

The Perceptual Similarity of Tone Clusters: An Experimental Approach to the Listening of Avant-Garde Music

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Background

The musical tone-cluster is a prototypical sound of avant-garde music in the 20th and 21st centuries. Tone-clusters mark the boundary between pitch-related techniques in earlier epochs to the use of sound-based materials in avant-garde music. The composer Henry Cowell offered the first theoretical reflection on the structure of tone-clusters with a focus on tone density, which relies on the number of tones and the ambitus of a cluster (Cowell, 1930).

Aim

We investigated whether participants were able to discriminate between various types of tone-clusters and how they evaluated their similarities. We also questioned whether a timbre-based approach using psychoacoustical methods of analysis could be used to explain the perception of avant-garde music sounds.

Method

Ten different prototypical tone-cluster-chords varying in density were presented in two studies. Additionally, the relation between similarity ratings and psychoacoustic features was examined. The design of the first study was based on an adaption of the Multi Stimulus with Hidden Reference and Anchor (MUSHRA) paradigm (International Telecommunication Union, 2014). Exploratory factor analysis and multiple regression analysis were used to reveal further variables influencing the perception of musical cluster-chords associated with concepts in composition and music theory. The second study used a paired comparison approach in combination with multidimensional scaling (MDS; Borg & Groenen, 2005; Handel, 1989). Additionally, a statistical cluster analysis was performed for grouping the 45 non-identical paired comparisons.

Results

The results of the timbre feature analysis (based on the MIR toolbox; Lartillot, Toiviainen, & Eerola, 2008) and perceptual evaluation of stimuli were congruent with the theoretical features of the tone-cluster structure. The correlation between tone-cluster density and psychoacoustical roughness was $r = .95$. In the first study, polynomial regression between roughness and similarity ratings showed a determination coefficient of $R^2 = .39$. The most stable solution of the MDS analysis showed a two-dimensional Cartesian representation related to the similarity ratings of the ten tone-clusters stimuli. As a result of the MDS analysis, the tone-clusters could be grouped into two classes of sounds: (a) those tone-clusters with a high grade of perceptual discrimination depending on the tone-cluster density (e.g. pentatonic tone-clusters) and (b) those tone-clusters of a more aurally saturated structure, making it difficult to separate and evaluate them (e.g. chromatic tone-clusters or tone-clusters with more than 7 tones per octave).

Conclusion

The findings can provide valuable insights into aural training methods for avant-garde music. A timbre-based approach can be one possibility, but it is not the only way to a perceptual theory of avant-garde music. In future research, there will be a need to identify more variables influencing the aural perception of musical sounds to aid in listening to and understanding avant-garde music.

W1P: Workshop 1

Time: Friday, 27/Jul/2018: 13:30 - 14:30 · *Location:* La Plata

Possible innovations in concert formats of classical music

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Background

In the nineteenth century a conception of music emerged that in part continues to signify the meaning practices of some current musical performance (Kingsbury, 1988). The fine arts concept of art as an object created by human beings for the rejoicing of individuals, something to be contemplated, as opposed to the minor arts called decorative because they produced objects to be used. This ontology of the sublime in art and music as an idea dissociates the latter from other meaning sources. Music will be the contemplation object: hence the idea of the museum as a creation of the Illuminist thought of gathering art as an object. This perspective includes the concert hall as the place for the music to be contemplated who will define the concert situation with the format that is reproduced nowadays. We consider that traditional concert forms require renewal, so as to stimulate the musicians and regain impact in the audience, which has decreased quantitatively, lacking a generational renewal (Sloboda, 2017).

Aims

To explain ways to modernize the stereotype of a classical music concert.

Audience Activities

I would need the active participation of choir members and at least some instrumentalists, as I would use the approach to one of Mozart's masses as an example.

Implications for practice

Changes will be made to: (i) the spatial placement on the stage allowing for musicians to mix among themselves, and also with the audience; (ii) including attractive theatrical elements like stories and small dramatizations; (iii) musicians bodily behavior, outside the usual traditional orthodox cliché; (iv) variations which show, by didactic means of subtle irony, the many different possible approaches to the same composition, with the same conductor changing personality; (v) the Mirror Version of the same music transforming and decanting musical styles. Finally, so as to exploit the possibility of future audiences (vi) massive classical concerts, teaching classical pieces through television and/or the web, to converge ending in a mega-concert and; (vii) fusion situations like amateur choirs and orchestras that study one brief section of a symphonic-choral piece, and then perform it with the professional musicians.

Value for this conference

The psychology of music and embodied music cognition theories have opened the field of research towards the problem of human movement and its importance for our understanding of music and musical development. The growing relevance of these ideas in musical performance implies a revision of one's own ideas about musical practice in the planning of a concert nowadays. The inclusion of new concert formats that would not conform to the Central European western classical music canons in this conference allows an interesting point of view on the relationships between text and vocal-instrumental music, spatiality and the interpretative stylistic content that communicates the performance.

References

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T7M: Short Talks 7 - Entrainment

Time: Friday, 27/Jul/2018: 16:00 - 17:00 · Location: Montreal_1

Session Chair: Marc R. Thompson

A Dynamical-Systems Model for Synchronized Music Making with Acoustic Transmission Latency

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Background

Humans precisely time their actions to synchronize with external rhythmic signals and effectively carry out tasks like dancing or music performance. Behavioral data show that, when synchronizing with a periodic stimulus, humans often tap before stimulus onsets, resulting in a negative phase relationship known as the negative mean asynchrony (NMA). The NMA increases with longer stimulus periods between 300ms and 3500ms (Mates et al., 1994), but to a lesser extent in musicians compared to non-musicians (Repp and Doggett, 2007). Previous research shows that external factors influence the timing of tapping, such as presence of auditory feedback for one's own taps or presence of a partner who coordinates during joint tapping (Nowicki et al., 2013), and transmission latencies (TL) between coordinating partners (Chafe et al., 2010). The strong anticipation hypothesis suggests that anticipatory human behavior is supported by delays inherent to the human sensorimotor system (Stepp & Turvey, 2010; Washburn et al., 2015).

Aims

Here we tested whether adding delayed feedback to the oscillatory mathematical model described by Large and colleagues (2010) can explain the NMA size when tapping with isochronous stimuli at different frequencies. Further, we examined whether the model could explain the NMA size in two-person alternating tapping with and without auditory feedback, and the lagging dynamics caused by external delays (TLs) during alternating rhythm-tapping.

Methods

We built a dynamical system that receives its own delayed activity, and oscillates at a frequency learned from a stimulus via adaptive Hebbian learning (Righetti et al., 2006). Using previously published behavioral data we carried out three experiments to simulate 1) simple tapping (data presented in Repp and Doggett, 2007), 2) two-person alternating beat-tapping (Nowicki et al., 2013), and 3) two-person alternating rhythm-tapping in the presence of a TL (Chafe et al., 2010).

Results

In Experiment 1, our system was able to replicate the larger NMA for longer stimulus intervals. Moreover, when parameters were adjusted, it differentiated the NMA patterns in musicians and non-musicians. In Experiment 2, the alternating tapping was simulated with two systems alternately receiving each other's SMS activity as input. This revealed the same pattern as the behavioral data where the smaller NMA and larger lag1 correlation occurred for joint tapping compared to a solo tapping condition without auditory feedback. In Experiment 3, TLs between two systems alternately receiving each other's SMS activity resulted in reciprocal lags at the points of alternation found in the behavioral data.

Conclusions

Our model explains that the NMA becomes shorter when the feedback delay length is shortened, and that changing parameters in the system results in different NMA sizes that mimic actual data observed in musicians and non-musicians. This model is also useful in explaining jointly coordination. Overall, our model consists of a parsimonious architecture in which a delay feedback causes simple but organized and synchronized oscillatory behaviors. Extending this model would have a potential to account for a variety of anticipatory timing patterns in human coordination, and offers a useful tool for theorizing about the adaptive nature of human synchronization and its neural underpinnings.

Mutual synchronization and predictability in entraining walking to a musical beat

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Background

Mere presence of a predictable stimulus is not sufficient for auditory-motor entrainment. Two persons walking side by side spontaneously synchronize their steps on some occasions but not on others (van Ulzen et al., 2008). Predictive processing suggests that saliency factors such as predictability and interaction modulate sensory-motor coupling (Clark, 2015). These factors also have practical implications. Musical cueing helps patients with gait impairment due to Parkinson's disease (PD) (Spaulding et al., 2013) but with a few exceptions has been studied only in its non-adaptive (pre-recorded) forms.

Aims

How to incorporate principles of mutual synchronization in a paradigm for the cueing of gait, and how to do so in a way that can be applied in real-world circumstances? We designed an adaptive musical stimulus that changed its tempo in real-time in response to the walker's step timing. It was based on a theoretical model of mutual synchronization in biological and social systems (Kuramoto system).

Method

A weakly adaptive model-based stimulus was compared to a stimulus that mirrored footfalls without inducing mutual synchronization and two non-adaptive predictable stimuli. Participants (healthy, n=20 and PD, n=20) walked along with a musical stimulus without being instructed to synchronize. In weakly adaptive trials the stimulus increased or decreased its tempo by a small amount if its beat was lagging or leading the footfalls, respectively. Its preferred tempo was higher than the participant's preferred cadence (determined at pre-test). In a strongly adaptive condition the beat effectively shadowed footfalls. In two non-adaptive conditions the tempo was again higher than preferred cadence. The first was isochronous, hence perfectly predictable. The beat in the second was variable and statistically matched to typical parameters of gait.

Results

Cadence and speed, in both patients and healthy participants, were higher with weakly adaptive than with predictable non-adaptive or strongly adaptive stimuli. The weakly adaptive beat responded to gait but maintained a consistent phase lead, hence it embodied all three saliency factors: predictable, interactive, and consistent difference. Surprisingly, there were no differences in the way patients and healthy participants responded to cueing although patients' performance was worse at baseline.

Conclusions

Stimulus predictability is not sufficient for auditory-motor entrainment. The effect of rhythmic stimuli is increased by interactivity, provided that interaction takes the right form. Conditions fostering mutual synchronization are more effective than ones enforcing synchronization, potentially informing the design of cueing paradigms not only for PD but also for other conditions that benefit from sensorimotor synchrony with a stimulus.

References

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Music and Mirroring: The Effects of Musical Interventions on the Mirror Game

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Background

Social bonding and intersubjectivity are basic human necessities but have been notoriously difficult to measure. Recently, there has been interest in using mirroring activities (where two participants mirror each other's movements) as a possible measure for these phenomena. Mirror games (MG) contain highly synchronized movements, which can inform about emergent properties similar to those found in improvised music-making such as shared intentionality, creativity and assumed leader/follower dynamics.

Aims

We studied intersubjectivity and coordination by analyzing the effects of improvised musical activities on mirroring activities. Music has been shown to facilitate feelings of closeness and synchrony. Assuming that the MG indexes intersubjectivity, musical interaction should induce a shared focus and coordination within a pair that would carry over to the MG.

Method

64 participants (68% female, 29.8% male, 1.8% other; age: $M = 25.4$, $SD = 3.91$) were paired with a stranger of similar musical background. In an optical motion capture lab, the pairs engaged in musical improvisation tasks, preceded and followed by a dyadic MG in which each participant led, followed, and completed a leaderless condition. The participants were instructed to mirror each other's finger movement for two minutes. The musical improvisation tasks acted as interventions to the mirroring tasks, with pairs randomly selected to one of the following musical activities performed on pentatonic xylophones: i) improvised duets with simultaneous playing ii) improvised duets with turn-taking structure, and iii) a solo improvisation in which the pair performed separately. Social bonding was assessed through a continuous measure of physical proximity and the Inclusion of Other in Self scale (IOS; Aron, et al., 1992). Intersubjectivity was analysed computationally by extracting features from the finger trajectories, such as combined movement complexity and jitter (Noy, Dekel & Alon, 2011).

Results

The findings of this study provide some support for the MG as a measure of human interaction. Participants in the paired musical improvisations reported more enjoyment in the experiment than those in the solo condition, but this was not statistically significantly reflected in the kinematic measures at the experiment level. However, there were some kinematic and coordination patterns that suggest MG might be able to capture behavioural changes caused by interventions: we found some correlations between kinematic patterns and the IOS, but only for some tasks or groups, so while MG can perhaps track some intersubjectivity-related changes, our current measures of it do not seem to provide us a tool that could easily replace IOS or other measures of intersubjectivity.

Conclusions

We found that different musical interventions produced different, quantifiable effects on the mirror game performance. The MG produces interesting dyadic data for studying interpersonal coordination and synchronisation, but further analysis is needed to see how these are related to intersubjectivity and togetherness. Our study also produced a dyadic musical improvisations data set that can be studied, and thus it contributes in multiple ways to our understanding of the social effects of musical interactions.

T8M: Short Talks 8 - Expression

Time: Friday, 27/Jul/2018: 16:00 - 17:00 · *Location:* Montreal_2

Session Chair: Emma Moore

Vicarious cues in portraying emotion: Musicians' self-appraisal

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Background

Cue utilization in the musical communication of emotion has been studied recently from the standpoint of the listener (e.g. Juslin, 2000; Eerola, Friberg & Bresin 2013), with the focus on the performer's ability to communicate emotional content to an audience. While these studies involve an analysis of performers' musico-expressive and gestural techniques, they have not sought to understand what the performers themselves take as their focus during these acts of musical communication.

Aims

The present study seeks to discover attitudinal commonalities and differences within a musician population relative to the communication of emotion via music. We hypothesized that instrument type, as well as age and gender, would bear significantly on musicians' opinions.

Method

A survey was administered to 178 participants; 152 were current music majors (mean age 20.3 years, 62 female) and 26 were adult participants in a community choir (mean age 54.0 years, 12 female). The adult participants were all vocalists, while student participants represented the full range of orchestral instruments. The students were grouped by degree program (Performance, Music Education, or Other) and instrument type (Voice, Brass, Woodwinds, Strings, Percussion).

The survey asked "How important are each of the following areas to YOU for portraying emotion in music?" Participants were asked to rate each of 15 items on a scale of 1 (not at all important) to 10 (very important). Participants were also instructed to leave blank any item that they did not understand. The 15 items were: dynamic contrast, overall volume, phrasing, facial expression, staging (placement), pitch accuracy, tempo changes, bodily movement, your mood, your attitude, vibrato, rubato, stage/room lighting, clothing type, and clothing color.

Results & Discussion

Contrary to our hypothesis, there was no overall effect of gender or age, and neither did any single response item show a significant difference due to these subject parameters. Among the student participants, however, one-way ANOVA revealed a significant effect of degree program on the rated importance of four items: dynamic contrast, tempo changes, vibrato, and rubato. Significant effects of instrument type were found in the responses to eight items: facial expression, staging, body movement, vibrato, rubato, lighting, clothing type, and clothing color.

Post hoc comparisons (Tukey) show that some variation follows from obvious differences between instrument types (e.g. string players are more concerned with vibrato than everyone but woodwind players; vocalists are significantly more concerned with facial expression than everyone but string players), but other differences could point to communal mindsets toward vicarious cues within instrument type. These mindsets could be global (e.g. brass players deeming body movement significantly less important than string players since they are less often featured as soloists and appearing less often at the front of the stage) or local (e.g. string players being significantly more concerned than all other groups about both clothing color and type, perhaps due to the strongly-expressed opinions of specific teachers). Future work will attempt to identify the source of these self-appraisals, whether enculturated via explicit pedagogy, or whether absorbed from individuals' observations and performance experience.

Expressive Intonation and Tuning Variability in Music Performance: intentionality and skill

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Expressive Intonation and Tuning Variability in Music Performance: intentionality and skill

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Background

Subtle variations in intonation are not only typical but also desired in performances with non-fixed-tuned musical instruments. Some of those may be intentional, since performers accentuate melodic and harmonic contexts in order to convey meaning, and can portray emotions and affects through the use of expressive intonation. Nevertheless, intonation variability also depends on the ability of the performer to master different instrument registers at distinct dynamic levels.

Aims

This paper presents two studies. The first focuses on comparing intonation variability in different musical instruments and tests whether differences in tuning variability may be caused by register and dynamics. The second focuses on identifying tendencies to overall intonation deviation, such as high sharp, and expressive intonation that could arise from harmonic and melodic contexts.

Method

Computer software has been specially developed for comparing different methods for frequency estimation as well as analyzing intonation tendencies. Two sets of recordings have been studied. The first set of recordings has been used for identifying the intonation variability of held tones recorded in three different dynamic levels, across the range of 15 musical instruments. The second set contains musical excerpts from CD recordings by different professional performers.

Results

Results demonstrate highly different tendencies in intonation deviation in both studies. The paper reports three sets of results: an overall representation of intonation variability according to each instrument, register, and dynamic level; an intonation-space for each excerpt that represents groups of performances; and overall results for each kind of expressive intonation.

Conclusions

This paper presents an intonation-space within which different instrument deviation tendencies as well as individual performers can be compared. It can be inferred whether deviations could be intentional. Even though the ability to play in tune across registers and dynamic levels may not be the same for all performers, the actual knowledge about the performer's own ability may help as a guide for practicing. The knowledge of those different tendencies may help chamber musicians and ensemble conductors to understand how deviations on overall intonation occur within each family of instruments, as well as their interaction.

T5P: Short Talks 5 - Perception

Time: Friday, 27/Jul/2018: 16:00 - 17:00 · Location: La Plata

Session Chair: Favio Shifres

A multimodal analysis of vitality forms in the play Krapp's Last Tape

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Background

Forms of vitality, proposed by Stern (1985, 2010), are ways in which the human mind deals with dynamic experiences, crucial both to interpersonal encounters and the performing arts. They are Gestalts created by the integration of movement, force, space, time and direction/intentionality. There are few previous empirical studies based on this concept (Rochat, et.al. 2013, Español y Shifres 2015). Forms of vitality in theatre have been explored by Stern (2010); empirical studies in this field commencing recently (Weeks 2013).

Aims

To describe and analyze forms of vitality displayed in various sensory modalities in an excerpt from the play Krapp's Last Tape.

Method

Samuel Beckett's play Krapp's Last Tape features one character, an old man obsessed with the tapes he has been recording for many years, reflecting the changes in his life. The play therefore deals strongly with the issue of time.

One section from the play – as Krapp first speaks, while looking for a particular tape – was chosen. Three performances of it, each by a renowned actor, was subjected to an ELAN program. A comparative analysis was made using an ad-hoc observational code containing four categories: forms of vitality in actor's movements, voice, other scene sounds, and lighting. Subcategories were created based on attributes described by Stern (i.e. sudden, gentle), assigned along a temporal line. Prevalent forms of vitality per category were identified in each case, plus a comparison between categories.

Results

Wilson's version is particularly refined in all four categories, his movements being slow and gentle, occasionally abrupt, his voice strong, sometimes oscillating, his use of lighting displaying crescendo, fade and sudden cutting. Sometimes forms of vitality coincided in lighting, body movement and sound, that coincidence being emphasized; occasionally they displayed marked contrasts.

In the more naturalistic versions by Hurt and Bidonde, forms of vitality are revealed in the actor's movements, but less so in the other three categories. Hurt's version is characterized by heaviness, brusqueness and effort, while Bidonde's version displays acceleration, clumsiness, and moments of fragmentation. There are few contrasts between forms of vitality in either version.

These differences between versions create quite diverse effects in the spectator, outlined in the presentation.

Conclusions

This work opens up new understanding about forms of vitality in the performing arts, advancing the enquiry started by Stern, contributing to theatre reception theory, and to wider discussions on the role of sensory, non-verbal dynamic events in the time-based arts.

References

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Intervallic Awareness: the definition of a musical construct

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Background

Dowling (1986) and Goldemberg (2015) described, in previous endeavors, certain cognitive aspects that may be related to the processing of melodic scales and intervals. In his work, Dowling suggests that individuals who reach success in certain melodic perception tasks are able to combine scale-step representations with interval-representations. In a similar manner, Goldemberg suggests that the integration of bottom-up and top-down strategies may result in some cognitive advantages for performing sight-singing tasks. In other words, both researchers suggest that certain musical abilities may arise from the capacity to perceive and to manipulate either intervals and scales within tonal contexts. Those concepts served as background for the development of a new scientific construct called Intervallic Awareness Construct (IAC).

Aims

Definition of the IAC.

Operationalization and validation of an instrument that enables assessment of the IAC.

Methods

The Intervallic Awareness Test (IAT) has been administered to 21 college level music students. Psychometric concepts, such as criterion validity, internal consistency and inter-rater reliability have been used to assess the instrument's quality. The scoring system adopted has been based upon the criteria of interval accuracy, steadiness of pulse and number of trials. As a way to evaluate the strength of the scoring system adopted, a music Ph.D. and college professor scored the performance of 5 subjects according to his own criteria.

Results

The IAC has been defined as the ability to recognize and to manipulate melodic intervals within different melodic contexts. The IAT was composed by tasks of comparison, addition, inversion and substitution of melodic intervals, which were designed to assess trained musicians.

Addition tasks, for instance, asked for subjects to sing a tonal melody. Afterwards, a specific interval should be sung from the last note of that melody. For instance, subjects heard an "C-E-G-E" excerpt and sung an ascending Major Second from the note E, thus forming "C-E-G-E-F#".

Pearson's r has been estimated at 0,983 ($P < 0,001$) between the professor's criteria and the criteria previously adopted by the author of this study. Cronbach's alpha indicated a coefficient of 0,864, and the Spearman's rho showed a moderate to strong correlation between the scores subjects reached at the IAT and at a semester of Ear Training (0,744, $P < 0,01$).

Conclusions

The IAC might fulfill some research needs on music learning and performance. For instance, would high coefficients on the IAT be predictive of success on tasks such as sight-singing and melodic dictation? Would musicians be able to perform such tasks using cognitive strategies that are unrelated to the ones required by the IAT test?

On the future, a version of the IAT should be developed in order to enable assessment of non-musicians. Also, larger sample sizes would allow for deeper evaluations of the IAT's construct validity. Factor Analysis, for instance, could be used to evaluate the suitability of Item Response Theory, which assumes that the instrument is unidimensional.

References

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Analysing the impact of music on wine perception via temporal dominance of sensations

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Background

Several recent studies have examined the impact of music on the food/drink evaluation, but none have relied on time-based methods. A common method of time-based sensory evaluation of food products is temporal dominance of sensations (TDS), a relatively new technique used to record several sensory attributes simultaneously over time. In the present investigation, we conducted a study using TDS to examine how the same red wine might be experienced differently when tasted with soundtracks that have been shown, in a preliminary informal test, to enhance/detract tannin perception.

Aims

We used TDS as a way of assessing whether music can draw participants' attention to different aspects of a wine. If music does direct one's attention to different tastes/flavours, we should observe different patterns of attended flavours with different auditory conditions.

Methods

Participants: A total of 21 participants took part in the study. They had no professional experience in wine tasting and different levels of musical education.

Auditory stimuli: Two 45 seconds fragments of pieces of music, Brian Eno's "Discreet Music" and Mussorgsky's "Night on Bald Mountain".

Wine: Manos Negras Pinot Noir.

Design and Procedure: There were 3 randomized conditions for all participants: silent, listening to Eno piece and listening to Mussorgsky piece. For each trial, participants were given a sample of wine by the experimenter. They were instructed to start the trial as soon as they tasted the wine without drinking. During the trial, the TDS computerised system [1] showed the participant a list of 8 adjectives in two columns in a randomized order (red fruit, astringency, alcohol, woody, sweet, acidic, spicy, bitter). Participants were instructed to consider which attribute is perceived as the most dominant. Each time they feel like the perception has changed, they click on a new attribute which they perceive to be most dominant.

Results

Different soundtracks revealed different patterns of attended flavours. Overall, the attack of acidity is earlier in the silence condition compared to either of the soundtrack conditions, and astringency is less noticeable when there is music playing. Bitterness is more prominent in the attack of the wine for the Mussorgsky piece, whereas for the Brian Eno piece bitterness comes after the initial registration of acidity.

We segmented the music with an algorithm based on changes in timbric novelty [2]. The Mussorgsky piece shows close matches between the segment boundaries and the change in the region of prominent taste.

Also we computed Spearman cross-correlation between dominant taste curves and psychoacoustical curves in time, as roughness, brightness, intensity, and others, obtaining significant results for bitter taste in the case of Eno and sour taste in the case of Mussorgsky.

Conclusions

We showed evidence that music structure and specific musical and acoustic parameters modifies patterns of attended wine flavors.

References

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T7P: Short Talks 7 - Acoustics and Philosophy

Time: Friday, 27/Jul/2018: 20:00 - 22:00 · *Location:* La Plata

Session Chair: Bruno Alejandro Mesz

Session Chair: Luiz Naveda

Study of timbral modulation processes applied to saxophone multiphonic tones

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Background

In previous works, we studied the timbral qualities of the saxophone multiphonics from a musical, acoustical and psychoacoustical point of view, establishing a timbric categorization for these sounds into four main classes (Proscia 2011, Riera 2014). This allowed us to establish a framework including spectral attributes of sound, and its application to musical composition and performance. However, these studies were limited to three-seconds long recordings of static segments of multiphonics. A more recent work (Proscia 2017), extended this study to simple morphing trajectories between different multiphonic classes.

Aims

In this work we further extend our study to more general dynamical evolutions of multiphonic tones from the point of view of performance. In contrast to static tones or morphing trajectories, that were conceived with the multiphonic categorization in mind, in this case we start from the broader concept of timbral modulation and attempt to establish some systematics for these evolutions.

Method

The study was developed from recordings made by one of the authors of this work (MP). Taking as a reference procedures in the field of electroacoustic music (Smalley, 1997), we addressed the study of modulation processes that develop from the modification of some of the parameters of the sound: dynamic and spectral envelope, size and type of the grain of the sound, and number of elicited pitches. We also studied the possibility of determining different processes of modulatory periodicity from a periodic element (such as vibrato, tremolo, etc.). Finally, we considered the possibility of establishing timbric-melodic movements between different multiphonics, and its correlation with timbral modulation.

Results

As the main result of this work, we proposed four types of timbral modulation: modulation by modification of the size and type of grain, modulation by the number of pitches produced, modulation by modification of the spectral height, and modulation by modification of the dynamic envelope (ADSR). As a complement, examples of periodic modulation processes were presented, such as bisbigliando, tremolo and vibrato.

Conclusions

Saxophone multiphonics give rise to a complex timbric space difficult to chart due to the multiplicity of sonorities that they can cover, and their inherent dynamical quality. The present work delves into the study of the possibilities of timbral modulation, based on the hypothesis that it is possible to think of trajectories in the aforementioned timbric space. This allows not only to clarify aspects of the timbral perception related to these sounds, but also stimulates the creation of new trajectories or modulatory processes in this space.

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Two Organological Innovations in the Colombian Andean Bandola. An Acoustic Study

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Background

The typical Colombian Andean trio —consisting of bandola, tiple and guitar— has from its beginnings used the bandola as the main melodic instrument. In 1960, Diego Estrada modified the tuning parameters of the bandola from Bb to C and since 1980, Fernando "El Chino" León, proposed the subtraction of strings from 16 to 12. Both organological innovations —worked in conjunction with their master luthiers— opened the way to generate reflections inside the study of Colombian Andean Music (CAM). The present work arises, first, as a result of the controversies and discussions generated between bandola players and other musicians in the field of CAM after these innovations -thought of, as a social practice within the musical culture of the region- started to take place and ended in the development of a division inside the field in which both organological innovations are defended as the most convenient by different groups.

Aims

Thus, the aim is to characterize and compare three bandolas, two 16 strings bandolas accordingly tuned in Bb and C and the remaining one a 12 strings tuned in C, which altogether display the bandola before and after these two innovations were introduced by Estrada and León.

Methods

The methodology proposed is based on performing an acoustic analysis. The sound emitted by these instruments is analyzed from a physical perspective, taking into account their structural qualities (dimensions, types of wood and construction techniques), the characteristic pick for each bandola, strings and the technique used during performance, all with the objective of obtaining an acoustic overview of the impact of these organological transformations.

Additionally thanks to the conditions of absolute silence and the absorption qualities of the sound energy of an anechoic chamber used in this investigation provided us the opportunity to present an spectral and evolutionary analysis of the harmonics of the versions of the instrument over time.

Results

The results of this acoustic analysis allow us to discuss and analyze the relationships between these results and the discourses about sounds and music made with bandolas as proposed by musicians inside the CAM.

Conclusions

This work propose a different approach and view of the processes of transformation and innovation within this musical culture. The results of the analysis show that the acoustic differences between the mentioned bandolas are not significant enough in terms of sound quality. Therefore, these differences are determined by performatic questions of the musicians and not by the organological and morphological differences of the bandolas.

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Applied Concepts about Objects, Processes and Recursive Representation in Computer Music

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Background

The notions of musical material and procedure, as used in music practice, are vague and relative to the knowledge system within composers develop his or her style. They may rely on basic acoustic or instrumental features, performance actions, higher level style abstractions, symbolisms or even extra-musical ideas. Thus, the definition of what a musical material is and how a procedure behaves varies according to the applied system. Taking the notions of musical material at instrumental level and procedures as processes over those materials and transposing them to the computer music domain

this work addresses a coherent and general conceptual mapping of basic data structures and algorithmic processes as musical materials used to create music (Samaruga 2016). The technical background of this work is based on the analysis of software designed for computer music through the past few decades (e.g. Roads et al. 1997; Agon 1998; Puckette 2007; McCartney 2002). For this framework, processes and objects are considered dual entities on the intersection of two fields, as computational resources and grammatical elements for composing music. This approach is based on the assumption that combinatorial elements that define musical grammars aren't at traditional musical level but algorithmic representation elements level and thus addresses the problem of conceptual and perceptive ambiguity related to the object of knowledge.

Aims

This work aims to provide systematic basis to develop a conceptual frameworks that can be applied to software design and computer music composition and analysis.

Main Contribution

This work discerns many musical concepts structurally represented by 'sub-symbolic' (Bresson & Agon 2007) computational abstractions and combine them in a coherent and systematic framework to be applied to software development and design of learning techniques and general compositional knowledge about computer music despite concrete needs and foreign software engineering concepts of particular environments idiosyncrasy.

Implications

Learning programming as a tool for composing and studying music is still a challenging task for most musicians which can be discouraging depending on their field of interest. A theoretical articulation of computer science concepts with music theory can be used to develop not only domain specific software but new curricula adaptable to musicians working with new media.

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Genre indication as a tool for musical signification

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Background

Musical genre is a form of categorization that groups musical entities, such as musical works, which share affinity criteria. However, when we listen to music or we think of it, we can categorize it in many different ways depending on the context and the background of our experiences. One way to stabilize the categorization of music is through a genre indication: a textual information that explicitly states a category that refers to a particular musical entity. Genre indications can work as a form of hermeneutic guide to music: it guides toward attitudes, conjectures and expectations around the cultural artefact or the musical fact as social phenomena.

Aims

This study analyzes the function of genre indication as a sign in music and its possibilities as a tool for musical signification. It aims to explain the implications of relating a particular musical entity with a certain genre. To achieve this, it is necessary to understand the structure of genres as musical categories; to identify the possible representations of the genre by means of paratexts, and to recognize the function of this sign of music in the pragmatic context of music listening.

Method

The model presented in this paper gives an account of the way genre indications influence the perception of music by creating expectations and meanings.

Implications

The analysis of genre indications is useful to evaluate its function as a hermeneutic guide to music. These analytical tools provide arguments that composers, musicologists, producers, or critics can use to think about the way they want the listeners to perceive the music they share.

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Music as ludic behavior

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Background

Based on the works of Cross (2007), Merker (2000), Dissanayake (Wallin et al., 2000), Brown (2000), Fitch (2006), Spencer (1890) and Darwin (1871), I will point out that all of these theories on the origin of music, from sexual selection to group coercion, do not exclude the others. They do not answer the question “where does music come from?” but offer partial views of the behavior, as music would not be exclusively due to reproductive pressure neither would it be due to the behavior's groupal factor, but always a combination of both and more. This work is influenced by Dario Martinelli's (2008) work on zoomusicology and the understanding that if other animals have the cognitive capacities to create imaginary scenarios, to manipulate real elements into the virtual world of play, and have the capacity to understand sound as an object, then they are able to produce music in their own means. It is not intended to delimit which would be the art of non-human animals, but to understand each non-human animal's epistemology and search for what would be its art. I will work with the definitions of animal play presented by Gordon Burghardt (2004), and his criteria to identify the behavior on other animals outside the scope of our epistemology.

Aim

This study deals with the origin of the musical behavior as artistic, with the function of stimulating the imagination and exercising the emotional faculties of the being; based on the pleasure felt by the stimulus of the five senses; all this included in the five base criteria for the identification of a play behavior, by Burghardt (2004) (limited immediate function, endogenous component, structural or temporal difference, repeated performance and relaxed field). Music then would be the extension of what we understand as animal play behavior.

Main contribution

With this work, I hope to elucidate the epistemology towards non-human animals and bring forward the idea that art is not exclusive to humans, but a complex non-species-specific behavior.

Implication

I argue art as the product of manipulating ordinary elements to invoke virtual emotions, therefore establishing imagination and make-believe behavior as the core of art, and possible to any other species.

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Epistemological misrepresentation and Coloniality of Knowledge in Music Psychology

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Background

One central problem of music psychology is to explain the nature and content of musical experience (Sloboda, 1998). Nowadays, music psychology funnels a number of questions about how human beings connect themselves with and within music that thinkers from all latitudes have put since ancient times (Deutsch, 2001). In this search, psychology has been nourished by systematic musicology. However, this disciplinary encounter is problematic when its findings are intended to be generalized due to the abyssal characteristics that both disciplines have shown since their origins (Dussel, 2014). The Abyssal Thinking (Santos, 2007) is developed when people define, unilaterally, radical lines that divide human experiences. Such lines make visible and valorize their own experiences, and make unintelligible and invisible the experiences at the other side of the line. Particularly, in music psychology, this thinking is mainly expressed while developing models based on an epistemic framework identified with the categories that Western music theory developed over centuries laying the foundations of the hegemonic musical thinking. This dominant episteme makes the nature of the subalternized cultures musical experience invisible (Shifres, 2017).

Aims

This paper aims to explore some mechanisms by which the abyssal perspective in music psychology studies is consolidated. It intends to show how the dominant episteme misrepresent or directly obscure the nature of the musical experience of cultures that are subalternized.

Main contribution

Two mechanisms of epistemological subalternization, commonly observed in studies in music psychology, are presented. On the one hand, the mythification mechanism (Martínez Garnica, 1985) produce observable realities based on theoretical categories generated a priori by the observer, which have the paradoxical effect of making the genuine prior realities invisible. Secondly, the concealment of the locus of enunciation (Grosfoguel, 2014), proposes a non-situated and omniscient researcher. Thus, the local character of the validity criteria of knowledge is misrepresented and universalized. Such a concealment also relegates other criteria and forms of knowledge that may be locally more relevant. Some examples from recent and classical research in music psychology are discussed according to both concepts.

Implications

Both presented mechanisms, when associated, reinforce coloniality of knowledge (Maldonado Torres, 2007) within the psychology of music. Within the framework of this granted coloniality, cross-cultural studies imply the impossibility of the Other for postulating his own theoretical categories and methodologies to answer their own questions (Zemelman, 2006). Through this form of epistemic racism (Maldonado Torres, 2014), the psychology of music runs the risk of collaborating with cognitive injustice, adopting an "extractive" perspective and denying the Other's epistemic sovereignty (Santos, 2009).

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T9M: Short Talks 9 - Personality

Time: Friday, 27/Jul/2018: 21:00 - 22:00 · Location: Montreal_1

Session Chair: Mara Elizabeth Breen

The role of personality in brain activity during perception of emotions in music

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Background

Individual differences in personality are related to emotional tendencies, and emotion is an important part of musical experiences. In particular, the personality traits Extraversion and Neuroticism have been related to reward sensitivity and propensities to experience positive and negative emotional states, respectively (Larsen & Ketelaar, 1991). In line with this, functional brain imaging has related these traits to limbic activity during perception of emotionally-valenced non-musical stimuli (e.g., Canli et al., 2002). While behavioral music research suggests that individual differences play a role in the perception of emotions in music (Vuoskoski & Eerola, 2011), to our knowledge the role of personality in brain activity during perception of emotions in music has not been investigated.

Aims

To investigate the role of individual differences in personality in brain activity during perception of music portraying different emotions.

Methods

Fifty-six participants were scanned using functional magnetic resonance imaging (fMRI) while they listened to 30, 4-second film-music excerpts portraying happiness, sadness, or fear. Additionally, participants completed the Big Five Questionnaire as a measure of personality traits.

In order to narrow the voxel search space for the analysis of the neuroimaging data, regions of interest (ROIs) will be selected using a thresholded variance map (Omura, Aron, & Canli, 2005) for each emotional contrast. A summary statistics approach will then be used to relate the personality traits to stimulus-related activation in the ROIs. Additionally, this ongoing study will implement a novel data-driven clustering method for investigating individual differences in neuroimaging.

Results

The analyses are underway, and the results will be presented at the conference. However, based on previous neuroimaging research with non-musical stimuli, it is predicted that Extraversion and Neuroticism will be related to brain activity during perception of positively- and negatively-valenced musical stimuli, respectively.

Conclusions

This research has potential implications in several areas. In personality research, it may further support the relationship between personality traits and emotional processing. In music research, it may indicate a similarity between music-evoked and everyday emotions, and it may suggest that personality ought to be considered in studies of music and the brain. There may also be therapeutic applications, as this study could help elucidate the link between personality and emotional outcomes. Finally, this study has methodological implications, as it may show the usefulness of variance maps and the novel clustering approach for studying individual differences in neuroimaging research.

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Variations in music appreciation: The relationship between musical expertise and musical empathizing and systemizing traits

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Background

A primary interest for the study of music psychology is the way individuals experience and appreciate music in everyday life. To investigate this complex phenomenon, the influence of individual differences (e.g., gender, culture, personality, and musical expertise) on music listening is commonly explored. Two general cognitive traits, empathizing and systemizing, are also found to affect music listening and these traits have musical equivalents: musical empathizing and systemizing, respectively (Kreutz et al., 2008). General empathizing is the ability to respond in accordance to others' emotions, while musical empathizing is the ability to respond to the emotional content of a musical piece. General systemizing is the ability to respond to regular patterns in objects and events, while musical systemizing is the ability to understand the structure and organization of a musical piece. Although individual differences in engagement with and response to music are well documented, little is known about variations in musical empathizing and systemizing (E-S) traits and their relation to musical expertise.

Aims

This study aims to investigate the influence of music expertise on musical E-S traits and the relationship between musical and general (non-musical) E-S traits. The objective of the current study is three-fold: 1) To assess the relationship between musical and general E-S traits; 2) to examine the overall relationship between musical expertise and musical E-S traits; and 3) to specify the types of music training, particularly number of instruments played, years of formal instrumental training, and years of formal music theory training, that may be associated with musical E-S traits.

Methods

81 respondents aged 12-33 were included in this survey and reported on their level of musical expertise and endorsement of musical and general (non-musical) E-S traits. The participants were asked to complete the Goldsmiths Musical Sophistication Index (musical expertise), the Empathizing and Systemizing quotients (general/non-musical E-S traits), and the Musical Empathizing and Systemizing inventory (musical E-S traits).

Results

The results confirm that general E-S traits are related to musical E-S traits. Findings also reveal that musical expertise, including but not limited to formal training, is positively associated with musical E-S traits. Musical training was positively associated with musical E-S traits, such that people who played several instruments and reported several years of formal instrumental training endorsed high E-S traits; while music theory training differentially impacted musical E-S traits.

Conclusions

Findings confirm and expand previous work showing individual differences in musical appreciation. General musical expertise, that extends beyond training, such as engagement in music related activities, is positively related to musical E-S traits. Receiving instrumental or theoretical training in music strengthens musical E-S traits. Implications of findings will be discussed in relation to E-S traits of individuals with autism spectrum disorder given that they present with stronger systemizing than empathizing traits.

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Personality correlates of musical engagement and experience

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Background

Musical preferences and ability have been shown to be related to individual personality characteristics in the general population (Rentfrow & Gosling, 2003; Dunn et al., 2012). However, less is known about the relationship between specific aspects of musical sophistication (e.g., musical engagement, training, and ability) and individual differences in personality.

Aims

The aim of the current study was to explore the relationship between general musical sophistication and other musicality variables, as measured by the newly developed Goldsmiths Musical Sophistication Index (Müllensiefen et al., 2014) and the 5-factor model of personality, as measured by the NEO-FFI-3 (Costa & McCrae, 2010).

Methods

117 students (79 female) aged 18-35 ($M=21$, $SD=3.29$) from various programs studying at a large Canadian university completed the NEO-FFI-3 Personality Inventory and the Goldsmiths Musical Sophistication Index (GMSI), as part of a larger study.

Results

Linear regression analyses revealed significant positive correlations between self-reported openness to experience (NEO-O) and GMSI factors of musical engagement, music perception, appreciation of music-evoked emotion, and general musical sophistication ($p < 0.05$), but not singing ability. Extraversion (NEO-E) was positively correlated with GMSI factors of musical engagement, singing ability, appreciation of music-evoked emotion, and general musical sophistication ($p < 0.05$), but not music perception. Further, greater musical training is significantly associated with higher levels of musical engagement, music perception, singing ability, and appreciation of music-evoked emotion ($p < 0.05$), but not with personality characteristics.

Conclusions

This work builds on previous findings on associations between openness to experience and extraversion and musical preferences (Dollinger, 1993; Greenberg et al., 2016), suggesting that these particular personality characteristics may also have multiple and differential impacts on specific aspects of musical sophistication and ability.

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T10M: Short Talks 10 - Neuroscience

Time: Friday, 27/Jul/2018: 21:00 - 22:00 · Location: Montreal_2

Induced Beta Power Modulations Reflect Active Prediction During and After Gradual Tempo Changes in Auditory Beats

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Background

In order to process time when performing music, musicians must actively track the beat. Such tracking is particularly important in small ensembles when the group members must stay together during tempo changes or start a passage together after rests. To understand the neural processes involved in temporal tracking, we targeted beta power changes (13-30 Hz) which can reflect numerous top-down processes in time (Kilavik et al., 2013). Recently, beta-band activities were found to distinguish active temporal anticipation before accelerating and decelerating beats, and power changes in the auditory and motor systems reflected aspects of anticipation like imagery (Fujioka et al., 2015) and uncertainty (Tzagarakis et al., 2010). Whether the same networks and neural responses can reflect active tracking during tempo changes and during silence is unknown.

Aims

We hypothesized that beta power changes would reflect the mental processes related to tracking a beat during tempo changes and during silence. Therefore, after contextual beats, we examined whether power modulations revealed temporal predictions about where a beat should fall during a tempo change or during silence.

Method

Using previously recorded EEG data from 13 musicians, we examined beta power modulations during tempo changes and subsequent inter-trial silences. Participants attended to smoothly accelerating, decelerating, or steady beats for eight intervals while detecting rare targets of sudden, shifted beats. The beat-based neural responses to the beginning and end of the tempo changes were compared within the three conditions. Additionally, neural activity in the silence following each trial, in which no explicit task was given, was analyzed for any systematic effects related to beat imagery across all three conditions.

Results

Beta oscillations projected onto an auditory-related principal component tended to show larger power decreases as tempo changes progressed. In the steady condition, the reverse trend occurred. These effects, however, were not significant when examined by ANOVA.

Significant beta power decreases in the same component were found across all three conditions at the time when another beat would have occurred if the trial continued. This coincided with a large evoked response as well.

Conclusions

Beat-based changes in beta oscillations were not clearly observed. In contrast, a power decrease was still observed after the trials, but it was weaker compared to the omission evoked response. These results demonstrate that the beta-band oscillatory neural circuit is not 'automatically' entrained to changing beats and during missing beats, which indicates the importance of actively engaging attention during tempo tracking in music performance.

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The Impact of Physical Exercise on Music Appreciation

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Background

Music's ability to influence exercise performance is well known (e.g., Karageorghis, 2016); but the converse, how exercise influences music listening, remains unknown. Exercise can elevate mood and neurotransmitters such as dopamine (Heijnen et al., 2016). Mood and dopamine/reward circuitry are implicated in musical appreciation (e.g., Salimpoor et al., 2013). Therefore, exercise could presumably influence music appreciation.

Aims

We examine the effects of exercise on music appreciation, and test for a modulatory role of dopamine levels by measuring eye-blink rates.

Method

Participants (n=20) rated unfamiliar music clips on enjoyment before and after two sessions: an exercise day and a rest day (counterbalanced in order). On the exercise day, participants ran on a treadmill for 12 minutes—6 minutes at a comfortable pace followed by 6 minutes at increasingly vigorous pace (Winter et al., 2007). On the rest day, participants sat and listened to a 12-minute podcast. Before and after each session, we collected measures of positive and negative affect (PANAS questionnaire) and eye-blink rates, an established method to measure dopamine level (Jongkees & Colzato, 2016). Participants were asked “How much did you enjoy that song?” and responded on a horizontal slider quantized on a 100-point scale.

Results

Participants' ratings of musical enjoyment increased significantly after running ($p = .004$), but not after the rest control condition ($p=.79$). On the running day, the change in enjoyment positively correlated with a change in eye-blink rates, $r=.359$, $p=.08$. On the control day, music ratings did not correlate with eye-blinks. Positive affect scores increased on the exercise day ($p<.001$). The change in positive affect correlated positively with a change in music enjoyment, $r=.44$, $p=.03$.

Conclusions

Here we show that exercise lead to an increase in music appreciation, and music appreciation was related to mood and dopamine levels.

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How consonant is Bach's C Major Prelude? Listener's ratings, neural correlates, and some mathematics

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Background

The topic of musical consonance and dissonance has interested many researchers. One reason for such interest is understanding the relationship between tonal (relationship between tone frequencies) and perceptual consonance (i.e. related to hearing sensation) in music, which helps elucidate brain mechanisms linking sensory perception with higher cognition (Koelsch & Siebel, 2005). Previous studies feature investigations of single chord/interval perception (Pallesen et al., 2005), and extended melodies (Green et al., 2008).

Aims

The main aim is to explore the link between sensory (including neural) and tonal consonance. An additional aim is to combine advantages of single chord/interval approach with those of extended pieces (little short-term memory load and high ecological validity, respectively).

Methods

Study 1 involved an online questionnaire with 12 excerpts representing individual bars from Prelude in C major by J.S. Bach (The Well-Tempered Clavier), requested to be ranked from most dissonant to most consonant. To provide an objective estimate of consonance for each excerpt, we used the metric called Percentage Similarity (PS) to harmonic series (Gill & Purves, 2009). Study 2, involving electroencephalography (EEG) acquisition (BioSemi, 64 scalp electrodes), had a similar design, albeit the subjects were asked to rate the excerpts using continuous sliders instead of discrete ranks. From the EEG data in study 2, we obtained the P300 event-related potentials (ERP) time-locked to excerpt playback, from 20 subjects, and subjected them to partial least squares (PLS) analysis (McIntosh & Lobaugh, 2004), using each excerpt as a separate group to find optimal contrast in P300 responses.

Results

In study 1, 91 out of 129 respondents provided complete results; quality control retained responses from 71 subjects. Subjective ratings in study 1 had strong association with PS ($r=.84$, $p<.0001$) and with an established roughness model as a test case (Vassilakis, 2007). The slider-based approach in study 2 had a close correspondence in rankings to study 1 ($r=.94$, $p=0$). The first two latent variables (LV1 and LV2) in the PLS analysis of ERP data in study 2 were significant, LV1 showing interhemispheric difference wherein the left hemisphere featured generally greater P300 response to dissonant excerpts ($p<.001$, permutation test). LV2 showed a scalp pattern with a greater P300 response around F1 and F2 channels, indicating either anterior cingulate or central frontal amplitude increase pattern, or a combination thereof, for more dissonant excerpts ($p<.02$, permutation test). Remarkably, LV1 and LV2 featured additive effect in relation to perceived consonance, such that the sum of their respective contrast vectors showed a strong correlation with excerpt ratings across studies 1 and 2 ($r=.73$, $p<.01$).

Conclusions

Studies 1 and 2 feature high ecological validity of the stimuli, and show relations between tonal and sensory consonance, including neural representations of the latter, supporting and extending previous findings (Green, 2008).

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P2M: Posters 2

Time: Friday, 27/Jul/2018: 22:00 - 23:00 · *Location:* Montreal Poster Room

Are Rhythm and Pitch Processed Independently?

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Background

Numerous studies suggest pitch and rhythm are processed independently (Krumhansl, 2000). These studies are also supported by many brain lesion studies (Peretz & Zatorre, 2005). Other accounts argue that allocating attention in time influences pitch perception (Jones et al., 1982) and that pitch expectation can vary depending on rhythmic contrast. (Boltz, 1993). These studies indicate that rhythm influences pitch perception and imply processing interdependence.

Aims

This study aimed to investigate the relationship between pitch and rhythm processing in melodic memory and recall.

Method

All participants completed a demographic questionnaire, an exposure phase, and a test phase. The experiment had three conditions, melody to rhythm (MtR), Rhythm to Melody (RtM), and melody to melody (control). In the exposure phase, participants heard five novel melodies or their unpitched rhythmic content (URC)—a tapped, unpitched version of each melody. Each excerpt was repeated ten times. In the test phase, participants heard ten melodies or URCs. Each excerpt was repeated three times and participants reported if they heard that excerpt in the exposure phase through a “yes-no” response and ranked their confidence in their answer on a 7-point Likert scale. This task was used in each condition.

Results

To determine participant sensitivity in the “yes-no” responses, d' prime values were calculated for each condition and used in all analyses. A single sample ANOVA and post-hoc t-tests indicated that there was a significant difference between MtR/RtM and control, but not between MtR and RtM. A logistic regression was performed to determine the significance of performance variance in the “yes-no” responses. When comparing MtR/RtM to control, participants were more likely to choose correctly in the control than the other two conditions. When comparing RtM to MtR, participants were no more likely to choose correctly in either condition. A single-sample t-test was performed to compare participants' discrimination performance against chance. Participants did not discriminate better than chance in the MtR and RtM conditions but did discriminate better in the control.

Conclusions

The data suggests the task in the MtR and RtM conditions was too difficult for participants to complete. This could be attributed to a lack of stimuli repetitions in the test phase, use of memory recognition rather than predictive judgement, or the presence of a tonal context (Prince et al., 2009). Addressing these factors in further research is needed before making conclusions.

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Auditory Imagery Stability and Musical Training

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Background

Auditory imagery—hearing sound in one’s head without external input—is often cited in music pedagogy as an important skill in advanced musicianship (Gordon, 2004). Despite extensive pedagogical work discussing approaches for developing auditory imagery (Karpinski, 2000), research to date has not examined if current pedagogical approaches impact auditory imagery as measured by modern psychometrics. Research has surprisingly demonstrated moderately weak relationships between musical training and auditory imagery ability (Halpern, 2015), suggesting that musical training may only account for a small proportion of measured differences.

Aims

The purpose of the current study was to examine whether auditory imagery (as measured by the BAIS, Halpern, 2015) is stable or plastic over time in a population of musicians receiving differing amounts of aural skills training using a pretest-posttest design.

Method

The pretest (Fall 2017) established a baseline of auditory imagery ability, and the posttest (Spring 2018) examined auditory ability following completion of Northwestern University’s First-Year Aural Skills Curriculum. Two primary evaluation methods were used: 1) the BAIS (Vividness and Control) to measure auditory imagery ability, and 2) the melodic reversal task, a behavioral component of the BAIS. Two participant groups were tested: the experimental group consisting of students required to take full-year aural skills ($n = 5$), and the control group of students exempted from first-year curriculum entirely ($n = 2$).

Results

A repeated measures ANOVA on both melodic reversal and BAIS scores yielded no main effect of melody reversal accuracy, $F(1,5) = .993$, $p = .365$, $\eta^2 = .166$, $MPre = .771$, $SE = .029$, $MPost = .799$, $SE = .025$, nor BAIS scores, $F(1,5) = .763$, $p = .422$, $\eta^2 = .132$, $MPre = 5.3$, $SE = .345$, $MPost = 5.72$, $SE = .313$. Due to the small participant sample, no between-subject factors were examined.

Conclusions

These results suggest that auditory imagery as measured by the BAIS may be stable over time musicians undergoing their first year of post-secondary musical training. That no change to melodic reversal scores was found from pre- to posttest may indicate that imagery skills recruited for performing melodic reversal may not be utilized and developed by musicians in their first year of post-secondary study. Future work will endeavor to examine the relationship between BAIS scores and success on aural-skills specific tasks.

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The Relationships Between Genre Preference, Aural Skills, and Tonal Working Memory

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Musical training and cognitive abilities appear to be related to one another, but why? Recent research has used measures of musical sophistication to predict measures of working memory capacity, especially tonal working memory capacity, and vice versa, but definitive mediators of the relationship have yet to be identified. Musicians may have an advantage over non-musicians due to their likely enrollment in aural skills courses, in which they learn strategies for melodic dictation, a complex tonal working memory task. They may also have an advantage due to an accrual of aural skills implicitly learned through more meaningful engagement with music, or due to engagement with specific types of music. The aim of

this paper is to investigate the role of explicitly and implicitly learned aural skills as potential mediators of the relationship between musicianship and working memory capacity. Results suggest that musicians are more likely to engage strategies that encourage deeper levels of processing for tonal working memory tasks than non-musicians and that musicianship and aural skills achievement help predict tonal working memory capacity. Exploratory analysis of genre preference suggests listening to classical music, jazz, or heavy metal correlates to higher tonal WMC, which encourages further research into genre preference. Considering these findings, we suggest that the “musician advantage” in working memory tasks may be found in the acquisition of valuable strategies for decreasing working memory load gained through the pursuit of musical mastery.

Predictive processing in music liking and arousal: influences of syntactic and explicit music predictability

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Background

Music consistently ranks among the greatest human pleasures (Dubé and Le Bel, 2003), and its manipulation of expectations seems fundamental to its power (Huron, 2006). Prediction confirmations and violations are both crucial to understanding the environment via the predictive-coding framework (Friston et al., 2009), and multilevel musical structures offer many of each. Accordingly, liking can arise from both surprising and unsurprising musical events (Sloboda, 1991; Egermann et al., 2013). Some evidence suggests an inverted-U-shaped “Wundt” effect (Berlyne, 1971), such that the most pleasurable music is that which optimally balances prediction confirmations and errors (Zald and Zatorre, 2011), but there are few systematic manipulations of musical predictability and their results are mixed (reviewed in Pearce, 2015).

Aims

We sought to better understand the relationship between music predictability and liking by analyzing liking and arousal for melodies of varying music-syntactic complexity across multiple repetitions.

Method

We generated controlled MIDI files of 12 real Western musical excerpts across a wide spectrum of objective musical predictability as computed via an information-theoretic model of note-by-note transition probabilities (Pearce, 2005), and presented these seven times each, as a randomized but fixed sequence, to 27 participants with a range of musical backgrounds. Listeners rated their liking, arousal, and familiarity. We evaluated the effects with mixed-effects regression models.

Results

A linear effect significantly accounted for 31.60% of the variance between music complexity and liking, but adding a negative quadratic term explained 10.91% more and performed significantly better [$F(1,2180) = 7.43, p = 0.0065$]. We also observed positive linear and negative quadratic relationships between music complexity and arousal ($ps \leq 0.04$). Repetition increased familiarity ($p < 0.001$), and decreased arousal ($ps < 0.001$) and liking ($p = 0.0015$).

Conclusions

These results evince a “Wundt” effect of syntactic predictability, as listeners preferred melodies with medium probabilities. Familiarity decreased liking, contrary to other findings but perhaps related to the amount and type of stimuli involved. This systematic, computational approach clarifies an ambiguous phenomenon and underscores the role of predictive processing in music liking.

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Human Perception of Melodic Similarity in Theme and Variation Pieces

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Background

The generation of musical forms relies heavily on a listener's ability to hear and understand repetition of and similarity between musical ideas. Since music is a temporal art in which listeners cannot go back to rehear a section repetition has been used by composers for centuries to give listeners a sense of order and understanding. Due to its importance in comprehending music, this research project intends to investigate how listeners perceive melodic similarity in varied repetitions of musical ideas. Providing insight to the similarity processes in the brain could be applied to our understanding of theme and variation compositions as well as the human perception of similarity outside the musical realm.

Aims

The goal of the present research was to examine theme and variation pieces to determine which musical factors affect a listener's ability to perceive melodic similarity. The first study examined three factors: harmonic differences, change in timbre, and change of ornamentation. The second study attempted to unpack this issue further by asking participants to rate how similar variations from different pieces are to a given theme, and focused on three ornamentation techniques (16th note rhythms, triplet rhythms, octave leaps in the left hand) and minor mode harmonizations.

Method

For the first study, participants were presented with pairs of themes and permutations of variations based on Beethoven's WoO 64 and WoO 77 and asked to rank their similarity on a scale of 1-7. Although two pieces were used, each pair consisted of a theme and variation from the same piece. In the second study, themes and variations from two different works were compared: Mozart K. 354 and Beethoven Op. 35. Participants heard a theme and then 4 variations from each piece and were asked to rank how similar each variation was to the given theme. The process was then repeated with the second theme.

Results

The results showed that a change in harmony or in timbre were not considered to be variations on the theme. However, varying degrees of ornamentation did affect the participants' ability to recognize the variation as being similar to the theme. In the second study, no difference was observed by participants when listening to a variation that belonged to the theme and ones that did not. This study also revealed a significant difference when listening to variations with a change in mode compared to other variation techniques.

Conclusions

Since participants were more likely to rate the variations as less similar if the ornamentation was changed, it is likely that listeners are focusing on surface elements rather than structural elements. The results of the second study also suggest this conclusion.

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Talking about Timbre: Words Used by Musicians to Describe Characteristic Sounds of Instruments and Voice

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Background

Researchers have attempted to relate perceptual dimensions of timbre to acoustical determinants. Approaches have included the use of semantic differentials, verbal attribute magnitude estimation, and combining dissimilarity ratings with multidimensional scaling. More recent study has queried pianists and vocalists regarding their use of timbre descriptors (e.g., Bellemare & Traube, 2005; Prem & Parncutt, 2007).

Aims

This initial study attempted to ascertain the vocabulary used by college music majors to describe timbres of their instrument or voice. How do student musicians representing different instrument families describe the “characteristic sound” of their own instrument? What are the commonalities and differences between instrument types?

Method

Participants were students attending a large music school in the southeastern United States. We gathered responses from music majors representing four instrument families: strings, woodwinds, brass, and voice. Undergraduate and graduate students completed a written form requesting them to respond to the following open-ended prompt: “Please list words or short phrases you would use in describing the ‘characteristic sound’ (tone quality) of your instrument /voice when talking with a high school music student (not a beginner).”

Results

We obtained 168 responses: 48 string players, and 40 each from voice, woodwind, and brass instrument students. Many adjectives were common to lists (dark, warm, full, resonant, and bright were listed at least 30 times), however, only two were cited frequently (at least 10 times) by all four groups: dark and warm. Resonant was among the most frequent for strings, voice, and brasses, but not woodwinds. Bright was identified frequently by string and voice students, not by brass and woodwind musicians. Full was listed commonly among woodwind and brass players but not by string and voice students.

Conclusions

Adjectives used to describe characteristic timbres have different citation frequencies between instrument families. For example, a string instrument or voice quality may be described characteristically as “bright”, however, that adjective may not be considered a positive aspect of woodwind or brass tone. Musicians often use the term “characteristic tone quality” perhaps to avoid the use of adjectives with little precise meaning, and teachers often provide an aural model rather than verbal description. Furthermore, there are a number of different timbres for a given instrument depending upon register and context, particularly with advanced level performers or when comparing various “schools,” such as a French or German tone. What is considered “good” or “characteristic” appears to be a set of learned behaviors in music studios and schools that involve judgment and preference and is not entirely a matter of perceptual discrimination or acoustical invariance.

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Acoustic Correlates of Identification and Confusion Rates Among Speakers, Musical Timbres and Environmental Sounds

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Background

Research into musical timbre has identified a number of acoustic dimensions that support the perception of different instrument sounds, such as spectral centroid, log-attack-time, and spectral variability (Caclin, McAdams, Smith, & Winsberg, 2005; Iverson & Krumhansl, 1995; McAdams, Winsberg, Donnadieu, De Soete, & Krimphoff, 1995). However, musical instruments represent a subset of the auditory objects and events relevant to typical human listeners who must also navigate environments made up of sounds from everyday objects and conspecifics.

Aims

Can a wider range of auditory objects and events be characterized along similar acoustic dimensions as musical timbre? Or, are other acoustic features important for the identification of auditory objects and events outside of musical timbre, and if so, which are they?

Method

We conducted a sound identification study using a broad set of 36 sounds (12 speech utterances from different speakers, 12 instrument timbres, and 12 everyday object sounds from a typical human environment) that took advantage of the acoustic variability both within and between different sound categories. We analyzed confusion rates between pairs of stimuli as a function of how they differed in terms of their acoustic features.

Results

Overall, identification for individual items was well above chance, and was most accurate for environmental sounds. Accuracy got progressively worse for speech and instrument sounds. Confusions typically occurred within categories, and more specifically within instrument families (strings, brass etc.) and within vowels and genders. Linear mixed-effect regression analyses of confusion and identification rates indicated that responses were related to acoustic features pertaining to the sounds' spectral envelopes (Euclidean distance of median power across ERB filter channels) and noisiness (spectral flatness), as well as spectrotemporal modulation rates (Euclidean distance of modulation power spectra) and temporal envelopes (temporal centroid and log-attack-time). These identification responses also appear to closely parallel dissimilarity ratings ($r = -.39$, $p < 0.05$).

Conclusions

The acoustic dimensions identified in timbre research, such as spectral envelope characteristics and log-attack-time, are useful for identifying a wider variety of auditory objects and events. However spectrotemporal modulation rates and the noisiness of the signals plays an especially important role among more diverse sets of sounds.

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Beyond the Effect: The Perceptual Effects of Reverberation

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Background

Written for amplified solo triangle, *Silver Streetcar for the Orchestra* explores the resonance of the common percussion instrument. Alvin Lucier asks the performer to repeatedly strike the triangle for no more than 20 minutes while muting the triangle between the thumb and forefinger (1988). Throughout this performance, the performer manipulates five performance parameters. Manipulating only one parameter at a time, the performer alters each parameter gradually and

imperceptibly. This process of slow change allows the triangle to emit variations of its unique harmonic structure. Moreover, the increased level of reverberation caused by amplification results in easier accessibility to the overtones of the triangle, subsequently creating an increase in arousal (interest) for the listener.

Aims

The presence of reverberation focuses the listener's attention from the repeated sounds of the triangle to the increased presence of overtones. To better understand what listeners are hearing with the presence of reverberation, I designed a focus group that features multiple open-ended questions geared towards the perception and discrimination of the two excerpts of the same musical material—one with the absence of reverberation and one with reverberation.

Method

This hypothesis was tested with a qualitative study using a recording of Silver Streetcar for the Performer in an anechoic chamber. A five-minute passage of this recording was extracted and duplicated keeping one dry and adding reverberation to the duplicate. The recordings were played in succession—first the dry recording, then the reverberant recording with a five-second pause between excerpts.

Main Contribution

Out of 34 participants, 17 agreed that the second recording (reverberant) felt shorter, 2 felt the first excerpt (dry) was shorter, and 15 either were not paying attention to the length or felt that the excerpts were similar in length. Testing this hypothesis with open ended questions in a qualitative setting led to additional reverberation affects: 19 students stated that the speed of articulations increased with the presence of the reverberation. Additionally, 2 students (without prompt) commented that the pitch of the triangle shifted with the presence of reverberation.

Implications

The results of this study show a myriad of perceptual changes in response to the addition of reverberation to an auditory signal. These findings can reveal new creative strategies for composers to utilize the effect of reverberation as more of a compositional tool rather than a blanket effect applied to the final mix of a recording. Moreover, these findings open additional analytical avenues for theorists when approaching works with mixed-media.

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The neural correlates of somatosensory beat perception

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Background

Musical rhythms with a strong sense of a beat have a tendency to elicit a perception of a beat (or pulse) which is often wedded with motor synchronization (Repp & Su, 2013). Electroencephalography (EEG) measurement has revealed that endogenous neural oscillations dynamically entrain to beat frequencies of musical rhythms providing a neurological marker for beat perception (Nozaradan, Peretz, Missal, & Mouraux, 2011). Although beat perception has been shown to be bias to auditory rhythms (McAuley & Henry, 2010), recent research suggests that rhythms presented through vibro-tactile stimulation of the skin can also elicit motor synchronization, albeit to simple rhythms only (Ammirante, Patel, & Russo, 2016). There is also some evidence of information processing enhancements with regards to visual processing being enhanced by auditory rhythms (Escoffier, Herrmann, & Schirmer, 2015; Escoffier, Sheng, & Schirmer, 2010).

Aims

The current research purposes to explore the neural correlates of vibro-tactile beat perception with the aim of providing further evidence for rhythm perception from a vibro-tactile modality. This research is exploratory in nature but the results may provide evidence that informs best-practices regarding vibro-tactile music, as well as providing a broader understanding of the auditory advantage for beat perception. Finally, the results will inform ideas regarding multimodal enhancements of beat perception.

Methods

Participants will be asked to tap to the beat of rhythms that vary in complexity (isochronous, simple) and modality (auditory, vitro-tactile, multimodal). Mean asynchronies will be measured (tap onset - beat onset) to determine the extent of beat synchronization. In conjunction with a synchronization task, participants will also be passively exposed to isochronous and simple rhythms from auditory, vibro-tactile, and multi-modal sources while EEG data is collected. Neural entrainment to the beat will be measured by comparing the distribution of spectral energy in the EEG signal to that in the stimulus envelope onsets. Synchronization and Entrainment will be compared across modalities and rhythm complexity.

Felt It My Way: Idiosyncratic Psychophysiological Response Patterns to Recorded Music

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Background

Psychophysiological responses to music have been studied from decades, but the focus has typically been on common response patterns across listeners. The Repeated Response paradigm, recording a participant's responses to a set playlist of stimuli over multiple listenings, allows for more in depth considerations of responses typical of individual listeners. Repeated exposures to the same stimuli have been associated with desensitization (Grewe, Nagel, Kopiez, & Altenmüller, 2007) as well as sensitization in increased coordination (Sato, Ohsuga, & Moriya, 2012). Either way, there is an opportunity to capture consistencies tied to individual participants musical histories and inclinations that can easily be lost when looking for agreement across a population or audience.

Aims

Identify consistency and coordination in individual participants psychophysiological responses to music and consider the contrasts between participants' responses to pieces of music.

Method

Five participants heard the same six pieces of music 12 times over several weeks. During these listenings, skin conductance, finger temperature, heart rate, respiration, and facial muscle sEMG (Zygomaticus, Corrugator) were recorded continuously. Using activity analysis, we evaluated first which responses showed significantly coordinated in music relevant response events per participant. When participants showed coordination, their moments of consistency were compared to see whether they aligned or contrasted.

Results

Preliminary results show that participants vary how well their responses are coordinated between listenings and which response measures show the most coordination. For example, two participants showed very high respiratory coordination but different patterns of consistency in finger temperature decreases. Besides the overall pattern of disagreement, specific results will be shared on responses to specific works, including a late Beethoven String Quartet excerpt and a Dubstep track.

Conclusions

Listeners can show some shared patterns of behaviour to music, but they also develop idiosyncratic response sequences to pieces they come to know. This is not only measurable in post-stimulus ratings and preference but also in the sensitivity, reliability, and timing of changes in their psychophysiological responses.

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Cortical and Subcortical Responses to Missing Pulse Rhythms

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Background

Many rhythm perception experiments employ simple isochronous rhythms, in which synchronous neural or behavioral responses are observed. However, neural responses at the stimulus frequency do not allow one to distinguish whether synchrony occurs as a response to a common input, or as the result of an emergent population oscillation that entrains at a particular frequency. We used rhythms with no spectral energy at the pulse frequency (“missing pulse” rhythms) by manipulating the number of events that occur anti-phase (180°) versus in-phase (0°) with the basic rhythmic cycle. Dynamical analysis predicts neural oscillation will emerge at such a missing pulse frequency. –Previous studies have shown that most listeners tap to these complex rhythms at the missing pulse frequency – a finding that supports the prediction.

Aims

This study aimed to investigate whether the sensorimotor system, as measured by 32-channel cortical EEG, would entrain to a complex rhythm at the pulse frequency even when the complex rhythm contained no spectral power at that frequency.

Methods

The experiment utilized four different rhythms of varying complexity (1 simple, 2 complex, and 1 random rhythm) created from 100ms tones with a 200 Hz fundamental frequency (F0). EEG was decomposed offline into the cortical-steady state response (SS-EP) and the subcortical frequency following response (FFR). Fast Fourier Transform (FFT) of the Hilbert envelope showed energy at the repetition frequency (2Hz) for the simple rhythm, but no spectral energy at the missing pulse frequency (2Hz) for the complex rhythms of the random rhythm. EEG responses to these stimuli were examined for evidence of neural oscillations and power modulations at the missing pulse frequency, as predicted by dynamical analysis. Additional analyses examined the FFR to the 200 Hz tones that made up the rhythms.

Results

We found cortical responses at the missing pulse frequency for the listeners who were able to tap the pulse of these rhythms. We also found strong correlations between the predictions of the dynamical model and the cortical responses. Interestingly, the perceived phase of the pulse varied between listeners and trials. Therefore, we analyzed the subcortical responses based on their relationship to the perceived phase of the pulse in the rhythmic context. We describe the extent to which the FFR depends of the phase of the perceived pulse.

Conclusions

These data support the theory that rhythmic synchrony occurs as the result of an emergent population oscillation that entrains at this particular frequency.

Now you like it, now you don't: Modulation of musical reward sensitivity with TMS and associated changes in reward-system BOLD activity.

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Background

Humans have the unique capacity to experience pleasure from aesthetic stimuli, such as music. Neuroimaging findings with music have led to a model whereby mesolimbic striatal circuits interact with cortical systems to generate expectancies leading to pleasure (Salimpoor et al., 2013). Recently (Mas-Herrero et al., 2017), we have provided causal evidence for the model using transcranial magnetic stimulation (TMS) over the left dorsolateral prefrontal (DLPFC) cortex—a procedure that is known to modulate fronto-striatal function (Strafella et al., 2001). Excitatory and inhibitory stimulation of the fronto-striatal pathways led to increases and decreases, respectively, of both musical pleasure and motivation. However, the exact neural mechanisms underlying these changes are still unknown. Here, we provide novel insights into this topic by combining functional magnetic resonance imaging (fMRI) and TMS while participants listen to pleasurable music.

Aims

Our goal was to identify which particular brain regions and networks are responsible of the changes found in musical pleasure and motivation following TMS over the left DLPFC.

Methods

Seventeen participants performed three sessions in which intermittent TBS (iTBS), continuous TBS (cTBS) and sham were applied over the left DLPFC. Following the stimulation, the participants entered into the MRI, where they listened to a set of musical excerpts while providing real-time rating of pleasure. Additionally, to assess their motivation to seek music, individuals could purchase the music with their own money.

Results

Notably, we replicated our previous behavioral findings, that is, enhancement and disruption of the fronto-striatal circuit by means of TMS modulated up and down music reward sensitivity, respectively. Additionally, our fMRI data indicate that changes in pleasure and motivation across sessions were accompanied by changes in striatal engagement and connectivity. Specifically, the degree to which subjective pleasure responses scaled with brain activity was modulated by TMS, such that pleasure-related responses elicited greater striatal activity and increased connectivity strength among reward-related regions for iTBS compared to cTBS.

Conclusion

These findings further demonstrate that musical reward can be causally modulated bidirectionally by applying TMS over the left DLPFC. In addition, our fMRI results point out that these changes are driven by alteration of fronto-striatal function. These results indicate that the engagement of fronto-striatal paths may be an indispensable step to produce an emotional reaction and induce pleasure with music. These findings may provide new insights in understanding the neural mechanism underlying musical pleasure and more broadly, it opens new avenues for research into how affective processes may be modulated by extrinsic stimulation of fronto-striatal circuits.

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Effects of pitch expectancy violations on timing of motor actions

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Background

Tapping in synchrony with an isochronous sequence of metronome beats requires anticipatory mechanisms. The ability to predict when an event will occur allows the motor system to prepare an appropriate response in advance so that actions coincide with a target event. A continuous process of refining actions based on feedback also allows the system to generate increasingly more accurate predictions of the behavioral effects of a movement (van der Steen & Keller, 2013). According to the internal models theory (Wolpert & Flanagan, 2001), forward models represent the causal relationship between the input and output of the action control system, where expectancies related to motor and perceptual outcomes are tethered to motor commands. This investigation considered the implications of the forward model for motor actions that generate strong expectancies for the resultant pitch outcomes.

Aims

To test whether pitch expectancy violations affect timing accuracy of motor actions that generate strong expectancies for the resultant pitch outcomes.

Method

A synchronization and continuation paradigm was adopted whereby each tap in the continuation phase triggered a piano tone. In Condition 1, taps generated a combination of four tones (G4 C4 C4 C4) which was repeated five times, ensuring the sequence was highly expected. In Condition 2, the same feedback tones were presented, but one of the expected pitch changes (to G4) was unexpectedly displaced upward by 1 semitone (to G#4). In Condition 3, one of the expected pitch changes of the sequence (to G4) unexpectedly did not occur, remaining at C4. In Condition 4, all piano feedback tones presented were identical (C4), except for one unexpected pitch change (to G#4). Participants ($n = 25$) were instructed to tap the index finger on a drum-pad in synchrony with the metronome clicks (IOI = 600 ms) and maintain the pace in the continuation phase. Data analysis compared the timing variability of 3 intertap intervals (ITIs) before the feedback tone manipulations with 3 ITIs after the unexpected pitches.

Results

Unexpected pitches significantly affected the timing accuracy of motor actions. More specifically, the ITI immediately after a pitch violation was significantly shortened and the next ITI was significantly overcompensated. The effect was observed in all conditions where pitch expectancy violations occurred (Conditions 2-4). However, timing accuracy was not affected in Condition 1, where a highly predictable and expected sequence of pitch changes was maintained.

Conclusions

This study demonstrated that pitch expectancy violations interfere with motor timing accuracy, supporting the internal models theory that expectancies related to motor and perceptual outcomes are tethered to motor commands. Future research is needed to validate this protocol with tasks involving more complex motor sequences and to further understand the implications of the internal models theory for music performance.

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Modeling Rhythmic Complexity in a Corpus of Polyrythm Examples from Europe and America, 1900-1950

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Modeling Rhythmic Complexity in a Corpus of Polyrythm Examples from Europe and America, 1900-1950

Background

Rhythmic complexity, and particularly the use of “polyrythm” (the simultaneous presence of two or more contrasting rhythmic layers, meters or speeds), is often identified as one central feature of twentieth-century Western art music. Close reading and generalization from a small number of representative examples have resulted in several competing ideas to explain the increased prevalence and scale of polyrythm in this period (e.g., Krebs, 1999; Poudrier, 2009), but these remain to be tested.

Aims

The current project uses computational analysis to explore the development of polyrythm in a corpus of 719 examples extracted from 450 works by composers from Europe and North America from 1900 to 1950 (Suter, 1980). Corpus examples and associated metadata have been processed to be analyzed using the Humdrum Toolkit (Huron, 1995). The primary research objectives are to: (1) identify structural features and associated musical parameters; (2) develop complexity measures for metrically dissonant rhythmic strands; and (3) identify trends in the development of polyrythm in that period.

Main Contribution

Computational modeling and exploratory analysis were conducted using a stratified sample dataset ($N = 80$) that includes four randomly selected examples for each composer ($N = 20$). Exploratory analysis found no significant differences in terms of global complexity measures, i.e., entropy, nPVI, event density applied to the resultant composite rhythms, either of each example as a whole or based on a division of the texture into two contrasting rhythmic groups. Thus, prior claims of increasing complexity over the focus period have not been substantiated, at least from the perspective of polyrythm and

global complexity measures. However, some trends based on national origin and genre have been identified, and the wide variance observed in measures of rhythmic regularity based on composer, nationality, genre, and pre- vs. post-war composition year suggests that there are other factors at play, which future analytical work will address. Hypotheses derived from the exploratory analysis will be tested using the remainder of the corpus (N = 639).

Implication

This project seeks to provide a framework for the computational analysis of musical excerpts that features a wide range of polyrhythmic structures. Specifically, it provides complexity metrics to examine the use of polyrhythm in 20th-century music, test competing claims about its development, and explore aspects of the cognitive processing of complex rhythms within a culturally-situated musical practice.

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Hearing (and seeing) the beat of a different drummer: Event-related desynchronization in the action observation network

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Background

The action observation network (AON) is a fronto-parietal network activated during the execution and observation of intentional movement. Activation of this network has primarily been observed using visual stimuli but some limited evidence exists for activation by auditory stimuli (e.g., McGarry et al., 2012). Even less is known about the extent to which the AON is activated during music listening (but see Leveque & Schon, 2013; McGarry, Pineda & Russo, 2015). Event-related desynchronization of the sensorimotor rhythm (8-13 Hz) is a temporally-sensitive method for assessing AON activation.

Aims

The purpose of our experiment was to explore the role that motor simulation plays in perception of percussion by experts and novices under unimodal and multimodal presentation conditions.

Method

Expert percussionists and novices viewed the principal percussionist of the Toronto Symphony play excerpts from Rimsky-Korsakov's *Scheherazade* (mvt IV). The high familiarity of this piece among expert percussionists allowed us to investigate the role that experience/familiarity plays in AON activation. To explore the effects of modality, we presented the excerpts in A (audio), V (visual), and AV (audiovisual) modalities. To explore the role of stimuli richness, we presented the excerpts in rich (human) and impoverished (point light and sine tones) conditions. Neuro-electric recordings were obtained using a 64 channel BioSemi ActiveTwo EEG system. Analyses were performed using custom MATLAB 7.12.0 (R2011a) scripts and EEGLAB 13.0.1b, a freely available MATLAB toolbox (DeLorme & Makeig, 2004). An independent components analysis (ICA) was run on the data using the RUNICA algorithm to separate sources of activity. The sources were localized using DIPFIT (an EEGLAB plug-in). Two theoretically-expected sources of activity in premotor and parietal regions were analysed. Event-related desynchronization (ERD) was the dependent variable used to measure AON activation for all conditions. An analysis on electrodes CZ, C3, and C4 yielded an overall pattern of results that was similar to that obtained through the component analysis.

Results

Visual presentations consistently elicited more ERD than auditory presentations, and multimodal stimuli did not lead to greater ERD than unimodal stimuli. ERD was comparable for experts and novices, and the extent of ERD in the audio condition differed significantly from zero.

Conclusions

Although visual information was dominant, we found evidence of ERD in the audio-alone condition. Richness of stimuli as manipulated here does not appear to be an important moderator for AON activation. Future work will further probe familiarity-based effects by manipulating rehearsal of musical excerpts in a within-subject paradigm.

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Horses do not spontaneously engage in tempo-flexible synchronization to a musical beat

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Background

Spontaneous, predictive, tempo-flexible synchronization to external rhythms is a unique phenomenon that has been observed in humans and only a handful of parrot species, all of whom display a capacity for vocal learning. According to the vocal learning hypothesis (Patel, 2006), the ability to synchronize movements to an external auditory beat in a predictive and tempo-flexible way is linked to vocal learning, i.e. the capacity to learn complex vocalization patterns based on an auditory model. Horses (*Equus ferus caballus*) may present an interesting challenge to this hypothesis. They are not vocal learners, yet there are many anecdotal reports of horses displaying beat synchronization-like behavior. This claim however has not been empirically investigated; the purpose of the present study is to do so.

Aims

To determine whether horses spontaneously synchronize movement to an external beat in a predictive, tempo-flexible manner.

Methods

Eight horses stabled at the Mount Holyoke College Equestrian Center were tested using the circular trotting to music paradigm described by Bregman, et al. (2013). Horses were held on a lead line and lunged at a trot in a circle while musical excerpts were played over arena loudspeakers. Excerpts from two songs ("Happy" and "Shake It Off") were played at their canonical tempo (160 bpm) and four shifted tempi (144, 152, 168, 176 bpm); these tempi were selected due to prior report of 152 bpm as a typical trotting rate (Gallo, 2007). Each horse trotted to twenty 45-second excerpts, grouped into two ten-excerpt blocks. Before each block, horses trotted in silence for 60 seconds. Horses changed direction between blocks. The lungers wore earplugs and listened to a dense, arrhythmic audio mixture over noise-cancelling headphones to avoid delivering rhythmic cues to the horses. A second researcher delivered visual cues to the lungers when excerpts started and stopped, but otherwise remained out of sight. Horse gait was recorded using high-speed video and accelerometers mounted to forelimb boots. Forelimb hooffalls were identified, and inter-hooffall intervals (IHIs) were calculated to assess trotting synchronization to the musical beat.

Results

A range of preferred inter-hoofall intervals was observed across horses (preferred IHI: 343 – 411 ms; 146 – 175 bpm). However, IHIs were not modulated by musical excerpt tempo ($p > .7$), demonstrating that horses do not spontaneously engage in predictive, tempo-flexible synchronization to a musical beat.

Conclusions

Despite anecdotal claims to the contrary, horses do not spontaneously synchronize their trotting to musical beats in a predictive, tempo-flexible manner. This finding is consistent with the claims of the vocal learning hypothesis that such synchronization is linked to neural structures underlying vocal learning.

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Keys to the Origin of Entrainment

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Background

The number of hypotheses concerning the original function of music is not much smaller than the number of music-origin theorists. Sexual selection, social bonding, social amusement, mood synchronization, safe haven for childhood exploration of social behaviour, mother-child bonding, the link between grooming and language to enable social communication, and tribal defence through territorial boundary delimitation are all defensible. This wide variety of hypotheses stems from differing concepts of music, the several disciplines of the theorists, and the paucity of the pre-historical record.

Aims

Musical entrainment – the universally shared capacity of homo sapiens to synchronize our movements to an external beat – is a capacity critical to the creation, performance and participation of and in music. Without it there would be no concept of rhythm. It is a narrower and more clearly defined phenomenon, so its study can be usefully focussed. Its roots are as deep and probably deeper than our melodic and harmonic capacities, so its study can yield important insights into the origin and purposes of music, and as well into the implications of those origins in our modern daily lives.

Main Contribution

The theory I would like to present is that entrainment developed as an adaptive trait over tens of thousands of years as our ancestors gradually came to live in communal groups, and came to associate the sounds of communal living with the evolutionary success of communal living. Those sounds – marching, pounding, scraping – either became sequentially uniform and then abstracted or abstracted and then uniform. Either way, abstracted rhythmic sound associated with the positive emotion of communal living forms the heart of musical entrainment.

Implications

Today we continue to associate rhythmic music with the general positive emotion that it is better to be in a group than not. By understanding how entrainment works, we better understand the effects of church hymns, national anthems, music accompanying commercials, music joining people of different cultures, music binding protest marchers. Entrainment's evolutionary origin also provides a structure on which many of the music origin hypotheses may be considered.

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Effect of melody and rhythm on the perception of nonadjacent harmonic relationships

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Background

Temporally nonadjacent key relationships are ubiquitous in tonal-harmonic music. However, the degree to which they are perceived beyond relatively short durations is uncertain. Using a stimulus-matching paradigm, Woolhouse et al. (2016) maintained the memory of the original, nonadjacent key by increasing the duration of an intervening key to ca 12s. Farbood (2016) similarly found that the memory for a key remains active for 20s after modulation. These findings support previous work by Cook (1987) who carried out conceptually similar experiments using repertoire pieces; in this case, the perception of large-scale tonal structures did not surpass a minute.

Aims

The stimuli of Woolhouse and Farbood were limited to the harmonic domain: in Woolhouse et al. (2016), the textures were homophonic, while in Farbood (2016) participants listened to repeated arpeggios. Yet the use of real excerpts by Cook (1987) and the extended effects he obtained suggests that musical features—in addition to harmony—may be important in maintaining nonadjacent key relationships. The current study aims to investigate this in a controlled manner by manipulating specific features of the musical surface and testing the effects of these manipulations on global harmonic perceptions. Two music-theoretically defined features were tested: melodic figurations (e.g. chordal skips and passing tones) and rhythmic figurations (e.g. anticipations and suspensions).

Method

We replicated the stimulus-matching paradigm of Woolhouse et al. (2016) in which influence the of a particular manipulation (in this case, the musical surface) is observed by pairing two stimuli, identically matched except for the feature under investigation. Concluding each stimulus is a probe cadence, rated by participants for goodness-of-closure. The overall form of the stimuli is segmented into three parts: X1 (key establishing sequence), Y (second key), and X2 (probe cadence having a tonic relationship to X1). We investigate the effects of the musical surface from three perspectives: (1) whether the presence of melodic and rhythmic figurations increases the global effect of X1; (2) whether the type of harmonic progression at X1 itself affects global retention; and (3) whether the probe cadence needs to be melodically and rhythmically similar in order to maintain this global retention.

Results

Stimuli with rhythmic or melodic figurations were rated significantly higher than unembellished control stimuli ($p < 0.001$). Similarly, stimuli in which the probe cadence was stylistically similar to X1 were rated higher than when it was different ($p < 0.0001$). No significant effect was found for type of harmonic progression ($p = 0.25$).

Conclusions

Our results are consistent with the notion that surface musical features contribute to the establishment and maintenance of temporally nonadjacent key relationships within tonal harmonic music. However, 'deeper' structures, such as type of harmonic progression (for example, cycle of fifths), seem not to be crucial.

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The effect of harmony on the activation of phrase schemata in twelve-bar blues progressions

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Background

Harmonic expectation has been shown to reflect syntactical rules for chord-to-chord connections in both short and long musical contexts (Bharucha and Stoeckig 1986; Bigand et al. 1999). These expectations may derive from the activation of specific schemata which provide context for identifying syntactical errors (Gjerdingen 1988). Few empirical studies address the connection between low-level and high-level structure, such as phrases or form. The twelve-bar blues, with its three unique phrases, offers an opportunity to investigate this relationship.

Aims

This research investigates whether listeners expect chord successions presented in the context of the twelve-bar blues idiom to adhere to common-practice syntax. Additionally, it addresses how harmony affects the activation of phrase schemata.

Method

Participants (N=21, mean age=18.7 years) listened to 16-second synthesized excerpts that represented four-measure phrases from the twelve-bar blues. Excerpts were designed to harmonically resemble one of the three standard phrases from the twelve-bar blues, with one chord per measure: I-I-I-I, IV-IV-I-I, or V-IV-I-I. Each excerpt included a single variable chord, drawn from the set of 24 major and minor triads, in one of eight possible locations. Redundant progressions were excluded, yielding 160 unique trials. For each trial, participants provided a goodness rating on a six-point scale and indicated whether they thought the excerpt came from first, second, or third phrase of a twelve-bar blues.

Results

Listeners preferred harmonic successions reflective of common-practice syntax; however, two instances of idiomatic blues root motion also received high ratings: modally-inflected ascending minor thirds (e.g. I-bIII), and descending major seconds (e.g. V-IV). Both the location and content of the variable chord significantly affected phrase labelling. Successions with a consensus phrase label received significantly higher ratings. Some ratings and phrase labels combined to reveal that specific chord successions can invoke different expectations depending on the presently active phrase schema.

Conclusions

Harmonic expectation in blues includes a wider range of acceptable root motion. Phrase schemata are defined both by their harmonic content and by the order in which that content is presented. Single chords can affect the strength of an active schema and can suppress the activation of other viable schemata. Listeners have stronger expectations for phrases that can be identified as part of the larger musical context.

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Conceptual rather than perceptual: Cross-modal correspondences of musical scales are based on an abstract schematic structure

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Background

Literature proposes at least three origins of musical cross-modal correspondences: natural-scene statistics, neurophysiological binding, and abstract, structural connections. The dilemma is relevant to linguistics, as well: e.g. if a musical scale “moves upward” in one language, but becomes “thinner” in another, the difference may be motivated by the lexicalization from the mother tongue, but also by an abstract underlying schema (Antović et al, 2013).

Aims

We hypothesize that five apparently different conceptualizations of musical scales (vertical movement, shrinking in size, thinning in width, rotating, and changing hue) are based on a single underlying structure consisting of three progressively specific conceptual primitives: DISCRETE DISTANCE, temporal alignment between tones heard and steps in the animations presented, SCALAR CHANGE, the progressive, unidirectional spatial transformation of the animations, and OVERT MOVEMENT, favoring actual transformation of the shapes to static parameter change (as in color).

Methods

In three experiments totaling 184 participants, children and adults were asked to rate the congruence of a total of 52 animations to accompanying tonal (major diatonic) and nontonal (Pierce-Bohlean) musical scales. The scales were visually presented as squares moving vertically, shrinking/expanding in size, narrowing/thickening in width, rotating clockwise/counterclockwise, and changing in hue from pure red to pure blue and back. In each animation type, we varied the underlying structure by systematically including or excluding DISCRETE DISTANCE and SCALAR CHANGE. For instance, the excluded discrete distance and included scalar change meant the squares moved or transformed smoothly from initial to final position; the opposite case involved stepwise movement, yet not all the way through to the final tone – rather, the square went in one direction and then started “going back” in the middle of the scale. Both parameters turned on meant the scale went stepwise all the way.

Results

Scores generally increased as one and then two primitives were added in adult musicians and nonmusicians, but less markedly in children. However, the scores did not differ across animation type (“pitch/height”, “pitch/size”, “pitch/width”, “pitch/rotation”, “pitch/hue”) if the same number of primitives was present, in any population. The only exception was that both adults and children similarly (highly) rated one primitive DISCRETE DISTANCE and two primitives with hue change. This may suggest that overt musical movement is favored over more general scalar change in conceptualizing scales.

Conclusions

Results indicate that in conceptualizing pitch movement people rely on abstract schematic structure rather than lexicalizations from the mother tongue or lower-level perceptual clues. This supports positions in linguistic semantics and cognitive psychology on the need for an abstract mental representation underlying apparently disparate conceptual options available cross-culturally and cross-linguistically (e.g. Jackendoff, 2002; Walker, 2016).

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How embodiment and enactivism theory can help musicians perform pieces requiring electroacoustic fixed media

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Background

Music for instrument and fixed electroacoustic media (IFEM) presents a peculiar set of challenges for performers, especially with regards to temporal concerns such as the maintenance of precise tempi, the incorporation of accelerandi and decelerandi to fixed arrival points, and moment-to-moment synchronization. But beyond such practical timing issues, many practitioners and listeners of music for IFEM criticize electroacoustic soundtracks for their lack of “liveness.” Recent research in embodiment and enactivism (Varela, Thompson, Rosch, and Kabat-Zinn 2017), and a close reading of literature of acousmatic music (Windsor 2007), can enable performing musicians to interact with the fixed media track more meaningfully.

Aims

This project has two primary aims. First, the paper explains philosophically why music for IFEM should be understood primarily as an embodied phenomenon. An embodied and enactivist understanding of music for IFEM allows theorists and

analysts to focus on sonorous gesture rather than pitch and rhythm. Core embodiment ideals of enacted perception, sensorimotor feedback, and ecological affordances are invoked as appropriate for the music. Second, the project draws upon theories of metaphor and sonorous gesture to better articulate how a musician might choreograph the fixed media track to visibly impart gestural meaning to the electronic track. This “auto-choreography” can be kept private as a practicing tool, or displayed on video and presented to the audience as a multimedia exhibition as a way of engendering embodied meaning into the performance (MacCallum and Naccarato 2016).

Main Contribution

Using compositions from the literature (Lin(1), Davidovsky, Lin(2) and others) this poster will examine how performers’ understanding of embodied gestures within fixed media tracks can assist the learning of music for IFEM. The author, also a pianist/performer, will choreograph an electronic part used in a recent performance of music for IFEM. All pieces are scored for piano and fixed media electronic sound. A taxonomy of gestures and metaphors centered around the concepts of percussive, environmental, and stretching, is also proposed and applied to the sample works.

Implications

Musicians can utilize research in embodied cognition to better prepare and perform IFEM works. Embodiment theory allows us to evaluate how the electroacoustic music’s perceived status as fixed, and music for IFEM in particular, might be challenged. To mediate between liveness and the acousmatic of the IFM genre, a performer should envision embodied versions of the acousmatic track, focusing on the three gestural categories listed above.

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Influence of prior knowledge on statistical learning of music

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Background

Musical stimuli present a unique opportunity to examine the influence of prior knowledge on statistical learning. Knowledge of pitch distributions of music may be acquired through past informal exposure (Cui, Diercks, Troje, & Cuddy, 2016) or formal music training (Cuddy & Badertscher, 1987). Using the latter’s variance in the population we can ask whether it corresponds to variance in statistical learning ability (Siegelman, Bogaerts, Christiansen, & Frost, 2017).

Aims

Here, we examine the influence on statistical learning of participants’ prior music exposure to pitch distributional information.

Method

Thirty-four participants listened to 160 tone sequences each followed by a probe-tone, judging each probe-tone’s fit with the prior sequence. In one block, sequences were generated from an unfamiliar tone distribution. In the other, sequences were generated from a distribution typical for a piece written in C-major, considered a distribution familiar to participants exposed to Western music. The four probe-tones either occurred (congruent) or did not occur (incongruent) in the sequence. Probe-tones were identical for both blocks but differed in their congruency to the distributions. Concurrently we recorded EEG data using EGI HydroCel Nets. We analysed the mean amplitude of a 40 ms time window centred around the maximal peak 380-450 ms post probe-tone onset, corresponding to the time window of the P3b component.

Results

An ANOVA on the proportion of times each probe-tone was judged “fitting”, with factors distribution, probe-tone, and block order, revealed an interaction between distribution and probe-tone, $F(3, 78) = 79.28$, $p < .001$. Congruent probe-tones were judged “fitting” more often. Hits and false alarm rates corresponding to the judged fit of congruent and incongruent tones, respectively, were converted to measures of sensitivity d' , higher for the familiar than the unfamiliar distribution, $t(33) =$

5.62, $p < .001$, and response bias C, more conservative for the familiar than the unfamiliar distribution, $t(33) = 2.97$, $p = .005$. Years of music training and sensitivity correlated positively for the familiar distribution, $r(32) = .40$, $p = .018$, but not for the unfamiliar, or with C for either distribution, $p > .05$. Analysis of the EEG data found a significant effect of congruency at frontal electrodes for the familiar, $F(1, 33) = 8.83$, $p = .006$, but not for the unfamiliar distribution, $p > .05$.

Conclusions

Participants were sensitive to the distributional information in the tone sequences. The difference in sensitivity between distributions supports our hypothesis that prior knowledge influences responses. Moreover, the association with music training for the familiar and lack thereof for the unfamiliar distribution shows that prior knowledge and music training influence responses in specific cases but not statistical learning itself.

The exaggerated P3b component for incongruent tones in the familiar distribution suggests that this component represents a violation of knowledge represented in long-term memory, as it was absent when participants listened to the unfamiliar distribution. This allows us to analyse the P3b component in participants exposed to an unfamiliar distribution for a period of time in order to examine the trajectory of musical knowledge in future studies.

It's Only Rock 'n Roll, But I Like It: Computer Simulation Based on an Auditory Short-Term Memory Model Helps Explain Chord Rating Data

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Background

How do people determine whether a chord fits with a musical passage? Do they first need to learn tonal regularities through enculturation, or can bottom-up processes compute goodness-of-fit from the auditory signal alone? Computational modeling can help test these competing accounts (Bigand et al., 2014; Collins et al., 2014). For instance, Bigand et al. (2014) showed that Leman's (2000) bottom-up auditory short-term memory (ASTM) model simulates many behavioral and neurophysiological findings from empirical studies of chord processing. To our knowledge, the ASTM model has not yet been used to simulate chord rating data. Experiments from our laboratory provide a novel opportunity to do so (Craton et al., 2016); these have documented high fitness ratings for rock chords lying outside the traditional harmonic hierarchy (II, bIII, III, bVI, VI, bVII).

Aims

We assessed whether chord ratings from an online replication experiment ($N = 188$; Craton et al., in preparation) are approximated by simulation with the ASTM model.

Methods

Twenty musical sequences served as input to the model (6 s key-establishing context + 2s target chord). The 20 targets were major triads presented in root position, built off every chromatic root from IV (descending from context) to I (ascending). The model computed representations at four stages: 1) peripheral auditory system, 2) pitch periodicity analysis, 3) echoic memory (local = 0.1 s, global = 1.5 s), and 4) tonal contextuality (TC). For each sequence, the mean TC value for the 2 s time window corresponding to the target chord was taken as the "fitness rating" for that target.

Results

A comparison plot of TC values from the simulation (where TC = 1 indicates highest possible rating) and listeners' mean fitness ratings (1 = fits poorly; 10 = fits well) showed striking similarity. Kendall's W revealed statistically significant agreement between the model and listeners' ratings, $W = .899$, $p = .018$.

Conclusions

Listeners may judge chord fitness without abstract knowledge of tonal regularities acquired through enculturation. We propose that bottom-up processes create a perceptual ranking of chord fitness which provides the harmonic palette from which composers/improvisers in different musical systems may conservatively (common-practice) or liberally (rock) choose.

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The Functional Nature of Theoretically Non-Functional Diminished Seventh Chords

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Background

A goal of music theory is to classify patterns in music in order to understand the structure of music. While these principles quite often coincide with perception, as is arguably the case with mixture and applied dominants, complex cases require more nuanced explanations. The non-dominant diminished seventh, or common-tone diminished seventh (CT o 7), is such an example, being typically interpreted as non-functional decorative harmony (Piston, 1978), despite its use within otherwise well-formed musical phrases. More generally, the ambiguous nature of diminished seventh chords presents an obstacle for theoretical classification.

Aims

Through the principal of "tritone substitution" of tones belonging to the subdominant harmony, we identify the CT o 7 as a predominant chord, relative to the key region of the common tone. In the same way that the subdominant can approach the dominant or return to the tonic, this theory relates CT o 7 to its dominant enharmonic equivalents. In order to test this theoretical notion, this study aims to connect the CT o 7 with its related subdominant harmony through a psychological experiment, testing the validity of the theory against perception. If our conjecture is correct, results will indicate how the three

identities of diminished seventh chords (tonic, dominant, subdominant) behave functionally despite their ambiguous nature.

Methods

The three possible (enharmonically spelt) diminished seventh chords are related to simple diatonic tonic-predominant and tonic-dominant structures using a two alternative forced choice paradigm. Participants select one of two diminished seventh chord progressions, which they deem to be most similar to the presented stimulus. For instance, when presented a tonic-predominant progression, we hypothesize the participant will select CT o 7 over CT o 7/V due to its tritone relationship with the subdominant. The effect of mode and voicing are controlled for due to their potential confounding nature.

Results

Data analysis is currently underway.

Conclusions

We expect participants to choose the CT o 7 over CT o 7/V or the dominant diminished seventh (vii o 7) when the stimulus presented is tonic-subdominant. This would confirm that the CT o 7 is indeed perceptually and therefore functionally related to the subdominant harmony by tritone substitution, in addition to sharing a greater number of chord tones.

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The Role of Structural Tones in Establishing Mode in Renaissance Two-part Counterpoint

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Background

This project investigates mode through an empirical examination of two-part counterpoint. Music theorists have claimed that it is not simply the finalis (i.e., final note) that determines mode, but that “structural tones” within a melody are responsible for establishing the mode (e.g., Tinctoris, 1476; Aron, 1525; Zarlino, 1558). Specifically, these theorists have pointed to notes forming “turning points” (outlines), and leaps, as key “ingredients” for the careful construction of a melody in a given mode. However, to the authors’ knowledge no empirical investigation has been made of this claim.

Aims

Taking as an assumption that endpoints of melodic leaps and outlines will carry greater structural significance, we hypothesize that these structural features will be predictive of a piece’s modal label. In addition, we hypothesize a correlation between pitches creating perfect vertical intervals and modal labels (Schubert, 1993).

Methods

To carry out this analysis, we assembled a corpus of 44 Renaissance contrapuntal duos considered to be “exemplars” of a given mode. Of these, 32 are classified according to the theoretical treatises in which they appear, and 12 come from a collection shown to be modally ordered (Powers, 1981). Thus the size of our corpus was restricted to the limited set of data with reliable ground truth.

Using the music analysis toolkits VIS (v.3.0.5) and music21 (v2.1.2), the relevant melodic and harmonic features are tallied and tabled for each piece. We use multinomial regression modelling as well as behavioural experiments to evaluate the predictive power of leaps, outlines, and vertical intervals to predict mode.

Results

While our results are tentative due to our small sample size, we propose that the authentic/plagal distinction is not clearly marked in polyphonic music. Vertical intervals appear the best predictor of mode compared with melodic leaps and outlines, however, simple pitch class distributions predict mode best while using a simpler model.

Conclusions

This corpus study provided some surprising information about mode in the Renaissance. Using both statistical regression and behavioural experiments allowed us to compare the value of both exercises. The converging evidence from both approaches suggests that composers “writing in the modes” were primarily thinking in terms of mode family (e.g., Dorian). Our reluctant conclusion is that the plagal-authentic distinction was maintained by theorists because of the authority of the system of modes for chant, but that it has relatively little relevance for polyphonic music.

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The Perception of Stable Tones in Polytonal Structures

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Background

Textbooks on twentieth-century techniques place a differing emphasis on the aural distinguishability of two tonal centers in polychords. Krumhansl and Schmuckler (1986) found that probe tone ratings from polytonal structures in Stravinsky's *Petroushka* fit Van den Toorn's (1983) hierarchy of priorities better than the major key profiles. Thompson and Mor (1991) found that listeners were sensitive to two key centers and that when one key predominates in a polytonal context, other keys may not contribute to the overall tonal structure. These studies demonstrate that post-tonal music is perceived to have different tonal hierarchies than music from the common-practice period, and they raise the question of how other polytonal combinations are perceived by listeners.

Aims

This research examined polychords drawn from Milhaud's *Saudades do Brasil* Op. 6 to determine if listeners can perceive two simultaneous tonal centers and if the composer's orchestration of the individual chords has an effect on perception.

Method

In the first study, participants were presented with three polychords and their transformations as stimuli. Participants sang or the most stable tone in the structure and used a piano to determine the name of the pitch. For the second study, two polychords and their transformations were used in conjunction with probe tones. The subjects were asked to evaluate how well the probe tone fit with the polychord.

Results

Results from the first study showed that participants selected the tone present in both triads of the polychord as the most stable. The first study demonstrated that extreme registral placement of one triad in the polychord resulted in a preference for the other triad. The second study confirmed the preference of doubled tones, showed a significant difference in the treatment of doubled tones compared to other tones, and revealed a significant difference in the treatment of non-chord tones compared to chord tones. The results suggest that listeners favor the C4-C5 register in polychords to determine the goodness of fit for probe-tones.

Conclusions

Overall results show a significant difference in the treatment of doubled tones compared to other tones in the polychords and demonstrate that non-chord tones were treated differently than chord members of the polychords. These findings reinforce the idea that the compositional choice of writing music with polychords does impact the listener's perception of stability in a piece.

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What sounds right? Categorization of correctness in music.

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Background

People have a good appraisal of the correctness of music performances. Indeed, we develop correctness categories with regard to pitch (Larrouy-Maestri, under review) and rhythm (Larrouy-Maestri et al., ESCOM 2016), and rely on them to decide if a musical excerpt/a melody sounds right or not. However, little is known about the process underlying correctness categorization and its specificity/generalizability across music dimensions.

Aim

In the present study, we examine and compare the categorization processes underlying correctness judgments for two important dimensions in music, namely pitch and time.

Methods

Sixty-three participants (38 women) with various degree of musical expertise, from 20 to 34 years old ($M = 24.17$, $SD = 3.69$), were submitted to pitch and rhythm correctness tasks. In the pitch task, we presented 6-tone melodies in which an interval was gradually manipulated (increased progressively by 10-cent steps, with a deviation ranging from 0 to 60 cents). In the rhythm task, the material consisted in a computer-generated 2-bar excerpt of Bach's "Badinerie" BWV 1067, taken from a previous study (Dalla Bella et al., 2017). The excerpt beats were either regular (i.e., isochronous) or included a time shift: the 1st beat in the second bar was delayed from 0 to 42% of the inter-onset interval (IOI), in 6% steps. In both tasks, participants were asked to identify each sequence as in- vs. out-of-tune or on- vs. off-beat, and rated the confidence of their rating on a 4-point scale (0 = not confident, 3 = very confident).

Results

Correctness thresholds stand around 25 cents of interval deviation (for pitch) and around 22% IOI deviation (for rhythm). The psychometric curves of the identification task revealed that most participants (86%) could categorize music sequences as correct or not. However, important individual differences appeared and only half of the participants showed categorization abilities in both tasks. Surprisingly, the correctness thresholds as well as the categorization slopes for pitch and rhythm dimensions were uncorrelated.

Conclusions

By examining the correctness judgments with regard to pitch and rhythm deviations, this study confirms the presence of a categorization process but also highlights a dissociation between pitch and rhythm dimensions. Further studies in which the two manipulations are combined will certainly shed light on this dissociation. Furthermore, our results demonstrate a wide range of individual differences that are currently investigated to gain a better understanding of the mechanisms underlying correctness judgments.

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Cognition of South Indian Percussion

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Background

The mridangam is a double-headed pitched drum prominently featured in South Indian (Carnatic) music. Carnatic music utilizes a series of looped percussive patterns that often feature rhythmic accents between pulses. While previous studies in rhythmic memory have dealt with Western rhythms (Iversen, Repp, & Patel, 2009), few have focused on perception of rhythm cross-culturally. Studies on the cognitive representation of rhythm suggest that listeners' attention is directed toward the downbeat of a rhythm, then organizes other parts of the rhythm in reference to the downbeat in a "hierarchical" sequence (Fitch, 2013): Does this representational schema apply to rhythmic structures that are unfamiliar?

Aims

We wanted to determine the recognition accuracy of non-Indian listeners in encoding rhythms in memory.

Methods

Our study reports results from two experiments. In Experiment 1, we evaluated participants' (N = 36) memory for 27 natural and mechanical (computer generated) versions of mridangam rhythmic patterns, with a "target" rhythm memorized in contrast to two lure patterns, designated as "similar" and "different", separated by three delay times. Results of repeated-measures ANOVA suggested that there was not a significant difference in listeners' ability to distinguish between natural and mechanical versions. Difference between "similar" and "different" lures was significant, delay time also appeared to have an effect on identification.

In Experiment 2, naïve listeners (N = 24) heard a series of 20 rhythmic trials. Each trial began with a "target" rhythm, followed by a pool of three answer choices comprised of a random ordering of the "target" and the lure types. Listeners were instructed to identify the "target," from among the options then rate their confidence using a 6-point Likert scale. Results indicated a significant effect of answer choice position on accuracy. Confidence ratings and accurate responses were not significantly different, indicating that post-hoc performance evaluations strongly reflected accuracy on the task.

Conclusions

From these experiments, we can conclude that low degree of musical congruence and shortest delay time between samples are most conducive to recognition accuracy. Musical unfamiliarity combined with the isochrony of the stimuli could have served as a strong memory aid for listeners (Hannon & Trehub, 2005), indicated by a ceiling effect in both cases. We are currently testing a similar protocol using a set of "experienced" listeners possessing at least 7 years of training in Carnatic music. We anticipate a more even distribution of accuracy rates across position and lure type. We also hope to determine what specific ordering of stimuli was most conducive to high recognition accuracy, as well as analyze what salient rhythmic features were most memorable.

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P2P: Posters 2

Time: Friday, 27/Jul/2018: 22:00 - 23:00 · *Location:* La Plata Poster Room

From play to gesture: exploring the intrinsic relations between body and mind in the pedagogy of musical performance

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Background

The refinement of a sound-producing gesture, which occurs through the vitality of this action and depends on the perfection of skills common to every moving body (balance, flexibility, distribution of forces, and the imagery of trajectories guiding the movement) walks alongside the refinement of sonority and expression. Gestures are not merely conventions or instrumental for performance, but emerge from spontaneous acts of vitality. Understanding the role of the body in musical performance as strictly bound to sound production mechanics stems from a partial view of musical technique, one that disconnects intention and musical meaning from the concrete action producing them. By disconnecting means and intention, it ultimately disconnects body and mind.

Aims

The paper presents a theoretical reflection on the construction of sound production gestures and its association with play and metaphor.

Main Contribution

The expression of musical ideas and intentions may only gain materiality through the construction and expansion of a repertoire of actions. Our hypothesis is that the behavior existent in play allows for the exchange between different domains of experience, as it happens in metaphorical thinking, and that play configures itself as an experiential field that facilitates the development of creativity and comprehension, enabling the transformation and development of actions and behaviors. A cognitive process is metaphorical when the duality present in the activation of distinct domains of experience integrates the process of construction of meaning. Such process is always constructive and creative. We believe that play, gesture, and metaphor, three central concepts in this article, are found in “seeing-as” – a specific mode of seeing and constructing meanings. The activation process enabling the construction of metaphorical inferences is selective and dependent on the encyclopedia of the subjects’ experiences. Gadamer (2012) uses the concept of play (*spiel*) as the guiding thread for his model of understanding since he considers that, as a game, the entire process of constructing meanings is an open act and an interpretive and interactive action. It is circumscribed to a context and dependent upon the encounter and interaction with alterity. The understanding and experience of metaphoricity are not mere products of consciousness, but a negotiation process between myself and another, as a game.

Implications

Play creates a framework for action, establishing a field that allows for interpretive flexibility and engagement – you play when aware of what you do at the moment you do it. It is a key concept for the development of intentional actions and may contribute to the construction of cognitive models to explain our musical experience from a human-centered and embodied perspective. It is my belief that a next step should be taken in understanding how gestural experiences may be suggested by images and metaphors to develop teaching and learning actions motivated by the creation of a favorable pedagogical environment for the development of creativity and engagement in instrumental practice.

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The role of motivation to the quality of attention in deliberate practice

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Background

Researchers into musical performance and expertise have emphasized the importance of motivation and attention for the so-called deliberate practice, neglecting, however, the discussion about the conditions that favor that state of primacy. Understanding this to be such an essential condition for the quality of deliberate practice, why not discuss it with greater depth?

Aims

Demonstrate the relations between the performer's motivational states and the attentional capacity. According to the current theoretical framework, the evidence suggests that the quality of attention is, at least in part, regulated by the subjects' levels of motivation. My theoretical references considered authors as Reeve (2009), Deci & Ryan (1985), Csikszentmihaly (1997), Araújo (2013), Styles (2005), Eysenck & Keane (2010), Cohen (2014), Baddeley, Anderson & Eysenck (2015), Parncutt & McPherson (2002), Ericsson, Krampe & Tesch-Römer (1993), among others.

Methods

To test my proposition, I developed a small experimental program executed with piano students of different levels so that I could observe, among other things, their routines of study, habits, tastes, personal and professional histories, aspirations, from where it was possible to testify some statements.

Results

The results showed that there is a clear relationship between the individuals' motivational states and their respective attentional abilities. Besides, certain levels of motivation induce a higher capacity for focus, suggesting that there is a need to broaden discussions about updating curricula of the formation of instrumentalists, particularly of pianists.

Conclusions

It is essential to the pedagogy of the instrument to prepare the students to overcome the difficulties related to the inefficacy of attention, aiming at higher quality in the deliberate practice.

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EXPRESSIVE ALIGNMENT IN ORCHESTRA ROW´ SESSION REHEARSAL

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Background

Body movement in accompaniment to music can refer to and express different degrees of empathic relationships, from the alignment and the simple physical synchrony (Clayton et al, 2005) to the emotional involvement (Stern, 2010) of the participants with the sonic forms in movement (Leman, 2008). Its origin is found in the biological and cultural bodily commitment that underlies the configuration of those intermodal energetic forms expressed through time (Hatten, 2006). Likewise, the evidence suggests that the observation of the movements of others in interactive situations interferes with the execution of a similar concordant action, leading to an intensification and greater coherence of the gestures and actions of the group (Leman, 2010). Therefore, and according to the concept of expressive musical alignment (Leman, 2016) as a dynamic arrangement of sound and movement gestural patterns that involves the processing of predictive, energetic and affective states, this work assumes that the way in which the performers of orchestra build the musical ensemble responds to the features of the above-mentioned concept. The alignment is observed both in relation to the matching of outgoing temporal marks fundamentally associated with the learning of predictive models, as well as the sound-kinetic coupling of the continuous flow, with respect to which the identification of keys of spontaneous leadership among the performers is hypothesized.

Aims

The work aims to identify sound-kinetic indicators of expressive alignment between musicians of the same orchestra rank.

Method

3 professional violists were summoned for a first ensemble of the initial measures of the third movement of *Sehr Langsam, frei im Zeitmaß* from Paul Hindemith's "Mathis der Maler". The performance was recorded initially on an individual basis and then during the first group rehearsal, using individual microphones and a video camera. The synchronic analysis of sound and body movement was carried out with the Sonic Visualiser and ELAN programs, respectively.

Results

The data is currently being analyzed. Preliminary observations identify the presence of performers' gaze as indicator of a predictive behavior, and of leadership spontaneous alternation among performers during rehearsal, suggesting the emergence of temporal constructions of sound-and-movement forms.

Conclusions

The results are discussed in relation to the concept of expressive alignment as a bio-social signal built on the basis of learned expressive codes and continuous response schemes. The observations support the hypothesis that body movement is an expression of intentional coordination that results in the co-modeling of the form in real time.

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Towards the concept of the embodied voice.

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Background

During classes, singing teachers have to address the interaction of the physiological, somatic, proprioceptive, psychological and cognitive processes. Only adopting this holistic pedagogical point of view (Porges, 2017; Beltramone, 2016; Torres Gallardo, 2016; Gilman, 2015; Chapman, 2014) can lead to the balance of that complex interaction.

Within this paradigm, the teacher approaches the student with a broad background of technical and scientific knowledge. The student approaches the teacher to learn, often with limited knowledge, and physical and psychological experience. The challenge to the teacher is to facilitate the act of singing while avoiding conceptual entropy (Alessandroni, 2014).

Our own extensive experience as teachers, in individual classes, master classes and group workshops, has evidenced that the correct application of these pedagogical techniques invariably produces improvements in performance and in psychological positivity, both in the short term (classes) and in the long term (extended courses), which, by thus unifying the technical, articulatory and stylistic requirements, ultimately materialises in the true objective of all singers, artistic expression (Caligaris and Salmon, 2016, 2017, 2018).

Aims

To assess the degree of association between the perception of changes teachers and students experience in the context of singing classes.

Method

We put a group of 36 students in a master class, by turns as individual participants and as observers. Each individual was asked to rate, anonymously, from 0 to 10 their perception of changes (technical or physical, and psychological) as participants, and perception of changes (physical and aural) as observers, inviting brief personal comments. We then compared information to see if there were any association between the two categories, and in relation to our own perceptions.

Results

The results demonstrated an overall consistency in perceived improvement of varying degrees in 100% of cases, and a notable correlation between the perceptions of participants and of observers, consistent with our own empirical findings.

Conclusions

The results emphasise the importance of establishing parameters that contribute to a holistic (as defined above) pedagogical process of optimizing results in the singing studio and in performance.

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Parse Trees from “Lua Branca” and “Naquele Tempo”: Generative Theory and Reharmonizations

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Background

Regarding communication amidst composer and listener, tonal harmonic syntax plays an important role in a wide range of genres and styles. This is a topic much discussed in music theory but has been improved and formalized through its link with generative theories from linguistics (Chomsky, 1965). There are, for instance, works such as Generative Theory of Tonal Music (GTTM; Lerdahl & Jackendoff, 1983) and Generative Syntax Model (GSM; Rohrmeier, 2011). The latter provides us an interesting tool for the present work in order to understand the hierarchical structure underlying the long-standing harmonic functions. The GSM sets two ways to understand chord sequences within tonal music: a bottom-up strategy which is parsing a sequence of chords (roughly, what the listener does); and a top-down strategy with which one can generate the sequences of chords from subject's implicit and explicit knowledge (roughly, what the composer does).

Regarding the objectives of the current work, in musical practices of many genres and styles, reharmonization is a fundamental part to give the audience different perspectives and inquisitiveness of old pieces (Levine, 1995). Moreover, it is an opportunity to show idiosyncrasies and competences of an arranger or composer. Hence, I single out two reinterpretations of traditional Brazilian pieces (from the beginning of 20th century) made by the pianist and arranger Leandro Braga (1955) to compare the harmonic changes by using the analytical framework of the GSM.

Aims

Here I seek to demonstrate through parse trees the differences between “traditional” harmonies of pieces from 20th century and “reinterpreted” contemporary arrangements. It makes explicit the strategies applied by the arranger in terms of prolongation, substitution and modulation rules, and which parts of this reinterpretation are ambiguous.

Main Contribution

One of the premises of generative approaches for music is that these rules and hierarchical features express cognitive operations. Parsing (or analysis) musical elements from pieces allow an approximation amidst composer and listener in order to infer some processes of mind. Still, this work deepens interdisciplinary approaches by linking music theory, psychology and linguistics.

Implications

Stemmed from the contribution, the current work sheds light into how the composer or arranger generates a sequence of chords with a formal approach. The next step of this project is to collate the parses with the protocol stemmed from a psychological method called think aloud in order to investigate how these rules and hierarchical features work in the act of composition. Through introspection, this collating will bring information about the relationships mainly of the harmony into the black box and from the mind. In a foreseeable future it can be applied to help composers to elicit the mind processes of generating and manipulating tonal harmony by referring stylistic norms.

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Limitations of the study of harmony as tension

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Background

Currently, one of the main approaches to investigating how music and harmony communicate what might be called “expressive meaning” (Larson, 2012) is through the study of musical expectations and tension. This approach has one origin in the work of Meyer (1956), which was partly responsible for making the element of tension one of the main focuses of investigation in studies in music cognition, as, according to the author, expectation, tension, and affect are intimately linked. As a consequence, there have been several empirical studies which have attempted to measure listener's experience of musical and/or harmonic tension, such as Bigand & Parncutt (1999), Lerdahl & Krumhansl (2007) and Farbood (2016).

Aims

I intend to point out some limitations of this approach. First, I argue that this research is based on a conceptual metaphor of harmony as tension. Then, I suggest aspects of this experience that cannot be fully explained by this metaphor, based on evidence from research in music and emotion (Juslin & Västfjäll, 2008, Lahdelma & Eerola, 2016), such as the emotional qualities conveyed by single chords.

Main Contribution

With this work, I intend to contribute to the study of expressive meaning in music by suggesting that research in the field investigate harmony in terms of different metaphors such as color (Isbilen & Krumhansl, 2016), forces (Larson, 2012) and gesture (Godøy, 2011), all of which have their own limitations, but might help explain some of the expressive meanings of harmony that aren't accounted for by the metaphor of tension.

Implications

This work implies that new research on the expressive meaning of harmony be carried out focussing other of its aspects, beyond tension and expectation. While the metaphor of tension does account for some aspects of the musical experience, it does not completely explain the expressive meaning of music and harmony, and other approaches are necessary to improve our understanding of this experience.

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A reversible musicological design for analyzing songs written in traditional western notation.

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Theoretical frame

The learning of songs is one of the most frequent activities in the field of formal, not formal, academic or popular music. From our work of teaching songs for more than two decades to adult students of different Institutes of Teaching Formation or Professorships of Argentina, We design an analytical model in which theory and musical practice are reversible during the process of teaching-learning songs. We understand by reversible in the learning of a song, that it can be analyzed as a score from the theory, or as an interpretation of that score from practice. We use the seven principles of David Perkins 'full Learning' (2009) as a theoretical framework for our design related to musical practices of scores.

Objective

1. Analyze in scores and in musical performances sung of those scores, eight elements of musical morphology: pulse, accent, rhythm, type of compass, type of start, type of finish, movement and musical phrases.

2. Demonstrate the reversibility between theory and musical practice that have the eight morphological aspects analyzed in songs and its pedagogic utility for the field of the music education.

Method

The methodology for the conduct of this investigation was the corresponding to a case study of cognition and musical theory of performances, sustained in the musicology as unified discipline and in music as theoretical-practical discipline, according to eight aspects morphological musicals specific. We analyzed eight musical elements from the theory and from the musical practice in a reversible constructivist posture between theory and musical practice. After defining each analysis item and to write in scores the analytical results, we sang the songs analyzed marking and verifying in the musical practice the results of our theoretical analyses.

Results

This musicological research conducted annually for more than twenty consecutive years with different groups of students of higher level in Argentina, It has allowed us to make this analytical design musicological to teach songs. The double possibility of checking the analytical results of our design facilitates the coherence between the written music of songs and the interpretive orality of these scores.

The conclusion

We could verify the efficacy of the application of this reversible design between theory and musical practice for musical education. Moreover, we demonstrate the importance of considering musicology as a unified discipline field and music as a theoretical-practical discipline, to continue advancing in the field of musical perception and cognition.

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Igor Stravinsky and György Ligeti Strings Music Textural Similarities

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Background

The text compares two string music excerpts which denote some similarities perceived through hearing experience. The first one is in Igor Stravinsky's Firebird Suite finished in 1910; the second is in György Ligeti's String Quartet n° 2 which was written in 1968. A segment of both pieces presents a similar sounding structure that is to be compared using music parameters such as rhythmic direction evolution; chromatic voicing; harmony and texture.

Aims

The study intends to bring up the importance of the hearing perception in music cognition and how it might be useful in the fields of musical analysis; ear training study; music performance and general music education.

Methods

The method develops a comparison between two string music excerpts which denote some sounding similarities. The first in Igor Stravinsky's Firebird Suite finished in 1910 and the second in György Ligeti's String Quartet n° 2 written in 1968. The resulting sound in both pieces was traced using parameters such as rhythmic evolution; chromatic voicing; harmony and texture, all based on the auditory process. The analytical approach is based on the fact that they both present a specific sonoric texture. Both use same instruments but in different number but show a very close sounding result. What is interesting here besides the similarities is that: 1) Both use different compositional techniques; 2) The music pieces are fifty years apart in time and 3) The instrumentation is also much different in number (while Stravinsky's Firebird performs a string section of a large orchestra, Ligeti's piece uses a string quartet). The development of the analysis suggests that music cognition through auditory process might reveal subjective musical, psychological and emotional issues that are not written on the music score and can be part of a deeper process of analysis.

Results

György Ligeti achieved a kind of continuous sound texture out of the string quartet with this timewise odd note attacks. Different than that, Igor Stravinsky wrote similarly in direction but with a parallel rhythmic evolvement. Although separate in time for over 50 years and presenting much different compositional procedures both segments end up resulting a very similar sound effect.

The analysis testifies that the sounding similarities perceived by the hearing perception may be demonstrated positively. This might be useful as a possibility of bringing the hearing cognition to a deeper level in the study of music.

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Stockhausen's Struktur und Erlebniszeit: conceptual implications in late-twentieth century music

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Stockhausen's Struktur und Erlebniszeit: conceptual implications in post-tonal music

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Background

This research evaluates Stockhausen's concepts concerning time perception presented in *Struktur und Erlebniszeit* (1955) using definitions by Todorovic (2008), Deutsch (2013) and Mesquita (2016) of Gestalt grouping theories. Through processes of alteration in sound structure, the research aims to highlight aspects of superposition of temporal articulations in order to attest its applicability in post-tonal music. This poster is a partial result of a master dissertation developed under guidance of Prof. PhD Marcos Mesquita in the research group Cogmus.

Aims

The research aims to evaluate Stockhausen's proposal to analysis according to Gestalt principles concerning perception of alterations in order to investigate structural devices and to distinguish different temporal occurrences in simultaneity.

Main contribution

The evaluation of Stockhausen's theories may provide a valid tool for analysis of the distribution of sound material in time and stimulate further researches on Gestalt theory applied to post-tonal repertoire.

Implication

In Stockhausen's example the superposition of modes of attack, offers the most dissimilar sound in this context. Thanks to changes in one parameter while others remains unchangeable, there is a superposition of temporal articulations, where one remains constant while the other alters. Figure 1 illustrates Stockhausen's schema of analysis. As a theoretical and analytical tool, Stockhausen's definitions can be understood after Gestalt principles and offer multiple senses of time in post-tonal tendencies according to concepts of similarity and dissimilarity of parameters, superposing different time structures.

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Embodied metaphors of gender in the culture of samba dance and music.

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Background

The recurrence of dance cultures in the contexts of musical cultures is a strong evidence that the body performs an essential role in the development of musical cultures. Major differences between bodies in the musical cultures are often related to sex and gender, which respond to important idiosyncrasies between music agencies. Music studies often approach music as a danceless-genderless musical phenomenon. From XVI's century Sarabandes to XXI century pop-music videos, musicology insist that the objects of the music studies are just sound, subjected to acousmatic listening and isolated from woman and men performing specific roles. Approaches to music and gender such as McClary (2002) attempted to uncover relationships between the music and gender by looking at the discourses in the culture. Cultural and ethnomusicological studies found that the acousmatic tradition of Western musicology can be imprecise and the body is present in a great part of non-Western musical traditions. Both fields of inquiry fail in providing a concrete rationale for the influence of the body and to the musical culture, without relying upon the representation or discourses about the body (Desmond,2004). In this study, we directly approach the movements of dancers evaluated as feminine, masculine or neutral in the attempt to describe metaphors related to gender.

Aims

The aim of the study is to indicate what are the characteristics of the movement of dancers that could lend the constructions of feminine and masculine to the musical texture.

Methods

The dataset used in this study involves 15 sequences of dances represented as stick-figure representations of the moving body (thus, isolated from noticeable visual characteristics of gender). In a previous study (XXXX, 2017), the perception of gender in the dance sequences accompanied by music were evaluated 28 acculturated subjects. The evaluations have shown how dances are perceived as a map of gender associations. The dances evaluated as masculine, feminine and undetermined were then analyzed in relation to velocity profiles, amplitude, synchronization, shape and grouped using machine learning techniques.

Results

The results show how groups of movement and spatiotemporal features are correlated to dances labeled as feminine or masculine. The relationship between variability and gender seem to be associated with feminine characteristics of dances. Profiles of dance masculinity are less ambiguous.

Conclusion

Associations between music, dance, and gender are difficult to identify. Ethnomusicological literature and local cosmologies of Afro-Brazilian cultures suggest that ambiguity might be valued as a key element in a culture of racial resistance. In short, variability as a condition for adaptation might play an important role in the salience of feminine characteristics of movements.

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Individual movement and intercorporeity in collective jazz improvisation: exploring the differences between live playing and playing alone with recordings

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Background

Group improvisation in jazz refers to a practice in which more than one musician is soloing with others. Musicians co-generate meanings giving rise to a common inter-corporality and experience of sound and movement (Fuchs & De Jaegher 2009). For enactive cognition, meaning emerges from a coordinated coupling of agents that can be defined as participatory sense-making (PSM) (De Jaegher & Di Paolo, 2007). According to this, only co-regulated coordination of mutual influence could be considered as truly interactive. However, sometimes jazz improvisers play and record over previous recordings. This type of action could be in some way 'participatory' thanks to the intrinsic agenciality of music. To differentiate these two conditions, movement and sound will be explored in a 'live musical interaction' and in a simulated interaction with a 'virtual other' in recorded music.

Aims

To describe aspects of corporeity and sound in improvisation that will help us to differentiate between inter-acting together and the individual act with recordings.

Methods

Two ad hoc professional jazz trios (1-2) with 2 tenor saxophones A-B and 1 piano each were video-recorded playing "There is no greater love" standard (Jones-Symes). Saxophonist –A(1) was asked to play with Trio-1 videorecording with his own performance removed and with Trio-2 videorecording with Saxophonist-A(2) removed.

Analysis: Repeated observations of body movements in Saxophonist –A(1) were registered in three conditions (i) 'live playing'; (ii) playing along with own trio videorecording and; (iii) playing along with Trio-2 videorecording. 32 measure audio-video segments were analyzed in ELAN video annotation software at a macro-level (2-4 measures); and (ii) at a micro-level (beat-to-beat) to identify interactive gestures. Score transcriptions were produced for musicological descriptions that give support to movement analysis.

Results

Macro-level analyses showed interactive movement linked to temporality, coordination and thematicity (embodied sonic gestures). Movements with interactive intentionality were evident in beginnings and endings of musical phrases in condition i. Dynamics of textural roles and length of musical phrases in the other's improvisation can't be anticipated entirely in conditions ii and iii. Despite this, some aspects that account for participatory intentionality are observed, even in this conditions.

Conclusions

In live performances an organized embodied discourse is co-generated based on dialogical alternation of musical phrases and textural roles. In contrast, action with the recording generates the illusion of interaction. By not being able to anticipate, or modify what will happen in the recording, the improviser can't sustain any type of non-rehearsed alternation. This situation produces a high degree of uncertainty that is evidenced in the corporality of the improviser. But even in these conditions the musician maintains a communicative and interactive intentionality. It would not be appropriate to use the concept of inter-corporality for interactions with a recording. Finally, we will discuss to what extent these performances could be considered interactive or participatory.

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The musical gesture and the interpretative construction of contemporary Brazilian musical works

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Background

The level of the performer musical understanding, and consequently of the performance quality, will depend on the familiarity, the experience, the knowledge acquired by the musician about the expressive intentions and stylistic tendencies of the work (Meyer, 2000; Silverman, 2008). The pianistic performance of a musical idea is carried out by body conscious movements as a reaction to the symbols written in the score. The inner imagination of sound becomes, then, the signal that causes the motor reaction. Therefore, when performing a musical idea, the sound image must always come before the motor reaction (Kochevitsky, 1967). Brazilian contemporary piano music contains a vast, growing repertoire that presents different tendencies which demand from the interpreter different attitudes than those he/she is used to do and for which the traditional formation did not prepare him/her. The perception of great part of the music of the XX and XXI centuries, which is not conditioned to a set of conventions pre-established by a traditional interpretative practice, happens through sound blocks and by the way these blocks relate or transform themselves in the course of the composition (Souza, 2004). As a result interpreters do not initially have a cognitive plan, a repertoire of problem-solving specific to the issues that come to light from the work.

Aims

The visual stimulus of a musical piece induces a mental elaboration of a previous sound image, which in turn leads to the choice of the adequate gesture to produce the requested sound. The aim of this study is to expose the difficulties to recognize the musical gesture within a network of elements of unconventional interactions, which structure the production of the musical gesture itself.

Main Contribution

When we speak of instrumental performance, how to do it, it is of paramount importance the way of playing it and how we plan to play it. The awareness of the gestures used in the instrumental execution, interferes in the quality of the interpretation because the sound imagination will allow the performer to choose the suitable movements that will produce the differentiated imagined sounds through the definition of the different musical gestures.

Implications

The creative process aims to resolve problems presented in each new piece and it defines itself cognitively as the formation of new paths, new solutions to the difficulties that come to light in order to reach a final product. Greater experience will generate more subsidies to the performer creative imagination activity, therefore enabling the interpreter to acquire the means for the interpretative construction of the music with a contemporary aesthetics.

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The functional and "non functional" thing in teaching music ¿There's a functional harmony and a non functional one?

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Background

"Individuals elaborate concepts and comparisons, not because they satisfy basic biological needs (not because they serve to eat, as functionalists might argue), but because they satisfy cognitive requirements (they serve to think)" (Gardner, 2011, p. 63). From the moment we are born, we constantly face situations that generate learning, to which we react instinctively or because we recognize them as pleasant or unpleasant. In this process, the concepts of relationship and function are essential to appropriate the necessary knowledge, and thus, understand the processes of things. These two conceptual devices interact in each functional system, which is a set of properties, things or elements, that are related to each other and contribute to a specific objective.

"There are no isolated properties, to put it categorically: all properties belong to some functional system" (Bunge and Ardila, 1988, p. 111). Therefore, both the concept of functional system and the theory of sets, are indispensable instruments and tools for the acquisition of knowledge in any discipline. The relationship between the concept of functional system and musical harmony implies that "musical harmony" is part of a functional musical system with its specific properties, so that harmony will be functional, regardless of the culture to which it belongs.

Aims

By developing the concept of system and its characteristics from the scientific point of view, as well as the concept of functional system, aims to demonstrate what is wrong in the idea of a "functional harmony". This one, like other concepts, are questioned because generate confusion.

Method

Research and historical and current revision of the existing musical literature. Evaluation of teaching practices of the specialty in official and private institutions.

Results

From the understanding of the processes that go from the general to the particular, linked to the functionality of the elements within a musical context, the anachronistic ideas are demystified preventing the development of the analytical and creative thinking of the individual. This work emphasizes conceptualization that has a profound impact on teaching-learning situations.

Conclusions

A functional system is a set of interrelated properties that lead to a particular objective. Therefore, any musical system, whatever the culture to which it belongs, is a functional system with its specific properties. Then, each system is functional and, therefore, all musical system. So, there is not a functional harmony and a non-functional one: it's just Harmony. The sounds, chords and any element of that system interact in the set Harmony, whose properties are functional to that system.

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L9M: Long Talks 9 - Sociology

Time: Friday, 27/Jul/2018: 23:00 - 23:59 · Location: Montreal_1

Session Chair: Juan Chattah

Do you like what sounds right?

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Background

The popularity of singing contests attests to the aesthetic draw of the singing voice. Lay and expert listeners of singing performances share similar definitions of “what sounds right” (Larrouy-Maestri et al., 2017) and base their judgements on the combination of specific acoustic features. However, we don’t attend opera to evaluate a performance’s correctness but to enjoy it. Unlike for correctness, little is known about listeners’ preferences and several questions arise: Do listeners share singing preferences for operatic voices? Do listeners prefer what sounds right? What acoustic and musical features inform preference judgments?

Aims

This on-going study investigates what “preference” means when listening to sung performances and explores the roots of such aesthetic experience.

Methods

Thirty-eight participants with various degree of musical expertise (26 women; age: M = 34.45 years old, SD = 16.21) were invited two times. The musical material consisted of nine a cappella versions of the first musical phrase of the “Vocalise” Op.34, No.14 of Sergei Rachmaninoff, performed by highly trained soprano singers.

Participants listened to pairs of clips (each one presented with all the other ones) and selected one version either on the basis of preference, correctness, or typicality (in separate blocks, order randomized). Participants' choices were analyzed using logistic regression to estimate preference, correctness and typicality values for each stimulus for each participant.

Results

Surprisingly, the degree to which participants expressed similar choices was highest for preference judgments (“mean-minus-one” correlation MM1 = 0.78), followed by correctness (MM1 = 0.72), with typicality showing much lower agreement (0.44; difference between questions was significant $\chi^2(2) = 40.7$, $p < .001$). This was not simply a result of listeners being more consistent for one judgment type over another, as test-retest reliability (1 week later) did not significantly differ [$r(\text{preference}) = 0.73$, $r(\text{correctness}) = 0.71$, $r(\text{typicality}) = 0.63$; $\chi^2(2) = 2.06$, $p = .357$]. In addition to both being relatively shared by listeners, we observed a strong relation between preference and correctness judgments [$\beta(\text{correctness}) = .60$ and $\beta(\text{typicality}) = .16$ in a hierarchical linear model predicting preference].

Conclusions

Our findings suggest that despite the subjective nature of preference judgments and lack of a definition of a typical operatic voice, lay listeners build highly shared representations of which operatic voices they prefer. Compared to other aesthetic domains, listeners’ behavior (i.e., agreement) toward operatic voices seems closer to attractiveness judgments of faces than to judgments of visual artworks (Vessel et al., 2014). Finally, while listeners tend to prefer what sounds right, there is variance in preference that is not predicted by correctness. Ongoing analyses seek to understand the degree to which acoustical characteristics predict preferences and to clarify mechanisms behind listeners’ appreciation of singing voices.

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L10M: Long Talks 10 - Structure

Time: Friday, 27/Jul/2018: 23:00 - 23:59 · Location: Montreal_2

Linguistic structure and listener characteristics modulate the “speech-to-song illusion”

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Background

The "speech-to-song illusion" (S2S) is a perceptual phenomenon in which a spoken phrase shifts to be heard as sung after a series of repetitions. This transformation indicates a tight link between language and music perception, and has received much attention since its discovery in 1995 (Deutsch 1995). In a previous study, we showed that acoustic characteristics of looped phrases influenced the perceptual shifts (Falk et al 2014). However, it is still unclear whether linguistic (lexical or syntactic) properties of phrases influence S2S. Moreover, listeners themselves are likely to contribute to their experience of the shift. S2S has been observed in musicians and non-musicians, yet musicality itself is likely to increase the likelihood of the reported shift frequency (Falk et al 2014). A further open question concerns individual differences in cognitive processing styles, and if previous language experience may also shape this perceptual phenomenon.

Hypothesis

We hypothesized that the transformation is achieved via functional re-evaluation of prosodic properties: aspects relevant to speech processing dominate the perception initially and diminish during repetitions when underlying rhythmicity comes to light, enabling a melodic re-analysis of the sentence as singing. This general hypothesis allowed for predictions involving both linguistic structure and listener characteristics, e.g. a smaller memory span, longer sentences, sentences with a semantic or syntactic violation were expected to delay the transformation due to higher demands on speech processing.

Method

Two sets of sentence pairs were created in English. The first set contained alternations in the plausibility of lexical constituents (Ducks can fly. vs. Trains can fly). The second set comprised of "garden path" sentences in which prosodic break location influenced the sentence interpretability (While the woman washed (.) the cat (.) purred). Sentence length was varied in terms of the number of syllables (3-14). 40 native English listeners participated in the experiment. They rated each test sentences on a scale from 1 (clearly speech) to 8 (clearly song) before and after being exposed to its massed repetitions. Individual data (autistic traits, auditory working memory capacity, flexibility, divided attention, alertness, self-reported musicality and foreign language proficiency) were collected via an online questionnaire and the TAP battery (Zimmermann and Fimm 2011). The data of 40 non-native listeners (native speakers of the prosodically dissimilar French) are currently being collected.

Results

Preliminary results show that overall, all stimuli sounded significantly more song-like after the exposure to their looped versions. Shorter phrases transformed into song much quicker and more often than longer phrases. Most transformations occurred during the 3rd-5th repetition. The shift occurred earlier, however, for listeners showing worse performance in the divided attention test. These preliminary findings with S2S provide the opportunity to gain insights into the cognitive and structural factors governing the links between music and language.

Prosody, Poetry and Processing: ERP evidence for hierarchical metrical structure in silent reading

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Background

Under the Implicit Prosody Hypothesis, readers generate prosodic structures during silent reading that can direct their real-time interpretations of text (Fodor, 2002). Evidence for the realization of metric structure during silent reading is demonstrated by longer reading times for metrically unpredictable words than predictable ones (Breen & Clifton, 2011), but the cognitive processes underlying metric structure processing in silent reading are unclear.

Aims

The current study was designed to investigate whether metric unpredictability in silent reading is processed similarly to metric unpredictability in listening to speech and music.

Method

We analyzed ERPs from nineteen participants (18 female; 1 nonbinary) who silently read 160 rhyming couplets. We manipulated the lexical stress pattern (strong-weak, weak-strong) and metrical predictability (predictable, unpredictable) of the target word (present in [1-4]) in a 2x2 design. In this way, the first syllable in the target word appeared as: [1] a strong syllable aligned with a strong beat (predictable); [2] a strong syllable aligned with a weak beat (unpredictable); [3] a weak syllable aligned with a weak beat (predictable); [4] a weak syllable aligned with a weak beat (unpredictable). An additional 160 metrically predictable rhyming couplets served as fillers. Each couplet was presented in center-embedded 1-to-4-word segments for 700 ms each; the rhyme prime (peasant in [1,4]) was presented for 1000ms. The target word was presented alone for 1000 ms.

1. Trochaic; Predictable:

There once was a penniless peasant // Who couldn't afford a nice PREsent

2. Trochaic; Unpredictable:

There once was a clever young gent // Who gave to his girl a *PREsent

3. Iambic; Predictable:

There once was a clever young gent // Who had a nice talk to preSENT

4. Iambic; Unpredictable:

There once was a penniless peasant // Who went to his master to *preSENT

Results

Metrically unpredictable trochaic targets (*PREsent in [2]) elicited a negativity between 325-400ms over left and medial-frontocentral scalp regions relative to predictable trochaic targets (PREsent in [1]). Conversely, there was no difference between iambic targets on strong or weak beats.

Conclusions

The larger negativity for the occurrence of a strong syllable on a predicted weak beat is consistent with results from overt listening (Bohn, et al., 2003), demonstrating that consistent metric structure creates temporal expectancies even during silent reading. Moreover, this finding is consistent with music perception results demonstrating larger negativities to metrically unexpected notes (Ladinig, et al., 2009), demonstrating cognitive overlap between hierarchical timing processes in speech and music.

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L9Mcont'd: Long Talks 9 - Sociology cont'd

Time: Saturday, 28/Jul/2018: 0:00 - 1:00 · *Location:* Montreal_1

Film / Music / Narrative: A Multidimensional Mapping Processes

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Background

Music operates at an almost subliminal level during a film, activating sensorimotor reflexes and conveying complex messages that motivate, support, highlight, complement, or even negate other facets of the cinematic experience. To fully understand our response to (or interpretation of) the music and the film, we must trace the logic underlying the perceptual and cognitive processes that elicit musical meaning within film; this requires a holistic approach that navigates through the humanities and sciences alike.

Aims

I advance an analytical framework that (re)frames cross-modal and cross-domain correspondences as metaphorical mappings mediated by image schemas. Because music in film often acts as one agent within a multidimensional mapping that involves the visuals and the narrative, I draw exclusively on the film music repertoire.

Main Contribution

First, I unpack Lakoff & Johnson's (1980) Conceptual Metaphor theory and Johnson's (1987) Image Schema theory. Second, I apply these theories as investigative frameworks to explore multidimensional mappings within film, and survey empirical studies within music cognition that draw parallels between the perception of music and the perception of visual or bodily motion (e.g., Eitan & Granot, 2005) and parallels between the perception of music and the induction of psychophysiological states (e.g., van der Zwaag et al., 2011). Third, I review theoretical and empirical research that seeks to uncover the neural underpinnings of metaphor and schema theories, with particular attention to two strands: one favoring the notion that mental models of concrete domains are recruited as prototypes to build mental models of abstract domains (e.g., Boroditsky & Ramasca, 2002); the other, more biologically grounded strand, arguing that both domains in a metaphor (the abstract and the concrete) share neural substrates as part of a process coined by Anderson (2010) as "neural reuse."

Implication

Overlaying the metaphor and image schema frameworks onto the investigation of cross-modal and cross-domain correspondences within film provides numerous advantages—such approach reveals an (unobserved) implicit directionality of mappings, uncovers the intrinsic qualities of the domains that enable such mappings, expands the relevant body of research to include investigations on the neural underpinnings of metaphor and image schemas, and ultimately serves to lay an experiential foundation upon which broader testable hypotheses may be constructed.

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Stereotypes of Listeners and Producers of Different Music Genres

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Background and Aims

Previous research indicates fairly clear stereotypes about the personality and other characteristics of people who listen to certain genres of music (Rentfrow and Gosling, 2003; North and Hargreaves, 1999). North and Hargreaves (1999 and 2007) use social identity theory to suggest that music preferences can signal social group membership. Rentfrow, McDonald and Oldmeadow (2009) showed that ethnicity and social class were associated with specific music preferences.

We explored the stereotypes concerning social class and motivation for both listeners and producers of different music genres

Methods

We used the 14 genres that Rentfrow and Gosling (2007) suggest as the best level of analysis for understanding how music preferences relate to stereotypes of music listeners. One hundred and twenty participants evaluated listeners of each genre on the degree to which; they belonged to a privileged group, were wealthy, listened to influence other peoples' impressions of them, and intrinsically enjoyed the music. Participants also evaluated writers of each genre on the degree to which they belonged to a privileged group, produced this music primarily to make money, and intrinsically enjoyed the music.

Results

Listeners' wealth and privilege were correlated for all genres so the results for those two questions are presented together. Participants rated wealth and privilege highest for classical music, then jazz, then soundtracks; the lowest ratings were for rap followed by blues, soul, country, folk and heavy metal. Participants evaluated listeners of religious music, then rap, then classical genres as most likely to do so to influence others' impressions of the listener; the lowest ratings were for blues, then folk, then soul music. The highest ratings for intrinsic enjoyment of the music were for classical, rap and religious music; the lowest was for soundtracks.

For music writers, participants rated privilege highest for classical and pop, followed by soundtracks; The lowest ratings were for blues, rap and soul music. Participants rated pop followed by rap highest in terms of motivation for monetary gain and, to a lesser extent, electronic music and soundtracks; the lowest ratings were for blues, folk, jazz, religion, and soul music. Participants rated intrinsic enjoyment of music as highest for writing jazz, followed by blues, classical, rock, soul, and folk music; the lowest rating was for pop music.

Conclusions

Our results for privilege and wealth of listeners mirror previous findings for social class. Classical, rap, and religious music were rated high on both impression management and also intrinsic enjoyment. The relationship between these two ratings may result from tight associations between these three genres and specific social classes. There was no overlap of genres for low ratings on these two measures. For music producers the patterns were the same for privilege but strongly differed on other factors. Pop and soundtracks are associated with greed, pop with low intrinsic enjoyment, but classical with high intrinsic enjoyment. Blues and soul have low rating, though rap has high, ratings for greed. For producers, greed and intrinsic enjoyment seem to be opposing motivations.

L10Mcont'd: Long Talks 10 - Structure cont'd

Time: Saturday, 28/Jul/2018: 0:00 - 1:00 · Location: Montreal_2

The Effect of Comparison on Categorizing Musical Excerpts

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Background

While music theorists assume that listeners categorize musical themes using structural features (e.g. pitch, rhythm), previous empirical work find listeners use surface-level features instead (e.g. dynamics, genre) (Lamont & Dibben, 2001; Ziv & Eitan, 2007). Cognitive psychologists distinguish between relational categories (where members share relational/structural features) and entity categories (where members share surface-level features) (Gentner & Kurtz, 2005). In studies with visual stimuli, comparison of co-presented structurally-similar exemplars promote relational category acquisition, influencing participants to categorize based on relational/structural features over surface-level features (Markman & Gentner, 1993).

Aims

We investigate whether comparing structurally-similar musical patterns sways participants to categorize musical patterns using structural features over surface-level ones.

Methods

In study 1, participants (N=60) completed a forced choice triad task. They heard a target musical excerpt, followed by two musical excerpts: one a structural match (shared the same harmonic progression, pitches and/or rhythm with target, but not surface-level features) and one a surface-level match (shared the same ornamentation, texture and/or genre with target, but not structural features). Participants chose which excerpt best went with the target to form a category. 30 participants heard one target excerpt before choosing (no-compare condition), while 30 participants heard and compared two structurally-similar target excerpts before choosing (compare condition). We used a 2x3 between-subjects design where categorization choice (surface-level or structural match) was the dependent variable and musical training and comparison manipulation were between subject-factors. We hypothesized that participants would choose structural matches significantly more often after comparing exemplars. Participants heard three stimuli types over thirteen sets: 18th-century thematic variations, 18th-century contrapuntal excerpts (Gjerdingen, 2007), and 21st/20th-century popular music chord progressions. Variables were controlled differently depending on stimuli (e.g. popular music: target shared harmonic progression with structural match and genre with surface-level match). In study 2, participants heard two target excerpts in both conditions, but only compared excerpts in compare condition.

Results

Participants in the compare condition chose structural matches significantly more than the no-compare condition for all stimuli types. A 2 (no-compare v. compare) x 3 (musician v. casual musician v. non-musician) ANOVA revealed a significant main effect of condition for popular music stimuli ($F=20.36, p<.001, w2=0.24$), thematic variation stimuli ($F=7.79, p<0.01, w2=0.1$), and contrapuntal stimuli ($F=5.71, p<0.05, w2=0.08$). There was no significant effect of musical training nor was the interaction significant.

Conclusions

This study is the first to test auditory relational categories. Results indicate that listeners use relational-processing to categorize music based on structural features. We discuss these results with respect to music-based relational categories, relational (also analogical) processing, and how task influences what features listeners attend to.

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T15G: Short Talks 15 - Health

Time: Saturday, 28/Jul/2018: 7:00 - 8:00 · Location: Graz_1

Session Chair: Annemarie Seither-Preisler

Health behaviours, personality and flow in South African undergraduate music students

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Background

Research has shown that South African music students' health behaviours generalize across different socio-cultural contexts (Kreutz et al., 2009; Panebianco-Warrens et al. 2015). The experience of flow has been related to the subjective well-being of music students (Fritz & Avsec 2007), however, little is known of the associations between health behaviours, personality traits and flow.

Aims

The study aims to explore South African undergraduate music students' health behaviours, personality and experiences of flow. A further goal is to discover potential correlations between health behaviors, personality, and flow, and the possible influences of gender, year of study and instrument.

Method

A cross sectional study was conducted involving students from five university music departments across South Africa. A total of 162 (N = 109 w; N = 52 m) participants completed an online survey. The survey consisted of the Health-Promotion Lifestyle Profile scale (HPLP-II), the Flow-Short-Scale (FSS) (Rheinberg et al. 2003), and the BFI-10 ten-item personality inventory (a brief measure of the Big Five inventory, Rammstedt, B. & John, O.P. 2007).

Results

The results show significant correlations between health behaviours, flow and personality. GLM analysis revealed gender as a predictor of health responsibility, nutrition, spiritual growth, interpersonal relations. Gender was also found to be a predictor of personality traits conscientiousness and neuroticism. Year of study, course and number of hours was a predictor of flow and motivation.

Conclusions

These findings emphasize associations between health behaviours, personality and flow in the undergraduate tertiary music student context in South Africa. However, the relationship between these variables is complex. The study provides valuable insight into this population and provides useful evidence to address key curriculum issues in South African institutions.

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How do musicians spend their leisure time? A thematic analysis

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Background

Research in the field of music, health and wellbeing has demonstrated the beneficial effects of music on individuals who do not identify themselves as musicians and amateur musicians who engage in music in moderate amounts (MacDonald, Kreutz, & Mitchell, 2012). Research in the field of music medicine has also demonstrated the negative effects of music on musicians' physical and psychological health and suggested a range of potential coping strategies (Braden, Osborne & Wilson, 2015). Research in the field of leisure studies has shown that optimal use of leisure time, including structured leisure activities such as musical engagement, contributes to improved quality of life and wellbeing (Brajša-Žganec, Merkaš, & Šverko, 2011). It is therefore worth investigating musicians' leisure activities to discover the extent to which music contributes to their wellbeing. Although a small number of studies have looked into musicians' wellbeing (e.g. Croom, 2015) no such research has been undertaken to date.

Aims

The aim of this study was to gain insight into the leisure experiences of musicians. The findings will inform the design of a subsequent large-scale study, a questionnaire survey.

Methods

Ethical approval was sought and granted by the RNCM Research Ethics Committee. Five professional musicians, three from the UK and two from Sri Lanka, and two master's students at the Royal Northern College of Music expecting to pursue a career as professional musicians, aged between 24 and 52 years, took part in face-to-face semi-structured interviews. Interviews with Sri Lankan musicians were conducted and transcribed in Sinhalese which were translated into English before analysis. The English interviews were transcribed verbatim. The transcriptions were analysed thematically.

Results

All participants reported that they do have leisure time or that they make time for leisure as it is important for their wellbeing. The main themes identified were: (1) participants' self-concept as professionals; (2) from a hobby to the choice of career as a professional musician; (3) their perception of leisure and work with three subthemes: (3.1) engaging in musical and non-musical activities for leisure; (3.2) the distinction between leisure and work; (3.3) the overlap between leisure and work; (4) choice of leisure activities and its impact on wellbeing.

Conclusions

The interviews provided initial insights into how musicians spend their leisure time, engaging in musical and non-musical activities for pleasure. They all perceived their chosen leisure activities, musical and otherwise, to have a positive impact on their wellbeing.

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Musical training could compensate for the detrimental effects of noise exposure on speech-in-noise processing abilities

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Background

Musicians are vulnerable to noise-induced hearing loss (NIHL) because of prolonged exposure to loud music on a daily basis. A newly described form of NIHL, 'cochlear synaptopathy', is not detectable by conventional testing, and so many musicians may be affected despite appearing to have normal hearing. Cochlear synaptopathy refers to a loss of connections between inner-ear hair cells and auditory nerves which relay sound signals to the brain (Liberman et al. 2016). This may lead to perceptual difficulties such as difficulty hearing speech in a noisy environment. However, there is also evidence that musical experience may improve auditory attention and working memory, and this may reduce some of the detrimental effects of high noise exposure (Swaminathan et al. 2015).

Aims

The aim of this study was to assess how high levels of noise exposure might impact on hearing perception in early-career musicians and to determine which aspects of the hearing pathway might be affected.

Methods

Fifty-eight early-career musicians (female n = 26; age = 18-26 years) and thirty non-musicians (female n = 19; age = 18-26 years) completed a testing battery to assess auditory functioning including pure-tone audiometry (PTA), extended high frequency audiometry (EHF), distortion product otoacoustic emissions (DPOAEs), and auditory brainstem responses (ABRs). Speech-in-noise processing abilities were assessed using the coordinate response measure (CRM) which requires participants to follow instructions from a target speaker whilst ignoring conflicting information from distracting speakers (maskers). Maskers were presented centrally or spatially offset. A lifetime noise immission rating (NIR) was obtained by structured interview, which was used to classify participants into low and high noise exposure groups.

Results

The total NIR did not differ between musicians and non-musicians in either low or high noise exposure groups. There were no effects of musicianship or noise exposure on PTA, EHF, or DPOAEs. However, there was a significant interaction between musicianship and noise exposure on CRM performance [$F(1, 71) = 8.733, p = .004$]. For all participants, performance was improved for spatially offset maskers compared to central, but non-musicians with high noise exposure showed significantly less improvement for spatially offset maskers compared to non-musicians with low noise exposure and musicians with high and low noise exposure (all $p < .05$). In addition, total NIRs were correlated with the amount of improvement for spatially offset maskers (i.e. higher noise exposure = less improvement in spatially offset conditions) for non-musicians only. There were only very modest (non-significant) effects of musicianship or noise exposure on auditory nerve function as assessed by the ABR.

Conclusions

High levels of noise exposure could impact on speech-in-noise processing, but musical experience may help to negate these perceptual effects through enhanced auditory cognitive processing abilities. However, there is little evidence that noise exposure produces large deficits in auditory nerve function consistent with cochlear synaptopathy, and so poorer speech-in-noise processing is likely due to an alternative mechanism.

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T16G: Short Talks 16 - Improvisation

Time: Saturday, 28/Jul/2018: 7:00 - 8:00 · Location: Graz_2

Session Chair: John Anthony Sloboda

Visual Signals between Improvisers Indicate Attention rather than Intentions

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Background

Music performance is an inherently creative task requiring either interpretation of a score or improvisation of new material. During ensemble performance, creativity is distributed across group members as they combine their efforts to produce a cohesive performance. There has been some debate in the literature over the nature of the interpersonal interactions that take place during these task – when is explicit communication needed to coordinate individual intentions, and when does coordination unfold autonomously through a dynamical exchange of low-level sensory information? We study musicians' body movements and eye gaze patterns as they perform collaboratively in duos, either improvising or rehearsing from a score. Both tasks require cognitive flexibility and a willingness to accommodate variability in others' playing; however, the types of variability that should be expected are different (e.g., greater temporal variability is expected during performance of Western classical music than during jazz improvisation). The communication strategies that performers draw on may differ as a result.

Aims

This study tested the hypothesis that visual signals serve a primarily social function during jazz improvisation, helping performers monitor each other's attention. Gaze patterns were expected to relate to leader/follower roles and the turn-taking structure of improvised performances. During rehearsal of notated music, visual signals were expected to serve a similar social function, but to contribute to temporal coordination as well.

Method

Twenty pairs of classical musicians (playing clarinet or piano) and three pairs of jazz musicians (playing various instruments) rehearsed a new duet piece or performed a set of improvisations. Optical motion capture and mobile eye tracking were used to record their upper body and instrument movements and their eye gaze patterns. Eye gaze coordinates were then mathematically mapped to the motion capture space to allow automatic calculation of when and how often performers looked towards each other.

Results

Preliminary results suggest that jazz musicians rely minimally on visual signals to coordinate their improvisations. Performers look at each other often (compared to musicians performing from a score), but their glances do not relate to the structure of the improvisation. In contrast, classical musicians performing from a score exchange glances at predictable points in the performance. Their gaze patterns also reflect fluctuating leader/follower relationships. Analysis of performers' head and upper body movements (still ongoing) are expected to show that performers' movements are mutually influential.

Conclusions

Our findings show that visual communication is used to communicate attention and engagement during music ensemble performance, particularly during performance of notated music, when performers' glances towards each other occur at predictable points in the piece. Musicians tend to glance at each other's faces rather than bodies/instruments, suggesting that most glances serve a social function. Research on ensemble performance has already shown how performers monitor (and accommodate) each other's sound output; this study is expected to show how ensemble members monitor each other's participation in the interaction.

Acknowledgements

Funding for this work was provided by Austrian Science Fund (FWF) grant P29427 and European Research Council (ERC) grant 670035, project "Con Espressione".

Free collective improvisation and transindividuation

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Background

Free collective improvisation requires that performers play something together that is not determined in advance. Rather, it has to be co-created on the spot. In other words, the shape of the music has to be actively co-constructed and co-regulated in the very moment of the unfolding performance. Classical explanatory schemes in cognitive sciences generally explain behavioral performances in terms of the individual mental processes that underlie them. However, the very fact that free collective improvisations have to rely on actual bodily performances as well as on interactions between musicians lacks in this picture.

Aims

To account for the real-time, interactive creativity that can be observed in the course of free collective improvisations, I propose an enactive and dynamical account of collective creativity. I describe a three-fold process of participatory sense-making (De Jaegher & di Paolo, 2007) that leads to what I coin as « transindividual aesthetics », borrowing a concept from Simondon (1989).

Main Contribution

By transindividual aesthetics, I designate :

the emergence of an aesthetic outcome that cannot be reduced to the mere sum of individual contributions, thanks to the dynamics of interactions themselves

the transformation of individual creativity by the dynamics of the interaction process, so that individual players enact behavioral patterns that were absent from their previous repertoire (that is, they wouldn't have enacted these patterns outside of the context of interaction)

The co-regulation of the dynamics of interaction by the performers which leads to creative processes and outcomes that are proper to the ongoing collective meeting.

To illustrate, I will show examples drawn from dyadic improvisations performed in a pedagogical context by children with their teacher (Laroche & Kaddouch, 2014).

Implications

Overall, improvising together brings forth a peculiar form of aesthetics that is based on the intersubjective processes themselves. In this process, the musical outcome is co-individuated by the performers and gets an autonomy on its own, and it individuates the performers in return by transforming their autonomous dynamics ; this is why collective improvisations are a paradigmatic case of the process trans-individuation. By using this paradigmatic case, I aim at bringing together the enactive and dynamical views in cognitive sciences on the one hand, and the philosophy of Simondon on the other hand.

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Does the Primary Motor Cortex Contribute to Musical Creativity? A tDCS Study

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Background

Research on musical improvisation has identified key brain regions that underpin musical creativity, including the dorsolateral prefrontal cortex (DLPFC) and the ventro-medial prefrontal cortex (vMPFC) (Limb & Braun, 2008; Bengtsson, Csikszentmihalyi & Ullén, 2007). The DLPFC mediates attention, working memory, and organisation; the vMPFC mediates mind wandering and mental simulation. Other research has examined high-level motor areas, including the pre-supplementary motor area and pre-motor cortex (Bashwiler, Wertz, Flores & Jung, 2016; Sosnik, Flash, Sterkin, Hauptmann & Karni, 2014). However, the role of the primary motor cortex (M1 region) has never been examined. The M1 region mediates dexterity, orientation, and velocity of the hand (Sosnik et al., 2014).

Aims

To investigate the role of the M1 region on creativity and technical fluency in music improvisation, and to assess the interrelation between creativity and technical fluency. Creativity is defined as an idea that is novel and appropriate. Technical fluency involves the attainment of fine motor skills that are harnessed through regimented practice.

Methods

Transcranial direct current stimulation (tDCS) was used to excite or inhibit the left M1 whilst jazz pianists performed right-handed improvisations. 16 jazz pianists performed ten novel jazz piano improvisations in a two-block design (baseline and tDCS). There were two tDCS groups: one received excitatory tDCS (anode left M1/cathode right M1) and the other received inhibitory tDCS (cathode left M1/anode right M1). Two expert adjudicators rated all performances for creativity and technical fluency. We hypothesised that excitatory tDCS would enhance both creativity and technical fluency relative to inhibitory tDCS.

Results

For the first eight participants (one adjudicator) excitatory tDCS enhanced technical fluency ($p=.05$) and a trend was observed for creativity ($p=.07$) relative to inhibitory tDCS. Creativity and technical fluency were strongly correlated, $r(78) = .765$, $p < .001$. Data from a complete sample (16 pianists) and two expert-musician adjudicators will be presented at the conference.

Conclusions

In light of the current understandings of the neural mechanisms that mediate creative improvisations, the results from the current study suggests that the M1 region does contribute to creative and technically fluent improvisations. This study adds to the complex brain networks that drives creativity in a musical context.

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T17G: Short Talks 17 - Perception

Time: Saturday, 28/Jul/2018: 7:00 - 8:00 · Location: Graz_3

Session Chair: Jonna K. Vuoskoski

An information theoretic characterisation of neural predictive coding in rhythm perception

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Background

Rhythmic perception appears to be grounded in prediction (Vuust, Ostergaard, Pallesen, Bailey, & Roepstorff, 2009). The brain's goal is to minimize the surprise (or prediction error) induced by an event stimulus to attain temporally precise predictions (Vuust & Witek, 2014). This view is now supported by plenty of empirical evidence. What is less known is whether predictive coding is affected by the information properties of temporal stimuli - here, the amount of information content.

Aims

Our study explores this question with EEG by investigating how an entropy metric derived from information theory (Shannon, 1949) modulates the neural predictive responses to rhythmic sound sequences. Specifically, we investigate how a neural signature of prediction error, the auditory Mismatch Negativity (MMN) (Näätänen, Gaillard, & Mäntysalo, 1978), changes as a function of entropy.

Methods

Seventeen right-handed volunteers (11 females) participated in the study. During EEG participants sat in a sound-attenuated booth in front a monitor. Sequences consisted of equitone rhythms of 5 beats, presented in 3 oddball recording sessions. In each session, participants were presented with continuously repeating standard rhythms of given information content (isochronous, low-content, or high-content) with rare changes in timing of the fourth beat. In the meanwhile, the subjects were watching a self-selected subtitled movie. EEG data were pre-processed according to standard procedures, so to obtain 500 ms epochs (-100 to 400 ms from the stimulus onset). First, we used an RM-ANOVA to test the presence of the MMN. Then, we used linear-mixed effect models to explore the effects of entropy on MMN amplitude and latency.

Results

Our results show that time-deviant sounds generated a neural error response which is consistent in timing and scalp topography with the mismatch negativity (MMN). Critically, we observed a decrease in the magnitude of the error signal as a function of entropy.

Conclusions

Our results demonstrate the sensitivity of predictive timing processes to the information content of temporal stimuli. The weaker response associated to high-information content stimuli is in agreement with the precision weighting hypothesis of predictive coding (PC) (Heilbron & Chait, 2017). In PC, regular signals are up-weighted and prioritized (over irregular signals) for further processing. In turn, this can explain the privileged perceptual status for metronomically organized stimuli.

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Relationships between musical imagery and musical listening in everyday life: An experience sampling study.

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Background

Imagining music or hearing it in the 'inner mind' is a frequently occurring phenomenon for people with and without formal musical training. Recent and frequent exposure to music does increase the likelihood of involuntary musical imagery, whilst voluntary musical imagery is a skill developed alongside active musical training. Trait and state characteristics may influence the proneness to involuntary musical imagery (INMI) (Wammes & Baruss, 2009). Nevertheless, INMI especially seems to be a consequence of training through everyday music listening (and playing), implying that INMI may reflect the ways an individual chooses to listen to music and the functions that music plays for an individual.

Aims

This study aimed to explore the hypothesis that INMI is highly influenced by music listening habits. This influence may concern the context in which music is heard, the genre of music, and particular situation in which the individual would want listen to music.

Methods

An Experience Sampling Method (ESM) was used, asking participants 6 times a day to fill in an online form for 6 days in a row. During the first three days, the participants followed their normal routines without any particular instruction apart from responding to the alerts. In the second three days, participants were asked to refrain from music listening. Music listening was monitored through the Last FM 'scrobbler' software. Nineteen participants completed the study.

Results

First results showed that on average participants reported voluntary or involuntary musical imagery 35% of the time. They reported listening to music in a smaller proportion of individual reports (27%). The number of reports including musical imagery varied as can be expected considerably across participants from 3.8% of the reports to 78%. Reports of listening to music varied equally strongly, if not even stronger from a small proportion of 3.3% to a very large proportion of 81%. There was no reliable correlation between the frequency of musical imagery and musical listening reports. Participants frequently experienced the musical imagery as 'somewhat' entertaining, changing their mood, helping to pass time, helping to socialise, helping to evoke emotions. It was also perceived as an accompaniment to activities. Not surprisingly, the effect of music listening was stronger with more participants responding 'very much so' instead of 'somewhat' when indicating whether the music listening is entertaining, changing their mood, helping to pass time, etcetera. Both the musical imagery and the music listening made participants most frequently feel alert and happy. The degree to which this happened was again slightly stronger for music listening than musical imagery, but the effect of musical imagery seemed otherwise comparable.

Conclusions

As this study is in progress, further analysis will look at the specific relationship between individual's INMI experiences and the music listening habits, and examine the effect of 'abstaining' from music listening. The first results confirm a close correspondence between the functionality of INMI and music listening.

References

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Hardware Guitar Amplifier Sounds vs. Simulation by the Kemper Profiling Amp: Discernibility of Sound Sources

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Empirical Background

The technical means of special software to simulate expensive hardware have evolved over the last decades. Computer programs like Cubase enable users to produce music using sample libraries so that no real music instrument, musician or recording studio is required. In a previous study, we could show that non-expert listeners were not able to discriminate a recording of a live orchestra from one based on a high quality sample library, whereas experts showed a higher discrimination ability.

For about 20 years, modelling amplifiers (e.g., POD by Line 6) have been able to emulate the sound of a particular hardware guitar amplifier. However, differences between the original amp and the resulting model are still substantial. The Kemper Profiling Amp [KPA], developed in 2011 by the German company Kemper, uses a new approach to overcome these limitations by providing a device that is able to analyze the sound characteristics of a particular system and to produce a simulation that is supposedly “so close that you won’t be able to distinguish [it] from the original” (Kemper GmbH, 2017).

Aims

The aim of this study is to determine the simulation quality of the KPA compared to the sound of two original amplifiers. We want to quantify the overall degree of discrimination between both sound sources and hypothesize that there will be differences between (a) subgroups of different levels of musical sophistication, and (b) non-electric-guitar-players, amateur electric-guitar-players, and professional electric-guitar-players.

Method

Six musical examples differing in musical style were professionally recorded, each under both of the different recording conditions (via the original amp and via the profile using the KPA).

For the evaluation, a Signal Detection Paradigm and an online experiment are used. Participants are mostly (semi-)professional electric guitarists as well as others with presumably high sound discrimination skills (e.g., audio engineers). After explaining the features of the KPA and training audio examples, 14 stimuli are presented in random order including retests of two examples. Participants decide whether the example was produced using an original amp or via the KPA. Additionally, the quality of the audio equipment used by the participant is tested using an objective method. The Gold-MSI is used to determine the musical sophistication degree of each participant. Finally, the participants’ sociodemographic background and expertise concerning electric guitars and the KPA are surveyed.

Results

The online survey is currently running, and the data collection will be completed in February 2018.

Conclusions

To determine the quality with which the KPA can simulate the sound of an original amplifier is very important for professional electric guitarists and modern music production. The investigated device is already widely used by experts but also considered to have deficits. Our study will contribute to an objective discussion of the potential and limitations of modern digital music production in popular music.

References (selection)

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T18G: Short Talks 18 - Choral singing

Time: Saturday, 28/Jul/2018: 7:00 - 8:00 · Location: Graz_4

Session Chair: Birgitta Burger

The magic touch? The effect of physical contact on interpersonal physiological coupling during singing.

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Background

A large body of depictions originating between the 14th and 17th century show ensembles maintaining close physical contact while singing. These depictions, in the absence of supporting written evidence, raise the question of whether this was a genuine historical practice and if so what purpose it may have had. While one practical reason could simply have been the necessity for close proximity in order to read out of a single note-stand, another may have been the recognition of potential benefits of tactile stimulation on action coordination. Such benefits have been seen in a variety of contexts (e.g. Sofianidis, Hatzitaki, Grouios, Johannsen & Wing, 2012) and we hypothesized that similar benefits in a singing context may be evidenced by increased coupling of physiological responses.

Aims

To examine whether physical contact during singing increases interpersonal physiological coupling over and above that made possible through the joint action of singing.

Method

Respiratory activity and heart rate variability (HRV) were recorded from a choir of 8 professional singers while they performed (three pieces of approximately 6 minutes each) in three standing positions. In the Touch-Close condition (TC), singers stood in two rows of four with their arms around each other. In the No-touch-Close (NTC) condition, they stood in two rows of four (as in the TC condition) but without any physical contact. Finally, in the No-Touch-Far (NTF) condition, the singers adopted a typical contemporary arrangement of forming a semicircle with no physical contact. Within-subject ANOVAs were used to examine the effects of this manipulation on interpersonal synchrony which, in turn, was calculated as the relative number of phase-locked points lying in a specific range (the Absolute Coupling Index: Müller & Lindenberger, 2011).

Results

We observed a significant increase of respiration and HRV coupling during singing compared with rest, replicating Müller & Lindenberger (2011). However most importantly, we also showed greater coupling in the TC condition compared to the NTC condition in line with our main prediction, although this effect was limited to respiratory activity.

Conclusions

Our results support the notion that singing with close physical contact results in greater interpersonal coupling than singing without such contact. In doing so, it expands evidence of the beneficial effect of tactile stimulation on action coordination to the music-making domain and informs research in biological psychology and music pedagogy. Finally, our study provides an example of how utilization of empirical methods can help gain some insight into open historical questions. Further analysis will examine the extent to which the touch-induced increase in physiological coupling revealed here is associated with a higher quality output during singing.

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Synchronization in singing ensembles: Do performed asynchronies bear a relationship to the synchrony that listeners with a variety of levels of musical experience can perceive?

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Background

Synchronization between musicians in ensembles is a complex phenomenon. Empirical investigations show that synchrony is maintained through micro-timing adjustments (Keller, 2014) that might be affected by the visual contact between musicians, group roles such as leader-follower relationships, and the growing level of expertise achieved during rehearsals. Perceptual studies also suggest that listeners might be sensitive to the degree of synchrony between musicians and that the perceptibility of the synchronization might depend on the level of music training of the listener (Repp, 2010). Whether the performed asynchronies are directly related to the asynchronies that listeners perceive remains mostly unclear.

Aims

The main objective of this study is to observe whether the effects of manipulated visual contact, group roles and degree of rehearsal on the synchronization recorded in vocal groups is perceived by listeners with different levels of music expertise.

Methods

60 listeners took part in the experiment, grouped as non-experts (i.e. little or no music training), experts (i.e. highly trained music students), and performers (i.e. singers who performed the pieces). Two sets of ensemble performances were used for the study. One included a total of 48 performance snippets by 12 singing duos, who sang a two-part piece under four conditions: with and without visual contact, and with a designated leader or follower. Each snippet was approximately 1 sec long and extracted from the onset of each recording. The other set comprised 20 recordings, approximately 40 secs long, of two five-part pieces, performed by a newly-formed singing quintet before and after 5 rehearsal sessions. Participants listened to each recording and judged the level of “togetherness” and to what extent they heard the role of leader(s) in the performance, on a continuous sliding scale from 0 to 100. The order of recordings was randomised for each counterbalanced question. Physical measures of the recordings were precision and consistency of synchronization, and tendency to precede-lag note performance, extracted from note beginnings and endings of electrolyngography and audio recordings. Physical measures (i.e. recorded levels) and subjective measures (i.e. listener perceptions) of synchrony were compared.

Results

The analysis of the physical measures show a significant increase in the precision of synchrony over the course of study and with visual contact between singers, and complex patterns of leader-follower relationship, rather than a distinct division of roles. Data collection from the listening test is underway. We hypothesize that people perceive differences in asynchrony and that discrimination is better for performers, compared with experts and non-experts. Finally, we conjecture that patterns of leader-follower relationships highlighted by the performed asynchronies are closely reflected in the perception of synchrony from performers.

Conclusions

Improving understanding of the role of synchronization in ensembles provides insights for musicians to develop strategies to employ in performance.

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How do conductors shape the way choirs sing in rehearsals? The role of co-construction behaviours and interruptive feedback'

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Background

Studies of choral conductors have previously examined the gestures used to shape an ensemble's concurrent music (e.g. Daugherty & Brunkan, 2013), but often consider the movements in isolation from the ongoing rehearsal (although there are exceptions e.g. Poggi, 2011). In Conversation Analysis (CA) research, the term 'co-construction' refers to the collaborative production by two or more people of some verbal or non-verbal aspect of interaction e.g. a jointly produced word or sentence (e.g. Lerner, 1996).

Aims

This study aims to place some of the previously-researched conducting gestures in the context of choir rehearsal interaction, by looking at how they become part of the co-constructed shaping of the music by choir and conductor, as well as how the co-construction is formed and broken by the conductor and choir.

Methods

Choir rehearsals were videoed with nine conductors (two female) of varying expertise, all from a Western classical background, and each conductor took part in a semi-structured interview following their rehearsal. Choirs varied in size and proficiency. Conversation Analysis was used to examine the video data. CA focuses on the sequential organisation of verbal and non-verbal communication in interactions, meaning that gestures and talk can be considered in context. This allows for better understanding of their use at specific points and within certain activities.

Results

Analysis of the rehearsal data suggests that choirs and conductors co-construct the music together as one party, through a near-simultaneous, ongoing exchange of information. CA examines the way conductors set up and begin the co-construction before the choir sing (e.g. through gaze), and then break it off after they finish (e.g. by turning away). During singing, conductors' co-construction behaviours include verbal feedback and instructions, and non-verbal body language including posture, gesture, expression and gaze. These behaviours are used to constantly respond to and influence the choirs' singing. Comments made in the interviews supported the findings: one conductor described the choir and conductor as 'inextricably linked', and the music as 'this massive thing of clay and everyone's got their hands on it'.

Conclusions

Choirs and conductors work together to co-construct music during rehearsals. Conductors use their bodies, faces, gaze, and (less commonly) verbal instructions to influence sound during singing. The findings add to our knowledge of how choir rehearsals function as a unique form of interaction.

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T21G: Short Talks 21- Therapy and Preference

Time: Saturday, 28/Jul/2018: 8:30 - 10:30 · Location: Graz_1

Session Chair: Joshua Albrecht

The effect of a music intervention during caesarean sections on anxiety and stress of the expectant mother

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Background

Stress and anxiety during pregnancy and birth have detrimental effects on mother and child. Studies have shown that music in medical settings can have a positive and soothing influence. However, data for music during caesarean sections is sparse and inconclusive.

Aims

The aim of the present study is to systematically examine the anxiolytic effect of a music intervention during the caesarean section in the wake patient.

Method

The German SAMBA trial is a monocentric, prospective, controlled and randomized study. Patients in the intervention group listened to music after selecting one out of four genres via speakers during caesarean section in regional anesthesia. At admission, at skin incision, at skin closure and two hours after completion of surgery different subjective (STAI-State, visual analogue scale for anxiety (VAS-A)) and objective parameters (salivary cortisol/amylase, heart rate, blood pressure) were measured.

Results

304 patients (154 in the intervention group and 150 in the control group) participated in the SAMBA trial. At skin closure patients in the intervention group had significantly lower STAI-State and VAS-A values compared to the control group. Two hours after surgery VAS-A was still significantly lower. Objective parameters showed a significantly lower increase in salivary cortisol from admission to skin suture as well as lower systolic blood pressure and heart frequency at skin closure in the intervention group compared to the control group.

Conclusions

Music during caesarean section is an easy to implement, effective tool in order to reduce stress and anxiety of the expectant mother.

Musically induced archetypal imagery in Guided Imagery and Music therapy (GIM)

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Background

Jung proposed two opposing archetypal systems that govern human behaviour: Eros (emotional, imaginative, enveloping, passive) and Logos (rational, critical, reasonable, active), and 9 archetypal characters, each containing Eros or Logos traits or both. These archetypes were later applied to narrative forms by Campbell (1949). Newcombe (1992) and Almen (2003) used Jung's theory to assign semiotic meaning to musical elements in music analysis. However, their analysis did not take into consideration the listener's experience. GIM therapy does: clients experience imagery that appears to be evoked by music and has a narrative structure related to music's temporal structure (Bonny, 1995).

Aims

We investigated musical meaning by analysing the discourse of GIM participants during Bonny's 'Nurturing' programme, and comparing content with a collection of randomly selected myths from different cultures.

Method

Elicited imagery (emotions, social and physical situations) collected during 23 GIM sessions featuring the 'Nurturing' programme (7 compositions) was recorded, transcribed and categorised by 5 coders into 7 sub-categories, each belonging to either Jung's Eros (Flora, Fauna, Feelings) or contrasting Logos (Events, Structures, Actions) principle. The 7th category (Characters) contained both Eros and Logos traits. The same categorisation was applied to 23 randomly selected fairy-tales from different cultures (control group). Imagery in the sessions was expected to be of Eros quality because of the nurturing intentions for the programme.

Results

However, results showed that the imagery categories of Structures, Flora, Fauna and Feelings were selected significantly more often in the music group compared to the control group. Events, Actions and Characters were selected significantly less often in the music group compared to the control group. The dominant categories of Structures, Flora, Fauna and Feelings are plot-static; they do not generate active relationships between characters.

Conclusion

This suggests that music of this type has the psychological function of creating an emotional-scenic background, but does not drive the narrative plot.

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Effects of externalized preferred music on the brain's name-discrimination response

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Background

Normally, sounds we hear are located in the space around us. Real-world sound sources are acoustically filtered by the head and torso of the listener and by the reverberation producing variations in interaural cues across time. Headphone listening is not subject to these effects and gives the impression that the sound originates from within the head (it is "internalized"). Enhanced auditory quality, through addition of the acoustic filters present for outside-the-head sounds ("externalization") leads to a deeper meaning associated with the stimuli and an increased level of presence, emotion, and spatial perception (Brinkman, Hoekstra, & Egmond, 2015). Surprisingly little is known about the impact of auditory externalization on brain processes. Furthermore, how the effects of externalisation translate to acoustic stimuli with autobiographical context, personal relevance and emotion, such as preferred music remains unknown. The use of autobiographical stimuli are especially important in neurological pathology, like Disorders of Consciousness (DOC; patients showing no or limited signs of consciousness) where these stimuli lead to improved diagnostic accuracy. For example, the use of preferred music has shown effects on behavioral (Heine et al., 2017) and neuroimaging (Edlow et al., 2017; Heine et al., 2015) assessments due to temporary improvements of cognitive function. Enhanced realism created through sound-externalization is expected to improve attentional brain-processes both in healthy subjects as well as patients with DOC.

Aims

To study the effects of acoustic externalization of preferred music on cerebral processing in both healthy subjects and patients with DOC.

Method

Hd-EEG ERP analysis of the own-name paradigm (Perrin, Garcia-Larrea, Mauguire, & Bastuji, 1999) following four contexts: externalized preferred music, internalized preferred music, externalized neutral sound and internalized neutral sound.

Results

Both externalized, as well as internalized conditions show the classic P3 component after the own name. Further stimulus discrimination can be observed in the externalized condition through early differences between the own-name and other name. Moreover, own-name versus other-name discrimination is more often seen in the externalized condition on an individual level. In addition, effects on treatment of non-salient stimuli can be observed in the externalized condition in healthy subjects, but not in patients with DOC.

Conclusions

More realistic (externalized) quality of sounds causes enhanced discrimination of salient (own-name) versus non-salient (other-names) conditions and enhances attention to non salient stimuli. Translation of these findings into clinical practice might improve sensitivity of diagnostic assessment.

"For The Times They Are A-Changin'": Lifespan Developments in Preferred Musical Performance Tempo

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Background

Controlled laboratory experiments have shown that preferred tempo when tapping spontaneously or when listening to monotone sound sequences decreases over the lifespan and that a wider range of tapping tempos can be performed by 39-59-year-olds compared to older or younger individuals (McAuley et al., 2006). These findings led to the preferred period hypothesis and entrainment region hypothesis, respectively, ascribing these effects to age-related changes in internal oscillators. The conjectured biological basis suggests that age-related slowing should generalize to expert music performance where tempo choice is often attributed to aesthetic preferences or eccentric whims (Bazzana 2005).

Indeed, both absolute durations of movements and standard deviations of durations increased dramatically between Glenn Gould's famous recordings of J.S. Bach's Goldberg Variations as 22-year-old in 1955 and as 48-year-old in 1981 ($Z = -3.16$, $p = .001$). In 1980, Gould considered his first recording "too fast for comfort" (Bazzana 2005) and could "no longer recognize the person who did that" (Roberts, 1999). In addition to Gould's eccentric personality (Bazzana 2005) and general decreases in performance tempo since the emergence of recording technology, lifespan changes in biological event-tracking mechanisms offer a promising competing explanation.

Aims

This project tests whether mean performance tempo decreases with age and whether tempo variability follows an inverted U-shape over the course of expert pianists' lifespan, as predicted by the preferred period and entrainment region hypotheses.

Methods

For the final sample, beat-per-minute (BPM) values were recorded through manual tapping of ~800 recordings of 28 Chopin mazurkas. For the preliminary sample of 262 recordings, BPM values were available through the Center for the History and Analysis of Recorded Music (CHARM) "Mazurka Project". Multiple regression was conducted on the normalized means and standard deviations of BPM with performer age and recording year as predictors.

Results

Preliminary analysis of 234 recordings shows that age explains unique variance in tempo decrease, not accounted for by recording year, $F(1,231)=4.97$, $p = .027$. Moreover, the use of rubato decreases over a performer's lifespan when controlling for historical performance changes, $F(1,231)=16.71$, $p < .001$, but there was no evidence that an inverted U-shaped curve fits better than linear decrease. Analysis of the full sample is in progress.

Conclusions

The preliminary results suggest that age-related slowing in internal oscillators may subconsciously affect performance decisions in expert musicians. When combined with a strong apprenticeship model where tempo preferences are passed on from older mentors to younger pupils (Cook, 2007), this may explain historical declines in performance tempo of classical music during the 20th century.

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Music in the body: How does music listening influence the reality of pain? A scoping review.

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Background

While meta-analyses demonstrate the effectiveness of music listening interventions (MLI), it is not yet clear how the positive effects of music listening interventions are mediated (Bradt, Dileo, Magill, & Teague, 2016; Cepeda, Carr, Lau, & Alvarez, 2006). The absence of defined cognitive mechanisms coincides with inconsistencies in terms of how MLIs are delivered (with wide variability in terms of duration, frequency, style, genre, and sound quality) and in terms of how they are evaluated.

Aims

The primary objective of this scoping review is to explore the reported cognitive mechanisms underpinning the pain reducing properties of music listening interventions.

Main Contribution

A scoping review protocol (Howlin, Guerin, Rooney, In press) was designed using the principles from the Arksey and O'Malley (2005) framework, adapted by Levac (2010), and registered on the PROSPERO database. The protocol includes decisions about the search strategy, inclusion/exclusion criteria, article selection process, data extraction and data synthesis. Seventy-Six articles were included, spanning a time range from 2006 to 2017 from both laboratory and healthcare contexts. Using thematic synthesis, primary themes that emerged were distraction, direct impact on emotion, relaxation, perceived control, direct physiological responses alongside irritation, and music listening setting. Secondary themes within these categories included, cognitive engagement, affective engagement, personal memories, imagination, maintenance of self-identity, changing the meaning of pain experience, enjoyment, interruptions, and holism, amongst others. Together these themes help to identify the primary features that may facilitate optimal cognitive and affective engagement with a music listening intervention. For example, in a clinical context it seems that some patients are interrupted in their music listening experience, which would likely interrupt their music engagement, and potentially undermine their perceived control of their environment. The impact of environment is particularly important given the disparity in results between lab and hospital based studies, despite patient preferred music regularly being chosen in both settings. Results are discussed in line with the BRECVEMA unified theory of musical emotion, and the dynamic nature of music listening experiences as opposed to 'emotional induction' (Juslin, 2013).

Implication

The review has helped to identify differences between the underlying theoretical frameworks of music listening studies, which in turn shape how the studies are designed and how the music listening experience operationalised. Considering the wide range and sometimes opposing frameworks underlying MLI studies in pain contexts, it is unsurprising that such wide variability is seen in the results. This review helps to generate testable hypotheses to further define the underlying cognitive mechanisms of MLIs, and also to highlight theoretical issues when designing an MLI for clinical contexts.

T22G: Short Talks 22 - Rhythm

Time: Saturday, 28/Jul/2018: 8:30 - 10:30 · Location: Graz_2

Session Chair: Jan Stupacher

Pupillometry of Groove

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Background

Why does music make us want to move? Groove is defined as the quality of music that induces a subjective sense of wanting to move. Several studies have demonstrated that perceptual ratings of groove are highly consistent across listeners (Janata, Tomic, & Haberman, 2012; Madison, 2006). On a neural level, imaging studies have demonstrated that rhythmic music engages not only auditory but also motor pathways (Grahn & Brett, 2007).

Aims

We aim to determine whether neural sensitivity to groove can be detected in peripheral physiology (absent actual movement), and thus provide an objective measure of how we react to rhythm in music.

Methods

We do this in a series of psychophysiological experiments examining the pupillary response of listeners hearing (1) excerpts of real music varying in groove, and (2) drum loops varied in bass frequency content and syncopation. All stimuli were controlled for tempo and loudness.

Results

We demonstrate pupillary sensitivity to groove in music, showing that music perceived as high in groove stimulates greater dilation than music perceived as low in groove. We also demonstrate pupillary sensitivity to bass frequency content and syncopation. Linear mixed models designed to predict pupil dilation in these experiments show significant interactions with listener sex for all manipulated factors: groove, bass frequency content and syncopation.

Conclusion

These findings provide evidence that peripheral physiological reactions can provide an objective measure of the link between movement and music in our species. Applying the techniques developed here in other species should allow us to determine whether they exhibit similar sensitivities, thus providing insight into the biological foundations of music.

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Style preference and familiarity affect the groove experience of individuals listening to Western popular music drum patterns

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Background

Groove has been defined as a pleasurable urge to move one's body in synchrony with the rhythm of music. Groove has been recognized as an important reason why listeners engage with music on a daily basis (in dance, sports, work, and ritual). The musical factors that contribute to the groove experience are still largely unknown. Past research has found that rhythmic syncopation, event density, beat salience, and rhythmic variability are positively related to groove [1-5].

Aims

This explorative study investigates the groove effect of 250 reconstructed drum patterns from different popular music styles (pop, rock, funk, heavy metal, rock & roll, rap, soul, R&B, jazz). It aims at identifying factors that are relevant for groove and that are worth investigating in a controlled setting in the future.

Methods

Drum patterns of eight bars duration, chosen from 250 popular music tracks, have been transcribed (including dynamics and microtiming) by expert musicians and faithful audio reconstructions have been created on a MIDI/sample basis. During an online listening experiment, 682 participants rated the reconstructions a total of 8,329 times using a reliable 3-item groove questionnaire (Cronbach's $\alpha=0.81$).

Results

Results show that syncopation ($R^2=0.010$, $p<0.001$) and event density ($R^2=0.011$, $p<0.001$) were each positively associated with the groove ratings; beat salience ($p=0.804$) and rhythmic variability ($p=0.338$) showed no effect. Listeners' familiarity with a drum pattern (their impression that they know the song) was positively associated with the groove ratings ($\eta^2=0.051$, $p<0.001$). The largest isolated effect was measured for listeners' style preference ($R^2=0.123$, $p<0.001$): groove ratings tended to be high if listeners had the impression that the drum pattern belonged to a style they liked. Combined, the participant-related effects of style preference and familiarity ($R^2=0.152$, $p<0.001$) exceeded the effect sizes of either syncopation or event density by a factor of 15.

Conclusions

We conclude that taste and musical biography have a strong moderating effect on listeners' groove experience. This suggests that groove research should expand its focus: in addition to studying the music, we should also study the people who listen to it.

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The Effect of Tempo on Non-Isochronous Subdivisions in Performed Samba Groove

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Background

Several empirical studies have investigated the role of tempo on the characteristic non-isochronous long–short duration pattern on eight note level in jazz. Friberg and Sundström (1997) found an approximately linear decrease of swing ratio with increasing tempo and suggest a lower limit to the duration of the short second eight note around 100 ms. Honing and Haas (2008) found that the swing ratio is adapted to the overall tempo, but did not find that it scaled linearly with tempo. Non-isochronous subdivision patterns have also been found in samba groove (e.g., Gerischer, 2006; Haugen, 2016; Naveda, 2011)—that is, at the level of sixteenth notes. In samba groove the fourth sixteenth note seems to be longer in duration than the others.

Aims

The aim of this study is to investigate the influence of tempo on the duration pattern on sixteenth note level in a performed samba groove.

Method

Two professional samba performers, a percussionist and a dancer, participated in the study. The analysis in present paper is based on the recorded sound. The percussionist played a samba groove at three different tempi: 133, 100, and 69 BPM. Since all the sixteenth notes are played in this recording, their temporal position could be detected using onset detection. Subsequently, the inter-onset-intervals (IOIs) between the sixteenth notes were calculated and converted into percent values according to their percentage of the beat.

Results

The analysis showed significant differences between all the sixteenth note durations in all three tempi—that is, a medium/long–short–medium/short–long duration pattern on sixteenth note level were found at all tempi. In addition, a significant interaction between sixteenth note type and tempo were found. The analysis showed that as the tempo increases the short second sixteenth note became shorter and the long fourth sixteenth note became longer. In the fastest tempo, the short second sixteenth note's mean duration is only 68 ms, something that is much shorter than 100 ms that has previous been suggested to be the shortest interval that we can hear and perform.

Conclusions

The results suggest that the non-isochronous duration pattern on sixteenth note level in samba becomes even more non-isochronous with increasing tempo. In addition, the results indicate that the lower limit for IOIs in samba groove is below 100 ms.

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Categorizing western popular music drum patterns

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Background

The Lucerne Groove Research Library is a collection of 250 reconstructed drum patterns and associated metadata, derived from recordings of 50 highly acclaimed drummers covering the last 60 years of Western popular music. The Library was published online in August 2017 [1] with the goal of providing ecologically valid audio stimuli for groove studies (<http://www.grooveresearch.ch>).

Aims

This paper proposes a system for the classification of the drum patterns currently available in the Lucerne Groove Research Library, based on selected structural features.

Main Contribution

A Western popular music drum pattern usually consists of three rhythmic layers: The rhythm of the downbeat layer is played on the bass drum; in most cases it accentuates the first and third quarter note beats of the common time bar. The backbeat layer is normally played on the snare drum and adds the second and fourth beats of the bar to the pattern. Finally, the pulse layer presents a basic, often quite regular pulsation on hi-hat or ride cymbals.

Patterns were classified using a semi-automatic, iterative method: categories were defined according to the smallest metric subdivision necessary to represent the pattern (quarter notes, eighth notes, etc.), separately for each layer. This procedure

resulted in six categories for the downbeat and backbeat layers, and five categories for the pulse layer. Eleven combinations of downbeat, backbeat and pulse categories were frequent and covered 200 of the 250 patterns.

Metadata associated with the drum patterns suggests that these 11 groups also reflect historical and stylistic changes: the distribution of the recording years shows that some pattern types are more prevalent during specific eras, while others are widely spread across several decades. Listeners' genre associations (collected in a listening experiment in the course of an ongoing study with 682 participants) connect the eleven pattern types with different genre families (rock and related styles, funk-soul-R&B, pop-disco-dance). These style associations are consistent with the median tempi in the groups: the more complicated patterns associated with funk show slower tempi in the median, whereas the more straightforward rock patterns are played with faster tempi.

Implications

The classification of the drum patterns was based on simple, purely structural criteria. Metadata and listener responses show that the structural features are associated with specific popular music styles and eras. A more detailed, corpus-based music analysis of the patterns will be likely to shed further light on the history and development of Western popular music drum patterns.

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Testing a model of rhythmic syncopation

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Background

Syncopation has been found to influence the sensation of groove [1-3]. In order to investigate how syncopation affects our perception of music, a reliable measure of syncopation needs to be developed. In 2014 Witek et al. proposed a method to model syncopation in backbeat drum patterns, which is based on Longuet-Higgins' and Lee's idea of light and heavy metrical positions [3,4].

Aims

The aim of this study was to test the fit between the Witek et al. (2014) model and listeners' perceived degree of syncopation.

Method

Six audio stimuli based on 8-bar transcriptions from popular music drum patterns (rock, pop, funk) were constructed, using sounds from a drum sample library. The patterns consisted of consecutive eighth notes, played on the hi-hat, and bass/snare drum figures that introduced more or less syncopation by variation.

17 professional musicians listened to the randomized 15 pairwise combinations and decided, for each pair, which stimulus appeared to be more strongly syncopated (win). The patterns were ranked according to their total number of wins. The listeners' ranking was then tested against the ranking predicted by the model.

Results

The results show that overall the model is a good predictor for perceived syncopation: All stimuli but one were ranked by the participants as the model predicted.

For this one pattern, however, the model predicted significantly stronger syncopation than perceived by the participants. This pattern is a simple backbeat, except the bass drum is played with additional, softer strokes on the 16th note positions after the downbeats. This "echo" is the main factor for the high syncopation predicted by the model, but seems to have little influence on participants' perception of syncopation.

Conclusion

This study offers empirical data on the validity and possible limitations of the Witek et al. model. More rhythmic patterns need to be tested in order to investigate whether there are other rhythms, where perception and model disagree.

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T23G: Short Talks 23 - Education

Time: Saturday, 28/Jul/2018: 8:30 - 10:30 · Location: Graz_3

Session Chair: Dawn Carole Rose

Music and social protest: the effect of musical genre and lyrics

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Background

Music has always played an important role in social movements, expressing criticism and opposition to social and political issues, and encouraging protest (Eyerman, 2002; Peddie, 2006). Although the message of dissent is conveyed through lyrics, certain genres are perceived as more typical of protest than others. Thus, whereas rap is perceived as a musical style expressing social discontent, pop is regarded as more mainstream and conformist (Rentfrow & Gosling, 2007). To our knowledge, no previous study has empirically examined the effect of lyrics and musical genre on attitudes towards protest.

Aims

The aim of the present study was to examine the effect of lyrics and genre two songs dealing with social injustice: a rap song and a pop song.

Method

123 participants took part in the study (66 males, 57 females), aged between 18-38 (mean age = 25.69). In a 2X2 design, participants either read lyrics or listened to a rap or pop song, chosen through a pre-test as expressing protest. Participants were asked to evaluate the song and reply to questions regarding the importance of social activity, and their degree of trust in the government and in politicians.

Results

MANOVAs were conducted to examine the effect of genre (rap/ pop) and presentation (music/ lyrics alone) on song evaluation and on the perceived importance of protest and attitudes towards the government and politicians.

Regarding the songs' perception, preliminary results show a main effect of presentation, with songs presented with music being perceived as being more familiar, and more encouraging of protest. A main effect of genre was found for expression and encouragement of protest, with the rap song receiving higher ratings than the pop song.

As for the effect of the songs on the importance of protesting and degree of trust in the government and politicians: several main effects of music were found, showing that songs presented with music have a stronger effect than lyrics alone. Likewise, several interactions between song and lyrics were found, showing that although the pop song was perceived as less of a protest song, when presented with music, its effect on these variables was stronger than that of the rap song.

Conclusions

The presented study is a first attempt to examine how musical genre and lyrics influence attitudes towards social injustice and the need to protest. Results demonstrate how music influences attitudes regarding social issues, beyond lyrics. Moreover, although in general rap is perceived as more encouraging of protest, the effect of the combination of lyrics and music is more complex. Future studies, controlling for lyrics and using larger samples of songs, are needed in order to allow generalizations regarding these issues.

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Patterns of Social Distinction in Music: A Cross-Cultural Study

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Background

Since Bourdieu (1979), musical genres have been understood as carriers of social distinction. Apart from marking social status by their listening habits, people may also have stereotypical beliefs concerning the listeners of other musical genres (North & Hargreaves, 1999). What is less clear is how such listener stereotyping is affected by cultural differences: only western comparisons have been carried out (Rentfrow & Gosling, 2007; Kristen & Shevy, 2012).

Aims

Based on theories of social categorization (Leonardelli & Toh, 2015), we suggest that associative beliefs concerning other musical listeners' social standpoints only receive their meaning in relation to the respondent's own social standpoint. For different respondents, similar genre-based associations might thus represent different value distinctions with regard to their own positions. We ask (1) whether such genre-related value distinctions show cross-cultural differences, and (2) whether they form broader patterns that reflect fundamental differences in value schemata between cultures.

Methods

58 Finnish and 49 South African university music students heard 12 musical excerpts representing four musical genres (gospel, old-time dance music, opera, rap), and responded to a 27-item questionnaire concerning the potential life goals of typical listeners of the music. The participants also rated the correspondence of the items to their own life goals. Value distinctions were obtained by subtracting the latter judgments from the ones regarding the musical excerpts.

Results

Generalized estimating equation (GEE) analyses of the value distinctions showed significant interactions involving participants' nationality and musical genre for 18 of the questionnaire items. Post hoc tests revealed cultural differences for each of the genres. For example, opera appeared to signal negative social distinctions for the Finnish participants, whereas in South Africa, imagined opera listeners seemed closer to the participants' own values, suggesting an "indigenization" of the genre.

Exploratory factor analyses of the value distinctions revealed different national patterns. For instance, whereas in the Finnish responses altruism was associated with global values such as environmental concerns, for South Africans it was connected with communitarianism and traditionality, suggesting a kind of traditional group morality ("ubuntu").

Conclusions

This is the first empirical study conceptualizing listener stereotypes as differences between participants' judgments concerning musical genres and their own social standpoints. We have shown that the social distinctions attached to musical genres may be culture-dependent, and that they may form broader patterns of value, reflecting world-views such as (European) ethical individualism and (African) communitarianism.

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It's time for a break - reasons for not listening to mobile music

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Background

The focus of mobile music related literature has been on the reasons and situations surrounding the use of portable listening devices (e.g., Bull, 2000). Music has been found to motivate (Laukka & Quick), and influence emotions (Sloboda et al., 2001), among other things, which can happen anywhere since the invention of the portable listening device which enables access to a whole music library at any given time. However, there has not been any research on the reasons for not listening to mobile music, the topic of this paper.

Aims

The aim was to discover situations in mobile music listening where the listener decides that 'it's time to turn off the music'. The situations will be described and possible reasons for not listening to mobile music revealed. The reasons for non-users of mobile listening devices to not engage in that activity are also explored.

Method

To answer these questions 11 mobile music listeners were interviewed, shadowed (DeNora, 2003), i.e., observed in their everyday behaviour of mobile music listening, and then interviewed again. Additionally, 11 non-users of portable listening devices were interviewed about their opinions on and experiences with mobile music listening.

Results

Results show that both users and non-users would not use headphones if they are not ideal for the situation, e.g., too warm in summer. Furthermore, while crowded, noisy, unpleasant urban environments lead to the wish for music for distancing and mood management purposes, nature and rural surroundings have the opposite effect.

Moreover, the listeners' reasons for turning off their devices are that the music is experienced as too much information, and sometimes the concurrent activities will not allow for music listening, e.g., when trying on clothes in shops. None of the interviewees would listen to music when they are walking around with someone else.

Conclusions

The findings shown here indicate that there are several circumstances in which users of mobile listening devices as well as non-users would decide not to listen to music. Most of these relate to the environment and the situation around them, e.g., whether there are acquaintances present, what kind of activity is carried out, and what kind of environment it is. This clearly demonstrates that mobile music listening means being aware of one's surroundings, because it includes making choices relevant to the situation.

Future research should try to expand this to different kinds of music listening to gain a more complete picture of possible reasons for turning off the music.

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Music Performance Analyses Of In-Car Music Engagement During Simulated Driving

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Background

Drivers often listen to music, sing-along, and drum rhythms. Although the benefits for in-car music are entertainment, stress reduction, combating boredom, counteracting fatigue, and emotional regulation, adding music to a hazardous road environment impacts safety. There is a controversy: Does music facilitate driver performance via increased arousal leading to more focused concentration (Unal et al., 2012, 2013a; 2013b), or cause distraction placing drivers at greater risk (Brodsky, 2002, 2015; Brodsky & Slor, 2013)?

Aims

The investigation examined driver music engagement. It was expected that as perceptual demands increase (parking □ low-demand driving □ high-demand driving), music performances would be corrupted. Music Performance Analysis (MPA) was employed to examine secondary-task driver behaviour.

Method

There were two simulated driving studies: Singing-along and Drumming-along. In Study 1, 19 participants (Mage = 26, 68% female, Mdriving years = 7) drove while singing 2 songs in 3 conditions: no-drive baseline, low-demand driving, and high-demand driving. Vocal recordings underwent MPA by a Répétiteur. Statistical analyses compared baseline to driving conditions, and between the two driving conditions. In Study 2 19 participants (Mage = 24, 74% female, Mdriving years = 6) drove while drumming to 2 songs. Electronic drum-kit sensor clip technology was coupled to steering wheel, gear stick, driver's left thigh, and left foot floorboard. Percussive recordings underwent MPA by an orchestra musician.

Results

The results indicate that as perceptual demands of driving increased, music activity was hampered. Sub-optimal music performances featured intonation errors, rhythmic inaccuracies, lack of synchrony, inconsistent and unstable temporal flow, lyric replacement, and neglect. Study 1 found memory for lyrics of popular well-known songs significantly obstructed. Study 2 found songs covered less with increased errors; errors were less when tapping a steady pulse beat or melody rhythm than when drivers improvised an accompaniment.

Conclusions

Two alternatives surfaced: (1) While drivers attempt to allocate mental resources to the primary driving task, secondary music tasks draw resources away from the required allocation (i.e., neglect); or, (2) Obstructed music performances result by ranking attention between the primary driving task and secondary music task (i.e., prioritization). Further studies are needed.

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What Infants Hear On TV: A Soundscape Analysis Of Infant-Directed Broadcasts

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Background

Music and songs serve as fertile ground for learning skills among young children. Caregivers, parents, and teachers use music to scaffold children's behaviour since it can help to accelerate cognitive, emotional, and sensorimotor development (de l'Etoile, 2006). However, not all music representations are educationally and developmentally appropriate for young children. If music is to be used for developmental and educational purposes, pieces have to feature specific characteristics (Sulkin & Brodsky, 2015). In the last decades media has become an important part of young children's environment. Babies and infants spend a considerable amount of time every day in front of screens. Sound and music are integral components of programming that target young viewers. The presence of sound effects and music pieces can assist in transferring information required for viewers' interpretation (Brooks, 2014). Therefore, aural features are not simply decorative figures, but rather essential constituent components of infant-directed content. Several investigations examining young children's learning processes from television advocate that it is explicitly the soundtrack that manages the passage from 2D animations to 3D real-world settings; it is also well documented that children react to music they hear from the screen (Barr et al., 2009). But, are the musical utterances educationally and developmentally appropriate for the young ears? Surprisingly, little research has targeted the soundscapes of infant-directed broadcasts.

Aims

The current study aimed to fill the above-mentioned gap by implementing a soundscape analysis of infant-directed TV broadcasts. We considered both musical and linguistic constituents as structural components of the soundscape.

Method

A representative corpus of 39 programs broadcasted by BabyTV channel were analysed. BabyTV was chosen because of its global relevance; it is distributed in more than 100 countries in 18 languages. For the purposes of the study, a descriptive inventory was developed to assess sound-related features of the broadcasted show-series: Soundscape Appraisal of Broadcast Shows. In addition, we developed a criterion-based checklist to measure age appropriateness and developmental fitting of songs materials: Sulkin Infant Song Inventory.

Results

The results indicate music constituents mainly employed as a strategy to attract young viewers to the screen. For the most part, musical materials are educationally and developmentally inappropriate. Moreover, the linguistic constituents were often non-intelligible utterances that cannot be recalled or reproduced by young viewers.

Conclusions

The urge for co-operation between media content creators and music education development specialists is warranted. Such co-operation will support creating appropriate content for young children and will make screen viewing a more suitable platform for infant's growth.

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T24G: Short Talks 24 - Musical Skill

Time: Saturday, 28/Jul/2018: 8:30 - 10:30 · Location: Graz_4

Session Chair: László Pál Stachó

The Chinese Version of the Gold-MSI: Adaptation and Validation of an Inventory for the Measurement of Musicality in a Taiwanese Sample

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Background

The Gold-MSI (Goldsmiths Musical Sophistication Index) includes one self-report questionnaire and four music tests which altogether measure musical ability, attitudes toward music, and music-related behaviors in the general population (Müllensiefen, Gingras, Musil, & Stewart, 2014). The questionnaire contains 39 items that comprise five subscales and one general factor. Previous studies showed that the inventory demonstrates good reliability and validity, and its factor structure could be consistently replicated (Fiedler & Müllensiefen, 2015; Schaal, Bauer, & Müllensiefen, 2014). However, these findings emerged from samples within the European cultural region. The question of its generalizability for into Far Eastern cultures remains open.

Aims

The current study aimed to investigate the psychometric qualities of the Chinese Gold-MSI questionnaire using a Taiwanese sample by examining its factor structure, reliability and validity.

Method

The translation of the Gold-MSI followed the ITC Guidelines for Translating and Adapting Tests (International Test Commission, 2017). To create the first draft, we obtained three independent translations by professional translators. Discrepancies were discussed with an expert for in psychological testing. In the next step, it was translated back into English by a native speaker. Two experts then compared the backward translation with the original questionnaire, resulting in the second draft. Thereafter, six Taiwanese evaluated the readability of all the items' readability. Accordingly, we improved the syntactic quality of two items' syntactic quality. From April to July 2017, we administered the Chinese Gold-MSI along with two music tests from the Gold-MSI test battery (the Melodic Memory Task and the Beat Alignment Perception Task) and the Musical Intelligence subscale (Chou, 2006) in an online survey. Additionally, participants were invited for a retest after two weeks. In all, 1,065 and 160 valid responses returned for the first and second inquiry, respectively.

Results

First, the confirmatory factor analysis showed that the original factor structure could be replicated (SRMR = 0.053, CFI = 0.886). Second, the values of Cronbach's α and test-retest reliability coefficients (Pearson's r) were between .74 and .90 as well as .77 and .92, respectively, supporting the questionnaire's good reliability. Third, the convergent validity could be corroborated by the correlation between the General Musical Sophistication factor and the Musical Intelligence subscale ($r = .78$).

Conclusions

The Chinese Gold-MSI possesses good psychometric qualities, and its factor structure remains invariant. Hence, the present study provides a solid foundation for further intercultural inquiries in the field of musical development.

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Explaining Objective and Subjective Aspects of Musical Sophistication: Insights from General Fluid Intelligence and Working Memory

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Recent work in music psychology has examined the relationship between individual differences and factors that predict various aspects of musical sophistication. Some of the recent research has begun to model how musical sophistication or aptitude relates to various cognitive measures, ranging from executive functions, to measures of general fluid intelligence. Recent research has also investigated how differences in musical training may lead to differences in working, short-term, and long-term memory capacity. While some of the previously mentioned work uses continuous measures of musical sophistication, many only collect data on years of formalized musical training as opposed to a more multi-faceted view of musical sophistication. The aim of this paper is to share findings from a large study investigating how musical sophistication, as measured by the Goldsmiths Musical Sophistication Index (Gold-MSI), relates to measures of working memory and general fluid intelligence. Results using structural equation modeling (SEM) suggest working memory capacity and general fluid intelligence explain more of the variance in perceptual tasks than self-report measures of musical sophistication. In light of these findings, we suggest that further models of music perception should focus on modeling what processes contribute to a task, rather than using large, composite latent variables.

Sight reading strategies and personality dimensions

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Background

The framework of the self-regulative learning theory was used (McPherson & Zimmerman, 2002) in order to find out about the metacognitive strategies used during each phase of the sight-reading. We are of the opinion that, besides the confirmed place of cognitive, perceptive and motor abilities (Kopiez & Lee, 2008), the non-cognitive factors such as personality and motivation play an important role in acquiring and performing sight-reading as an expert skill (Bogunović, 2017).

Aims

a) To identify the metacognitive strategies used at each phase of the self-regulated sight reading, and b) to determine relations of the sight-reading factors with personality dimensions.

Method

The sample consisted of 95 music students of the Faculty of Music in Belgrade who had 12 to 15 years of specialized music education experience. The participants filled in the Sight-reading questionnaire (12 questions, five-point Likert scale) and the NEO-PI-R. Six Exploratory Factor analysis were performed and correlations with personality dimensions were investigated.

Results

The results yielded the following factors which exist in the subsequent phases of the sight-reading process: while Preparing (Analytical, Inner hearing, General overview), during Setting goals (To Play through, Technical Accuracy, No Goals), during Performance (Expertness, Non-Perfectionism, Visualization and Continuity Control), Problem solving (Corrective or Inefficient strategies), Monitoring (strong and weak sides) and Self-reflection/evaluation (Self-efficacy and Self-satisfaction). The students who have higher self-efficacy have a “bigger” picture of the composition, and “top-down” cognition. They also enjoy sight-reading more. It seems that personality dimensions are mostly related to the sight-reading factors of Preparation and Performance. Namely, students who tend to have the Analytical approach in preparing for the sight-reading tasks showed higher Emotional stability, Agreeableness and Conscientiousness, especially higher Competence, Dutifulness, Achievement striving, Discipline and Deliberate thinking. The factor of Expertness in performing is significantly related to the facets such as Dutifulness and Achievement Striving.