USING EMOTIONAL INTELLIGENCE AND MUSICAL TRAINING TO PREDICT EMOTION-DETECTION IN MUSIC: A CROSS-CULTURAL STUDY

A THESIS
SUBMITTED TO THE DEPARTMENT OF PSYCHOLOGY
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FOR THE DEGREE OF
MASTER OF ARTS IN PSYCHOLOGY

By
Olivia Jewell
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TO PREDICT EMOTION-DETECTION IN MUSIC: A CROSS-CULTURAL STUDY

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Abstract

Recently, research in music and emotions has become very popular, and has indicated that individuals can detect emotions in various pieces of music across cultural borders. Additionally, research has explored emotional intelligence and musical training with respect to this skill. However, no previous study has examined if emotional intelligence or musical training is more predictive of one's ability to perceive an emotion in a piece of music across cultures. The current study seeks to explore this question, by providing participants with musical clips to listen to, and then choose the emotion that they feel fits it the best. The musical clips come from a subset of 36 clips that were used in a pilot study to determine whether individuals can discern an intended emotion in the piece of music. Additionally, participants filled out measures of musical training and emotional intelligence. It was hypothesized that participants who scored higher on emotional intelligence would score higher on measures of emotion-detection, across cultures. A second hypothesis stated that emotional intelligence would be more predictive of emotion-detection than previous musical training or experience. The hypotheses were partially supported, with emotional intelligence being a significant negative predictor of emotion-detection. Cultural variation was only a significant predictor of emotion-detection for our measure of target agreement, but not for our measure of consensus agreement. Overall, the current study sheds light on emotional intelligence, musical training, and music interpretation across cultures.

Cross-Cultural Understanding of Emotions in Music

It has been argued that music is the language of emotion (Johnsen, Tranel, Lutgendorf, & Adolphs, 2008) and it is no mystery that music is associated with various emotional contexts, whether that comes from the artist composing a song to express something he or she is feeling, or from a listener using a song to elicit feelings of catharsis. Ekman (1992) conducted foundational research on emotions, arguing for six, which he referred to as "Basic emotions." These are joy, anger, fear, sadness, surprise, and disgust, and much of his research has indicated that they are universal across cultures, including those ranging across Europe, Indonesia, and New Guinea (Ekman, 1992). Additional research has indicated that the same might be the case for recognition of emotions in music (Mohn, Argstatter, & Wilhelm-Wilker, 2010).

Review of the Literature

Six Basic Emotions

Important research regarding emotions comes from Ekman, who argues for the presence of six "basic" emotions (Ekman, 1992). He proposes an evolutionary explanation for these emotions, claiming that they would have been adaptive for mobilizing human responses that would have either kept someone alive or increased the likelihood of reproduction. Ekman (1992) references this research arguing that in an environment where there are dangers are frequently lethal, it would have been highly adaptive to have biological responses that helped avoid these. The universality in the antecedent events that elicit emotions, helps support his theory that these basic emotions are adaptive, and thus likely universal (Ekman, 1992, 1993).

Much of Ekman's most famous research on the six basic emotions has incorporated studies of facial expressions. Initial research done on educated samples from both western and eastern cultures indicated agreement between a facial expression and which of the six basic emotions it conveyed. Additional research found that this result was similar, even in cultures that had limited or no access to modern cultures or technologies (Ekman, 1993; Ekman et al., 1987). Specifically, research compared this emotion-detection ability in participants from across Europe, East Asia, Africa, the Middle East, and the United States. However, further research suggested that facial expressions were not the only avenue through which emotions could be expressed or detected. After establishing a universal relationship between the six basic emotions and the facial expressions that display them, research was done on vocal expressions to see if the same phenomenon was observed. Between English-speaking people from England, and a sample of a group of people from Western Africa, called the Himba, it seemed that individuals are perfectly capable of recognizing non-verbal vocal expressions associated with each of the six basic emotions (Sauter, Eisner, Ekman, & Scott, 2010). This idea is further supported by research done, comparing vocal sounds for their respective emotions, across different European countries and Indonesia. This study manipulated the pitch and rhythm of meaningless phrases in order to convey the emotion in question (Scherer, Banse, & Wallbott, 2001). Since this kind of manipulation is commonly done in music for the same reason, there may be important similarities between vocal prosody and music, with regards to emotion-communication.

Voices and Music

The cross-cultural nature of recognizing emotions in non-verbal vocal sounds points to important similarities in different kinds of vocal communications. For instance, music and language are human universals. Both use variation in tone, rhythm, and pitch, albeit differently, to convey different kinds of information, especially if emotions are involved (Carey, Parris, & Lloyd-Thomas, 1999; Zattorre, Belin, & Penhune, 2002), which suggests that tonal and rhythmic variation in music and language may serve similar purposes.

Evidence suggests that speech and music rely on variation in pitch and rhythm differently to communicate particular messages. Production and comprehension of speech tends to rely more on temporal changes, whereas music usually features more tonal variance. The two of these can be compared to understand how people differentiate between music and speech (Carey et al., 1999; Zattorre et al., 2002). Despite crucial differences, comparisons have been done between the expression of emotions in music with the expression of emotion in non-verbal vocal cues. Analysis concluded that, overall, participants are just as accurate at detecting emotions in vocal sounds as they are at detecting emotions in music. This result appeared to be the case cross-culturally as well, including countries across Northern, Eastern, and Western Europe, East Asia, and Cree-speaking Canadian Indians (Johnsen et al, 2008; Juslin, & Laukka, 2003).

Analysis of structural features of the vocal patterns indicated consistency between specific features and the emotions the exhibited. Additionally, the differences in rhythms in music between France and Britain tends to reflect, or mirror, the differences in rhythms in the French and English languages (Juslin, & Laukka, 2003; Patel, & Daniele, 2003). If differences in the structural features of language can be used to communicate emotions, and if music and language are very structurally similar, then we can expect to see structural features in music that also help communicate emotions.

Features in Music

Indeed, it appears to be the case that specific musical features may help to convey an emotion. Overall, music that has a more upbeat tempo, played in major keys, tends to be perceived as happier, whereas music that has a slower tempo, played in minor keys, tends to be perceived as sadder, with large degrees of agreement across varying participants (Juslin, & Laukka, 2003; Webster, & Weir, 2005). Melodic and harmonic complexity appear to be especially important to discriminating emotion (Gomez, & Danuser, 2007; Webster, & Weir, 2005). Again, these patterns also appeared with relation to vocal cues, not just in the context of music (Carey et al., 1999; Juslin, & Laukka, 2003).

Not only do participants tend to perceive that the specific emotion exists in a musical piece (potentially due to these features) but physiological responses in humans tend to accompany these features, potentially explaining why we perceive these songs as being one emotion or another. Responses like increased skin conductance, and increased heart rate, varied between positive and negative valence of a piece, and high versus low degrees of arousal (Gomez, & Danuser, 2007). Interestingly, trained musicians tend to exhibit more arousal in response to music than amateur musicians or non-musicians (Mikutta, Maissen, Altorfer, Strik, & Koenig, 2014; Park, et al., 2014). Which could suggest that musical training might have an impact on the way individuals listen to music.

Musical Training

It might seem obvious that musical ability may have an impact on an individual’s ability to detect an emotion in a piece of music. However, some of the research below may make the relationship a little less clear. While the evidence is not contradictory, it certainly elicits questions.

Work done by Mikutta and colleagues (2014) asserted that musical training can alter neural structure, and leads to more precise auditory processing and motor functioning. This thought is echoed by Park and colleagues (2014) who added that musical training can increase an individual's ability to process emotions, and that musicians have enhanced cognitive skills especially with regards to music. Research investigated discrepancies in arousal between professional and amateur musicians while listening to music. It was discovered that the professional musicians were more aroused by a piece of music than non-musicians (Mikuatta, et al, 2014).

Similarly, Park and colleagues (2104) examined potential differences in processing and listening to music between musicians and non-musicians. Interestingly, while there was a difference in the way musicians and non-musicians responded to the music, with musicians showing higher degrees of arousal, there was no difference in ability to detect the valence of the emotion (Park, et al, 2014).

These combined findings suggest that while amateur musicians and non-musicians might not be as aroused by a piece of music, they are still able to detect an emotion in a piece of music in a forced-choice format, just as well as trained musicians. Trained musicians may be able to detect emotions in music at a precise level, but individuals with no musical training can detect the emotion in the piece of music just as well as musicians can.

If music has this powerful ability to convey emotions, and even produce physiological responses, it is no surprise that one of the most highly documented reasons for listening to music is emotional regulation, either to alter the emotion someone feels, or enhance it. Emotions have been considered the driving force behind listening to, or making music (Juslin, Barradas, Ovsiannikow, Limmo, & Thompson, 2016). This function suggests that not only is the emotional context of music likely clear to listeners, but it is clear enough that it can change the listener's state of mind. This finding is the case, even if the person is an experienced musician, or not (Mikutta, Maissen, Altorfer, Strik, & Koenig, 2014; Park, et al., 2014). If the features of music successfully portray emotions within cultures, is it possible that people can identify the intended emotion in a piece of music, across cultures?

Identification of Emotions in Music

In fact, evidence suggests that individuals across cultures are significantly able to identify the emotion displayed in a piece of music. It appears to be that joy, sadness, and anger, are the easiest or most salient emotions to detect in a piece of music. This finding was consistent for cultures across Europe, East Asia, Indonesia, and isolated cultures in Central Africa, as well as for those of different ages, and degrees of musical training (Argstatter, 2016; Mohn et al., 2010; Fritz et al., 2009; Juslin, & Laukka, 2003).

Additional research asked musical professionals to identify written music that they felt exhibited a specific emotion, that participants later listened to. Participants usually agreed with the original person's choice of emotion for that piece. These were rated statistically significantly except for surprise and disgust (Kallinen, 2005).

Surprise, and disgust, as well as fear, have been the emotions that appear to be the most difficult to identify in music, and it may be that more nuanced descriptors are needed to capture and understand the affective responses and reactions that people both feel or perceive when listening to a musical piece (Argstatter, 2016; Mohn et al., 2010; Zentner, Grandjean, & Scherer, 2008). Additional research has suggested that the emotions used to describe music outside of a forced-choice situation tend to be more complex (Zentner et al., 2008). The current study seeks to ask participants the degree to which each emotion is exhibited in a musical clip, ideally with the intended emotion getting the highest scores. We hope that this method allows for the intricacies of both emotions and music to be accounted for and examined.

Emotional Intelligence

An individual's ability to detect these emotions in music is likely related to a variety of different skills. There is clearly a musical impact, but there is also likely an emotional one. To come full circle, back to the discussion of emotions, Salovey and Mayer (1990) are credited with coming up with the term "emotional intelligence." They describe it as "the ability to monitor one's own and others' feelings and emotions, to distinguish among them, and to use this information to guide one's thinking and actions," (Salovey, & Mayer, 1990, p. 5). Clearly that kind of skill would come in handy when attempting to identify and differentiate the emotions that might be present in a piece of music. It is even possible that emotional intelligence is more important to detecting emotions in music, than musical training is.

A study done by Resnicow, Salovey, and Repp (2014) investigated a similar phenomenon. They played three different classical pieces to participants and rate the degree to which each of four emotion, fear, anger, joy, and sadness, was expressed in each piece. Participants also took an Emotional Intelligence test and had indicated how many years of musical training they had. Oddly, years of musical training were not correlated with emotional intelligence, however, emotional intelligence was correlated with correct responses on the music test, (Resnicow, Salovey, and Repp, 2004), which suggests that emotional intelligence may play a larger role in recognizing emotions in music than was previously thought.

Similar research compared scores on the Mayer-Salovey-Caruso Emotional Intelligence Test, with scores on the Kaufman Brief Intelligence Test, and with background information about participants' musical training and experience (Schellenberg, 2011). Like the above research, students who had undergone musical training did not appear to have higher levels of emotional intelligence than those who had not undergone musical training, even though musicians had overall higher scores on the Kaufman Brief Intelligence Test. If musical training and emotional intelligence are not related, and those who undergo musical training do not do better at detecting emotions in music, then it might be that this skill is not based on formal training.

Emotions Across Cultures

While it may be well and good to understand the potential connection between emotional intelligence and music, it is also crucial to understand how emotional intelligence—and emotions in general—cross cultural boundaries. Previous literature has suggested that variation in cultural practices, expectations, and values, has helped create variation in emotional experience and expression in different cultures across the world. A commonly cited example is the difference between Individualist Western cultures and Collectivist East Asian cultures. There is varied evidence that suggests that Collectivist cultures tend to be more inhibitory when it comes to their emotional expressiveness, whereas individualist cultures are usually more outwardly emotive (Cordaro, Sun, Keltner, Kamble, Huddar, & McNeil, 2017; Kitayama, Karasawa, & Mesquita, 2006). This evidence displays how cultural affordances impact behavior.

An affordance, as described by Gibson (1982) is essentially a relational property that comes from an individual's interaction with an environment and thus impacts the behavior of that individual in that environment. In this study, affordances can describe the way that a cultural environment can influence the emotional experiences of the individuals in that culture. For example, in Japan, where collectivist values are highlighted, emotional behavior will likely relate to ideas of group harmony, (e.g. shame, sympathy). However, in North America, individualist ideas are emphasized meaning that emotions tend to be more associated with personal achievement (e.g. pride, anger). This idea accompanies evidence that the Japanese experience engaging emotions more strongly than Americans, and vice-versa for disengaging emotions (Kitayama, Karasawa, & Mesquita, 2006). This difference in intensity could impact how members of different cultures perceive different emotions.

The above point indicates that different emotions are more salient in different cultures, however that does not mean that the six basic emotions do not exist in these cultures. Additional research on the physical expression of emotion in China, India, Japan, South Korea, and the United States, indicated that while there are culture-specific differences in some of the ways that these emotions are expressed, there are also certain universals that accounted for about 50% of the expressive behavior in question (Cordaro et al, 2017). Similarly, cross-cultural research was done on seeing and congenitally blind athletes, for their physical displays in response to feeling pride or shame. Results indicated that across cultures, congenitally blind athletes exhibited the prototypical "pride" behaviors in response to winning, as well as the prototypical "shame" behaviors in response to losing. While this behavior was also the case for seeing athletes, these behaviors' presence in congenitally blind athletes indicates that the behaviors are likely not learned, but could be more innate (Tracy, & Matsumoto, 2008). Additional research by Ekman and colleagues (1969; 1971) has indicated recognition of emotions in facial expressions for those in both Eastern and Western cultures, as well as literate and isolated, non-literate cultures.

Because of the affective nature of music, combined with Ekman's research on universal basic emotions, a pilot study was run to examine whether emotions expressed through musical clips can be detected by people from the same culture as the composer. Another goal of this initial study was to gather ratings of emotional content from each musical clip, so they could then be used as stimuli for the current study.

Pilot Study

To examine this simple question of whether individuals in a Western culture can detect emotions in instrumental clips of music, a brief pilot study was conducted. While validated musical clips that do exist, we chose to conduct this pilot study for a handful of reasons. First, it was more difficult than expected to find musical clips of the type we were searching. Previous literature examined Ekman's (1993) six basic emotions (Argstatter, 2016; Mohn et al., 2010), but this study was done on a European sample, on different instruments. Since the timbre of a musical instrument can impact the way it expresses an emotion, or which emotions it expresses most effectively (Hailstone et al., 2009), we wanted the instrument to be consistent, to avoid this feature impacting the way participants heard the emotions. Our goal was to try to capture emotion simply using the variation in melody and tempo that would be allowed, considering that all clips were recorded on acoustic guitar. Additional research was done to validate "Musical Emotional Bursts," on clarinet and violin, however these clips were under 4 seconds long (Paquette, Peretz, & Belin, 2013). For the current study, we wanted to use musical clips that were between 10 and 15 seconds long, for there to be more time to convey the emotion in question. Other research has featured musical clips that come from already-composed works, usually featuring a large orchestra. While this method certainly constitutes an advantage with regards to expressing an emotion, we wanted to have a little more control over the musical clips, by being able to give our musician specific instructions, and access to Ekman's (1993) literature, so he understood our purpose. With this method, we were able to tell our musician specifically what we wanted the music to do, and what it would be for.

While only using one musician may seem like a disadvantage, we hoped it would create consistency in the themes behind the musical pieces that were intended to convey each emotion. We also wanted to have a musical perspective from someone who is a self-taught musician, partly because this setting is more comparable to the way individuals learn music when they do not have access to formal schooling, or if they are in a position where formal schooling does not exist. We hope that this approach will replicate the way music was produced for our ancestors, as well as making his musical expression genuine to him, and not to a specific music school or tradition.

To maintain a degree of methodological control, the musical samples used for the pilot study were intended to follow certain guidelines to maintain a degree of uniformity. These dimensions were as follows:

- All pieces were composed by the same musician, an experienced guitarist who has written, recorded and produced his own music.
- All pieces were recorded on acoustic guitar.
- All samples were between 10 and 15 seconds in length.
- All pieces were recorded in the same setting, using the same equipment.

While it would have been possible to locate pre-recorded samples of music, it was specifically determined that these guidelines would be ideal for the composition of the musical clips. For this reason, it was deemed safer to have pieces composed specifically for this study, to maintain the aforementioned uniformity.

Method

Participants

Participants included several college students at a Northeastern University, as well as people who responded to a Facebook post on several psychology-related pages. Participant age ranged from 18 to 75, with a mean age of about 29 years. Twenty-four participants identified as Male (25%), and 64 participants identified as female (67%), with one participant identifying as non-binary. Seven participants declined to answer this demographic question. While several participants took the survey, only 89 completed the whole thing, thus data from only these participants were included in analysis. Seventy-five percent of participants self-identified as white/Caucasian, 8.5% identified themselves as Latino, 7.5% identified themselves as Asian or Asian-American, 8.5% of participants identified as African or African-American, Native American, Middle Eastern, or multiracial. All participants were from the United States.

Musical Clips

Our musician was asked to compose 36 song clips, six for each emotion (anger, fear, surprise, joy, disgust, and sadness). For each group of songs for each emotion, three were asked to be more rhythmic interpretations of the emotion, and the other three were asked to be more melodic interpretations of the emotion. It was requested that he would compose and record all of these on acoustic guitar.

Procedure

Participants completed the study online via a survey hosted on Qualtrics. A consent form at the beginning informed them as to what the study would entail and assured them that they could end the study at any time without penalty. The study had two main parts, the first being a series of listening questions, and the second being several survey questions. The listening part of the survey featured 36 musical clips all composed on acoustic guitar, with six for each of Ekman's (1992) six basic emotions: Anger, Joy, Sadness, Fear, Surprise, and Disgust. After listening to each musical clip, participants were presented with six slide-bar scales ranging from one to 100, with each assigned to one of the emotions in question. Participants were asked to use the slide-bars to indicate the degree to which they felt each emotion was present in the piece of music.

Musical Experience

The second part of the survey consisted of several questions asking about musical habits and preferences. Questions included varieties such as: *How many hours per week do you spend listening to music? (Include tie between classes, in the car, studying)* and *Do you play music on your own? (including music you have or have not written).* At the end of the survey, university students were offered class credit if they needed it, and all participants were thanked for their time.

Results

Analysis

A between-groups ANOVA was conducted to examine the mean differences between participant ratings for each emotion. Musical clips for happiness, sadness, and anger, produced the clearest results, with mean ratings for their respective emotions being the highest compared to ratings for the other emotions. Surprise, fear, and disgust produced results that were a little more ambiguous. Note that musical clips are described by the emotion they were intended to convey, whether they are rhythmic or melodic, and a number delineating it from the others in the same category (e.g. Rhythmic Sadness Two).

Three musical clips that represented Anger, Joy, and Sadness, were included in the current study, for a total of nine musical clips. There were specific criteria that the chosen musical clips had to meet to be included. The first being that their highest scoring emotion rating had to match the emotion that the clip was written to express. The second was that this emotion-rating needed to be statistically significantly higher than the other mean emotion ratings for that song. Of the musical clips for each emotion that met those criteria, the top three were chosen from their emotion-group to represent that emotion in the current study. All musical clips were analyzed using an ANOVA and a Bonferroni post-hoc test. Details regarding the emotion-ratings for each musical clip for its respective emotion are found below. Means and Standard Deviations for all musical clips can be found in *Table 1*.

Anger

The three *Melodic Anger* clips did not incur statistically significant results and produced more ambiguous responses. ANOVA and post-hoc analysis indicated that while there were some differences in emotion ratings between specific emotions, there was no emotion that was voted to be the most representative overall. For *Melodic Anger* clips, some of the highest-rated emotions included *Sadness* (M = 21.89, SD = 27.602), *Surprise* (M = 20.82, SD = 24.70), and *Fear* (M = 20.15, SD = 24.32). While the *Melodic Anger* musical clips were ambiguous, the *Rhythmic Anger* clips were less so, suggesting that rhythm is essential for conveying anger in music.

An ANOVA analysis was run on each of the three *Rhythmic Anger* pieces, followed by a Bonferroni post-hoc test. The mean anger rating for *Rhythmic Anger One* (37.44, *SD* = 28.559) was significantly higher ($F(5, 528) = 31.112$, $p < .001$) than the ratings for the other emotions for that song. *Rhythmic Anger Two* had a lower mean rating (*M* = 32.12, *SD* = 32.095) than *Rhythmic Anger One*, but also received an *Anger* rating that was significantly higher than the other emotion ratings for that musical clip ($F(5, 528) = 18.78$, $p < .001$). Finally, *Rhythmic Anger Three* received a mean *Anger* rating that was similar to that of *Rhythmic Anger Two* and was also significantly larger than the mean ratings for the other emotions for that song ($F(5, 528) = 26.18$, $p < .001$). These three clips were chosen to be included in the current study.

Sadness

The musical clips composed to evoke sadness generally produced clearer results, however they were by no means perfect. *Rhythmic Sadness Three*, was rated highest for *Joy*, ($F(5, 528) = 40.51$, $p < .001$; *M* = 37.44, *SD* = 29.573). *Melodic Sadness Two* a melodic song clip, was rated highly for *Sadness* (*M* = 46.03, *SD* = 31.93), but also received moderately-high ratings for *Fear* (*M* = 25.92, *SD* = 28.10).

The other four *Sadness* musical clips were clearer in their results. All had mean ratings for Sadness that were significantly higher than for the other emotions. We wanted to have an equal number of songs conveying each emotion, only three of the four *Sadness* clips that had significant results were chosen. These were *Melodic Sadness Two* ($F(5, 528) = 104.114$, $p < .001$; *M* = 54.85, *SD* = 30.79), *Rhythmic Sadness One* ($F(5, 528) = 238.511$, $p < .001$; *M* = 69.70, *SD* = 27.50), and *Melodic Sadness One* ($F(5, 528) = 265.77$, $p < .001$; *M* = 70.00, *SD* = 26.77).

Joy

Similar to the clips for Sadness, musical clips intended to convey *Joy* were much less ambiguous than those for the other emotions. Again, only the top three musical clips were chosen to represent joy in the current study. Interestingly, the highest emotion-rating for *Melodic Joy Two* and Three was *Sadness* (*M* = 28.19, *SD* = 29.50; *M* = 50.82, *SD* = 32.75; respectively). Both pieces were the more melodic compositions intended to display Joy, so we wondered if that was somehow part of why they ended up conveying sadness instead. Maybe participants felt the song was more bittersweet.

The other four song clips received the highest emotional ratings for *Joy*, but again, it was necessary to narrow these down to three clips so that the current study had three from each emotion category. *Rhythmic Joy Two* ranked at third-place for its mean rating for *Joy* (*M* = 60.64, *SD* = 30.104), but this rating was still significantly higher than those for the other emotions ($F(5, 528) = 165.69$, $p < .001$). *Rhythmic Joy One* had the next-highest mean rating for *Joy*, which was also significantly higher than the means for the other emotions ($F(5, 528) = 174.57$, $p < .001$; *M* = 62.82, *SD* = 30.841). Finally, *Melodic Joy One* had the highest emotion-rating for *Joy*, which was statistically significant, compared to the emotion-ratings for the other emotions ($F(5, 528) = 288.152$, $p < .001$; *M* = 66.09, *SD* = 28.28). These three clips composed to express Joy were selected to be part of the current study.

Fear, Surprise, and Disgust

Fear, surprise, and disgust all produced much more ambiguous emotional results. Only one song out of the 18 intended to convey these emotions was successful in doing so. *Melodic Fear One* was analyzed with an ANOVA to compare the mean ratings for each emotion. *Fear* received the highest rating and was significantly higher ($F(5,528) = 20.08$, $p < .001$) than the ratings for all other emotions for this song clip. A Bonferroni post-hoc analyzed the differences between this emotion rating and those for the other emotions, finding that *Fear* did indeed incur higher ratings in response to the song clip than the other emotions.

The five other songs conveying fear were unable to produce results that were as clear. Notable observations included song clips that were rated similarly highly for *Surprise*, *Fear*, and *Joy* (*M* = 17.03, *SD* = 23.08; *M* = 16.89, *SD* = 21.55; *M* = 16.10, *SD* = 22.41; respectively). For two different musical clips intended to convey fear, the highest ratings went to *Sadness*, (*M* = 33.76, *SD* = 30.77; *M* = 32.67, *SD* = 32.29; respectively) followed by *Fear*, (*M* = 21.99, *SD* = 26.67; *M* = 21.60, *SD* = 25.46; respectively), which might suggest similarities between the two when it comes to music. The large standard deviations for these ratings helps illustrate the degree of disagreement between participants listening to this musical clip.

Musical clips written to convey surprise produced high mean emotion ratings for several emotions including *Fear* (*M* = 29.44; *SD* = 30.39), *Anger* (*M* = 47.83; *SD* = 31.64), and *Sadness* (*M* = 35.80; *SD* = 32.00). While these three clips did not appear to convey the intended emotion, the other three Surprise clips displayed an interesting pattern in their mean emotion-ratings. For all three clips, *Joy* received the highest rating (*M* = 29.83, *SD* = 31.32; *M* = 33.84, *SD* = 29.74; *M* = 26.64, *SD* = 2.25; respectively), which was closely followed by *Surprise* (*M* = 16.35, *SD* = 24.53; *M* = 24.75, *SD* = 25.78; *M* = 23.75, *SD* = 27.39; respectively). Naturally, this outcome meant that neither emotion was significantly different enough from the others to be the clear response for these musical clips, but it suggests that the way that these emotions are conveyed or experienced may be similar. Surprise is an interesting emotion, because it may potentially be related more closely to fear or joy, or equally related to both. If that complexity comes across in these musical clips, it may be that the nuances of music can communicate a lot more than may have previously thought.

The mean ratings for musical clips intended to convey disgust were also all over the map. The highest ratings ranged from *Joy* (M = 30.89, SD = 27.19, $p < .001$), to *Sadness* (M = 18.02, SD = 24.744, $p = .024$), to *Anger* (M = 42.88, SD = 33.03, $p < .001$), again indicating that Disgust was not easily conveyed through music. One musical clip received similarly high means for *Anger* (M = 27.88; SD = 30.675) and *Disgust* (M = 25.76; SD = 29.80), which sparked thoughts about whether the song clip conveyed an emotion that was a kind of combination between the two, such as contempt.

Overall, the musical clips for these emotions did not produce clear-enough results to justify using them in the current study. There are likely several reasons that these clips produced ambiguous results, for example the complexity of the emotion itself, or the participants potentially being unused to describing musical clips as “disgusting,” “fearful,” or “surprising.” Future analysis seeks to examine the musical properties of each song to better understand what musical traits might be common to certain emotional ratings. We look forward to taking a more detailed approach to understanding what in music conveys a specific emotion.

Summary of Pilot Study

The goal for the pilot study was to find several musical stimuli that can convey a specific emotion, of Ekman’s (1992, 1993) theorized Basic Emotions. It was determined that having an equal number of musical clips to convey each emotion would be ideal for the current study. The only musical clips that had more than one statistically significant result for their respective emotion-category were those conveying *Anger*, *Sadness*, and *Joy*. There were at least three clips from these three categories that produced significant results, thus three musical clips intended to convey each of these emotions were chosen for the current study.

The Current Study

The above research found that six basic emotions are likely universal and can be conveyed across varied cultures through facial expressions and nonverbal vocal patterns. It is possible that non-verbal vocal patterns could have been an evolutionary precursor to both spoken language and music, especially because of the vast similarities that exist in structural features between music and voice, for elements like rhythm, pitch, and tone. Additionally, the presence of these features, in both, can help convey certain emotions. It is thus possible that music and language evolved together for similar purposes.

This evidence supports the notion that music is firmly and universally connected to a variety of emotions. However, none of the previous research has captured the different mechanisms that might lie behind the ability to detect emotions in music. One might argue that it is due to increased emotional intelligence, or musical training, or both. The above evidence indicates that musical training likely aids in the appraisal of emotions in music, but that training is not necessary, which makes it somewhat unclear the exact relationship that musical training plays in this capability and is it more or less important than the role that emotional intelligence might play.

Most people experience music in one way or another, but Western culture is one of the few that assumes that only those who are trained or talented at music can perform or create it publicly. But most people in any culture interact with music in some way, which means that there may be a kind of plateau effect when it comes to emotion recognition in music. Essentially, if someone interacts with music somewhat, that person will be able to detect an emotion in a piece of music, and any interaction with music beyond that does not make an individual any better at this task.

For a long time, musical practices were not reserved to the elite, talented few, they were part of daily life, meaning that everyone likely interacted with emotional music on a regular basis. Which would then suggest that most people would have had the ability to detect an emotion in a piece of music, because it would have been part of the social aspect of their culture, (Hargreaves, & North, 1999; Rice, 1996; Sloboda, O'Neill, & Ivaldi, 2001) which would likely have made that skill more related to emotional intelligence than it would have been to any kind of musical training, especially because musical training likely did not exist the same way it does today. If this study finds that emotional intelligence is more related to the ability to perceive emotions in music than training is, for participants from different musical backgrounds, this outcome would provide evidence for music being an essential part of social life for ancestral humans.

The current study seeks to expand on the findings of the pilot study, using a subset of the original musical clips, as well as pre-validated ones, to explore the differential effects of emotional intelligence and musical training on the ability to accurately detect the emotional content of a piece of music across cultures. The hypotheses are as follows:

1. Participants, regardless of country of origin, will be able to detect an emotion in a piece of music. This result will be determined by their ability to rate the intended emotion highest, compared to other emotions.
2. Emotional intelligence will be a better predictor of the above ability for participants, regardless of cultural origin, than will previous musical training/experience.

If emotional intelligence, compared to musical training, better predicts scores on this music-emotion-detection task, it would support the idea that the emotional content of music has a distinct relationship to human both the ontogeny and phylogeny of the human experience. Our hope is that this research, in the long run, might help provide an understanding as to why and how music can convey these emotions, and if that may have been adaptive.

Method

Participants

Participants were selected via their participation in an emailed-survey. Any consenting adults who spoke either English, Turkish, Chinese, Bulgarian, or Spanish were permitted to participate in the survey. The only potential criterion for limiting participants was based on their hearing ability. Participants were asked not to partake in the survey if they had any history of severe hearing issues, as this disability may interfere with their ability to hear the important features in each piece of music.

Participants came from cultures around the world, including the United Kingdom, the United States, Bolivia, Bulgaria, China, and Turkey. These countries and cultures feature vast amounts of linguistic and cultural diversity, such that it made for a vast sample. This sample features people from four different continents (North America, South America, Europe, and Asia), speaking five different languages (English, Spanish, Chinese, Turkish, and Bulgarian), and from at least seven countries (America, Bolivia, Turkey, Bulgaria, Great Britain, Ireland, and China).

Overall, 317 people responded to the survey. Only four were Chinese (1.3%) and only eight were Bolivian (2.5%), making those the smallest samples. This condition also meant that in later analyses when language groups were analyzed independently from each other, these two samples were not included. Thirty-two (10.1%) respondents were Turkish, and 105 (33.1%) were Bulgarian. The largest sample was that of the English-speaking participants, which was 168 people (53.0%). Across all samples, we had 79 male participants (24.9%), 222 female participants (70%), and one participant who chose "not mentioned." Ages ranged from 18-64, with the majority (78%) falling between 18 and 25. Most participants identified as White/Caucasian, at 213 (67.2%). Twenty-Three (7.3%) participants identified as Latin-American, ten (3.2%) selected African/African-American, five (1.6%) identified as Asian/Asian-American, and only one (.3%) person identified as Middle-Eastern. Fifteen participants selected "not mentioned," and within the open-ended part of the question, several participants listed Turk, biracial, or multiracial.

This sample was based off the ability to locate translators who were fluent in English and one of the above languages, and who were willing to do the survey translation for us. This translation included the survey questions, the consent form, and the recruitment script. All translations were approved by the IRB.

An advantage to this sample is that it provided for participants with origins across the world, including participants from East Asia, Europe, Eastern Europe, the Middle East, South America, and North America. This sample meant that there is representation from cultures across the spectrum when it comes to Hofstede's cultural dimensions. These dimensions were examined for the current study in order to provide an even cultural distribution along a series of well-researched concepts for which there is a lot of cultural variation around the world.

Hofstede (1984) described several different dimensions that a culture can be classified by. These dimensions include Individualism, Power Distance, Long Term Orientation, Uncertainty Avoidance, Masculinity, and Indulgence. Each dimension describes a spectrum onto which a given culture can fall, describing the degree to which it ascribes to the values associated with that dimension. Available ratings by the Hofstede Institute (2018) for each country are featured in *Table 2*.

Individualism versus Collectivism

Individualism versus collectivism is a commonly cited example, especially when describing differences between traditionally Eastern and traditionally Western cultures. A more individualist culture will tend to value independence, and it is expected that individuals will prioritize taking care of themselves and a small number of family only. Collectivist cultures tend to value more interdependence, where it is expected that family members will take care of each other and be completely loyal (Hofstede, 1984).

Power Distance

Hofstede (1984) describes Power Distance as the degree to which society members acknowledge that societal power in a variety of institutions is unequal, which can impact behavior in all members, no matter how much power they have. Cultures with a small Power Distance usually value equality between society members and strive to achieve this fairness when inequality appears to be unreasonable. Large Power Distance cultures understand that there are hierarchies that include each individual in a different position, no justification necessary. This feature helps explain how or why institutions are set up they way they are.

Uncertainty Avoidance

Uncertainty Avoidance describes how comfortable society members are with ambiguity. There are implications here with regards to how much a society values tradition, social norms, and conformity, versus flexibility and tolerance. High Uncertainty Avoidance means that a culture believes in strict conformity and behavioral norms, with a high amount of intolerance towards social deviance. Cultures that are Low in Uncertainty Avoidance tend to me more relaxed towards deviance or unorthodoxy. This dimension also includes the way a culture deals with the reality that we cannot know the future (Hofstede, 1984).

Masculinity versus Femininity

Hofstede (1984) uses the terms *Masculinity* versus *Femininity* to describe different kinds of cultures, this definition includes the degree to which a society assigns social roles to the different sexes. Masculine cultures tend to be more divisive in terms of the allocation of social roles to men and women. These societies emphasize achievement, ambition, and assertiveness, as well as individual success. Feminine societies tend to put less emphasis on this division of social roles. These cultures also accentuate relationships, caring for others, and modesty. Some more feminine cultures have been colloquially known as *welfare states*, since they try to emphasize the health and wellbeing of all its members (Hofstede, 1984).

Long Term Orientation

Long-term versus Short-term Orientation refers to the extent to which a culture maintains its connections to its heritage. Societies who have a short-term orientation tend to emphasize tradition and are reluctant to change. A long-term orientation would describe a society that is more open to change and progress as they move towards the future (Hofstede Institute, 2018).

Indulgence

Cultures that are more permissive and allow freedom with regards to an individual's desire to enjoy life and seek personal interests while satisfying their human needs would be described as Indulgent. On the opposite side of the scale, Restraint describes a culture that uses rigid social customs to restrict this kind of freedom (Hofstede Institute, 2018).

Procedures

The survey was distributed to potential participants via Email and Facebook post. Participants received a link to a survey on Qualtrics where they listened to 9 musical clips, three intended to evoke each of Ekman's (1992, 1993) six basic emotions: Anger, Joy, and Sadness. Below the question, participants saw three basic emotions, Anger, Joy, and Sadness, next to a scale from 1-100 with a slide-bar. They were asked to use the slide bar to rate the degree to which each emotion exists in the musical clip they just heard. Participants were able to play the musical clip as many times as they would like. After listening to the musical clips, participants were asked several questions about their musical experiences and/or training, and their emotional intelligence. The latter came from the Schutte (1998) scale of emotional intelligence.

The data from the study was analyzed using SPSS. Each of the measures was scored separately, meaning that each participant had a score for their musical training, emotional intelligence, *target agreement* (listening scores) and for *consensus agreement*. We looked at *target agreement*, and *consensus agreement*. *Target agreement* describes an individual's ability to detect the emotion intended by the composer in the piece of music, this is also referenced below as *Listening Score*. C*onsensus agreement* describes when several participants choose the same emotion for a piece of music. These are described in more detail below. This analysis is based on research done by Mayer and Geher (1996). A more detailed explanation of target and consensus agreement is found below. A multiple regression was run, examining whether musical training and/or emotional intelligence are predictors of the level of accuracy with which the participants rated each clip for the appropriate emotion.

Materials

Detection of Emotion in Music

This study used musical clips from the pilot study, all played on one instrument by one person, who comes from a western musical tradition. This procedure was intentional, as is stated above. Additionally, since music and emotions can be subjective, we hoped that using one musician would allow for consistency of expression, since the purpose of the pilot study was simply to see if these musical clips did convey the intended emotion, according to the subjective opinions of the listeners. Additionally, we understood that all the musical clips would be coming from the western musical tradition. It was felt that this factor would not be a confound, because, ideally, if an individual or group of individuals can recognize emotions in the music of other cultures, that still stands to support our hypothesis. In this sense, the participants who come from Western backgrounds serve as controls.

Emotional Intelligence

The Schutte (1998) Emotional Intelligence Scale (SEIS) was used to assess emotional intelligence. The scale is based off constructs set down by Salovey and Mayer (1990). Items are used to assess emotional regulation, utilization, expression, and appraisal, and has an internal consistency of 0.90. There are four subscales that make up a total score, which include *Perception of Emotion, Monitoring of One's Own Emotions, Monitoring of Others' Emotions,* and *Utilization of Emotion.* Participants will respond to questions using a Likert scale from 1-7, sample items include: *By looking at facial expressions, I recognize the emotions people are experiencing* and *I know why my emotions change,* as well as *I know what other people are feeling just by looking at them.*

The scale was developed from 62 original items based on the model of Emotional Intelligence by Salovey and Mayer (1990). The survey has been correlated with measures of similar traits, including positive correlations with the Attention, Mood Repair, and Clarity subscales of the Trait Meta Mood Scale, a negative correlation with the Zung Depression Scale, and a positive correlation with the Optimism subscale of the Life Orientation Test. An examination of the survey's test-retest reliability produced a score of 0.78, after participants completed the measure once, and then again two weeks later. There was also a positive prediction of GPA, as related to scores on the SEIS (Schutte et al., 1998).

Additionally, this scale has been translated and tested with individuals internationally, to investigate cross-cultural validity. The survey has successfully been validated with populations from Turkey, (Tatar, Tok, & Saltukoğlu, 2011) Saudi Arabia, (Naeem, & Muijtjens, 2015), and international students from Africa, Asia, Oceanic countries, Europe, and South American countries, studying across 28 states (Ng, Wang, Kim, & Bodenhorn, 2010). These studies give us confidence that using the Schutte Emotional Intelligence scale on a cross-cultural population will still provide meaningful responses.

Musical Training

A questionnaire was used determine previous musical training. Professors from a university's music department were consulted with respect to the questions, to make sure they are clear and comprehensive enough to achieve our goal. Much of the musical testing that currently exists in academia is in the form of musical aptitude tests, which usually involved sight-reading, listening exams, and other similar tests of skill (Gordon, 1989; Watkins & Farnum, 1954). Since we wanted to examine what kinds of musical training and experiences our participants may have had, a unique list of questions was composed to accomplish that goal. This section of the study included questions intended to get at a range of different musical experiences including school training, private training, and amateur practice. A sample of questions included: *For how many years have you played a musical instrument as an amateur (including voice)? For how many years have you received formal instruction (e.g. private lessons/training, school courses), in a musical instrument (including voice)?* and *For how many years/semesters have you taken a music theory class? (Do not include ensembles, such as orchestra, band, or choir).* Again, these were designed to examine the musical experiences of our participants. It is important to note that our sample was intended to include participants of varying musical backgrounds.

Analyses

Target Agreement

Target agreement concerned whether an individual was able to detect the emotion intended by the composer. These scores were calculated by comparing each emotion score per clip. If an individual gave the target emotion the highest score, compared to the other emotion options, then that warranted one point towards that person's listening score, with regard to target agreement. For example, if a participant listening to one of the clips intended to convey sadness rated each emotion as follows: Anger - 18, Joy - 12, Sadness - 77, then that participant would receive one point, for giving the highest rating to the emotion that was intended by the musical clip (in this case sadness). If a participant listened to a clip that was intended to convey Anger, and rated each emotion as follows: Anger - 36, Joy - 45, Sadness - 11, then the participant would not receive any points, because the highest rating went to an emotion that was not the one intended by the composer.

Consensus Agreement

Consensus agreement was intended to measure an individual's agreement with the rest of the participants with regards to the emotion that a musical clip conveys. Scores were calculated by getting the absolute value of the difference between an individual's score and the mean score for that emotion per musical clip. This technique meant that lower numerical scores indicated higher consensus agreement. For ease of interpretation, consensus scores were multiplied by negative one, so that higher scores meant higher consensus agreement. For example, if a participant listened to a musical clip intended to convey Joy, and gave the following ratings: Anger - 15, Joy - 88, Sadness - 20, and the means for each emotion for this musical clip were as follows: Anger - 11, Joy - 80, Sadness - 15, then the participant's consensus agreement score (in absolute value) would be (|Anger - *M* Anger| = 4) + (|Joy - *M* Joy| = 8) + (|Sadness - *M* Sadness| = 5) = 17. Again, a lower score indicated more consensus agreement with the means for each emotion for each musical clip. Again, these scores were then multiplied by negative one so that lower scores meant less consensus agreement. We calculated two consensus agreement scores for each participant. The first was a total agreement score, which included every emotion option for every song clip, 27 in total. The second was Total Consensus Agreement for agreed-upon Emotion (TCAE), for which we only totaled scores from the highest-scoring emotion per musical clip, nine in total.

Results

The data from the study was analyzed using SPSS. Scores for each participant included target agreement (listening score) and the two scores for consensus agreement. These were compared with participant scores on the measures of musical training and emotional intelligence. A multiple-regression was run to determine whether musical training or emotional intelligence predicts greater variance in ability to detect an emotion in a piece of music.

Descriptive Statistics Across the Samples

Descriptive statistics were calculated across all samples. The total emotional intelligence score on the SEIS which ranged from 91-221 was about 169 (*SD* = 24.74, *N* = 276). Total listening scores for the target emotion for the whole sample varied from 0-9, and had a mean of 5.53 (*SD* = 2.20, *N* = 317). The number of years a participant spent playing an instrument varied from 0 to 50, with a mean of 4.84, (*SD* = 7.39, *N* = 279). We also calculated mean scores for total consensus agreement, and total consensus agreement for the emotion per musical clip that had the highest overall mean score. Both scores had wide ranges, with consensus agreement varying from 228.54 to 1310.78, and agreed consensus agreement varying from 79.51 to 491.27. The mean for total consensus agreement was 443.96 (*SD* = 128.03, *N* = 317), and the mean for agreed consensus agreement was 220.91 (*SD* = 76.67, *N* = 317). A complete list of these scores can be found in *Tables 3-5*. Participant ratings for each emotion-option for each musical clip are featured on *Table 6.*

Overall, participants from each cultural group tended to rate the same emotion highest, even if that emotion was not the one intended by the musical clip. One interesting observation: the first two Anger song clips that participants were presented were not rated highly for anger, even though they were in the pilot study.

Correlations among the Variables

A series of bivariate correlations was run to examine initial relationships between the different variables across-cultures. Each set of correlations compared the measures that were used to examine Emotional Intelligence, Musical Training, Listening Scores, and Consensus Agreement. Because each variable featured a variety of subscales or measures, detailed correlations can be found in *Tables 7-12.* There were no significant correlations between the measures of consensus agreement, and any of the measures of musical experience. There were also no significant correlations between the total listening scores and the measures of emotional intelligence.

To our surprise the measures of emotional intelligence were negatively correlated with our measures of target agreement and consensus agreement across cultural samples. Again, these correlations were nonsignificant between SEIS and target agreement, but there were some notable correlations between SEIS and consensus agreement. Total Emotional Intelligence was significantly negatively correlated with Total consensus agreement scores ($r = -.141$, $p = .019$), and it was also significantly and negatively correlated with Agreed-Upon Consensus Agreement ($r = -.131$, $p = .030$). Because these correlations (both significant and nonsignificant), were negative, it appears that as emotional intelligence increased, consensus agreement decreased, which is opposite to what was predicted in the hypotheses.

As might be expected, total listening score (target agreement) was positively correlated with several of the measures of musical training, including years of playing an instrument ($r = .126$, $p = .036$), years of playing a second instrument ($r = .169$, $p = .006$), years of formal musical instruction ($r = .207$, $p = .001$), and number of hours per week spent listening to music ($r = .133$, $p = .027$). Musical training was also positively correlated with the emotional intelligence scores. Score for Utilization of Emotions was also significantly correlated with years of playing an instrument ($r = .134$, $p = .029$), years of formal instruction ($r = .129$, $p = .036$), and years of music theory classes ($r = .144$, $p = .020$). Total SEIS was only significantly correlated with number of years having taken a music theory class ($r = .175$, $p = .006$).

Bivariate correlations were also run to examine the relationships between target agreement and consensus agreement. There were moderately strong, and significant correlations between the measures of consensus agreement and total listening scores for the Joyful musical clips and the Sad musical clips, which are featured in *Table 12*. As might be expected, total listening score was significantly correlated with Agreed Consensus Agreement (r = .179, p = .001), and with Total Consensus Agreement (r = .214, p < .001).

Regressions

Predicting Target Agreement

A multiple regression was run to test the hypothesis about which factor would be a better predictor of emotion-detection in music, musical training or emotional intelligence. Each of the subscales for emotional intelligence was tested, however none were better predictors than the total emotional intelligence scores overall. The same was the case for the different measures of musical training, with “Total years of playing one instrument” (henceforth known as Years Playing an Instrument, or YPI) being the most powerful predictor as well compared to the other musical experience questions. The Turkish, English, and Bulgarian samples were the only individual cultural samples that were large enough to produce meaningful effects on their own, however the Turkish sample (N = 32) did not produce any statistically significant regressions. For the Bulgarian sample, the only variable that was a significant predictor of total listening score was Years Playing an Instrument (F(1,78) = 5.60, p = .020).

A similar analysis was done on the English-speaking sample to examine which variables were better predictors of target agreement. The regression suggested that YPI and SEIS were significantly predictive of total listening score for target agreement (F(2,129) = 7.201, p = .001), however SEIS was a negative predictor. These results are displayed in *Table 13.* Next we ran the same regression as above, but on the whole data set, so we could include all participants. The results indicated that SEIS and YPI were significant predictors of Total Listening Score across cultures ($F(2,239) = 4.856$, $p = .009$). However, like the correlations above, SEIS negatively predicted target agreement. The findings, illustrated in *Table 14,* seem to indicate that lower emotional intelligence predicted better target agreement by participants.

To test whether culture was predictive of target agreement, we ran an additional regression using dummy codes for those who spoke Bulgarian, Chinese, Spanish, and Turkish, using the English-speakers as the reference variable. The regression was statistically significant ($F(4,312) = 117.936$, $p < .001$), indicating that culture was predictive of Total Listening Scores. However, the Turkish sample had the highest Beta weight, and it was the only variable that was significant on its own. Oddly, all of the variables were negative predictors of total listening score. This negative relationship between culture and total listening score suggests that differences in music education may have impacted participants' ability to rate the "correct" emotion highest.

Predicting Consensus Agreement

Our second hypothesis concerned whether consensus agreement was also predicted by emotional intelligence scores. Again, initial regressions examined this question using only the English-speaking sample, and Bulgarian sample, since there were no significant regressions predicting consensus agreement within the Turkish sample. Two regressions were run on the Bulgarian sample, the first using Total Consensus Agreement as the dependent variable, and the second using Total Consensus for Agreed-upon Emotion (TCAE) as the dependent variable. TCAE examined only the consensus-agreement scores that were for the emotion with the highest mean for a given song clip, regardless of the emotion the composer intended (e.g., for Song 2, the highest mean score for an emotion was for Joy, so participant consensus-agreement scores for this question only included their responses to Joy). For both regressions, the predictors were

SEIS and YPI. Only the regression using SEIS and YPI to predict TCAE was statistically significant ($F(2,82) = 4.19$, $p = .018$). Again, emotional intelligence was negatively predictive of TCAE, and in this instance, YPI was negatively predictive as well, however the Beta-weight was relatively small (-.010). This can be seen in *Table 15*.

A regression was then run, testing the English-speaking sample if SEIS and YPI would predict consensus agreement as well. However, the English-speaking sample did not reveal any significant results, with one exception. SIES and YPI were used to predict the Total consensus agreement for only musical clips that participants agreed were “Sad,” and this regression was statistically significant ($F(2,132) = 4.86$, $p = .009$). *Table 16* displays these results.

The final regression used data from all samples to predict total consensus agreement from SEIS and YPI. The regression as a whole was predictive of an individual’s emotion-detection ability, however, like with target agreement, SEIS was negatively, significantly predictive of this ability ($F(2,248) = 3.24$, $p = .041$). This finding is especially interesting because target agreement scores are based purely on what was intended by the composer, which mean that a better understanding of the musical tradition of the composer might be necessary to accurately detect that emotion, and this may be less related to emotional intelligence. With consensus agreement, because this is based more on how a collection of people with varying musical experience interpret an emotion from a piece of music, one might think that higher emotional intelligence would be more important in this case.

Two final regressions were conducted to determine whether culture was a significant predictor of consensus agreement. These used the same dummy codes as the regression to predict target agreement. Culture was not predictive for total consensus agreement ($F(4,312) = .447$, $p = .775$), nor was it predictive of the total consensus agreement for the agreed-upon trait ($F(4,312) =$

1.26, p = .286). The regressions using culture to predict consensus agreement scores are illustrated in *Tables 17* and *18*.

ANOVA

A series of between-group ANOVAs were run to examine any differences in scores for each of the measured variables, between cultural groups, language groups, and sex. We compared both target agreement scores and consensus agreement scores. As with the regressions, each ANOVA was run within each language group, and then across each language group.

Turkish Sample

ANOVAs were run on the Turkish sample first, examining group differences between musicians, people who identified as being somewhat musical, and those who identified as not being musical at all. There were no significant differences for either target agreement or consensus agreement between self-identified musicians and non-musicians, indicating that this skill is not one that is purely based on musical training. There was one significant difference between musicians and non-musicians for measures of musical training, which was for the number of hours they spent per week practicing their instrument ($F(2,17) = 30.88$, $p < .001$). However, the other measures of musical training did not show significant differences between musicians and non-musicians. Additionally, there were no significant differences between musicians and non-musicians on their various emotional intelligence scores. Just by taking a cursory look over the group means, in general, most of these variables were low, indicating that the lack of significant differences may simply come from the fact that this group of Turkish participants does not have a large amount of musical experience overall.

Bulgarian Sample

Next, the Bulgarian sample was analyzed to examine group differences between musicians and non-musicians in these same variables. Unlike the Turkish sample, there were statistically significant group differences for the measures of musical training. This analysis included YPI ($F(2,88) = 22.56$, $p < .001$), years playing a second instrument ($F(2,87) = 12.61$, $p < .001$), years of formal training ($F(2,87) = 10.89$, $p < .001$), number of music theory classes ($F(2,83) = 11.81$, $p < .001$), and hours per week playing one's instrument ($F(2,84) = 30.99$, $p < .001$). A Tukey post-hoc revealed that these differences mainly existed between those who identified as musicians and those who identified as being not musical at all.

There was no statistically significant difference between musicians and non-musicians between how many hours per week they spend listening to music. Additionally, there were no statistically significant differences between musicians and non-musicians for any of the measures of emotional intelligence, any of the listening scores (target agreement), or the consensus agreement scores. This outcome suggests that for this sample, musicians and non-musicians are equally capable of detecting an emotion in music, whether that be an agreed-upon emotion, or the emotion intended by the composer, even when their musical experience differs significantly.

English-Speaking Sample

The English-speaking sample was also analyzed for potential group differences in these variables between musicians and non-musicians. As with the Bulgarian sample, there were statistically significant differences between musicians and non-musicians for the measures of musical training. This analysis included YPI ($F(2,154) = 28.85$, $p < .001$), years playing a second instrument ($F(2,144) = 19.46$, $p < .001$), years of formal training ($F(2,152) = 15.13$, $p < .001$), number of music theory classes ($F(2,152) = 3.88$, $p = .023$), hours per week playing one's instrument ($F(2,151) = 37.99$, $p < .001$), and hours per week listening to music which was the least significant ($F(2,149) = 3.197$, $p = .044$). A Tukey post-hoc test revealed that the musicians were significantly higher than those who identified as somewhat musical ($p = .049$), and those who identified as non-musicians ($p < .001$) for the number of years they spent playing a musical instrument. There were no statistically significant group differences between musicians and non-musicians for the measures of target agreement and consensus agreement.

Interestingly, there were a couple of significant differences with respect to the scores of emotional intelligence between English-speaking musicians and non-musicians. Total utilization of emotion revealed statistically significant differences ($F(2,148) = 6.91$, $p = .001$), with musicians having statistically higher scores than non-musicians.There was no statistically significant difference between people who identified as somewhat musical and either group. Additionally, total SEIS was also significantly higher for musicians than non-musicians ($F(2,134) = 3.34$, $p = .038$). As with the Bulgarian and Turkish samples, there were no significant differences between musicians and non-musicians for target agreement or consensus agreement.

Across Cultures

Finally, these analyses were conducted across cultural samples to examine if, overall, there are significant differences between musicians and non-musicians in the variables we tested. Similar to the above samples, musicians were significantly higher than both other groups (enjoys music, not musical at all) on almost all of the measures of musical training. These traits included YPI ($F(2,276) = 52.472$, $p < .001$), years playing a second instrument ($F(2,264) = 36.68$, $p < .001$), years of formal training ($F(2,273) = 33.58$, $p < .001$), number of music theory classes ($F(2,268) = 11.75$, $p < .001$), and hours per week playing one's instrument ($F(2,269) = 72{,}18$, p

< .001). The only variable that musicians did not score significantly higher on was the number of hours per week an individual listens to music.

Total listening scores (target agreement) almost reflected the within-cultures results, since those for Anger, Joy, and Sadness saw no significant differences between musicians and non-musicians. However, oddly enough, musicians were significantly higher on scores of total listening score ($F(2,305) = 6.442$, $p = .002$). There were no significant differences between musicians and non-musicians for consensus agreement. For the measures of emotional intelligence, there was only one subscale for which musicians scored significantly higher than non-musicians, but not significantly higher than those who are only somewhat musical, which was Utilization of Emotions ($F(2,276) = 5.469$, $p = .005$).

Additional ANOVAs were run to examine the differences in these variables based on which culture an individual was from. This was separated by language code, the language that the survey was translated in to, and thus the culture of the people who took that survey. A few of the measures of musical training did produce significant group differences. The first was number of years spent playing a second instrument ($F(4,262) = 3.90$, $p = .004$). However, the only significant difference here was between the English-speaking sample, and the Bulgarian sample, with a mean difference of only 2.74 more years for the English-speaking sample. The next measure that produced significant differences was number of years of formal education ($F(4,271) = 3.71$, $p = .006$). There were two group differences here, but only between the English-speaking sample and Bulgarian sample, and the English-speaking sample and the Turkish sample. The last music experience variable to produce significant differences was hours per week spent practicing an instrument ($F(4,267) = 2.67$, $p = .033$). In this case, the difference, again, was only between the English-speaking sample, and Bulgaria.

The listening scores produced interesting results. The Turkish sample displayed a Total Listening Score that was significantly lower than those of the other groups ($F(4,312) = 117.94$, $p < .001$). This may help explain their large, negative beta weight in the regression predicting target agreement. For the Listening Scores for Joyful Clips, Turkish participants only scored significantly higher than the Bulgarian sample ($F(4,312) = 4.09$, $p = .003$). There were no statistically significant differences across cultural samples for Total Consensus Agreement, or Consensus Agreement for the Agreed-upon emotion.

Emotional intelligence scores also produced significant differences between cultural groups. In this case, the Bolivian sample scored significantly lower than the other groups for Managing Others' Emotions ($F(4,290) = 6.79$, $p < .001$), and Utilization of Emotions ($F(4,290) = 18.18$, $p < .001$). However, it is important to remember in this case that the Bolivian sample was $N = 8$.

Initial thoughts about these results suggests that while there may be some group differences in musical training, emotional intelligence, and emotion-detection, it does not mean that these variables are any less predictive of one's ability to detect an emotion in a piece of music. In other words, despite the fact that there were slight differences between cultural groups on measures like Emotional Intelligence, it is still possible that these variables can be predictive, or at least associated with emotion-detection in music.

Discussion

The current study was intended to examine whether emotional intelligence, as measured by the Schutte Emotional Intelligence Scale (Schutte et al., 1998), was a better predictor of emotion-detection in music, than previous musical training, as measured by years playing an instrument. Overall, the second hypothesis was partially supported, in that SEIS scores were more predictive of emotion-detection than was musical training. However, this finding was in the opposite direction than was anticipated. The data indicated that those with lower emotional intelligence scores were *more* successful at detecting an emotion in a piece of music than those who had higher emotional intelligence scores. We examined target agreement as well as consensus agreement and found comparable results between the two. Analysis also indicated that when predicting for consensus agreement there was no significant effect of culture, but when predicting for target agreement there was a significant effect of culture, providing partial support for the first hypothesis.

Evolution and Music Revisited

The initial inspiration for the current study came from evolutionary theories of universal emotions and the universality of music in human populations, as well as the uniqueness of music to humans alone (Cross, 2003). The background for the study came from the idea that if music is a human universal, are there elements of music that can be identified across cultures. Today, musicians are given formal training, and in Western culture playing music appears to be reserved for those who are elite or talented, whereas this is not the case around the world (Hargreaves, & North, 1999; Rice, 1996; Sloboda, O'Neill, & Ivaldi, 2001).

Researchers have pondered the universality of music for years, and a variety of ideas have been put forth. Mainly, these focus around the concept of music being essential for the developing and maintaining culture through religious rituals, passing culture on through generations, storytelling, and integrating societies. Music has also been previously associated with creating rhythm during labor, as is well represented by sailors' sea-chanties, and the field hollers of the American Southeast. For these reasons, researchers have speculated whether music can be considered adaptive (Huron, 2001; Sloboda, O'Neill, & Ivaldi, 2001). To examine the potential adaptiveness and universality of music, the current study sought to determine whether an individual's ability to detect emotion in a musical clip is more related to an inherent trait or cultural training. If emotional intelligence was a better predictor, it could theoretically provide support that human understanding of music is more related to inherent traits than it is to cultural training. The cross-cultural element of the research was intended to help provide a universality that helps suggest the innateness of the understanding of emotions in music. This would mean that musical understanding is more innate to being human than may have been previously thought and could help forward research on music's potential adaptiveness.

As was stated above, the current study did find that emotional intelligence was a better predictor for emotion-detection, over previous musical experience, however the negative relationship between emotional intelligence and this emotion-detection ability has produced more questions that it has answered. It is tempting to initially try to make sense of this negative correlation from a methodological standpoint, however, there are other perspectives that need to be examined. To start, it makes sense to examine why people listen to music in the first place, and to what degree is that related to emotion. A developmental perspective takes these emotional incentives for music and connects it with social and emotional development in adolescence.

People listen to music for reasons varying from *background music* to helping *create or accentuate an emotion* (North, Hargreaves, & Hargreaves, 2004). One of the most cited reasons for listening to music is emotional expression (Hargreaves & North, 1999). Additionally, both listening to and playing music appears to be especially important to adolescents. Research specific to music and adolescents has discovered that teenagers tend to play or listen to music for a variety of reasons including coping with stress, working through hard times, and emotional expression. These observations have been found for both British and American adolescents

(North, Hargreaves, & O'Neill, 2000; Tarrant, North, & Hargreaves, 2000). Adolescence is also a time of large amounts of social and emotional development and change. Research on dopamine suggests that emotions experienced during adolescence constitute the highest highs and lowest lows that any individual experiences across the whole lifespan (Senior, 2013; Setoh, Qin, Zhang, & Pomerantz, 2015; Skoog, Ozdemir, &Stattin, 2015).

If there are adolescents who struggle with in-person interactions during a time of social and emotional development, could listening to music help fulfill their emotional needs without the face-to-face interaction? If this is the case, would that then mean that their understanding of musical emotions is better than their understanding of in-person emotions, potentially explaining the results obtained in the current study? This pattern of using music as emotional stimulation instead of human interaction could potentially reverberate through adulthood. The sample for the current study was mainly college students, making it more likely that musical or emotional habits learned as a teenager may still be potent a couple of years later. This could help explain why those with lower emotional intelligence were better at detecting emotions in music. This idea is compelling however it is also it is important to examine the predictive value of emotional intelligence as a construct.

Emotional Intelligence as a Predictor

Emotional intelligence is frequently thought of as an ability that varies based on individual differences (Geher, 2004). Two different definitions of emotional intelligence tend to emerge when discussing how to measure it. *Ability EI* describes emotional intelligence as a cognitive ability associated with emotion. This ability is frequently tested using a measure that requires participants to respond to emotional stimuli, such as facial expressions. The second definition for emotional intelligence is *Trait EI*, which considers emotional intelligence a group of personality attributes that can be associated with life success. Measures that test *Trait EI* tend to ask questions regarding how people use emotions to make decisions (Barchard & Russell, 2004). The questions featured on the Schutte Emotional Intelligence Scale suggest that it tests *Trait EI*, as opposed to *Ability EI*. If this is the case, our results should be considered in light of having tested a self-reported trait and not necessarily a psychological ability. It is possible that had we used a measure of emotional intelligence that tested *Ability EI*, that we may have found the results we anticipated. It is important to consider that self-report measures are sometimes described as inherently biased through intentional or unintentional sources (Bersoff & Bersoff, 2009).

Another Emotional Intelligence test, which has been cited as effective for measuring *Ability EI*, is the Mayer-Salovey-Caruso-Emotional Intelligence Test (MSCEIT). Some past research examined the potential relationship between the SEIS and the MSCEIT, as well as other measures of emotional intelligence, to determine if they displayed convergent validity. Mayer and Brackett (2003) had participants take several measures of emotional intelligence to compare scores. Participant scores on the SEIS and the MSCEIT were significantly and positively correlated, however the correlation was small ($r = .18$, $p < .01$). When computing the subscales, the only significant correlations were between total SEIS score and the *Regulation of Emotions* subscale ($r = .22$, $p < .01$), and *Facilitation* (using emotion to enhance cognition), ($r = .15$, $p < .05$). No significant correlations were found between total SEIS score and the *Perception of Emotion* subscale, or the *Understanding of Emotion* subscale. If our measure of emotional intelligence does not perform as well for determining an individual’s ability to perceive emotions, this fact may help explain why the results of the current study indicated that lower emotional intelligence, unexpectedly, corresponded to a participant’s an enhanced ability to perceive an emotion in a musical clip. Additional research suggests that scales that measure Trait EI, like the SEIS, are easier to fake scores on compared to measures of Ability EI, like the MSCEIT (Day & Carroll, 2007). Future research should take each of these discoveries into consideration.

Additionally, Newsome, Day, and Catano (2000) investigated whether emotional intelligence can predict academic achievement and found no significant results to indicate that it can. One thing to note is that Newsome, Day, and Catano (2000) used the EQ-i to measure emotional intelligence, which, according to Bachard and Russell (2004), would be considered a measure of *Trait EI* and not *Ability EI.* If that is the case, then it may be possible that *Trait EI* is not a successful predictor of academic achievement (or emotion-detection in music) but it does not conclude that *Ability EI* could not successfully predict these variables. Of course, emotion-detection in music, and academic achievement are not the same. However, this past research related to academic achievement does shed light on the possibility that emotional intelligence, or at the very least *Trait EI* is not an effective predictor of other behaviors. Hopefully, this research can potentially help provide insight on the nature of emotional intelligence as well as the nature of music.

Music

Music is an art that comes with an astonishing number of rules and structure. For those with a certain degree of expertise in music, those rules and structure can easily translate in to musical themes that depict emotion based on those rules. However, for people who do not have expertise in music, it may be that detection of emotion is not related to musical training because their experiences of musical emotions may come from more informal sources, such as folk music.

Is it possible that when people are asked to reflect on the emotional content of a set of emotional stimuli, that while they are processing that stimuli, they develop a set of rules surrounding those stimuli related to what constitutes a feature of each emotion? Research on contrast effects would suggest that exposure to a stimulus later impacts the perception of that second stimulus. In this case, exposure to joyful and sad songs would later impact the perception of the angry song, making it sound more uniquely angry in comparison with the joyful and sad clip previously listened to. This idea may explain why the first two clips intended to convey anger received more ambiguous ratings than did the very last anger clip, compared to when those clips were featured in the pilot study. Traits associated with what makes a song joyful, sad, or angry may have formed differently due to the order the clips were presented in. These traits would have also formed differently compared to when our composer wrote them, because he approached each clip independently of the others, unlike our participants, who were asked to listen to all clips in the same sitting. This situation would mean that each clip would have to have an impact on each later clip, thus producing a contrast effect within a musical or emotional domain. Preliminary studies suggests that contrast effects can be found with regards to both emotions (Li, Qi, Liu, & Luo, 2012),and music (Parker, Bascom, Rabinovitz, & Zellner, 2008), however there is still research that can be done to examine this.

In a related vein, is it possible that having fewer options was part of the reason behind why people were reluctant to choose “Anger.” Of all six basic emotions, Disgust, Fear, and Surprise, received the most ambiguous ratings overall, which suggests that they are not easily conveyed through music, or at the very least, that their rarity as emotions expressed in music may have caused people to be reluctant to rate those emotions highly for any piece of music they heard. If this circumstance is the case, then it may be possible that out of a much smaller selection of emotions, where Anger is the most ambiguous and least frequently conveyed through music, participants may have been more reluctant to rate it highly. This possibility may help explain why people struggled with rating the anger clips highly for anger, compared to the pilot study.

Cross-Cultural Variation

Naturally, it is also important to discuss the possibility that because musical traditions vary around the world, it may not always be possible for musical emotions and themes to be conveyed cross-culturally. One of the most interesting findings from the current study came out of the regression that was run using the cultural dummy codes to examine whether there was a significant effect of culture on an individual's target agreement or consensus agreement. The regression provided evidence suggesting that culture is a negative predictor of target agreement, meaning that any individual in our sample who was not from an English-speaking country, or at the very least, from the United States, would have lower predicted target agreement scores. It suggests that when it comes to correctly guessing the emotion intended by the composer, participants who were not from the composer's culture scored significantly lower, suggesting that this task was culturally dependent. If that is the case, it may be associated with differences in musical training, since Target Agreement scores were based off of the emotion intended by the composer, which he may have attempted to convey using specific musical themes. If a specifically western musical background was necessary for scoring well on target agreement, it may explain why there was no correlation between target agreement and SEIS for the cross-cultural sample. Below, we discuss the musical backgrounds and traditions from each of the cultures that produced our sample.

Bolivia

In Bolivia, a *copla* is a unit of music in what might be considered a verbal duel. Different genres of coplas are sung around different festivals during the year, each genre with its own stylistic rules. The songs are sung in a kind of call-and-response fashion between two people, each person creating verbal space for the other to retaliate. It is believed that this song-dueling comes from the Iberian roots of some of the settlers to Bolivia. It is believed that this Iberian heritage is also reflected in the style of the music itself (Solomon, 1994).

China

Research indicates that musical education is important in Chinese culture. A Confucian teaching claims that music is the most effective way to create human harmony in groups. As it relates to the current study it is clear that music education is part of a typical Chinese upbringing (Law & Ho, 2009; Law & Ho, 2011). Part of this education has focused on traditional Chinese culture, which suggests that part of the curriculum features music traditional to China. This is an important detail because traditional Chinese music is played on instruments and in scales very different from those in Western music, producing music that sounds very different from what we are familiar with (Moule, 1907). It is unclear if this is the only kind of music taught in Chinese schools (or if it is taught at all). However, the issues that appear to come into play surrounding globalization, which has created space for musical traditions from around the world to be easily accessible, suggest that part of the goal of music and cultural education in Chinese schools is to reinforce this sense of nationalism and value (Law & Ho, 2009). Thus, it would make sense that a large part of the music curriculum features music traditional to China's past. This being said, it can be hard to determine if these traditions would have impacted our sample, since we only had four Chinese participants.

Turkey

Turkish music can also be characterized by scales that are different from those typically used in the United States (Akkoc, 2010). Music in Turkey can be partially characterized by a *Taksim,* which is a kind of improvisation across a *Maqam,* which is a “musical environment” consisting of different notes along a particular scale. These scales are considered to be “non-deterministic” meaning notes appear anywhere along the scale, at frequencies that are not predetermined. Typical Western music uses deterministic scales, where every note along the scale is a fixed point. Instruments, like the *Kemence,* which are designed to play on non-deterministic scales, have more flexibility than an instrument like the Piano, for which the keys are tuned to exact pitches (Akkoc, 2010). This culture creates a musical tradition different from that of Western music.

Typical music instruction, as part of higher education in Turkey, consisted of training musicians to be performers, or training music teachers. However, many undergraduate students have very little or no musical training before starting university education, since music classes are not offered at all public schools. This inconsistency in musical training may help explain why the Turkish sample had particularly low scores for target agreement (Kasap, 1999). The above analysis that used cultural identity to predict target agreement indicated that being a Turkish-speaking participant was the strongest negative predictor for target agreement, it might be possible that this is due, in part, to the lack of uniform musical education in Turkey.

Bulgaria

Bulgarian music has frequently been compared to Turkish music, since they share a border. Bulgarian folk music features meters that are asymmetrical, (⅝ or ⅞) and is played on traditional instruments, such as the Gaida, a kind of Bulgarian bagpipe (Campbell, 2003; Krader, 1969). Traditionally, the kind of music an individual learned was related to what kinds of work their family did, and would have been captured in the work life of the family, taught to children aurally. However, like in China, when Bulgaria became communist, music became an essential way to build national identity (Rice, 1996). Orchestras of traditional Bulgarian instruments were created that helped build the image of a modern Bulgaria. Being a professional musician became a lucrative profession. Again, like China, music education became part of creating citizens who identified with and celebrated their culture (Rice, 1996).

Summary

In contrast to our results with target agreement, consensus agreement scores (both total consensus agreement and TCAE) were not significantly predicted by culture. Not only is this compelling because the result was not significant, meaning that being an English-speaking listener does not increase an individual's consensus agreement score, but because each *b* value was positive, which was the exact opposite to what was found when this variable was used to predict target agreement, and indicates that being from any particular culture would increase consensus agreement, meaning that it is possible that each cultural sample contributed something unique and different to the emotions that it was agreed were conveyed by a piece of music.

The outcome of the current study suggests the possibility that when a community of people agree on the emotion conveyed in a piece of music, cultural differences do not impact an individual's scores on that agreement. This reasoning suggests that, perhaps, culture does not matter, when everyone in a multicultural group agrees on the conveyed emotion. Basically, a group of people from around the world made decisions with regards to what emotion was the most salient in a piece of music, and when the scores of those participants were evaluated individually, the culture they came from did not significantly predict that person's agreement.

This reasoning may also partly explain why the correlations between consensus agreement and musical training were not significant, because there is no common musical training that exists between all of these cultures that would constitute that relationship. Several people from different communities with arguably different musical backgrounds agreed on what emotion was conveyed.

Limitations and Future Directions

One of the most obvious limitations to this study is the fact that all of the musical clips were composed by one individual. As was stated above, this procedure was intentional to give us a greater degree of control over the musical clips, such that the only variation between each clip was melody and rhythm. Naturally, there is a degree of subjectivity that goes along with any individual person's interpretation of an emotion and of what kinds of music or sounds may elicit it. The composer was provided with Ekman's (1992, 1993) research to help inform his creation of each musical clip. This instruction does not necessarily change the inherent subjectivity of the musical clips.

As there is subjectivity in the creation of musical clips that are intended to convey emotions, there is subjectivity in the interpretation of these clips. In theory, the sample size is intended to help control for this potential issue. That being said, there were a couple of samples that were not as large as was hoped. Our Turkish sample was only 32, but this number was still hefty compared to the Bolivian sample of eight, and the Chinese sample of four.

In addition, there is the argument that in a modern, internet-based era, it is not difficult for people to get access to music from around the world. Additionally, there is a lot of music that is produced by Western and English-speaking countries, such that the samples that we used may not have truly tapped in to the cross-cultural nature of music. It may be more beneficial in the future to examine musical samples like these in cultures that have limited or no access to western music.

Another possibility is that our measurements for musical training did not adequately capture differing musical experiences. The main variable that was used was number of years of having played a musical instrument, since this variable tended to actually have an impact or relationship with the other variables. Additionally, different cultures have different practices with regards to the importance or commonness of playing a musical instrument, as is cited above (Kasap, 1999;Law & Ho, 2009; Law & Ho, 2011; Rice, 1996). This cultural variation may have impacted the influence of musical training on a participant's emotion-detection abilities.

These findings are provocative, and necessitate the need for further examination of emotional intelligence and its relationship with music, and musicians. Additionally, larger and more varied cross-cultural samples may help provide insight that our small samples in this study were unable to capture. It is also essential that we examine other measures of emotional intelligence, those that potentially get at *Ability EI* and not just *Trait EI,* to see if there are elements that can be predictive of emotion-detection.

The above analyses helped test our hypotheses, but the data that have been collected are rich, and there are still questions that they can be used to answer. Moving forward, it is our goal to continue examining these questions to get a better understanding of the relationship between music's ability to express emotions, and the human ability to perceive those emotions.

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Tables

Table 1: *Means and Standard Deviations for all 36 Original Musical Clips*

	Anger	Surprise	Fear	Joy	Disgust	Sadness	
Song Emotion	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*N*
Anger							
Melodic							
Song 1	16.81 (23.41)	10.61 (19.10)	8.78 (16.65)	4.51 (11.71)	18.06 (23.83)	21.89 (27.60)	89
Song 2	5.99 (13.29)	20.89 (26.15)	20.15 (24.32)	12.10 (22.38)	6.25 (14.31)	9.16 (17.84)	89
Song 3	11.78 (19.30)	20.82 (24.70)	16.67 (21.58)	5.66 (14.01)	14.92 (24.06)	6.57 (14.52)	89
Rhythmic							
Song 4*	37.44** (28.56)	8.31 (17.31)	8.74 (16.74)	7.96 (17.01)	13.19 (20.06)	8.37 (15.51)	89
Song 5*	32.12** (32.01)	12.90 (22.30)	7.49 (16.12)	8.81 (19.78)	12.82 (22.72)	4.31 (9.33)	89
Song 6*	32.40** (28.00)	13.71 (21.73)	4.31 (11.13)	23.34 (27.58)	8.98 (15.86)	5.00 (12.34)	89
Disgust							
Melodic							
Song 7	11.07 (18.31)	12.75 (16.61)	8.15 (18.55)	30.89** (27.19	4.22 (11.84)	15.66 (21.38)	89
Song 8	27.88 (30.68)	13.00 (22.60)	16.19 (22.96)	3.57 (10.49)	25.76 (29.79)	6.78 (16.57)	89
Song 9	19.82 (25.17)	11.62 (21.58)	30.29 (30.77)	1.48 (6.82)	25.94 (29.49)	9.28 (18.09)	89
Rhythmic							
Song 10	15.87 (22.31)	11.61 (20.84)	8.12 (17.16)	12.67 (21.78)	10.49 (18.67)	18.02 (24.74)	89

Song 11	42.88** (33.03)	12.83 (19.91)	8.35 (18.64)	2.33 (8.02)	18.07 (26.38)	10.04 (18.41)	89
Song 12	19.36 (26.16)	15.87 (21.15)	6.11 (14.91)	18.99 (27.65)	10.80 (21.21)	4.76 (11.06)	89
Fear							
Melodic							
Song 13	19.19 (27.88)	15.16 (24.00)	38.25** (32.54)	2.97 (12.51)	11.20 (21.34)	18.24 (25.46)	89
Song 14	11.31 (21.06)	7.15 (14.55)	21.60 (25.46)	0.96 (3.83)	14.82 (21.59)	32.67** (32.29)	89
Song 15	11.82 (16.85)	17.03 (23.08)	16.89 (21.55)	16.10 (22.41)	5.81** (14.24)	14.30 (19.14)	89
Rhythmic							
Song 16	16.33 (21.13)	18.65 (24.00)	10.18 (20.03)	18.82 (24.45)	9.76 (18.02)	7.62 (16.33)	89
Song 17	15.53 (20.94)	17.92 (25.54)	5.74 (13.41)	20.72 (27.24)	7.89 (15.67)	8.12 (15.77)	89
Song 18	9.30 (17.65)	10.97 (18.86)	21.99 (26.67)	1.28 (4.13)	13.98 (19.78)	33.76 (30.77)	89
Joy							
Melodic							
Song 19*	0.63 (2.40)	13.42 (19.86)	0.72 (2.57)	66.09** (28.28)	0.48 (1.95)	2.63 (6.52)	89
Song 20	1.54 (5.74)	7.57 (16.25)	4.87 (12.38)	18.92 (24.04)	3.30 (9.04)	28.19** (29.50)	89
Song 21	2.30 (8.64)	3.09 (9.33)	9.91 (18.27)	5.98 (13.07)	3.13 (8.61)	50.82** (32.75)	89
Rhythmic							
Song 22*	3.90 (13.04)	14.01 (19.46)	2.13 (9.11)	62.82** (30.84)	2.18 (8.94)	4.02 (9.37)	89
Song 23*	1.31 (7.11)	7.93 (18.45)	2.21 (7.20)	60.64** (30.10)	1.10 (4.60)	12.42 (18.91)	89
Song 24	9.58 (18.71)	15.37 (20.55)	3.09 (12.59)	55.70** (31.02)	2.90 (9.52)	3.44 (11.08)	89

Sadness							
Melodic							
Song 25*	3.42 (10.74)	4.93 (14.85)	8.08 (15.99)	1.62 (4.56)	3.40 (11.23)	70.00** (26.77)	89
Song 26*	4.18 (11.19)	5.58 (14.20)	11.01 (19.66)	4.00 (14.41)	5.84 (13.96)	54.85** (30.79)	89
Song 27	8.89 (17.08)	6.33 (15.03)	25.92 (28.10)	1.83 (7.09)	9.87 (19.63)	46.03** (31.93)	89
Rhythmic							
Song 28*	4.28 (10.66)	2.67 (8.70)	10.28 (18.80)	2.81 (10.92)	4.70 (12.80)	69.70** (27.50)	89
Song 29	3.28 (9.45)	5.30 (14.48)	9.84 (17.63)	9.45 (17.87)	5.03 (13.18)	64.37** (30.12)	89
Song 30	7.09 (16.54)	11.83 (18.37)	3.72 (10.21)	37.44 (29.57)	4.69 (11.91)	16.97 (19.58)	89
Surprise							
Melodic							
Song 31	1.63 (5.82)	16.09 (24.18)	8.96 (17.49)	10.08 (17.93)	4.89 (13.96)	35.80** (32.00)	89
Song 32	2.15 (6.83)	16.35 (24.35)	3.94 (10.72)	29.83** (31.32)	4.21 (13.25)	14.81 (24.65)	89
Song 33	6.08 (16.74)	23.75 (27.39)	8.34 (17.83)	26.64 (28.25)	5.6 (15.18)	5.93 (16.26)	89
Rhythmic							
Song 34	6.83 (14.84)	24.75 (25.77)	5.00 (13.71)	33.84 (29.74)	4.71 (14.45)	2.38 (6.46)	89
Song 35	13.82 (20.76)	26.08 (28.74)	29.44 (30.38)	9.04 (19.70)	14.43 (23.93)	7.26 (15.96)	89
Song 36	47.83** (31.64)	18.74 (25.29)	13.19 (19.94)	9.16 (20.82)	17.88 (26.38)	3.9 (14.71)	89

*Musical clips that were selected for the current study
** Emotion-ratings that were significantly higher than others at $p < .001$

Table 2: Ratings for each country based on research by the Hofstede Institute (2018)

Variable	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-Term Orientation	Indulgence
United States	40	91	62	46	26	68
United Kingdom	35	89	66	35	51	69
Bulgaria	70	30	40	85	69	16
Turkey	66	37	45	85	46	49
China	80	20	66	30	87	24
Bolivia?	49-69	16-46	28-56	76-87	20-44	46-68
South America	**61.25 (59)**	**30.75 (31)**	**43.75 (42)**	**83.75 (81.5)**	**30 (32)**	**58.75 (57)**
Average	**58.71**	**49.63**	**53.79**	**60.79**	**51.5**	**47.46**

Scores are featured for each of Hofstede's Dimensions for each country for which the data had been collected. No data existed for Bolivia. The ranges above feature the means and medians for all of the countries that border Bolivia, in the interest of approximating what their scores might be. In the row labeled "Bolivia" is the range of scores from the surrounding countries for which we had data.

Table 3: Means and Standard Deviations for Each Culture's SEIS Scores:

	Bulgarian		Chinese		English		Spanish		Turkish		Total	
Variable	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*
Perception of Emotion	52.39 (39)	76	45.50 (12.02)	2	51.48 (9.43)	120	39.50 (13.89)	8	54.72 (6.76)	18	51.86 (9.65)	291
Monitoring One's Emotions	47.18 (6.06)	76	43.50 (13.44)	2	42.90 (8.67)	120	36.50 (6.99)	8	47.28 (6.83)	18	44.59 (8.43)	290
Monitoring of Others' Emotions	40.22 (5.15)	76	41.50 (9.19)	2	40.09 (7.88)	120	27.88 (8.04)	8	43.06 (6.47)	18	40.19 (7.35)	295
Utilization of Emotion	32.42 (5.36)	76	35.00 (8.49)	2	30.57 (5.39)	120	46.25 (6.27)	8	33.06 (5.20)	18	323.08 (6.12)	295
Total Emotional Intelligence	172.22 (20.637)	76	165.50 (43.13)	2	165.03 (25.53)	120	150.13 (30.10)	8	178.11 (19.63)	18	168.92 (24.74)	276

Table 4: Means and Standard Deviations for Target Agreement and Consensus Agreement

	Bulgarian		Chinese		English		Spanish		Turkish		Total	
Variable	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*
Total Anger Listening Score	1.00 (.98)	105	.50 (.71)	4	1.19 (938)	168	.75 (.71)	8	2.06 (.80)	32	1.15 (.98)	317
Total Joy Listening Score	2.16 (.77)	105	2.50 (.71)	4	2.37 (.67)	168	2.13 (1.13)	8	2.72 (.76)	32	2.31 (.78)	317
Total Sadness Listening Score	2.86 (.42)	105	2.50 (.71)	4	2.88 (.34)	168	3.00 (.00)	8	5.83 (1.65)	32	3.09 (1.14)	317
Total Listening Score	6.01 (1.26)	105	5.50 (.71)	4	6.43 (1.22)	168	5.88 (6.00)	8	.44 (.51)	32	5.53 (2.2)	317
Total Consensus Agreement	220.25 (60.65)	76	245.20 (51.89)	2	208.02 (68.03)	120	265.39 (101.01)	8	214.81 (65.90)	18	443.96 (128.03)	317
Total Agreed Consensus Agreement	447.81 (89.73)	76	464.00 (88.64)	3	423.36 (96.30)	120	483.44 (143.75)	8	449.71 (186.54)	18	220.91 (76.67)	317

Table 5: Means and Standard Deviations for Each Culture's Musical Experience:

	Bulgarian		Chinese		English		Spanish		Turkish		Total	
Variable	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*N*
For how many years have you played a musical instrument?	3.11 (7.04)	105	1.00 (1.41)	4	5.07 (6.38)	168	10.38 (16.84)	8	4.61 (6.52)	32	4.84 (7.39)	279
For how many years have you played a second musical instrument?	1.53 (5.71)	105	.50 (.71)	4	3.99 (6.33)	168	6.75 (13.90)	8	.94 (2.65)	32	3.13 (6.38)	267
For how many years have you received formal instruction in a musical instrument?	2.23 (5.56)	105	.25 (.35)	4	3.96 (4.00)	168	4.00 (4.00)	8	.94 (1.21)	18	3.22 (4.68)	276
For how many years/semesters have you taken a music theory class?	1.01 (2.52)	76	.50 (.71)	2	.83 (1.65)	120	2.00 (2.83)	8	.67 (1.91)	18	.97 (2.15)	271
How many hours per week do you spend listening to music?	25.43 (28.25)	76	13.50 (9.19)	2	21.67 (22.65)	120	20.88 (20.43)	8	12.00 (13.82)	18	22.68 (24.76)	279
How many hours per week do you spend playing or practicing your instrument?	1.00 (3.67)	76	.00 (.00)	2	1.77 (3.29)	120	2.63 (4.21)	8	.78 (2.36)	18	1.85 (4.09)	272

Table 6: Mean rating for Target Agreement (Clips are presented in the order they appeared on the survey):

	Bulgarian, n= 105	China, n= 4	English, n= 168	Spanish, n= 8	Turkish, n= 32	Total, n= 317
Musical Clip and Emotion	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Rhythmic Anger One						
Anger	19.71 (27.01)	23.50 (20.55)	23.64 (26.82)	22.50 (31.74)	25.47 (27.04)	22.50 (26.88)
Joy	44.64 (29.19)	71.25 (13.96)	48.15 (30.36)	45.87 (33.79)	44.75 (32.09)	46.88 (30.11)
Sadness	13.05 (20.95)	2.50 (5.00)	10.55 (17.53)	6.63 (18.74)	11.16 (13.35)	11.24 (18.31)
Rhythmic Joy						
Anger	.83 (2.72)	.00 (.00)	2.24 (10.55)	.00 (.00)	3.72 (12.85)	1.84 (8.85)
Joy	42.81 (33.48)	65.25 (29.18)	49.72 (29.34)	32.75 (35.88)	32.56 (31.84)	45.47 (31.58)
Sadness	36.08 (29.25)	16.25 (26.26)	34.08 (27.26)	19.13 (24.83)	36.25 (28.11)	34.36 (27.99)
Rhythmic Anger Three						
Anger	19.68 (23.65)	5.00 (5.77)	27.89 (25.68)	22.63 (29.17)	19.41 (25.39)	23.89 (25.22)
Joy	46.15 (34.02)	80.00 (14.70)	43.13 (29.58)	34.00 (32.022)	44.28 (30.61)	44.48 (31.38)
Sadness	6.61 (11.41)	3.75 (7.50)	8.05 (15.18)	8.50 (16.59)	6.59 (10.83)	7.38 (13.54)
Rhythmic Sadness One						
Anger	3.28 (9.37)	1.25 (2.5)	8.07 (16.70)	1.38 (2.88)	3.56 (9.82)	5.77 (13.85)
Joy	2.91 (8.84)	10.75 (12.47)	4.82 (14.59)	.87 (2.47)	3.03 (7.93)	3.98 (12.15)
Sadness	76.09 (26.67)	61.00 (46.38)	73.30 (28.07)	56.25 (36.57)	72.12 (27.42)	73.52 (28.04)
Melodic Joy One						

Anger	4.00 (12.01)	.00 (.00)	1.40 (7.89)	.00 (.00)	5.31 (13.55)	2.61 (10.04)
Joy	55.63 (30.32)	68.50 (25.67)	65.26 (29.16)	45.87 (34.25)	56.53 (32.19)	60.74 (20.22)
Sadness	14.05 (22.34)	4.50 (9.00)	11.25 (18.88)	12.45 (21.77)	9.12 (17.26)	11.91 (19.90)
Melodic Sadness Two						
Anger	4.70 (13.94)	2.50 (5.00)	6.37 (13.61)	.00 (.00)	5.72 (13.06)	5.54 (13.43)
Joy	5.75 (15.03)	10.00 (14.14)	7.27 (13.87)	1.25 (3.54)	5.97 (12.24)	6.52 (13.94)
Sadness	65.34 (29.81)	65.50 (36.72)	64.04 (27.46)	51.38 (33.08)	70.69 (25.36)	64.84 (28.27)
Melodic Sadness One						
Anger	3.64 (9.99)	1.25 (2.50)	7.51 (15.27)	3.62 (9.10)	5.00 (9.89)	5.80 (13.81)
Joy	7.54 (14.90)	25.00 (21.15)	8.30 (15.23)	2.75 (5.12)	7.47 (14.90)	8.04 (15.06)
Sadness	67.26 (29.32)	52.75 (41.11)	63.98 (27.09)	47.38 (29.53)	66.13 (27.85)	64.72 (28.18)
Rhythmic Joy One						
Anger	8.69 (16.30)	7.50 (9.57)	8.02 (15.28)	18.88 (30.74)	11.53 (20.45)	8.86 (16.66)
Joy	60.70 (27.50)	82.00 (9.20)	66.72 (27.07)	48.00 (40.98)	58.19 (31.70)	63.58 (28.18)
Sadness	10.17 (16.55)	1.75 (3.50)	6.49 (11.63)	.00 (.00)	6.19 (15.03)	7.45 (13.74)
Rhythmic Anger Two						
Anger	33.61 (30.55)	44.50 (41.32)	41.90 (29.57)	32.25 (35.22)	34.09 (29.61)	38.15 (30.27)
Joy	33.02 (31.03)	25.25 (30.39)	26.87 (26.44)	30.13 (33.34)	33.94 (31.96)	29.68 (28.81)
Sadness	6.54 (12.47)	18.75 (25.94)	9.58 (14.73)	.63 (1.77)	5.91 (11.69)	8.09 (13.82)

Table 7: Across-Cultures Correlations between Consensus Agreement and Musical Training

Variables	1.	2.	3.	4.	5.	6.	7.	8.
1. Agreed Consensus Agreement	-							
2. Total Consensus Agreement	.791**	-						
3. Years playing an instrument	.059	.085	-					
4. Years playing a second instrument	.067	.075	.801**	-				
5. Years of formal instruction	.012	.005	.578**	.491**	-			
6. Years of music theory classes	.109	.092	.330**	.387**	.403**	-		
7. Hours per week listening to music	.073	.040	.017	.083	-.078	.046	-	
8. Hours per week practicing	.050	-.024	.273**	.266**	.217**	.171**	.261**	-

*Correlations significant at p < .05

** Correlations significant at p < .01

Table 8: Across-Cultures Correlations between SEIS and Target Agreement

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Total Listening Score Anger	-								
2. Total Listening Score Joy	.086	-							
3. Total Listening Score Sadness	.381**	.290**	-						
4. Total Listening Score	.184**	.223**	-.420**	-					
5. Perception of Emotion	-.091	.003	-.008	-.057	-				
6. Managing One's Own Emotions	-.085	-.020	.030	-.096	.508**	-			
7. Managing Other's Emotions	.015	-.019	.057	-.047	.681**	.563**	-		
8. Utilization of Emotions	-.028	-.069	.022	-.044	.337**	.437**	.362**	-	
9. Total SEIS Score	-.072	-.018	.030	-.098	.839**	.803**	.837**	.631**	-

*Correlations significant at p < .05

** Correlations significant at p < .01

Table 9: Across-Cultures Correlations between SEIS and Consensus Agreement

Variables	1.	2.	3.	4.	5.	6.	7.
1.Agreed Consensus Agreement	-						
2.Total Consensus Agreement	.791**	-					
3. Perception of Emotion	-.089	-.103	-				
4. Managing One's Own Emotions	-.066	-.108	.508**	-			
5. Managing Other's Emotions	-.130*	-.135*	.681**	.563**	-		
6. Utilization of Emotions	-.152**	-.144*	.337**	.437**	.362**	-	
7. Total SEIS Score	-.131*	-.141*	.839**	.803**	.837**	.631**	-

*Correlations significant at p < .05

** Correlations significant at p < .0

Table 10: Across-Cultures Correlations between Musical Training and Target Agreement

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Total Listening Score Anger	-									
2. Total Listening Score Joy	.086	-								
3. Total Listening Score Sadness	.381**	.290**	-							
4. Total Listening Score	.184**	.223**	-.420**	-						
5. Years playing an instrument	.162**	.065	.000	.126*	-					
6. Years playing a second instrument	.100	.082	-.083	.169**	.801**	-				
7. Years of formal instruction	.190**	.014	-.141*	.207**	.578**	.491**	-			
8. Years of music theory classes	.066	.038	.001	.020	.330**	.387**	.403**	-		
9. Hours per week listening to music	-.119	.112	-.104	.133*	.017	.083	-.078	.046	-	
10. Hours per week practicing	.103	.019	-.113	.077	.273**	.266**	.217**	.171**	.261**	-

*Correlations significant at p < .05
** Correlations significant at p < .01

Table 11: Across-Cultures Correlations between SEIS and Musical Training

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Perception of Emotion	-										
2. Managing One's Own Emotions	.508**	-									
3. Managing Other's Emotions	.681**	.563**	-								
4. Utilization of Emotions	.337**	.437**	.362**	-							
5. Total SEIS Score	.839**	.803**	.837**	.631**	-						
6. Years playing an instrument	.018	-.032	-.048	.134*	.042	-					
7. Years playing a second instrument	.040	-.099	-.002	.075	.021	.801**	-				
8. Years of formal instruction	.059	-.022	.040	.129*	.084	.578**	.491**	-			
9. Years of music theory classes	.103	.123*	.165**	.144**	.175**	.330**	.387**	.403**	-		
10. Hours per week listening to music	-.030	.052	.088	-.067	-.007	.017	.083	-.078	.046	-	
11. Hours per week practicing	-.025	-.072	.003	.046	.011	.273**	.266**	.217**	.171**	.261**	-

*Correlations significant at p < .05
** Correlations significant at p < .01

Table 12: Across-Cultures Correlations between Target Agreement and Consensus Agreement

Variables	1.	2.	3.	4.	5.	6.
1. Agreed Consensus Agreement	-					
2. Total Consensus Agreement	.791**	-				
3. Total Listening Score Anger	.056	.032	-			
4. Total Listening Score Joy	.283**	.389**	.086	-		
5. Total Listening Score Sadness	.194**	.265**	.381**	.290**	-	
6. Total Listening Score	.179**	.214**	.184**	.223**	-.420**	-

*Correlations significant at p < .05

** Correlations significant at p < .01

Table 13: Regression table predicting Target Agreement within the English Sample.

	Target Agreement	
Variable	*B*	*β*
Constant	7.711**	
Years Playing a Musical Instrument	.056**	.274**
Total SEIS	-.010*	-.195*
R^2	.100	
F	7.201**	

*Significant at p < .05

**Significant at p < .01

Table 14: Regression table predicting Target Agreement Cross-Culturally.

	Target Agreement	
	Model 1	
Variable	*B*	*β*
Constant	7.682**	
Years Playing a Musical Instrument	.036*	.130*
Total SEIS	-.012*	-.153*
R^2	.039	
F	4.856**	
	Model 2	
Variable	*B*	*β*
Constant	6.238**	
Bulgarian Dummy Code	-.314	-.067
Chinese Dummy Code	-.988	-.050
Spanish Dummy Code	-.363	-.026
Turkish Dummy Code	-5.769**	-.791
R^2	.602	
F	117.936**	

*Significant at p < .05
**Significant at p < .01

Table 15: Regression table predicting Consensus Agreement for Agreed Emotion within the Bulgarian Sample.

	Consensus Agreement for Agreed Emotion	
Variable	*B*	*β*
Constant	-59.709	
Years Playing a Musical Instrument	-.950**	-.304
Total SEIS	-.096	-.010
R^2	.093	
F	4.192*	

*Significant at p < .05
**Significant at p < .01
Note that Consensus agreement scores were multiplied by negative 1.

Table 16: Regression table predicting Consensus Agreement for Agreed-Upon Sad Clips within the English Sample.

	Consensus Agreement for Sad Clips	
Variable	*B*	β
Constant	-69.393**	
Years Playing a Musical Instrument	1.373**	.263**
Total SEIS	-.014	-.011
R^2	.069	
F	4.862**	

*Significant at p < .05
**Significant at p < .01

Table 17: Regression table predicting Total Consensus Agreement Across Cultures.

	Total Consensus Agreement	
	Model 1	
Variable	*B*	*β*
Constant	-330.838	
Years Playing a Musical Instrument	1.327	.080
Total SEIS	-.691*	-.142*
R^2	.025	
F	3.240	
	Model 2	
Variable	*B*	*β*
Constant	436.483**	
Bulgarian Dummy Code	15.869	.058
Chinese Dummy Code	15.127	.013
Spanish Dummy Code	46.952	.058
Turkish Dummy Code	8.346	.020
R^2	.006	
F	.447	

*Significant at $p < .05$
**Significant at $p < .01$

Table 18: Regression table predicting Agreed-Upon Consensus Agreement Across Cultures.

	Agreed-Upon Consensus Agreement	
	Model 1	
Variable	*B*	*β*
Constant	-158.793**	
Years Playing a Musical Instrument	.470	.047
Total SEIS	-.367*	-.126*
R^2	.018	
F	2.237	
	Model 2	
Variable	*B*	*β*
Constant	214.493**	
Bulgarian Dummy Code	12.606	.078
Chinese Dummy Code	32.357	.047
Spanish Dummy Code	50.897	.104
Turkish Dummy Code	5.448	.021
R^2	.016	
F	1.258	

*Significant at $p < .05$
**Significant at $p < .01$