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Implications of Theory of Mind, Feelings of Connectedness, Flow State of Mind Through Active and Passive Music Improvisation Experiences

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Implications for Understanding Theory of Mind, Feelings of Connectedness, and Flow via Music Improvisation

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Abstract

This study is an introduction examining the relationship between a performer and the audience in a musical improvisation context. Current research exploring performer-audience interaction in improvisation experiences is scant and typically framed in a purely narrative context. This study seeks to evaluate four different components of the performer and audience relationship; amount, or level, of experience with improvisation and comfort levels, flow, theory of mind, and emotional connection. A survey was generated and given to students in an improvisation class to collect results based on these four components. This study found that improvisation experience levels were low but comfort with improvisation was moderate; flow was somewhat achieved between performers and audience; theory of mind had some agreement between the audience and performers on emotional detection; and there was a mutual agreement between the performers and audience on how connected they felt and how engaging the performances were.

Introduction

This study is an introduction to looking at the relationship between the performer and the audience in a musical improvisation performance. Current research does not discuss the relationship between audience and performers in an improvisational music performance setting. This study seeks to evaluate four different components of the performer and audience relationship; improvisation experience and comfort levels, flow, theory of mind, and emotional connection.

Improvisation

Music improvisation experiences have been called energizing, exciting, and fun, while other people have reported music improvisations to be nerve-wracking. This study will examine two mechanisms that might help a person come to the first, positive, conclusion. Specifically, how do experience levels and comfort levels with music improvisations affect a person's perception of the event? The following literature uses surveys to gather data and was examined to better understand these thoughts.

Many factors have been shown to impact a person's perception of the group music improvisation experience. One important factor is the positioning of the players to the other group members. Healey, Leach, and Bryan-Kinns (2005) examined the impact of the group's formations while improvising. They noted previous research which discussed the O-Space, which is the area where all of the musicians' sounds cross. For example, if a group was sitting in a circle facing inward, the O-Space would be the middle of the circle. Each player's positioning to this space can be indicative to their musical intentions (Healey et. al, 2005).

Results from a study examining middle school and high school string students that completed a music improvisation course, showed that having previous improvisation experience in a classroom setting may have led to increased confidence levels (Alexander, 2012, P. 29). This

study also examined the difference between male and female confidence and anxiety levels while improvising. They found that females experience higher levels of anxiety and lower levels of confidence than males; which was compared to a study done by Erin Wehl-Flowers in 2006 where females reported similar data. In both studies, confidence levels were correlated with experience levels.

Performing improvisations within groups can increase confidence levels of each participant (Hickey, 2015). Alexander (2012) recommends that improvisations be done in small groups as a way to increase confidence. Most of the aforementioned authors designed their research to better understand the impact of improvisation on other areas of human experience (i.e., confidence, anxiety, attitude), but others were interested in the interactions between group members.

The research mentioned above implies and/or recommends that further study should focus on doing improvisations in small groups, investigating the experience level of individuals to understand the reasoning for their confidence levels, and to position the group so that they are facing each other as if in a conversation.

Flow

Csikszentmihalyi is an important researcher when it comes to flow. Csikszentmihalyi advanced the flow framework into nine fundamental dimensions of flow. These nine dimensions are; “a balance between the perception of above-average challenges and skills; a merging of the action of the activity and the awareness of engaging in it; the possession of clear goals for the activity; the reception of unambiguous feedback while engaging in the activity; the maintenance of total concentration on the task at hand; the experience of control over what one is doing; a loss of self-consciousness; a transformation in the passing of time; and the experience of the activity

being autotelic" (Csikszentmihalyi, 1975). Flow is a state that can be experienced in a variety of ways in life. Flow has been recorded within sports, work environments, and music, and can be conceived as degrees on an existing continuum. A variety of experienced flow exists from light flow to deep flow, with a multitude of complexity to the activities involved. In addition to this, Csikszentmihalyi states that flow is easier to achieve when it is spontaneous or by chance, rather than a forcing of intentionally bringing on flow.

Individual flow and group flow are created similarly, yet attainability is dependent on group members. "Groups attain flow by staying in the improvisation zone between complete predictability and going too far, between their shared knowledge about conventional situations, and doing something so inconsistent that it just doesn't make sense" (Sawyer, 2003, p. 76) Group flow is a concept developed by Sawyer, and is similar to what one individual experiences when they have flow, but it is in relation to a group. "Group flow requires a type of parallel processing; the musicians are playing nonstop, yet while they are playing they must simultaneously listen to their band members, hearing and immediately responding to what they are playing" (Sawyer, 2003, 80).Flow that is attained within a group can encourage and develop an individual's ability to reach their own flow state. Examples of group flow include a sports team, music ensemble, or a theater performance.

It is to be expected that flow is difficult to measure. Reliability and validity can be difficult to maintain, and subjective feelings also present a challenge. However, a questionnaire, called the Flow State Scale, has been developed that aims to accurately and effectively measure the state of flow experience (Jackson & Marsh, 1996). When data is taken, it must be minimally invasive, otherwise distractions can take away from the flow experience. In music listening (the audience of our project) flow is based on "a combination of their cognitive ability paired with a

properly selected stimulus" (Diaz, 2013, p. 44). The Flow State Scale works to collect accurate data without interrupting the flow state of individuals.

Theory of Mind

Theory of Mind (ToM) is a theory which has developed over time. Astington and Baird describe Theory of Mind as one's ability to understand "people as mental beings who have beliefs, desires, emotions, and intentions and whose actions and interactions can be interpreted and explained by taking account of these mental states," (as cited in Livingstone & Thompson, 2009, p.95). One of the beginning versions of ToM is known as the "theory-theory." This version of ToM was used as a way to predict behavior (Goldman, 2012). The theory continued to develop and a new version come to existence in the 1980s and was a Modularity-Nativist approach to the theory of mind. This explained theory of mind as something which develops over time and matures rather than a learned ability.

Yet another version of the ToM was the "simulation" or "empathy theory." This takes into consideration the behavior of others (Goldman, 2012). This contrasting theory involves using perspective and thinking how the other person in the situation may feel. This can involve predicting one's response and reading someone's body language in a situation. The simulation theory does, however, eliminate the need to "create an abstract model of other minds," (Livingstone & Thompson, 2009, p.96), due to the use of one's own mind to take the perspective of that other person. This is done by imagining what the other person would do or feel in a situation, and taking on those same feelings in order to better understand the other person. This simulation theory has developed more with the discovery of mirror neurons. These neurons are evident when one executes or observes an action.

The mirror neurons are also used to explain the Perception Action Model of empathy (Preston & de Wall, 2002; Decety & Grezes, 2006, as cited in Livingstone & Thompson, 2009, p.97). This model states that one will understand and emulate the perceived emotional state of someone they are observing. This will then activate the observer's own emotional and physical responses to mirror the perceived emotional state (Hatfield et al., 1994, as cited in Livingstone & Thompson, 1994, p.97).

As the Theory of Mind has been studied and researched, it has been connected to music. It is thought by Livingstone and Thompson (2009), that music originated from ToM. They argue that the two models of ToM, the theory-theory and simulation theory, have played a part in the creation and increased use of music (2009, p.97). When the audio-visual stimuli of music occurs, the mirror neuron system results in a greater emotional experience for the listener or audience (Preston & de Wall, 2002, p.5 as cited in Livingstone & Thompson, 2009, p.97). This multimodal aspect of music allows us to engage with others at a higher level and create this cognitive understanding of the emotions being displayed and felt.

A study by Harwood and Farrar looks into the connection between the perspective taking and the theory of mind (2006). They found that when the individual experienced a different emotion from the one that they were observing or perceiving, there was a greater correlation between ToM and perspective taking. This also implies that one needs to have the ability to identify emotions other than what they are feeling in order to take one's perspective (Harwood & Farrar, 2006, p. 409).

Theory of Mind has also been shown to connect to the increase in social bonding. Seyfarth and Cheney say, "We can explain the evolution of rudimentary ToM by noting that it facilitates attentiveness to others' emotional states and thereby promotes the formation of strong

social bonds," (2013, p.10355). Being able to attend to one's emotions and determine their feelings can lead to a greater bond between the individuals.

Emotional Connection

Social bonding is the psychological experience of increased social closeness which is reflected in prosocial behaviors such as trust, respect, and friendship (Tarr, Launay, & Dunbar, 2014). For humans, social bonding is an important element of life and we would not thrive without it. Social bonding brings about feelings of trust, respect, friendship, belonging, love, and happiness which are all vital things to humans and can be portrayed through music. In music different tempos, rhythms, and melodies can be played to portray different emotions. For example, happy is portrayed using faster tempos and a major mode, while sadness is portrayed by slower tempos and a minor mode (Pereira, Teixeria, et. al., 2011). When listening to music, most people can detect what emotion is being portrayed, especially happiness or sadness (Dobrota & Reic, 2012, pg. 975). Research by Dobrota and Reic showed that when listening to music people most accurately identified the emotions of happiness and sadness while least accurately identifying fear. It was also found that the familiarity of the musical excerpts did not affect the recognition of emotion in music (Dobrota & Reic, 2012, pg. 978).

Since humans can easily identify emotions through music, this allows a group of people to share common knowledge and understanding when listening to music. When a group of people are listening to music together, they are automatically able to identify the information, such as mood or emotion, of the piece as a group (Loersch & Arbuckle, 2013, pg. 780). Groups are then able to move towards a common goal because of this (2013, pg. 781). For example, aggressive music is played at sporting events to help rally together fans against the rival and keep

the energy level up throughout the game (2013, pg. 781). There are many explanations for why and how music can elicit this response, one of which is rhythmic entrainment.

Entrainment is the temporal locking process in which one's repetitive frequency entrains to the frequency of another system (Thaut, Mcintosh, & Hoemberg, 2015). This process can be caused by auditory rhythmic patterns and can entrain speech patterns as well as speech patterns (Thaut, Mcintosh, & Hoemberg, 2015). The entrainment process is possible through music because several areas of the brain, especially movement areas, respond to rhythms, such as regular musical rhythms, or irregular rhythms. The area of the brain that is most affected by this is the basal ganglia which controls movement (Grahn & Watson, 2013, pg. 26).

In a group setting the entrainment process is important because simple movement synchrony has been shown to create social bonds as well as increase cooperation between individuals (Loersch & Arbuckle, 2013, Pg. 780). When listening, people internalize the rhythm of the music automatically and without realizing it, they start to groove and move with the music slightly. In a group setting this simple movement synchrony promotes a shared experience amongst the group members which can cause group members to start feeling a connection between themselves. The shared rhythms of the song and the externalization of predictable rhythms such as tapping along to the music, allows synchronization to occur between two or more people (Tarr, Launay, & Dunbar, 2014). This synchronization between people can influence their subsequent positive social feelings toward one another, increasing their social connection (Tarr, Launay, & Dunbar, 2014).

By activating the motor regions of the brain through music entrainment, passive music listening triggers the same neural pathways involved in active engagement to music including pathways connected to endorphins (Tarr, Launay, & Dunbar, 2014). The endorphins released in

passive music listening have been proven to be involved in social bonding and other human social behavior such as laughter (Tarr, Launay, & Dunbar, 2014). Along with endorphins, group music listening and making releases the neurohormone oxytocin. Increased levels of oxytocin can lead to increased trust, eye contact, face memory, and the ability to infer the mental state of others (Tarr, Launay, & Dunbar, 2014). In a group setting, not only does passive music listening create social bonds, but active music making can also create social bonds by releasing endorphins that promote social bonding. Overall, music can help a group entrain with one another to promote social bonding as well as release endorphins that also promote social bonding. In the following study, this information is applied to find out if in a music improvisation performance the audience participants and performer participants felt an emotional bond.

Research Questions

This study seeks to answer the following questions:

1a) In a group improvisation, how will a person's experience with music improvisation impact their perception of the performance?

1b) How will a person's comfort level with music improvisation impact their perception of the performance?

2) In a group improvisation, will flow occur for both the musicians actively engaged as well as listeners who are passively engaged?

3) Interpreted in a Theory of Mind context during an instrumental group improvisation experience, what is the level of agreement between performer and listener regarding the cognitive content of the improvisation?

4) During a group improvisation, what is the level of agreement between performer and listener regarding the emotional content of the improvisation?

Hypothesis

The following are the alternative and null hypothesis for improvisation; Alternative: Both (listeners and performers) will report that experience and comfort levels impact performance perception. Null: Neither will report that experience and comfort levels impact performance perception.

The following are the alternative and null hypothesis for flow; Alternative: While engaged in music improvisation experiences, participants in both active and passive roles will experience a state of flow equally. Null: Neither will report flow when engaged in music improvisation experiences.

The following are the alternative and null hypothesis for theory of mind; Alternative: Passive listeners and active improvisers will report similar levels of cognitive content during improvisations. Null: There will be a low level of agreement in the reports of cognitive content of an improvisation between an active performer and passive listener.

The following are the alternative and null hypothesis for connectedness; Alternative: Passive listeners and active improvisers will report similar levels of emotional connection during improvisations. Null: There will be a low level of agreement in the reports of emotional connection of an improvisation between an active performer and passive listener.

Method

Participants

Participants for this study included seventeen undergraduate music students at Western Michigan University. All participants were eighteen years old, or older, with a mix of male and female. All participants were enrolled in a "classical" music improvisation course. The participants were stratified into four different groups based on their major (e.g., performance major (2 groups), music therapy major, and music education). Group one included four performers, group two included five performers, group three had five performers, and group four had three performers. Because of the classroom setting, all seventeen participants had previous experience improvising together during the four weeks leading up to the data collection. However, this was the first time each particular group was paired to improvise together. All participants played on their primary instruments. Primary instruments included: voice, piano, viola, cello, clarinet, flute, saxophone, xylophone, and trumpet.

Consent and Enrollment

This study was conducted during an improvisation class at Western Michigan University's School of Music. Permission to complete this study was given from Dr. Lin Foulk, the instructor of the class. Human Subjects Institutional Review Board approval was obtained through Western Michigan University (18-01-73). A consent form was read aloud to and given to each participant explaining the expectations for their participation, confidentiality, and the general purpose of the study. All replies were kept anonymous and no identifying information was collected.

Setting and Materials

Data collection took place during the music course: MUS 2650: Aural Skills IV-Improv at Western Michigan University in a classroom in Dalton Center. The class was fifty minutes long and contained four performances that ranged from one minute and thirty seconds to two minutes and seven seconds. Performer participants sat in a circle facing each other, and group members created an O-space.

Each participant completed three audience surveys and one performer survey. The surveys each comprised of eight questions. One survey was given to the performer participants in that group while the other survey was given to the audience participants. After the participants filled out the survey, they placed the survey in their own individual manilla envelope. Once the surveys were placed in the individual envelopes, a discussion was lead by the professor which pertained to class content.

The tests were made of Likert-scale type questions and took approximately two minutes to complete. A new survey was given to each participant after each performance for a total of four surveys. Each survey was printed and given out immediately after each performance. Participants then immediately placed individual surveys into their own manilla envelope, for a total of four surveys per envelope.

Each question was rated on a Likert-Type scale ranging from 1-6 with varying descriptive information to rate experience level, comfort level, agreement level, connection level, and engagement level. An example of the survey can be found in the appendix.

Data was analyzed in Microsoft Excel on a password protected computer in Western Michigan University's BRAIN Lab. Before entering data on the computer, each manilla envelope that was collected was randomly assigned a number, which acted as the participants identification number. Then, the surveys inside each envelope were put in order by group

number. Subsequently, the surveys were then coded by group number, participate number, and whether they were a performer participant or audience participant during that group. A table was then created on an excel sheet for each group, for a total of four tables. Per group, each participants' responses to the survey questions were charted. Within each chart, it was noted who was a performer participant or audience participant during that particular group. For each group and question, the audience participant's means were calculated as well as the performer participant's means. Difference between means was then calculated by subtracting the audience participant mean from the performer participant mean. This was conducted to analyze the amount of agreement between the audience participant's and performer participant's perception of each performance.

Procedures

The improvisations were structured using the following prompt: Play an improvisation piece starting with playing a single note for thirty seconds, then move to two notes for thirty seconds, then play with three notes for thirty seconds, then move back to two notes for thirty seconds, then to a single note for thirty seconds before ending the piece. Though there was a time suggestion for each section of the improvisation, it was not a strict time limit and was not monitored. One at a time, the groups performed for their classmates using the prompt given by their instructor. The first group to perform included viola, cello, flute, and piano. This improvisation lasted one minute and fifty-three seconds. The second group contained two students on piano, voice, clarinet, and flute. This improvisation lasted one minute and forty seconds. The third group contained piano, xylophone, saxophone, and two on trumpet. This

improvisation lasted two minutes and seven seconds. The fourth group contained two on voice and piano. This improvisation lasted two minutes and one second.

After each performance, audience and performance members filled out a Likert-scale survey related to their participation in that group. The survey contained eight questions with the Likert-Scale ranging from one to six that rated experience level, comfort level, agreement level, connection level, and engagement level. (Appendix A) Each survey contained the following questions:

Audience Survey

The audience survey contained the following eight questions; 1) How much experience would you say you have with listening to live music improvisation? 2) What is your comfort level with listening to improvised music? 3) I listened to the music spontaneously and automatically without having to think 4) It felt like time stopped when I was listening to this performance 5) I felt that I could detect the emotions of the performer(s) while they were performing. 6) During the performance, the performer(s) appeared anxious. 7) During the performance, did you feel an emotional connection to the performers? 8) How engaging do you think the performers were during the performance?

An example of the survey can be found in Appendix A.

Performer Survey

The performer survey contained the following eight questions; 1) How much experience would you say you have with music improvisation with your major instrument? 2) What is you comfort level with performing improvised music? 3) I performed spontaneously and automatically without having to think. 4) It felt like time stopped when I was performing. 5) I felt that I could detect the emotions of the audience while I was performing. 6) During the

performance, I felt anxious. 7) During the performance, did you feel an emotional connection with the audience? 8) Do you feel your performance was engaging for the audience members?

An example of the survey can be found in Appendix B.

Results

Improvisation

The question on the survey pertaining to improvisation experience levels was question 1, with question 2 pertaining to the person's comfort level with improvisation. Question 1 for the audience was; "How much experience would you say you have with listening to live music improvisation?" Question 1 for the performers was; "How much experience would you say you have with music improvisation with your major instrument?" Table 1 contains the following mean scores for Question #1 for participant groups across all four groups.

1. How much experience would you say you have with listening to live music improvisation?

1	2	3	4	5	6
No Experience	**Minimal Experience**	**Some Experience**	**Moderately Experienced**	**Experienced**	**Very Experienced**

1. How much experience would you say you have with music improvisation with your major instrument?

1	2	3	4	5	6
No Experience	**Minimal Experience**	**Some Experience**	**Moderately Experienced**	**Experienced**	**Very Experienced**

Table 1, Mean self-report levels of experience

	Audience Mean	**Performer Mean**	**Difference between Means**
Group 1	2.69	1.75	0.94
Group 2	3.17	2.20	0.97
Group 3	2.92	3.20	-0.28
Group 4	2.86	3.00	-0.14

Grand Mean	2.91	2.53	0.38

During group 1, the audience had a mean of 2.69 and the performers a mean of 1.75 with a difference between mean of 0.94. During group 2, the audience had a mean of 3.17 and the performers a mean of 2.20 with a difference between mean of 0.97. During group 3, the audience had a mean of 2.92 and the performers had a mean of 3.20 with a difference between mean of -0.28. During group 4, the audience had a mean of 2.86 and the performers had a mean 3.00 with a difference between mean of -0.14. Through Groups 1 and 2, the audience reported a small but higher level of experience than the performers. During Groups 3 and 4, the performers reported a small but higher level of experience than the audience.

The question on the survey pertaining to improvisation comfort levels was question 2. Question 2, for the audience was; “What is your comfort level with listening to improvised music?”Question 2 for the performers was; “What is you comfort level with performing improvised music?” Table 2 contains the following mean scores for question two for both audience and performer participants across all four groups.

2. What is your comfort level with listening to improvised music?

1	**2**	**3**	**4**	**5**	**6**
Not Comfortable	**Minimal Comfort**	**Some Comfort**	**Moderately Comfortable**	**Comfortable**	**Very Comfortable**

2. What is you comfort level with performing improvised music?

1	**2**	**3**	**4**	**5**	**6**
Not Comfortable	**Minimal Comfort**	**Some Comfort**	**Moderately Comfortable**	**Comfortable**	**Very Comfortable**

Table 2, Performer Participants Mean for Improvisation

	Comfort with	**Comfort with**	**Difference between**

	Listening to Imp. Music: Audience Mean	**performing Imp. Music: Performer Mean**	**Mean**
Group 1	4.69	3.50	1.19
Group 2	4.33	2.60	1.73
Group 3	4.50	3.60	0.90
Group 4	4.43	2.33	2.10
Grand Mean	4.48	3.00	1.48

During group 1, the audience had a mean of 4.69 and the performers a mean of 3.50 with a difference between mean of 1.19. During group 2, the audience had a mean of 4.33 and the performers a mean of 2.60 with a difference between mean of 1.73. During group 3, the audience had a mean of 4.50 and the performers had a mean of 0.90 with a difference between mean of -0.40. During group 4, the audience had a mean of 4.43 and the performers had a mean 2.33 with a difference between mean of 2.10. According to the data, the audience was somewhat more comfortable with listening to improvisations than the performers were comfortable playing improvisations.

Flow

The questions on the survey pertaining to flow were survey questions number 3 and 4. Question 3 for the audience was; “I listened to the music spontaneously and automatically without having to think”. Performer question 3 is; “I performed spontaneously and automatically without having to think.” These are the following mean scores for question 3 across all four groups. Below are samples of the survey questions asked for audience participants and performer participants, respectively.

3. I listened to the music spontaneously and automatically without having to think

1 **2** **3** **4** **5** **6**
Disagree **Agree** **Strongly Agree**

Strongly Disagree		**Somewhat Disagree**	**Somewhat Agree**		

3. I performed spontaneously and automatically without having to think.

1	**2**	**3**	**4**	**5**	**6**
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

Table 3, Mean Self-Report of Acting Spontaneously and Automatically Without Thinking

	Listening Spontaneously: Audience	**Performing Spontaneously: Performer**
Group 1	4.54	4.25
Group 2	4.10	2.80
Group 3	4.58	3.80
Group 4	4.29	4.00
Grand Mean	4.37	3.71

For the audience participants, question 3 was used to measure the amount of flow achieved during each group performance based on the quality of listening automatically and spontaneously. Based on the data, audience participants reported that they "somewhat agree" with listening to the music spontaneously and automatically across all four groups (4.53, 4.08, 4.58, and 4.28 respectively).

For performers, participants reported that they somewhat agreed to playing spontaneously for group 1 and 4 (4.25, 4.00). During group 2, the results suggest that participants disagree with performing spontaneously (2.80). During group 3, the results show that participants somewhat disagreed with performing spontaneously (3.80). The overall mean of 3.71 suggests that performer participants somewhat disagree with achieving flow based on the quality of performing spontaneously and automatically.

Question 4 for the audience was; “It felt like time stopped when I was listening to this performance”. Question 4 for performers was; “It felt like time stopped when I was performing.” Below are samples of the survey questions for audience participants and performer participants, respectively.

4. It felt like time stopped when I was listening to this performance

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

4. It felt like time stopped when I was performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

Table 4, Mean of Self-Report for Feeling as Though Time Stopped

	Feeling Like Time Stopped: Audience	**Feeling Like Time Stopped: Performers**
Group 1	4.10	4.50
Group 2	3.00	3.40
Group 3	3.75	4.80
Group 4	4.29	4.67
Grand Mean	3.77	4.34

Question 4 aimed to measure the quality of performance regarding feeling like time stopped while performing. For the audience, participants reported somewhat agreed that time stopped for groups 1 and 4 (4.07, 4.28). For groups 2 and 3, audience participants somewhat disagreed that they felt time stop listening to the performance (3.00. 3.75). The grand mean of 3.77 suggests that audience participants somewhat disagreed they achieved a flow state for this quality.

For performers, performer participants somewhat agreed that they felt time stopped for groups 1, 3, and 4 (4.50, 4.80, 4.66). During group 2, performer participants reported that they somewhat disagree to feeling like time stopped while performing (3.4). Reports from performers ranged from somewhat disagreeing to achieving flow to somewhat agreeing to achieving flow. The grand mean for performers, 4.34, suggests that performers somewhat agreed to achieving flow.

Theory of Mind

The survey questions relating to Theory of Mind for this study are questions 5 and 6. Question 5 from the audience's perspective was: "I felt that I could detect the emotions of the performer(s) while they were performing." Question 5 from the performer's perspective was: "I felt that I could detect the emotions of the audience while I was performing." The following table represents the mean scores for the responses for both the audience and performers for question 5. The means are calculated for each of the four groups on which data was taken.

5. I felt that I could detect the emotions of the performer(s) while they were performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

5. I felt that I could detect the emotions of the audience while I was performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

Table 5, Mean Level of Emotional Detection of Audience and Performers

	Emotional Detection of Audience	**Emotional Detection of Performers**	**Difference between Means**
Group 1	4.69	4.00	0.69
Group 2	3.00	2.60	0.40

Group 3	3.67	2.20	1.47
Group 4	4.71	2.83	1.88

Question 5 for both the audience participants and the performers aimed to measure if the participants could detect each other's emotions and what was being felt by each group. The means for group 1 were 4.69 for the audience and 4.00 for the performers. This shows that the audience felt that they could detect the emotions of the performers more than the performers could detect those of the performers. This can be seen across all groups during this study. The audience had a mean of 4.69, 3.00, 3.67, and 4.71 for the four groups. The performers had a mean of 4.00, 2.60, 2.20, and 2.83 for each of the four performances. The difference in means for the two groups were, 0.69, 0.40, 1.47, and 1.88.

For group 1, the audience had a mean of 4.69 for question 5, which shows that they somewhat agreed that they could detect the emotions of the performers. The performers during this performance had a mean of 4.00 which also shows that they somewhat agreed that they could detect the emotions of the audience. During this group, both groups could somewhat detect the emotions of the other group. For group 2, the means for the audience and performers for question 5 were 3.00 and 2.60. The audience somewhat disagreed and the performers disagreed on being able to detect the emotions of the other group. During this group, the ability to detect emotions was lower than in the first performance. Group 3 had means of 3.67 and 2.20 for question 5. The audience somewhat disagreed on the ability to detect emotions of the performers. The performers disagreed on being able to detect the emotions of the audience participants. This places the means in the same categories as group 2, and still lower than group 1. The last group,

or group 4, had means of 4.71 and 2.83 for the audience and performers. Here, the audience stated that they somewhat agreed or agreed with the statement of being able to detect the emotions of the performers. The performers somewhat disagreed or disagreed with being able to detect the emotions of the audience. This shows that the audience detect more emotion from the performers than the performers detected from the audience participants.

Question 6 for the audience and performers looked at the perceived and reported level of anxiety for the performers. The question for the audience was: "During the performance, the performer(s) appeared anxious." Question 6 for the performers was: "During the performance, I felt anxious." The data was then compared for each of the groups to see if the audience participants were able to accurately detect the emotion of the performers. The table below shows the comparison between responses for the audience and performers for question 6.

6. During the performance, the performer(s) appeared anxious.

1	**2**	**3**	**4**	**5**	**6**
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

6. During the performance, I felt anxious.

1	**2**	**3**	**4**	**5**	**6**
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

Table 6, Mean Level of Perceived and Reported Anxiety of Performers

	Perceived Anxiety of Performers	**Reported Anxiety of Performers**	**Difference between Means**
Group 1	3.00	3.00	0.00
Group 2	4.42	2.60	1.82
Group 3	2.58	3.20	-0.62
Group 4	2.86	4.17	-1.31

For question 6 the audience was asked if they agreed if the performer(s) appeared anxious while performing and the performers were asked if they felt anxious while performing. The audience participants had a mean of 3.00, 4.42, 2.58, and 2.86 for each of the four groups. The performers had a mean of 3.00, 2.60, 3.20, and 4.17 for each group. The difference between means for question 6 between the audience and performers were 0.00, 1.82, -0.62, and -1.31.

For group 1, the audience had a mean of 3.00 for question 6, which shows that they somewhat disagreed that the performers appeared anxious. The performers during this group also had a mean of 3.00 which also shows that they somewhat disagreed that they felt anxious. This shows a strong agreement in the two groups with the audience detecting the emotions of the performers. For group 2, the audience had a mean of 4.42 and the performers had a mean of 2.60. The audience somewhat agreed that the performers appeared anxious. The performers disagreed that they felt anxious. Here, the audience thought that the performers were more anxious than the performers actually felt. The third performance had means of 2.58 and 3.20 for the audience and performers. The audience disagreed that the performs appeared anxious and the performers somewhat disagreed that they felt anxious while performing. The audience did not feel that the performers appeared anxious and the performers felt slightly more that they felt anxious while performing. Performance 4 had means of 2.86 and 4.17 for the audience and performers. The audience disagreed that the performers appeared anxious and the performers somewhat agreed that they felt anxious. The audience disagreed that the performers appeared anxious and the performers somewhat agreed that they felt anxious.

Emotional Connection

In the survey, questions 7 and 8 related to Emotional Connection. Question 7 for audience participants was: during the performance, did you feel an emotional connection to the performers? While for the performers the question stated: during the performance, did you feel an emotional connection with the audience? The audience participant's answers were kept separate from the performer's answers and two separate means were calculated; one for the performers and another for the audience participants, both means can be found in table 7 as well as the difference between means. The difference between means shows the agreement between the audience participants and the performer participants on how emotionally connected they felt to one another.

7. During the performance, did you feel an emotional connection to the performers?

1	2	3	4	5	6
Not Connected	**Minimally Connected**	**Somewhat Connected**	**Moderately Connected**	**Connected**	**Very Connected**

7. During the performance, did you feel an emotional connection with the audience?

1	2	3	4	5	6
Not Connected	**Minimally Connected**	**Somewhat Connected**	**Moderately Connected**	**Connected**	**Very Connected**

Table 7, Level of Emotional Connection

	Level of Emotional Connection: Audience Mean	**Level of Emotional Connection: Performer Mean**	**Difference Between Means**
Group 1	4.08	3.75	0.33
Group 2	2.75	1.80	0.95
Group 3	3.58	2.00	1.58
Group 4	4.21	3.33	0.88

Throughout all of the performances the audience participants felt more connected to the performer participants than the performers to the audience. In group 1, the audience participants

had a mean score of 4.08 while the performer participants reported a mean of 3.75 with a difference between means of 0.33. During this group, the audience participants felt moderately connected to the performer participants while the performers felt somewhat connected to the audience. For group 2, the audience had a mean score of 2.75 while the performers had a mean score of 1.80 with a difference between mean of 0.95. Compared to group 1, there was less agreement between the audience participants and performer participants. The audience participants felt minimally connected while the audience participants felt no connection. During group 3 there was a larger difference between mean between the audience participants and performer participants than the previous two groups. The audience participants reported a mean of 3.58 while the performer participants reported a mean of 2.00 with a mean difference between 1.58. Finally, in group 4 the audience participants reported a mean of 4.21 while the performer participants reported a mean of 3.33 with a mean difference of 0.88. The participants in group 4 were in more agreement that they felt an emotional connection than groups 2 and 3. Overall, in group 1 there was more agreement between how emotionally connected the audience participants and performer participants felt, while in group 4, the audience and performers felt a higher sense of connection than the other three groups.

Question 8 for audience participants was: “How engaging do you think the performers were during the performance?” While for the performers the question stated: “Do you feel your performance was engaging for the audience members?” The audience participant’s answers were kept separate from the performer’s answers and two separate means were calculated; one for the performers and another for audience participants both means can be found in table 8 as well as the difference between means. The difference between means shows how much agreement there

was between the audience participants and the performer participants in each group on how engaging the performance was.

8. How engaging do you think the performers were during the performance?

1	2	3	4	5	6
Not Engaging	**Minimally Engaging**	**Somewhat Engaging**	**Moderately Engaging**	**Engaging**	**Very Engaging**

8. Do you feel your performance was engaging for the audience members?

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

Table 8, Engagement Level of Performance

	Engagement Level of Performance: Audience Mean	**Engagement Level of Performance: Performer Mean**	**Difference Between Mean**
Group 1	4.38	4.50	-0.12
Group 2	3.25	3.50	-0.25
Group 3	4.33	4.00	0.33
Group 4	4.43	4.67	-0.24

Throughout all of the groups the performer participants felt the performance was more engaging than the audience participants felt, and in all four groups the audience participants and performer participants agreed upon what level of engagement they thought the performance was. In group 1, the audience participants had a mean score of 4.38 while the performers reported a mean of 4.50 with a difference between means of -0.12. During this group the audience participants and performer participants stated they somewhat agreed the performance was engaging, however the performer participants felt the performance was slightly more engaging than the audience participants. For group 2, the audience had a mean score of 3.25 while the performers had a mean score of 3.5 with a difference between mean of -0.25. Compared to group

1, there was less agreement between the audience participants and performer participants. However, both audience participants and performer participants agreed that the performance was not very engaging. During group 3 there was a larger difference between means between the audience participants and performer participants than the previous two groups. The audience participants reported a mean of 4.33 while the performer participants reported a mean of 4 with a mean difference of 0.33. Even though there was a larger difference between mean, the participants still agreed that the performance was somewhat engaging. Finally, in group 4 the audience participants reported a mean of 4.43 while the performer participants reported a mean of 4.67 with a mean difference of -0.24. Like the previous groups, the participants agreed that the performance was somewhat engaging. Overall, in group 1 there was more agreement between how engaging the performance was while in group 4, both groups felt the performance was the most engaging out of all four groups.

Discussion

Performer participants and audience participants contributed their thoughts on improvisation experience, flow, theory of mind, and emotional connection during four improvisation performances.

Data points from the questions about music improvisation experience and comfort level varied between questions. Audience and performers reported to have only some experience with music improvisation All audience groups felt more comfortable with listening to music improvisations than the performers felt playing.

For experience levels in groups 1 and 2, the data shows that the audience reported higher levels of experience with listening to improvisations than the performers reported having experience playing improvisations. Contrarily, the data for group 3 and 4 shows that the

performers felt as though they had more experience playing improvisations than the audience had experience listening. The grand mean of all groups shows that the audience members had 0.41 points higher with experience than the performers. All means for each group stated that the audience and performers felt like that had minimal or some experience. Most notably, the difference between the audience and performers ranged from 0.91-2.10 in comfort levels. This is clinically significant since this is on a 6-point scale. The participants all reported to be more comfortable in the listening seat than in the performing seat.

When coming to conclusions about improvisation, it seems as though experience and comfort are only loosely related to each other in an improvisation context. There is no consistent trend of comfort level to amount of experience as a listener or performer. One strong conclusion from this study includes that people are more comfortable listening to someone else play an improvisation than performing themselves.

For improvisation, the next question pertained to each person's comfort level with music improvisations. Across all four groups, the audience reported to have higher levels of comfort with listening to music improvisation than the performers felt comfort with playing music improvisations. The audience reported in all four groups between 4 and 5 points. This means they were either moderately comfortable (4) or comfortable (5). These scores are relatively high when looking at the rest of the tables.

In the flow section, our data was consistent with the findings that the music stimulus provided by the performers was stimulating enough to somewhat achieve flow without being too complicated to distract from the flow experience (Sawyer, 2003). For performing/listening spontaneously and automatically, groups 1 and 4 were able to equally achieve a state of flow. Both performer participants and audience participants somewhat agreed that they achieved a

flow state. However, for groups 2 and 3, there was over an entire point difference on the Likert scale, with the audience reporting higher than performers. There was a disagreement between flow states in those two performances regarding spontaneity.

For feeling like time stopped, again, groups 1 and 4 achieved an equal flow state, saying they somewhat agreed that they achieved a flow state. For group 2, the report of audience and performers are equal, which is agreeing with the alternative hypothesis. However, they both somewhat disagreed on achieving a flow state. Group 3 was over an entire point difference in flow state, with performers rating higher than audience.

Across both ratings of flow, groups 1 and 4 somewhat agreed that they achieved a flow state, whereas groups 2 and 3 across both questions disagreed with each other on the flow state achieved. The grand mean for question 3 for audience and performers was 4.37 and 3.71, respectively. The grand mean for question 4 for audience and performers was 3.77 and 4.34, respectively. This data can infer that achieving a flow state in a passive role (as an audience participant) is easier to achieve through listening spontaneously and automatically, rather than feeling like time stopped. Almost exactly inversely, performers report that is is easier to achieve a flow state through feeling like time stopped, rather than playing spontaneously and automatically. These differences in data can help analyze the active and passive roles involved with flow during music improvisation.

For Theory of Mind, the results show that the audience felt that they could detect the emotions of the performers more than the performers felt they could detect the emotions of the audience. Overall, the means for question 5 did not go above a rating of 5. This tells us that while the participants felt that they could detect the emotions somewhat, they did not fully agree that they could detect the emotions of the other participants. In groups 2, 3, and 4 for the performers,

they disagreed or somewhat disagreed that they could detect the emotions of the audience. This means that they had a mean of between 2.00 and 3.00. In groups 1 and 2, the difference between the audience and performers was much lower than between groups 3 and 4. Consistently for question 5, the audience members had a higher mean than the performers. This shows that the audience felt they could detect the emotions of the performers more than the performers could detect the emotions of the audience. This similar trend can be found in the flow and emotional connection portions as well. For example, the audience felt more connected to the performers than the performers felt to the audience. This feeling of connectedness plays into how well one is able to detect emotions of others. There should be some type of connection in order to detect the emotions of others.

While the audience participants felt they could detect the emotions of the performers, there was not a high level of agreement for the responses for question 6. The performers rated their own anxiety level and the audience participants also stated the perceived anxiety level of the performers. Only one group, group 1, had the same mean for level of anxiety. Both means for the perceived and reported anxiety level was 3, meaning they somewhat disagreed that they felt anxious. For the remaining groups, there was a larger difference between means. For group 2, the audience stated that they agreed that the performers appeared anxious while the performers stated that they somewhat disagreed that they were anxious. This could be due to the performers being self-conscious about their anxiety levels and rating themselves lower than they actually appeared to the audience. This also could be due to the lower level of emotional connection that occurred for group 2. The opposite results occurred for group 4. Here, the audience members somewhat disagreed that the performers appeared anxious while the performers stated that they somewhat disagreed that they felt anxious. There was a difference of -1.31 between the two

means. For this group, the audience participants agreed that they could detect the emotion of the performers, but they did not accurately perceive the anxiety of the performers. This could be that the performance was so engaging that the emotions of the performers did not matter or did not come through as much to the audience.

In the emotional connection portion, the audience felt more connected to the performers while the performers thought the performance was more engaging. The performers and audience were in more agreement on how engaging the performance was than for how connected they felt to one another. For emotional connection, the audience had a higher mean than the performers which shows they felt more connected to the performers than the performers felt to audience. These results also correspond with the result from table 5 which showed that the audience members felt they were able to detect the emotion in the music better than the performers were. For these participants, if they felt they were able to detect the emotion in the music better than they had a higher sense of emotional connection to the performers. One factor that might have played a role in these results is that the performers might have been more focused on the task at hand rather on detecting the emotion in the music and their connection to the audience participants. Since this was the first times these groups participated in this exercise they could have been more focused at the task at hand than concentrating on other elements. The performers were actively involved in the music making which may have caused them to focus more on the music making and less on outside stimuli such as detecting and feeling emotion.

Since the performers were actively making music they could have also thought their performance was more engaging because they were physically and mentally more engaged in the performance than the audience was. The results show that the performers did feel their performance was more engaging than the audience members, but there was more agreement on

how engaging the performances were. All of the groups thought the performances were either somewhat engaging or moderately engaging. In group 3 however, the audience participants thought the performance was more engaging than the performers did; this correlates with the results from the entire study. In most of the survey questions, there was less agreement between the audience participants and performer participants than any of the other groups. There are many different factors that could play into this such as group 3 performers holding themselves to a higher standard than the audience did, the instrumentation in the group, the performers' connection with one another, their major, and their major instrument. We do not have enough data to fully state why group 3 had less agreement but further research could be completed to see this may have occurred.

When comparing the different aspects of this study, there are some similarities to note. The audience rated higher scores on nearly all of the questions except the questions that pertain to feeling like time stopped, anxiety of performers, and the engagement level of the performance. Perhaps, due to the audience's higher levels of experience and comfort with listening to improvisations, they were able to listen spontaneously and automatically which led to their ability to better detect the emotions of the performers and feel a greater emotional connection with the performers.

Across all four performances, the performers reported higher levels of feeling as though time stopped and for three of the four performances the performers reported higher levels of feeling like the performance was engaging. There could be a connection between higher levels of flow leading to a perception of more engaging musical material.

Further research needs to be done on each participant individually to look further into the relationships of these components.

The combination of four different elements of the psychological music process involving flow, theory of mind, emotional connection, and improvisational background has not been combined into one research project before. The benefits of analyzing all four components together allow for linking between various psychological music connections. The implications found between the four components may be analyzed in further studies looking at the biological components behind these four aspects.

Limitations

A limitation of this study is that the sample size of participants was a convenience sample. The convenience sample was not an accurate representation of the general population of music students at Western Michigan University. In future studies, a participant basis of volunteers may change results. The sample size for this study was 17 participants. In future studies it would be best to have a larger sample size to better generalize the results. It would also be beneficial to have a wider range of majors and types of musicians used for the study.

Due to the study working with a class, the participants all had some form of interaction with each other before the data was collected. Data was taken during the fifth week of the class so the participants had been musically improvising together for the four preceding weeks. This was the first time the participants performed in the groups that they were in for the data collection. It is possible that the novel social pairings could have affected the nature of the improvisations thus impacting the constructs of theory of mind, flow, and emotional connection because of the previous connections made outside of the study.

A structured improvisation was utilized in this study. Structured improvisations consist of using guidelines to regulate the musical options available to those improvisations. The students were required to follow a prompt given by the professor which limited note use and time

requirements. Having these guidelines could be both beneficial for the improvisations but can also diminish feelings of flow or engagement due to the focus that is needed to ensure that the structure is being followed during the improvisation.

As part of the class structure, the class analyzed and discussed each performance after it occurred. Data was taken immediately after the completion of a performance, and then the discussion was led by the instructor. Because of the discussion after each performance, this may have affected data results for the following performance. Talking about the different components within the performances could change participants thoughts about how they should perform next. This makes them more aware of what their peers are thinking and how they should be thinking as well. The researchers made sure to collect data before a discussion of that particular performance. In addition, data was collected over four different performances and the survey questions were kept consistent between each performance. Since the performances occurred back to back and the survey questions were the same after each performance, once the participants completed the first survey they knew what questions to expect for the following three performances. Knowing the questions before the next three performances gave the participants more time to think about the questions and come up with answers than for the first performances. This allowed the participants to listen more critically for the last three performances which may have influenced the their answers and the data results. If this study were to be implemented again, we would utilize a counterbalance method to control for this learning effect.

Before the performances began, a list of instructions were verbally presented to the participants. One thing that was not stated in our instructions was to pick only one answer and to answer every question. When reviewing the surveys, one participant skipped one question and

another participant circled more than one answer per question. In order to input one answer we took the average between the numbers they circled.

Future Recommendations

In this study, performers performed a structured improvisation. The performers were allowed to play any three pitches (i.e., frequency of sound), but they were required to play only those for the entire improvisation.They were also given a time suggestion for how long each phase of the improvisation should last. For future studies a less structured or a free improvisation could be used and compared to the results from this study to see if having more or less structure affects the outcome of flow state, theory of mind, comfort level and emotional connection.

Along with structured improvisation, this data uses a classroom which limited the amount of freedom we had for setting up the groups and the structure for the improvisation and structure. For future studies the research should complete the study outside of a classroom to see how the results correlate to that of a classroom setting. A non-classroom setting will also allow the researchers to have more authority over the entire study instead of just the survey questions.

Conclusion

This study is the first study to combine four different elements of the psychological music process involving flow, theory of mind, emotional connection, and improvisational background to compare if and how they are related. We found that in a classroom setting there is a relationship between all four elements, but further research and analysis of the data needs to be completed to better understand how and why these four elements are related. Overall, this data helps pave the way for future research looking at the relationship between the audience and performers in an improvisational setting as well as the psychological music aspects involved in the relationship between the audience and the performers.

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Appendix A

Audience Survey

1. How much experience would you say you have with listening to live music improvisation?

1	2	3	4	5	6
No Experience	**Minimal Experience**	**Some Experience**	**Moderately Experienced**	**Experienced**	**Very Experienced**

2. What is your comfort level with listening to improvised music?

1	2	3	4	5	6
Not Comfortable	**Minimal Comfort**	**Some Comfort**	**Moderately Comfortable**	**Comfortable**	**Very Comfortable**

3. I listened to the music spontaneously and automatically without having to think

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

4. It felt like time stopped when I was listening to this performance

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

5. I felt that I could detect the emotions of the performer(s) while they were performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

6. During the performance, the performer(s) appeared anxious.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

7. During the performance, did you feel an emotional connection to the performers?

1	2	3	4	5	6
Not Connected	**Minimally Connected**	**Somewhat Connected**	**Moderately Connected**	**Connected**	**Very Connected**

8. How engaging do you think the performers were during the performance?

1	2	3	4	5	6
Not Engaging	**Minimally Engaging**	**Somewhat Engaging**	**Moderately Engaging**	**Engaging**	**Very Engaging**

Appendix B

Performer Survey

1. How much experience would you say you have with music improvisation with your major instrument?

1	2	3	4	5	6
No Experience	**Minimal Experience**	**Some Experience**	**Moderately Experienced**	**Experienced**	**Very Experienced**

2. What is you comfort level with performing improvised music?

1	2	3	4	5	6
Not Comfortable	**Minimal Comfort**	**Some Comfort**	**Moderately Comfortable**	**Comfortable**	**Very Comfortable**

3. I performed spontaneously and automatically without having to think.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

4. It felt like time stopped when I was performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

5. I felt that I could detect the emotions of the audience while I was performing.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

6. During the performance, I felt anxious.

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

7. During the performance, did you feel an emotional connection with the audience?

1	2	3	4	5	6
Not Connected	**Minimally Connected**	**Somewhat Connected**	**Moderately Connected**	**Connected**	**Very Connected**

8. Do you feel your performance was engaging for the audience members?

1	2	3	4	5	6
Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

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