized the expressive moments in the music. Davidson analyzed these three conditions for movement and moments of expressiveness. She found that high levels of performer movement and physical expression accompanied the most musically expressive recording. The pianists "movement vocabulary" was a large part of his expressive playing.

Role of Vision in Music Performance Evaluation. As Davidson (2007) found, the physical movements of the pianist were a large part of the expressive performance. In this particular study, the visual elements enhanced the perceived rating of the audio. Visual elements are a large part of musical performances, although with the rise of technology, many consumers

experience music through audio alone (Thompson, Graham, & Russo, 2005). The visual performance in Lehmann and Kopiez's (2013) study had an effect on the perception of the performance by audience members in the case of the rock and roll musicians, but this was not surprising. Humans tend to focus on visual cues in their lives.

This phenomenon in which humans focus on visual cues is enforced by studies of the McGurk Effect (McGurk & MacDonald, 1976). This study emphasizes our natural inclinations to "judge a book by its cover" and rely on visual cues to make formal judgements. McGurk and MacDonald (1976) found that people prioritized visual information in the form of lip shape when watching people speak. Syllable recognition was skewed when focusing on the visual stimulus even when the audio stimulus provided different information. This phenomenon of visual precedence is not lost in music. In a set of seven experiments, respondents were asked to pick the winner of a live music competition based on three conditions: audio-only, visual-only, and audiovisual. Respondents were most accurately able to pick the winners of the competition based on the visual-only condition (Tsay, 2013).

Pope and Barnes (2015) examined the scoring of orchestra performances based on audio-only presentation mediums versus audio-visual presentation mediums. Simply stated, they found that tone, intonation, and rhythmic precision were scored higher for the audio-visual medium when compared to the audio only medium. The mere presence of the visual stimulus increased scores when no other variables were changed. This supports the current research that audio-visual performances are often scored more favorably than audio-only performances.

Previous research indicates that visual stimuli can have a significant impact on the perception of audio stimuli (McGurk & MacDonald, 1976; Tsay, 2013). There is a lot of research that takes place in the concert hall to support this statement (Pope & Barnes, 2015), but

there is not much research in other musical contexts, especially regarding the potential effects of visual stimuli on music scores in high school marching bands.

CHAPTER 3

METHOD

Overview and Research Design

People often prioritize visual information over aural information, a phenomenon known as the McGurk effect (McGurk & MacDonald, 1976). For this reason, I examined the potential effects of visual performance on the music performance evaluations of high school marching bands. In live performances, marching band judges often view and listen to the marching band show, regardless of what caption they are judging. Simultaneous exposure to both the visual and the aural stimuli could cause interference between the music and visual scores. In this study, I focused on the concept of music performance judges' exposure to the visual performance and the possible effects that the visual performance could have on the music performance scores.

In this study, I used a post-test only control group design (Campbell & Stanley, 1963) by randomly assigning participants to a control group and an experimental group without having them take a pretest. With this type of experimental design, an outcome is observed after the treatment occurs. This design controls for testing as a main effect and interaction (Campbell & Stanley, 1963). A potential issue with this design occurs due to the lack of pretest, which could result in participants being randomly sorted into groups that systematically differ from each other. Despite this potential concern, the post-test only control group design worked better for this study than a design with a pretest because it prevented participants from becoming aware of the purpose of the study prior to data collection.

I obtained IRB approval before beginning the experiment, and the IRB approval letter is included in Appendix A. Data collection occurred in September of 2017 at a large public university in the southeastern United States. Participants were not individually identified but

were given unique identification codes that were used during data analysis. Participants were recruited and led through procedures using a verbal script (Appendix C); they were given the opportunity not to participate or to end their participation at any time during the study without penalty.

Participants and Setting

Participants (N = 47) were instrumental music education majors from a large university located in the southeastern United States. Participants were required to have at least 1 year of high school or college marching band experience or be currently involved in marching band at the time of the study. This sample included males (n = 25) and females (n = 22) with a mean age of 19.96 years (SD = 1.44). Participants included undergraduate students of all classifications, including freshman (n = 4), sophomores (n = 17), juniors (n =16), seniors (n = 9), and graduate students (n =1). Participants' primary instrument families included brass (n = 26), woodwinds (n = 13), and percussion (n = 8).

Participants were sampled from required music education classes including a music education practicum class and an instrumental methods class. Data collection occurred during normally-scheduled class times in music education classrooms. Additional data were collected from an evening session after a student teaching seminar for volunteer participants. At each data collection session, the control group and the experimental group participated simultaneously. During these times, the control group remained in the original classroom with the research assistant, and the experimental group went to a different music education classroom with me. The research assistant was trained in advance to administer the following procedures.

Procedure

Experimental procedures are summarized in Figure 3.1. As participants entered the room for data collection, I distributed a card with a blue square or a white square on it. The cards were ordered in advance using a random number generator. Participants returned to their seats and waited for the session to begin. At the start of the session, I informed those present that they would be participating in an experiment. They were told that they would be instructed to watch a 9-10 minute marching band show and evaluate their musical performance using a judging sheet (Appendix B) as if they were an official marching band judge. Participants with the blue cards (experimental group) followed me to another music education classroom, bringing along a writing utensil. Participants with the white cards (control group) remained in the room with the research assistant who asked them to get out a writing utensil. The administrator in both rooms read a recruitment/procedural script (Appendix C) to the participants. Both administrators then instructed the participants to observe the performance. Participants with the blue cards (experimental group) viewed a black screen while they listened to the show through a classroom speaker system. Participants with the white cards (control group) viewed the show projected on a screen while listening through a classroom speaker system. After observing the performance, participants completed the evaluation form as well as a short demographic questionnaire (Appendix B).

Figure 3.1 Research Design

Control Group (White Card)	**Experimental Group (Blue Card)**
(*n* = 24)	(*n* = 23)
Aural Stimulus Only	Aural and Visual Stimuli
Procedures:	Procedures:
1. Listen to marching band performance 2. Complete evaluation form	1. Listen to and watch marching band performance 2. Complete evaluation form

Evaluation Form

The participants used a researcher-designed evaluation form during the study (Appendix B), which was based on South Carolina Band Directors Association (South Carolina Band Directors Association, n.d.), Music for All (Bands of America, Music for All, n.d.-b), and Mississippi High School Activities Association High School Marching Band (Mississippi Bandmasters Association, n.d.) music ensemble adjudication forms. The form included two columns with music performance elements listed on the left side and a scoring column on the right side. The performance elements included (a) Clarification and Uniformity of Style and Interpretation, (b) Balance and Blend, (c) Tone and Intonation, (d) Precision and Vertical Alignment, and (e) Musicianship and Artistry. The participants rated each performance element utilizing a 10-point Likert-type scale with 1 being "poor" and 10 being "superior." Participants circled one number to indicate their scoring of each performance category. Participants totaled all the circled numbers and recorded their results in the box at the bottom of the sheet marked "Total out of 50." The evaluation form also had a space for optional comments to allow for participants to record some of their thoughts while observing the performance.

The evaluation form also included a section to collect demographic information. Participants provided their school classification, primary instrument, age, gender, and number of years of marching band experience in high school, college, and Drum Corps International (DCI)/ Drum Corps Associates (DCA). This information helped me to describe the sample, particularly related to participants past marching band experience. The evaluation form and demographic questionnaire are located in Appendix B.

Stimuli

A high school marching band located in the southeastern United States performed the show used as the stimulus. I chose this marching band show because of its high music and visual scores in its respective state marching band circuit. The school was ranked as a 5A school based on total school size with 6A being the largest classification of school size in the state. This high school band won first place in class 5A in its state marching band competition with this show, and this final state competition performance comprised the stimulus for this experiment. The show was about nature, and it used both musical and visual elements (described below) to convey to the audience the meaning.

The visual components of this show strongly depicted the theme of nature. The performers began lying on the field in the shape of tree branches. The band members wore brown pants with brown tunics and had their faces painted with branches, an atypical marching band uniform that added an additional visual element to the total production. Members of the front ensemble also had flowers in their hair. The colorguard wore green unitards with their hair down and flowing. Near the beginning of the show, there was a colorguard member in a white dress with a flower staff in the back-left corner of the field, who symbolized mother nature. Throughout the show, she moved across the field, eventually arriving at the front corner of the

field on a tree stump prop. The colorguard spun rifles, sabres, and flags, with many of the flags depicting nature scenes. The colorguard also spun giant leaves in the final movement, mimicking the natural movements of leaves in the wind. During the finale of the show, the Mother Nature character in white had a skirt that came out of the tree prop and attached to her, which eventually covered the whole band. Throughout the show, the colorguard and band members moved with fluid movements around the field. Many of the visuals involved natural looking movements such as swaying and reaching, which further enhanced the visual theme of nature.

The musical components of this show were also very important to the overall performance. The composition did not sample from any known musical selections, but was rather an originally-composed work. A female narrator, heard throughout the performance, began the show with the words "Some call me nature, others call me Mother Nature." The audio elements followed with a flute solo accompanied by the front ensemble. The music continued to build into the first full ensemble section of the show during which the whole band played. The full ensemble hit transitioned back into a flute solo, and a mellophone joined to create a duet. The music became intense and loud in the following section as the narrator said "I don't really need people, but people need me. Yes, your future depends on me. When I thrive, you thrive, when I falter, you falter… or worse." This section included a drum break which concluded with a trumpet solo. The trumpet soloist returned to play with the flute soloist to introduce the slower ballad section in the middle, and the flute soloist returned as well. The narrator spoke again, saying "I am home, I give you comfort, I shelter your family. See me for who I am, home sweet home." The show continued to build in intensity and volume to the last big hit of the show where the whole group was playing. The show ended lyrically, with another flute soloist playing

a simple melody that was present throughout the show and the narrator speaking one more time saying “I am nature, I will go on. I am prepared to evolve. Are you?” There were numerous soloists featured in this show. They, along with the rest of the ensemble, played with a wide range of dynamics and musical qualities. Sections of the ensemble phased in and out of the music, coming together during the impact moments of the show.

CHAPTER 4

RESULTS

Research Question #1

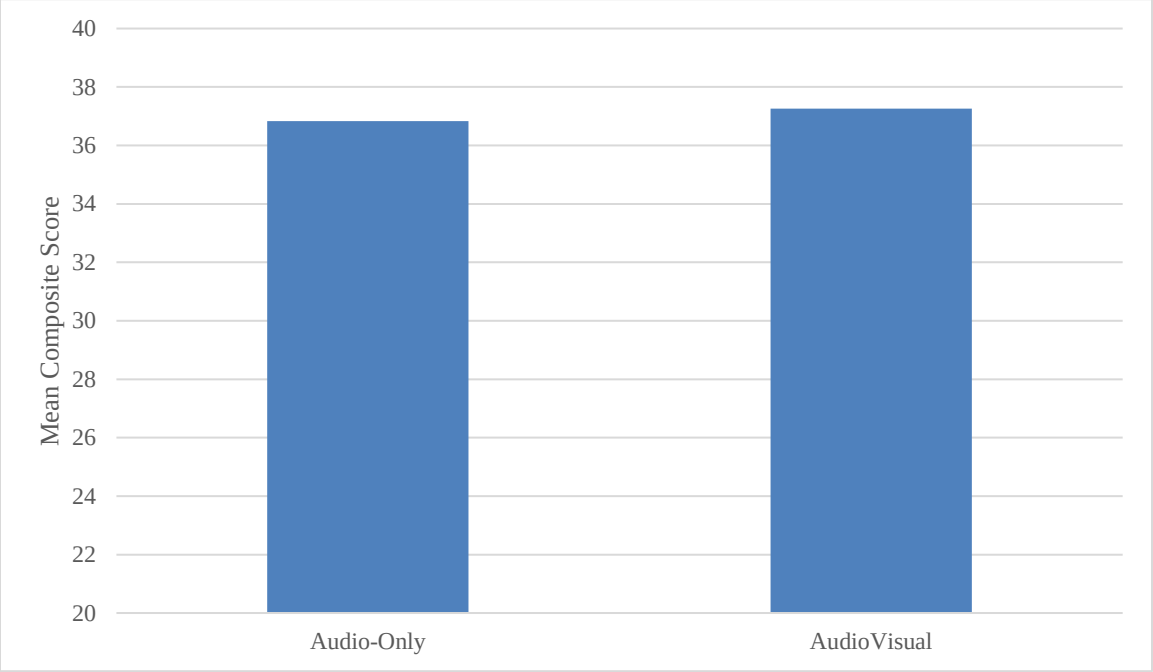
With regard to research question one, I examined how visual stimuli may affect composite music performance ratings. The composite ratings were calculated by totaling the ratings of the individual performance elements. To answer this question, I conducted an independent-samples *t* test. The results did not indicate a significant difference between the experimental group (audio-only) and the control group (audio-visual), $t(37.75) = -0.27$, $p = .79$. As shown in Table 4.1 and Figure 4.1, the audio-only and audio-visual ratings were similar. The audio-only mean rating was .43 lower than the audio-visual mean rating. As indicated by the larger standard deviation in the audio-only group, the spread of ratings was much larger.

Table 4.1 Means and Standard Deviations of Composite Ratings

Condition	*n*	*M*	*SD*
Experimental (AO)	24	36.83	6.59
Control (AV)	23	37.26	3.92

Note. Means are expressed as a composite rating, which could range from 5 to 50 with higher ratings signifying higher achievement. AO = audio-only condition; AV = audio-visual condition.

Figure 4.1 Bar Graph of Composite Ratings



Research Question #2

In this study, I also examined the effects of the visual stimuli on the ratings of individual performance elements. To answer the second research question, I conducted a mixed-design analysis of variance (ANOVA) with one between-subjects factor (group) and one within-subjects factor (ratings of the five performance elements). Results indicated a significant main effect due to performance element, $F(4, 180) = 8.81$, $p < .001$, $\eta^2_p = 0.16$. Bonferoni-corrected pairwise comparisons indicated significant differences between the following pairs of performance elements:

- Clarity and Uniformity of Style and Interpretation vs. Balance and Blend ($p = .02$)
- Clarity and Uniformity of Style and Interpretation vs. Tone and Intonation ($p < .001$)
- Balance and Blend vs. Tone and Intonation ($p = .05$)

- Precision and Vertical Alignment vs. Tone and Intonation (p = .002)
- Musicianship and Artistry vs. Tone and Intonation (p = .009)

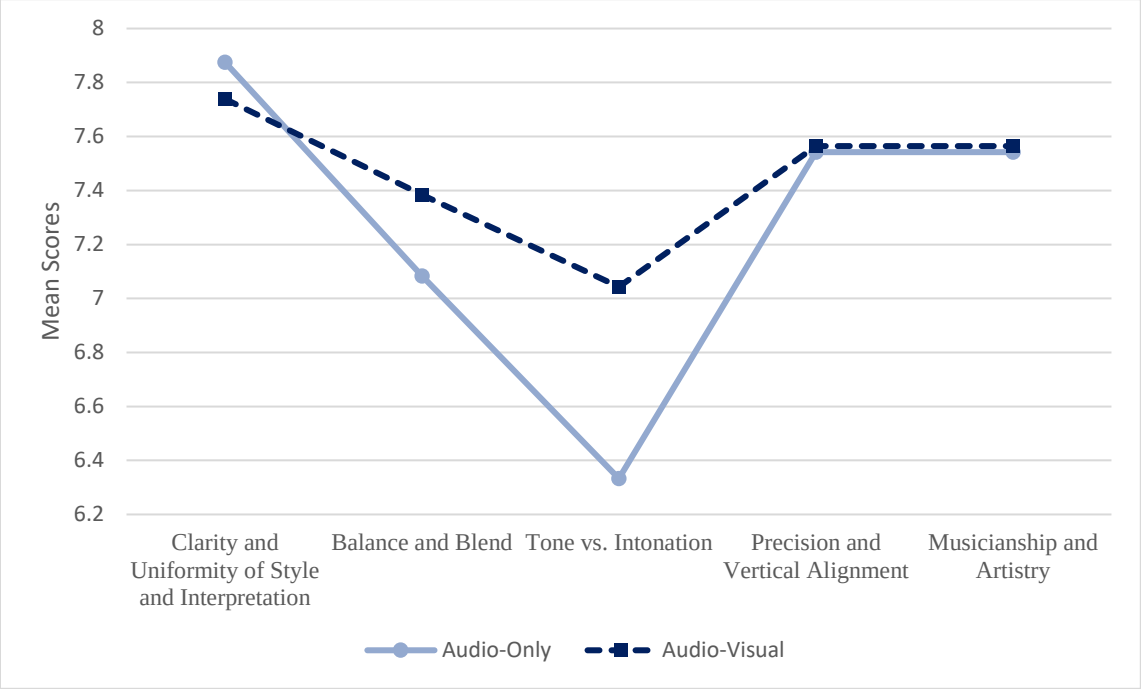
No significant main effects were found due to group, $F(1, 45) = 0.31$, $p = 0.58$, $\eta^2_p = 0.01$, and the group by performance element interaction was also not significant, $F(4, 180) = 1.29$, $p = 0.28$, $\eta^2_p = 0.03$.

Table 4.2 Means (and Standard Deviations) of Individual Performance Elements

Performance Element	AO	AV
Clarity and Uniformity of Style and Interpretation	7.89 (0.25)	7.74 (0.25)
Balance and Blend	7.08 (0.29)	7.35 (0.29)
Tone and Intonation	6.33 (0.31)	7.04 (0.31)
Precision and Vertical Alignment	7.54 (0.28)	7.57 (0.29)
Musicianship and Artistry	7.54 (0.32)	7.57 (0.32)

Note. Means are expressed on a 10-point Likert-type scale ranging from 1 (*poor*) to 10 (*superior*). AO = audio-only condition; AV = audio-visual condition.

Figure 4.2 Line Graph of Individual Performance Element Ratings by Condition



CHAPTER 5

DISCUSSION

Summary, Conclusions, and Implications

In this study, I examined the following research questions: (1) What are the effects of visual stimuli on composite music performance ratings? (2) What are the effects of visual stimuli on individual music performance element ratings (Clarity and Uniformity of Style and Interpretation, Balance and Blend, Tone and Intonation, Precision and Vertical Alignment, Musicianship and Artistry)? Participants rated the individual music performance elements on 10-point Likert-type scale with 1 being "poor" and 10 being "superior."

Although McGurk and MacDonald (1976) found that people tend to prioritize visual information over aural information, results from this study did not support this assertion. In this study, results indicated that there was no significant difference between the ratings of participants in the control group (audio-only) and the experimental group (audio-visual). The composite ratings were similar between the audio-visual and audio-only group. There was only a difference of 0.43 between the composite scores of the two groups. There was, however, greater variability in the ratings with those who only listened to the performance compared to the group who listened and watched the performance. The standard deviation for the audio-only group was 6.59, while the standard deviation for the audio-visual group was only 3.92.

Regarding the individual performance elements, I found significant differences across the five performance elements. Significant differences in ratings occurred between the following performance elements: Clarity and Uniformity of Style and Interpretation vs. Balance and Blend, Clarity and Uniformity of Style and Interpretation vs. Tone and Intonation, Balance and Blend vs. Tone and Intonation, Precision and Vertical Alignment vs. Tone and Intonation, and

Musicianship and Artistry vs. Tone and Intonation. The "Tone and Intonation" element had the largest mean difference. The mean rating for the audio-visual group was .71 higher than the mean rating for the audio-only group.

Because there was no significant difference between the groups, these results suggest that watching the performance did not have an effect on the composite ratings nor the individual performance element ratings. Results of previous studies (Finnäs, 2001; Pope & Barnes, 2015; Tsay, 2013) have shown that visual information does affect the perception of audio information, but this present study did not support those findings.

Marching band adjudicators strive to provide unbiased feedback and ratings and music educators expect to receive feedback and ratings that accurately describe their band's performance. There are many different factors that can affect adjudicators' ratings, but results of this study suggest that visual stimuli do not affect musical ratings of high school marching bands. The implications of these findings are that the McGurk effect (McGurk & MacDonald, 1976) may not be applicable in some contexts, such as marching band evaluation. Participants in the audio-only and the audio-visual group assigned similar musical ratings, which indicates that the visual information did not dominate the musical information.

These findings suggest that in the world of marching band adjudication, vision may not prevail as the dominant sense. This would mean that music judges could watch the shows that they are judging without expecting the visual feedback to influence their musical ratings. However, it is important to note that participants were college students with no training in marching band adjudication and that results could differ with more experience. In addition, fears concerning cross-modal sensory interactions in marching band adjudication could be less severe

than previously thought. Assertions that vision is the dominant sense might only be true in certain contexts.

Limitations

There are some limitations of this study that should be considered. First, the protocol for this study involved the evaluation of video and audio recordings instead of a live marching band performance. This strategy was necessary, though, to ensure consistent performances for each data collection session. In addition, with a video it is easy to cut the visual information, where in a live performance, it is more difficult to ensure that the audio-only group cannot see the performance. Second, the sample size of the study was relatively low and was comprised of music education majors from a single university. It could be possible that the education participants received at this university helped them to avoid the visual bias and therefore avoid letting the visual information effect the aural ratings. In addition, these participants had no adjudication experience so they would likely respond differently than trained adjudicators. Lastly, this study involved the evaluation of just one single marching band show. It could be the case that the visual components of this show were on the same level as the aural components, and therefore were not enough to influence the scores.

Suggestions for Further Research

Based on these findings and limitations, future research is needed to examine whether or not visual stimuli have an effect on music performance ratings of high school marching band students. Future researchers might want to use continuous ratings (e.g. with the Continuous Response Digital Interface, CRDI) instead of summative ratings in order to see if visual stimuli affect certain moments in a performance. Future researchers might also consider having the same participants observe multiple shows. This strategy would help researchers to see if there

are certain visual elements that are rated higher than others in reference to the music. Future researchers could also collect data during the performance of a live show instead of a recorded show by having the audio-only participants face away from the performing ensemble. A live marching band show could have a different effect on audience members as a live performance could be more visually appealing, and the visual components could enhance the music performance more during a live show. The effect of ensemble size on visual and aural ratings could also be studied. Larger ensembles with more students can make larger shapes and use more intricate drill moves which could affect their perceived musical abilities. Lastly, future researchers might want to seek participants with different levels of marching band experiences. Marching band teachers and judges might be affected differently than college students and high school students currently in marching band.

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APPENDIX A – IRB APPROVAL

OFFICE OF RESEARCH COMPLIANCE

INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH
APPROVAL LETTER for EXEMPT REVIEW

Kathryn Brimhall
School of Music
813 Assembly Street
Columbia, SC 29208

Re: **Pro00065865**

This is to certify that the research study, ***The Effect of Visual Performance on Music Performance Evaluation in High School Marching Band***, was reviewed in accordance with 45 CFR 46.101(b)(**1**), the study received an exemption from Human Research Subject Regulations on **4/3/2017.** No further action or Institutional Review Board (IRB) oversight is required, as long as the study remains the same. However, the Principal Investigator must inform the Office of Research Compliance of any changes in procedures involving human subjects. Changes to the current research study could result in a reclassification of the study and further review by the IRB.

Because this study was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

All research related records are to be retained for at least three (3) years after termination of the study.

The Office of Research Compliance is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). If you have questions, contact Arlene McWhorter at arlenem@sc.edu or (803) 777-7095.

Sincerely,

Lisa M. Johnson
IRB Assistant Director

APPENDIX B- EVALUATION FORM

To be Filled out by Researcher: _____

Music Performance Evaluation Sheet

MUSIC PERFORMANCE (ENSEMBLE)	SCORE OUT OF 10 (1-poor, 10-superior)
Clarity and Uniformity of Style and Interpretation	Comments (optional): Circle Your Rating: 1 2 3 4 5 6 7 8 9 10
Balance and Blend	Comments (optional): Circle Your Rating: 1 2 3 4 5 6 7 8 9 10
Tone and Intonation	Comments (optional): Circle Your Rating: 1 2 3 4 5 6 7 8 9 10
Precision and Vertical Alignment	Comments (optional): Circle Your Rating: 1 2 3 4 5 6 7 8 9 10
Musicianship and Artistry	Comments (optional): Circle Your Rating: 1 2 3 4 5 6 7 8 9 10
	Total out of 50:

Demographic Information:

1. Circle One: Freshman Sophomore Junior Senior 5-year Senior Graduate Student
2. Primary Instrument: _____
3. Age: _____
4. Gender: _____
5. How many years did you participate as a performer in a High School Marching Band?

   _____
6. Including the current year, how many years have you participated as a performer in a College Marching Band? _____
7. Do you have any Drum Corps (DCI or DCA) experience? (Circle One) YES NO

APPENDIX C- Recruitment/ Procedures Script

To be read aloud by researcher to participants:

Hello everyone. My name is Katie Brimhall. I am an undergraduate here in the Music Education Department at the University of South Carolina. I am conducting a research study as part of the requirements for graduating with honors, and I would like to invite you to participate. I am studying factors that influence how people evaluate high school marching band performances. If you decide to participate, you will observe a recorded marching band performance and fill out a brief demographic questionnaire, and an evaluation sheet as though you are a judge at an official marching band contest. These activities will last approximately 20 minutes or less.
Participation is confidential. Study information will be kept in a secure location at the University of South Carolina. The results of the study may be published and/ or presented at professional meetings, but your identity will not be revealed. Taking part in the study is your decision. You do not have to be in this study if you do not want to. You may also quit being in the study at any time or decide not to answer any question you are not comfortable answering. I will be happy to answer any questions you have about the study. You may contact me or my faculty advisor, Dr. Gregory Springer, if you have any study related questions or problems. Thank you for your consideration.
If you choose to participate, simply complete the research procedures following the instructions provided by the researcher or research assistant. If you choose not to participate, then you may leave the room.

(Pause)

Okay let's begin. If you received a blue card, please take a writing utensil and follow the research assistant to another classroom. If you received a garnet card, please remain seated and get out a writing utensil.

To be read aloud by researcher or research assistant to participants:
(Researcher or research assistant passes out evaluation form to participants in the classroom.)

You are about to participate in a research study. Please situate yourselves so that you cannot easily see another participant's paper. I will play a recording of a marching band show. Please listen and feel free to use the "optional comments" box to take notes. At the conclusion of the performance, please circle one number from 1 to 10, with 1 being poor and 10 being superior, to rate the marching band on their musical performance with regard to the listed qualities. After rating each performance quality, please add up your ratings and place the sum in the box marked "total out of 50." When you finish, please flip to the next sheet and fill out the demographic questionnaire. At the conclusion of the session, please turn your form back into the researcher or research assistant. Are there any questions?