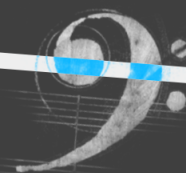12-14 2013
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Casa Paganini - InfoMus
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SysMus13

**Sixth International Conference of
Students of Systematic Musicology**

ABSTRACTS

Edited by

Manuela M. Marin
Michelle Phillips
Donald Glowinski

SysMus13

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Students of Systematic Musicology

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Genoa, Italy
September 12-14, 2013

Abstracts

Edited by Manuela M. Marin, Michelle Phillips, and
Donald Glowinski

Manuela M. Marin, Michelle Phillips, and Donald Glowinski (editors)

Sixth International Conference of Students of Systematic Musicology (SysMus13): Abstracts

Cover design: Andrea Pedrina

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Introduction

Welcome to SysMus13!

It is a great honor to welcome you to the Sixth International Conference of Students of Systematic Musicology (SysMus13) on behalf of the organizing committee.

Richard Parncutt and Manuela Marin had the brilliant intuition to co-found the SysMus Conference Series in 2008 to afford the opportunity for students to meet, discuss and make useful connections. Participating in a SysMus conference calls for passion, and a real interest and determination to discover something new about music. You must be clearly motivated to comprehend music in its many various forms. Many disciplines inform our understanding of music. SysMus promotes and fosters an interdisciplinary approach and community of scholars and researchers in music.

SysMus13 takes place in CasaPaganini-InfoMus Research Centre in Genoa, directed by Prof. Antonio Camurri, who we would like to thank for his support and his openness to host a conference on musicology. This international conference is sponsored by four different institutions: DIBRIS (Faculty of Engineering), DISFOR (Faculty of Psychology), Niccolò Paganini Conservatory of Music, and SEMPRE (Society for Education and Music Psychology Research).

Participants come from all over Europe and the conference is fortunate to include keynote papers by Prof. Peter Keller from the University of Western Sydney (Australia) and Prof. Frank Pollick from the University of Glasgow (U.K.), thanks to the generous financial support of SEMPRE.

As usual, a number of people worked very hard during the last year to make SysMus13 a success: I would like to thank Manuela Marin and Michelle Phillips for their valued support in the booklet editing and in overseeing the daily inflow of emails and issues to be solved as soon as possible; Andrea Pedrina who did a fantastic job as web editor and designer since the very beginning stages of conference planning; Giacomo Lepri for his exceptional commitment in organizing social events and especially the concert together with Prof. Roberto Doati and Prof. Claudio Proietti; and finally, the CasaPaganini staff, especially, Simone Ghisio, Paolo Coletta, Maurizio Mancini, Stefano Piana and Corrado Canepa for their support in organizing the workshop on *EyesWeb*.

I wish you a pleasant stay here in Genoa and hope that you will enjoy the conference!

Donald Glowinski, conference chair

Committees

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Anna Wolf, Hanover University of Music, Drama and Media, Germany

Support team

The support team mainly consists of local students of the Niccolò Paganini Conservatory of Music, Genoa, and the University of Genoa, Italy. Support team members will be available throughout the conference to answer questions, solve unexpected problems and generally make sure that things run smoothly. They are

Stefania Garotta, Giacomo Gianetta, Claudio Licheri, Chiara Noera, Arianna Riolfo and Matteo Spanò

Abstracts

Keynotes

Social influences upon musical performance skills

Peter Keller

The MARCS Institute, University of Western Sydney, Australia

Musical ensemble performance is a pristine social art form that places exceptional demands upon the cognitive and motor capacities of co-performers. A remarkable feature of ensemble performance is the exquisite balance that individuals are able to achieve between precision and flexibility in interpersonal coordination. In my presentation, I will give an overview of a theoretical framework and empirical approach for studying factors that determine an individual's ability to coordinate with others under such conditions. I will present selected results from a research program addressing how this ability is affected by individual differences in cognitive-motor skills (assessed via behavioural and neuroscientific methods) and social-psychological factors that affect these skills.

Biography

Peter Keller received degrees in Music and Psychology from the University of New South Wales in Australia. He conducts research that is aimed at understanding the behavioural and brain bases of human interaction in musical contexts. Keller has served as Editor of the interdisciplinary journal 'Empirical Musicology Review' (2010-2012), and is currently a Consulting Editor for 'Music Perception' and 'Psychomusicology: Music, Mind, and Brain', and a member of the Editorial Board at 'Advances in Cognitive Psychology'. He has held research positions at Haskins Laboratories (New Haven, USA), the Max Planck Institute for Psychological Research (Munich, Germany), and the Max Planck Institute for Human Cognitive and Brain Sciences (Leipzig, Germany), where he led the Music Cognition and Action group from 2007 until 2012. He is currently an Associate Professor in the MARCS Institute at the University of Western Sydney.

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Brains in synchrony with music and dance

Frank Pollick

Department of Psychology, University of Glasgow, United Kingdom

I will discuss recent experimental work from our lab that uses functional Magnetic Resonance Imaging (fMRI) to examine brain activity while observers watch dance. The dances used in these experiments are hundreds of seconds in duration, which is in distinction to most recent studies that have used dance clips of only a few seconds duration. Additionally, the dances represent a variety of styles, with one or two dancers, and participants watched either with or without music. The primary analysis technique used for these experiments was intersubject correlation (ISC). ISC is designed to find brain areas that act in synchrony across a group of observers when they observe a performance. This synchrony results from the brain responses of observers being time-locked to the experience of watching the performance.

I will interpret our experimental results within the context of theories that delineate auditory, visual, embodied and aesthetic processing within the brain. One challenging issue arising from this is the extent to which the influences of sight and sound can be distinguished from one another in the brain response to watching dance. Another important issue we will address is how other experimental techniques can be used to corroborate the ISC findings. In particular, we will present results where *EyesWeb* was used to calculate a motion index that could be used to predict activity in brain regions also identified by ISC.

Biography

Frank E. Pollick is a Professor of Psychology at the University of Glasgow. He received BS degrees in physics and biology from MIT, an MSc in biomedical engineering from Case Western Reserve University and a PhD in Psychology from The University of California, Irvine. From 1991–97 he was a researcher at the ATR Human Information Processing labs in Kyoto working on the topics of human perception and motor control. Since 1997 he has been in the School of Psychology at the University of Glasgow. His current research examines the information we use to perceive complex human activity and the underlying brain systems that process and evaluate this information. Recent research has explored topics of action recognition in autism, drumming and dance.

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Abstracts

Types of leadership in a string quartet

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Background

Playing music by ensembles is the result of a complex non-verbal social interaction. A string quartet, for example, can be modeled as a self-managed team (Gilboa, 2010), where the responsibility is equally shared among the musicians. However, during the performance there is still some degree of guidance, usually exerted by the first violinist. This guidance can be expressed in different ways, e.g., *autoritarian* or *individually considerate* leadership. Individually considerate leaders are attentive to their followers' needs and listen effectively whereas authoritarian leaders take decision without considering their followers (Bass, 2006). These two types of leadership have been modeled with two experimental conditions in (Glowinski et al., 2012): the first case models a concert-like condition, where the interpretation is decided beforehand. In the second condition, one musician suddenly modifies his usual interpretation by adding rhythmic and dynamic changes unexpected to the other musicians.

Such two different situations may be discriminated by looking at the so-called ancillary gestures performed by the string players. These are movements that are not directly intended to produce sound, but still play a central role in non-verbal communication (Dahl et al., 2009). For instance, an experiment conducted in (Glowinski et al., 2012) analyzed the interdependences between the movements of heads of the musicians under the leadership condition. However, the ancillary gestures performed by a string player include also movements of the upper body.

Aims

Our aim is to automatically discriminate between these two situations, using non-verbal features of the quartet and a combination of machine learning techniques to classify the situation, i.e. to find what player leads and the corresponding type of leadership.

Main contribution

Methods
We adopt the experimental conditions of (Glowinski et al., 2012) and introduce a multi-layered approach (based on movements of the head, shoulders, and waist) that would be appropriate for investigating behavioral features of the group. First, we compute dynamic features: individual (kinetic and energetic measures) and group (synchronization measures) features. Then, feature selection is performed and a model deciding the degree of followance is built and applied to every pair of

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players. Finally, we can state who the leader of the group is and his type at each moment of the performance.

Results
Automatic classification is achieved, allowing a comparison between a student quartet and a professional ensemble for a Schubert Quartet. Relevant behavioral features can be extracted, and are dependant on the situation and the musical structure. Maximum Margin Clustering and Hidden Markov Models are used for a dynamic two-steps classification.

Implications

This study reveals some relevant features for non-verbal communication that can be applied to other types of ensemble (orchestra, band...), but also in meetings. In [Kim et al., 2008], detecting leadership is exploited to regulate conversations, by measuring influences in group meetings. Transposing this to a music context, this can be a useful evaluation method of musical interactions' ability to create cohesion and expressivity.

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Biography

Floriane Dardard is starting her Phd under the supervision of Prof. Pelachaud at TELECOM ParisTech, France.

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A machine learning approach to recognising polyphonic structure in 16th-century lute tablature

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Background

The lute, an instrument widely used from the early 16th to the mid-18th century, has left us with a considerable corpus of instrumental polyphonic music (Ness & Kolczynski, 2001). This music is notated in tablature, which is the principal reason why it has been only poorly researched (Griffiths, 2002). Tablature is a practical notation that instructs the player where on the neck to place the fingers and which strings to pluck—but it reveals very little about polyphonic structure since it cannot specify (i) to which polyphonic voice a note belongs, and (ii) what its individual duration is.

We adopt a machine learning approach to recognising polyphonic structure in lute tablature. In Music Information Retrieval terminology, our problem is mainly one of voice separation. In the last decade, several methods have been suggested (e.g., Chew & Wu, 2004; Jordanous, 2008; Madsen & Widmer, 2006; Temperley, 2001). None of these, however, are designed for tablature; moreover, all except two are based on fixed rules.

Aims

The main questions addressed in our research are (i) how best to model the task of voice separation; (ii) which aspects of polyphonic structure are difficult to learn; and (iii) how different types of polyphony influence the learning and performance of the models.

Main contribution

Methods
Using cross-validation, we train and test two neural network models on different configurations of a set of nine annotated tablature pieces of different polyphonic texture. In model 1, which functions on the note level, the task is modelled as a classification problem. Based on context information encoded in the feature vectors (numerical input values given to the model), each individual note is assigned to a voice. In model 2, which functions on the chord level, the task is modelled as an optimisation problem. For each chord, all possible voice assignments are enumerated and a set of corresponding feature vectors is generated, each of which is rated. The chord is given the voice assignment that is rated highest.

Results
Model 2 outperforms model 1 by about 1 percentage point. Errors (percentages of misassigned notes) on the different subsets range roughly

between 6.0-13.5% on the training data and 9.5-26.0% on the test data. Furthermore, a preliminary comparison on a set of Bach fugues shows that the models perform on a par with existing voice separation methods.

Conclusions

(i) Both approaches give promising results; model 2 overall performs better. (ii) The training and test error increase with the complexity of the polyphonic texture; particularly problematic are voice crossings and shared notes. (iii) Error propagation—wrong assignments leading to more wrong assignments—complicates real-world applications. Paths we will explore next include extending the models with more features, expanding the information extraction window, and experimenting with other models.

Implications

Further evaluation of the models may give new insights into lute music and into cognition of polyphonic structure. Using these models as a starting point, we aim to develop new and flexible voice separation methods that can learn from data, as well as an automatic transcription system facilitating further research into the vast corpus of lute music.

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Biography

Reinier de Valk holds a BA degree in classical guitar from the Brabants Conservatorium, Tilburg, the Netherlands, and a BA and research MA degree in musicology from the Universiteit Utrecht, the Netherlands. He is currently a PhD student in the Music Informatics Research Group at City University London. His research, which is supervised by Dr Tillman Weyde, focuses on the computational modelling of polyphonic structure in lute tablature using machine learning techniques.

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Auditory lateralization, piano pedagogy and performance

Stefania Garotta[1], Maurizio Barboro[2]

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Background

According to audio-psycho-phonology, left ear dominance is related to learning difficulties and specific psychological characteristics (Tomatis, 1972). Since auditory selectivity and analytical listening are specific functions of the right ear, which is connected to language processing areas in the left hemisphere, Tomatis suggests that right ear "has to be the leading or dominant ear in musicians" (Madaule, 1987, p. 2). Other researchers have shown that professional musicians process melodies in the right ear through analytical listening, opposite to naive listeners (Chiarello & Baver, 1974). It has been observed that musicians and singers trained through Tomatis method improve selective listening ability and consequently performance skills (Madaule, 1987).

Aims

The purpose of this Master's thesis was to investigate the audio-psycho-phonological, neuro-physiological and psycho-physiological aspects of personal music learning processes. All this led to explore different approaches in order to achieve improvements in analytical skills. The final goal was to establish a psycho-audio-tactile connection.

Main contribution

Methods
Preliminary observations of personal piano approach, based on proprioception and teacher's assessments, resulted as natural predisposition: sense of melody, holistic perception, affective listening and playing, piano accompanying of lyrical singers, and as lacking skills: sense of harmony, analytical and polyphonic perception, cognitive listening, auditory selectivity, fingers proprioception, memorization, concentration, stage fright mastering. After choosing the final recital program, the following analytical proceedings have been investigated: alternative selective listening of different lines, internal hearing connected to fingertips proprioception of each small unit of musical meaning, practice on musical sections. The following synthetical proceedings have been subsequently juxtaposed: holistic listening, internal hearing of leading voice, improvisation, playing of the whole piece and program.

Results

A significant learning process has been observed in each analytical skill. Once established, mind-ear-fingers connection showed qualitative variation depending most on levels of concentration/distraction. As far as performances are concerned, improvements have led to higher level in self-consciousness and mastering of stage fright. Unexpected results may concern one moment of flow, never experienced before in performance, in which analytical skill and rational control were completely overshadowed by synthetical and emotional approaches.

Conclusions

Preliminary observations of a personal piano approach, together with a hearing test taken at the age of six, that showed significant deficiencies in auditory spatialization, suggest that I am left ear-right brain dominant. The right-brained learning style seems to best follow inductive reasoning, from practical experience to theory, in opposite direction to left-brained learning style. This may be the reason why some piano students, who are probably right-brained, if trained through traditional teaching systems from abstract theory and formal knowledge to practice, are unable to establish a functional connection between mind, ear and fingers.

Implications

Cerebral-auditory lateralization seems to be relevant for instrumental pedagogy and performance science. If right brain dominant children were trained through a different learning approach, from internal ear to eye-finger direction, might they become aware besides sensitive musicians? Does hemispherical dominance influence stage-fright mastering?

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Biography

Stefania Garotta studied Piano Performance, Musical Education, and Humanities at Niccolò Paganini Conservatory and University of Genoa. She graduated with Honours from both Institutions. She has a strong passion for scientific research and is currently working as a vocal coach, pianist and teacher. Her paper on Hindemith and Kepler will be published in the forthcoming issue of *Rivista rosminiana di filosofia e di cultura*.

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The potter: A cross-modal reflexive interactive application for learning-by-exploring sound

Giacomo Lepri, Gualtiero Volpe, Corrado Canepa, Antonio Camurri, Simone Ghisio

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Background

Since the pioneering concept of Theremin (Glinsky, 2000), the design of interfaces for real-time moulding of sound and music by means of gesture, with a particular focus on hand gesture, is a very active research topic in the Sound and Music Computing research community. This includes, for example, control of digital audio effects (e.g., Verfaille, Wanderley, & Depalle, 2006) and gestural control of sound synthesis (e.g., Wanderley & Depalle, 2004). The study of the relations between the musical education of children and the design of a musical interactive system was deeply carried out by Addessi (2004). The Potter grounds on the notion of *reflexive interaction* (Pachet, 2006). The concept is based on the idea of letting users manipulate virtual copies of themselves using a reflexive interactive systems designed as an intelligent mirror of the user's behaviour. The Potter was developed inside the researcher project UE ICT MIROR.

Aims

This paper presents the Potter: a cross-modal reflexive interactive system for learning-by-exploring the sound conceived mainly for children 5-10 years old. The purpose of the application is to stimulate the child's attention in relation to the key sound parameters such as timbre, pitch, loudness, and density, i.e., sound morphology.

Main contribution

The metaphor "the Potter" builds upon can be summarised as follows: As the potter takes the clay and moulds it yielding a pot, in the same way the sound craftsman takes a sound and moulds it yielding a crafted sound. The focus is on a sound object, which is manipulated through the association with a physical object. Interaction with sound is simultaneous, i.e., sounds are produced as the child "holds the sound" with the hands and moulds it. Sound crafting is carried out with the supervision of a teacher, who, through a graphical user interface, can choose a set of sound objects and the sound qualities that are subject to manipulation. The kernel of the Potter is the *crafting module* including: (i) the movement detection and feature computation module, and (ii) the audio processing module. Even if a robust evaluation of the interaction has never been carried out, the system was presented in different public

events. During these sessions it was possible to note that children behaved positively, by showing involvement, immediacy of feedback, focused attention, concentration.

Implications

From a musical pedagogical point of view, the application, through the practice of the game, offers the users the opportunity to experience a process of internalization of the most important sound qualities. Consequently, such processes allow the acquisition of fundamental knowledge related to musical practice (e.g., playing a musical instrument or listening and understanding a piece of music).

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Biography

Giacomo Lepri is a musician, composer and sound designer. After a period of studying at the University of Edinburgh as visiting student, he graduated in Electronic Music from the Conservatory N. Paganini of Genoa. He now works as sound designer in the international center of research Infomus Lab – Casa Paganini at the University of Genoa.

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How to ask questions about the cognition of musical improvisation

Andrew Goldman

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Background

Musical improvisation is often understood through music-analysis (e.g., Järvinen, 1995; Järvinen & Toiviainen, 2000). Rehearsed performance and improvisation are distinguished on the basis of music-analytic conceptions in that during improvisation performers generate novel structures within music-theoretical categories like melody, harmony, and rhythm. This conception leads to ideas like improvisation being a spectrum with more or less elements free to vary (e.g., Merker, 2006) or that all performance is improvisatory (Gould & Keaton, 2000). Although the cognition of improvisation must look to 'what' is produced and thus inevitably involve some kind of music analysis, to arrive at a cognitive-scientific research program, this conception must be reconsidered.

Aims

This talk reviews conceptions of improvisation from the literature in order to arrive at a set of cognitive-scientific questions accessible by experimentation. Through reviewing music-analytic literature, previous cognitive literature, and experiments from my own research, this approach will be developed. Cognitive-scientific experiments should try to dissociate the multiple ways a single improviser can recall knowledge, and how performance context can be experimentally manipulated to make inferences about differences in these performance processes.

Main contribution

This paper contributes two approaches. One approach is to compare groups of musicians with and without improvisational training. While different musicians may learn and understand music analytical structures in similar explicit ways, the way they represent and process such structures in the mind may differ depending on the pedagogical methods they used and the musical contexts in which they perform.

Another approach is to consider different cognition of similar musical structures within individual improvisers under different circumstances. Hargreaves (2012) describes improvisers as having different sources of ideas. Which performance contexts lead to which strategy of idea generation and why?

I suggest motor theories of perception (e.g., Shin et al., 2010) as a way of describing such differences. As these theories suggest, part of learning to play an instrument involves associating particular movements with particular perceptions (e.g., Drost, 2005). I suggest experimental

possibilities to manipulate mental imagery processes such as by using altered auditory feedback. If an improviser is less familiar with a key, for instance, the mental imagery could differ such that altered auditory feedback would be less disruptive.

Implications

Through applying research on the motor theories of perception to improvisation, this paper explores how musicians may improvise with multiple strategies that have different underlying cognition. Devising suitable analytical metrics to confidently infer such distinctions may prove to be a limiting factor. This research will help characterize improvisation as a plurality of processes and help describe what makes musical knowledge employable in improvisatory performance contexts. In other words, it will help define a cognitive taxonomy of performance in order to help differentiate improvisation from other modes of performance.

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Biography

Andrew Goldman studied piano performance and neuroscience at the University of Southern California and obtained his MPhil in musicology at the University of Cambridge. He is currently a PhD student at the University of Cambridge.

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Influences of genre-specific expertise on predictive processing of Charlie Parker solos

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Background

The human brain's ability to predict the future is considered essential in cognitive processing in general (Huang & Rao, 2011) and music cognition in particular (Vuust et al., 2009). Confirmation and violation of musical expectations have been studied carefully, using behavioural (Krumhansl, 1990) and neuroimaging techniques (Koelsch, 2005). However, despite the obvious experiential significance of this topic, the different degrees of uncertainty underlying predictions prior to event onset have received limited empirical attention. Recently, Hansen and Pearce (in review) showed that predictive uncertainty in melodic pitch expectations follows entropy estimates of a computational model and that expertise optimises our internal representations through statistical learning. This work raises interesting questions regarding the influence of genre-specific expertise. Representing a musical style whose highly specialised grammar is less familiar to the average listener (Johnson-Laird, 1991), Charlie Parker's improvisations lend themselves particularly well to the study hereof.

Aims

This experiment investigated effects of genre-specific musical expertise on predictive processing of Charlie Parker solos. It was hypothesised that jazz training would lead to more accurate predictions with lower uncertainty.

Main contribution

Methods
Twenty-four monophonic contexts were selected whose final notes differed in entropy as estimated by two probabilistic computational models of expectation (Pearce, 2005) trained on folksongs (*General*) and jazz (*Bebop*), respectively. Classical ($n = 20$), jazz ($n = 22$), and non-musician ($n = 20$) listeners' uncertainty was assessed *explicitly* via self-report and *inferred* from the normalised distributions of expectedness ratings for nine different probe-tone continuations for each melodic context.

Results and conclusions

As hypothesised, significant Expertise-by-Condition effects were present both for inferred uncertainty and expectedness. The former indicates that genre-congruent entropy predicts uncertainty to an extent determined by prior exposure to the genre; the latter replicates and extends our previous findings by showing that statistical learning primarily happens in contexts where model optimisation is enabled through genre-congruent low entropy, thus causing more salient prediction errors in experts. In sum, jazz musicians strongly followed *Bebop*, classical musicians less so, and non-musicians even less so with tendencies to follow aspects of *General*.

Implications

This research addresses the vital question of which cognitive mechanisms underlie musical learning. This knowledge may potentially inform the way music is taught and practised. Furthermore, musicologists can use information-theoretic analyses of music to characterise unique and shared properties of musical genres.

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Biography

Niels Chr. Hansen is doing a PhD on musical expectation mechanisms and statistical learning. He holds an MSc in Music, Mind & Brain, an MMus in Music Theory and a BA in Classical Piano, has published 7 peer-reviewed papers and performed concerts in DK, SE, PL, NL, DE, UK, LV, and IT.

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Musical expression in Lutosławski's *Trois poèmes d'Henri Michaux* and *Chantefleurs et Chantefables* in the philosophical context

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Background

Witold Lutosławski's music has often been analysed in terms of the structure of his works and the composer's new ideas (controlled aleatorism, bipartite form, chain form). Rae (1994) has given the most comprehensive picture of Lutosławski's work. Some more specialized problems were discussed in *Estetyka i styl twórczości Witolda Lutosławskiego* (2000; English edition: *Lutosławski Studies,* 2001). Lutosławski's own commentary on music (*Lutosławski on music,* 2007*)* also throws light on what he considered as important elements of musical composition. Additionally, the issue of expression continues to play a vital role in the philosophy of music thanks to many contemporary scholars, e.g. Kivy (1999), Newcomb (1984) or Robinson (1994)*,* who mostly invoke 19th-century example as representative instances of expression.

Aims

I would like to demonstrate that the emotional aspect remains crucial to Witold Lutosławski's composition techniques even if his work is far removed from tonality or the classical forms. My aim is to prove that the innovation in Lutosławski's song cycles does not obscure expression – on the contrary, his formal originality reinforces emotional expression.

Main contribution

I would like to concentrate on the problem of expression in Lutosławski's two song-cycles *Trois poèmes d'Henri Michaux* and *Chantefleurs et Chantefables, which* stand at the two opposite ends of the gamut of emotion used by Lutosławski. Whereas *Trois poèmes d'Henri Michaux* are full of terror and distress, *Chantefleurs et Chantefables* bring a light touch filled with brightness and joy. The two cycles are musical settings of French surrealist poetry, which according to Lutosławski's own words was so polysemic that approached the ambiguity of music. While the structure and the relationship between music and text in those pieces have been discussed by Homma (2000) and Aubigny (2000) among others, no detailed study of their expression has been published. I would like to show that musical expression could be characterized as the process of empathizing with dynamic motion of music which is parallel to dynamics of human emotions. This situation is similar to the emotional relation between two people who can only suppose the condition of the Other

taking into account their own experiences. Such relation is always nonverbal and it do not need to be categorized as a particular emotional state. Describing music as sad, happy or melancholic trivializes our perception and nullify its emotional complexity. I propose to bracket the attempts to name the exact emotions aroused in the listener and concentrate on the nature of recognizing and experiencing music.

Implications

Trois poèmes d'Henri Michaux and *Chantefleurs et Chantefables* are both representative of how Lutosławski constructed the form of his pieces in order to achieve a greater emotional involvement on the part of the listener. Taking into account the temporal aspect of music, especially the *ad libitum* parts used by Lutosławski, it would be interesting to show how some of their parts excite, maintain and relieve emotional tension.

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Biography

Karolina Kolinek received a bachelor's degree in the field of musicology and is continuing her studies in the College of Inter-Faculty Individual Studies in the Humanities at the University of Warsaw, combining musicology and philosophy. She is also an active music critic, publishing in polish cultural magazines: *Ruch Muzyczny, Dwutygodnik.com* (*Biweekly.com*)*, Meakultura* and *Rezonans.*

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Shaping music gesturally: Investigating the influence of musical training on cross-modal mappings

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Background

The relationship between gestures and music has recently attracted a lot of attention (Godøy & Leman, 2010; Gritten & King, 2011). While researchers have focussed on sound-producing or -accompanying gestures, as well as movements resulting from music such as dance or tapping to the beat, there is still little research on how sound, and especially music, is represented gesturally. For instance, Caramiaux and colleagues (in review) investigated differences between gestural mappings of action and non-action related sounds; Küssner & Leech-Wilkinson (2013) examined how sound features concurrently varied in pitch, loudness and tempo are mapped onto gestures; and Kozak, Nymoen, and Godøy (2012) investigated gestural synchronization to sound stimuli varied in rhythm.

Aims

The aim of this study is to investigate to what extent musical excerpts give rise to consistent gestural mappings, and whether musical training has an influence on these embodied cross-modal correspondences.

Main contribution

Methods
Sixty-four participants (32 musically trained, 32 musically untrained) were asked to represent sixteen musical excerpts gesturally with their right hand. Their movements were captured using Microsoft Kinect, Nintendo Wii Remote Controller and a video camera. The musical excerpts varied between eight and thirty seconds and comprised various genres such as classical, jazz, Latin, and rock. In the second of two experimental conditions, participants' movements additionally created a real-time visualization on a large screen in front of them, consisting of a black disk on a white background, responding to movements in all three spatial directions.

Results
Preliminary results indicate that the representation of the musical excerpts was interpreted differently, resulting in a diverse range of gestures including conducting, dancing, mimicking of sound-producing gestures, as well as abstract shapes.

Conclusions

Being one of the first studies to investigate representational gestures in response to musical excerpts, it was revealed that there is a variety of approaches to represent music gesturally.

Implications

It is hoped that the findings will provide new insights into cross-modal mappings of music, shed light on the influence of musical training on music perception and cognition, and prove useful for the design of new multimedia applications involving gestures.

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Biography

Mats Küssner studied psychology at the universities of Würzburg and Amsterdam, before graduating with an MSc in Music, Mind and Brain from Goldsmiths, University of London. Investigating cross-modal mappings of sound and music, he is in the final year of his PhD within the AHRC Research Centre for Musical Performance as Creative Practice at King's College London. Mats' work has been published in Literary and Linguistic Computing, Psychology of Music and NeuroImage, and together with Dan Leech-Wilkinson, he is currently editing a special issue on 'Music and Shape', due to be published later this year in Empirical Musicology Review.

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"*Sans parti pris d'école*": Strangers, schools and identity in French musicological discourse (1920-1940)

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Background

Histories of music call "*École de Paris*" a group of foreign composers immigrated to Paris in the 1920s. Two perspectives overlap in the study of this phenomenon. At first, the history of artistic groupings in interwar Paris: *Les Six* or *Jeune France* have been the object of specific critical investigation (e.g., Hurard-Viltard, 1987; Simeone, 2002; Wieder & Mahiet, 2005), but this is not the case for the *École de Paris*. Secondly, the topic of musical nationalism and migrant composers is prominent: as postcolonial scholars have claimed, we should analyze the discourse shaping the reality of exoticism, migration and national art (see Revuluri, 2011; See also, for the French context: Pasler, forthcoming).

Aims

This paper will analyze the different uses of the word "*école*" in French musical criticism and historicism in the 1920s and 1930s. It aims at deepening our understanding of the discourse about groupings and cosmopolitism in interwar Paris, with a special attention to the so-called "*École de Paris*".

Main contribution

Methods
Putting itself in the wake of the history of musical concepts promoted by Borio & Gentili (2007-2009) following R. Koselleck's *Begriffsgeschichte*, my research focuses on one concept ("*école*"), used by a specific musical community (music critics and historians), in a specific place and period (interwar France).

Results
Four major semantic areas are present. First, expressions like "*l'école française*" or "*l'école russe*" stress nationality (but different categories are used to explain how nationality gets into music). Second, in expressions like "*école de Fauré*", actual students of a major composer are involved. Third, "*une école*" can be an aesthetic tendency: this topic was the object of debate between critics claiming the importance for a composer of being part of a school, and those who saw in it a limitation to freedom and personal style. Last, "*école*" means academic technique. What is the relationship between these different uses of the word? Which one prevails in labeling the "*École de Paris*"?

Conclusions

It is worth understanding if the "otherness" of foreign composers proposing themselves to the Parisian musical public was more a matter of nationality, or masters, or aesthetic, or technique, or all this together. The conclusion is not univocal: my analysis shows the complexity of the labeling act, which has different implications depending on the actors producing and receiving it.

Implications

This paper is part of a broader research on "*École de Paris*", which will spread a new light on the actors, aesthetics, and politics of cosmopolitan musical life in ultranationalist interwar Paris.

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Biography

Federico Lazzaro studied in Italy (Universities of Milan and Pavia-Cremona) and France (Université de Strasbourg). Having completed a PhD in musicology with a thesis about the concept of "*renouveau*" in French music of the 1930s, he is currently doing a second PhD on the "*École de Paris*" at Université de Montréal. He has published articles about interwar French music and the reception of ancient music in the 20th century; he is also co-editor of the critical edition of Rossini's *Sigismondo* (2011) and responsible for the Italian edition of Ellen Rosand's *Monteverdi's Last Operas* (2012).

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Axiology of musical genius in Quebec

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Background

The question of musical genius has been treated in many ways such as in philosophical essays (Kivy, 2001) and in biographical works (Wagner, 1870). Since the last decades, two main fields have approached this question: psychology and sociocriticism of music, the first one studying the nature of the artist capable of creating great artwork (Lechevalier, 2003), while the second one search to explain the cultural greatness as a social construction (DeNora, 1995), leaving aside its contemporary use.

Aims

The purpose of this paper is to explore the issues around the current definition of the concept of genius in Quebec society and on the place it occupies among the different figures of exception (prodigy, hard worker, celebrity, etc.) that form the spectrum of cultural greatness. Even if I use a sociomusicological perceptive, I will not adopt an approach aiming to de-singularize the musical genius, but I will rather seek to highlight the values attributed to the singular in music.

Main contribution

Methods
At first, a genealogy of the concept of genius will be proposed, declined around the three moments that composed the concept as studied by Heinich (Zilsel, 1993): the capacity (the talent), the realisation (the artwork), and the recognition (the glory). This genealogy will allow me to highlight the axiological processes surrounding the evolution of the concept of musical genius from antiquity until today. The second part of this paper will show how the axiological analysis previously presented is a methodological tool relevant to the analysis of the contemporary discourse on musical genius. An example will be given with the figure of Claude Vivier, by the analysis of the discourse on the Quebec composer published since 2000 in *La Presse* and *Le Devoir* newspapers.

Results
The definition and the axiology of musical genius have undergone many transformation processes since the antiquity, and have crystallized in the early twentieth century. Also, those values are no longer the dominant values in the musical field, although they are still present. Those identified in the analysis of the discourse on Vivier seem to locate him, with slight variations, as a representative figure of musical genius in Quebec society.

Conclusions

The analysis of the concept of genius in music is not a simple task. Unlike a genealogy based on the semantic evolution of the term "genius", a history of the concept of musical genius based on the values accorded to it allows us to conduct a discourse and a content analysis.

Implications

This paper is part of a broader research on the concept of musical genius in the Quebec (Canada) cultural context of the 2000s.

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Biography

Marie-Pier Leduc holds a bachelor degree in musicology from Université de Montréal and is currently pursuing a master's thesis on the concept of musical genius. Member of the research team on sociomusicology of the OICRM, her works have notably concerned the professionalization's parameters of musicians in Quebec. She is also involved in the musical audience development research project (DPMQ) and in the project on the history of musical aesthetics in France between 1900 and 1950, both taking place at the OICRM.

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The enaction of conduction: Conducted improvisation as situated cognition

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Background

Enactivism represents a paradigm shift in the field of cognitive science; it is a multidisciplinary set of studies gathered under the name of *embodied cognition*, focusing on the hypothesis that mind is not an isolated system coinciding with the brain, but a complex object that must be investigated in its essential relations with the body and the environment which the organism is *situated* in (Gibson, 1979; Varela, Thompson, & Rosch, 1991; Clark & Chalmers, 1998; Santarcangelo, forthcoming). Noë's work, in particular (2004, 2009, 2012), proposes a dynamic model of interaction wherein *perception* is intrinsically connected to the *explorative activities* exercised by the body in motion. Noë and Gallagher's notion of *body schema* (Cole & Gallagher, 1995; Noë, 2004; Gallagher, 2005) does nothing but confirm the obvious: it is not necessary to pay attention to one's body parts, in order to use them efficiently; likewise, an expert performing a practical activity might be damaged if he focused his attention on the mechanic of the task, instead of participating in the activity *as a whole*. A leader conducting a number of performers is a typical example of an expert engaging in a practical and embodied activity. *Conducted improvisation* (Salvatore, 2000; Marino forthcoming) is a form of organized musical improvisation wherein the figure of a *conductor*, who delivers instructions to the performers, mainly via gestures and graphic scores, is established.

Aims

Conducted improvisation is set within the enactivist paradigm, by labelling this form of musical performance as an enactment-driven practice and by defining it as a metaphor of the enactive process itself.

Main contribution

Butch Morris' Conduction® is taken as a case study, wherein "various semiotic resources (talk, gestural imitation of instrumentalists' actions, vocal exemplifications, verbal and bodily enactments of directive sequences […]) are 'laminated' […] and mutually elaborate each other" (Veronesi, 2012). Conduction employs a set of *metaforms*, namely gestural metaphors and metonyms, or gestural *plastic formants*. Conducted improvisation establishes a type of performance and of environment which is challenging for the involved subjects: the performers have to learn entire sets of body schemas, which are

completely new to them, in a short term; the conductor has to consider the *feedback* coming from the performers, in order to deliver a subsequent instruction. Conducted improvisation, *de facto*, provides the *actantial positions* implied – and, normally, un-staged – in musical improvisationwith *physical actors*; namely, the conductor delivering the instructions to the performers, who embodies the constraints working underneath the musical practice (e.g. architextual, stylistic and conversational norms).

Implications

By showing the existence of rules and the asymmetry of relations, these practices stage the *behind the scenes* of musical improvisation (and of musical performance in general), stressing the intersubjective and contractual character of cognition and signification. Due to its autopoietic, cooperative and didactical nature, conducted improvisation can find a significant field of application in educational, rehabilitational and musicotherapical contexts. Enactivism is little employed as a theoretical framework in dealing with aesthetical subjects, and music in particular, still representing, in this perspective, a whole fertile field to be explored.

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Biography

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Nonverbal communication of emotions through sound and gesture: A preliminary performative testing

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Background

Anguished cries or crows of delight are examples for emotional expression as an evolutionary process and effect of the interaction between humans and their environment (Blacking, 1977; Knepler, 1972). This bodily interaction therefore provides the basis for the emergence of its cultural formation music (Brown, 2001; Mithen, 2010). Considering these theoretical assumptions the usage of nonverbal communication of emotions in musical expression can be traced in the basic emotional expression, such as prosody and bodily gesture (Blacking, 1977, Sloboda & Juslin, 2005). According to Juslin (Sloboda & Juslin, 2005) some aspects of music are more culture-specific than others, which are based on nonverbal communication of emotions. This anthropological framework allows the search for an underlying code of emotional expression through sound and gesture.

Aims

The extraction and generation of nonverbal patterns, consisting of sound and gesture, for four basic emotions and their communication.

Main contribution

Methods

In a performative experiment setting, which can be compared to the usage of the sentograph by Clynes (1978), participants (*n*=17, non-musicians) were instructed to express four basic emotions (anger, fear, happiness, sadness) in a two-dimensional sound-space (y-axis= continuous pitch-height and x-axis=time) on the JazzMutant Lemur (a visual touchpad) with one finger. These curves, visually presented by a simple black line, for each emotion were quantitatively analysed by a framework, based upon the following parameters: 1.) direction, 2.) amount, 3.) quality, and 4.) time and acceleration. Each pattern was then generated and used as the stimuli in the following testing series.

The perception of the four generated basic patterns in different presenting conditions (audio, audiovisual and visual) and their variations of sound quality (sharpness, timbre, sinusoid) were observed in a second experiment (*n*=30) concerning its: 1. emotional connotations measured on the semantic differential consisting of 15 bipolar adjective scales and 2. communication of basic emotions via rating-scales.

Results

The measured connotations reflected the emotions on the activity dimension. The communication through discrete verbal terms showed no significant results, but notable tendencies comparable to findings by Dahl & Friberg (2007).

Conclusions

These preliminary observations provide a basis for further experiments based on performance testing environment.

Implications

The performative testing setup opens up new options in the research on nonverbal emotional expression, especially for music interfaces. The insights into the functionality of emotional expression can be applied for affective computing or psychotherapies.

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Biography

Tobias Neuhold studied musicology at the University Graz and Art University Graz and finished his Master's degree in November 2012 with a focus on music psychology and empirical musicology. He worked on several projects within the work group "pop/music + medien/kunst" at the Department of Musicology in Graz.

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Analysis of violinists' expressive gestures

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Background

Some musicians move a lot and others less. Musicians make gestures and move their bodies expressing their musical intention (Dahl & Friedberg, 2007). According to the *embodied cognition* approach, music is implicitly associated with gestures at many levels (Godoy & Leman, 2010). This association can be functional for example when movement relates to the mere production of sound; this association can also be of higher level when movement deals with the emotion meant to be conveyed (e.g., *Expressive Gesture,* Camurri & Moeslund, 2010*)*. According to Hatten's definition of human gesture, as "any energetic shaping through time that may be interpreted as significant", our interest in this study is to put in evidence characteristics of gestures accounting for specific expressive intentions.

Aims

The aim of this study is to investigate the importance of the gesture in the musical expressive intention and to examine different parameters of musical gestures through 3 different kinds of expressive intentions. The selected parameters of gestures are: amplitude, speed, intrapersonal synchronization (degree of synchronization between the limbs of musician's body). The selected expressive intentions are: deadpan (with minimal expressive interpretation of the music), projected (consistent with public performance), and exaggerated (overstating all aspects of the expressive features) (Davidson, 1993).

Main contribution

Methods

For the first part of the study, we asked three violinists form the Haute Ecole de Musique de Genève to interpret Bach's Sarabande in D minor according to the 3 selected expressive intentions (Davidson, 1993): deadpan, projected and exaggerated. We captured their movements with the VICON motion capture system in order to analyse the amplitude, the velocity and the coherence between the body segments (head, torso, arms, sacrum and the violin). Motion capture system allows for a fine grained analysis of movement. Selected body parts have been selected following recent literature on analysis of music performance: head is known to convey expressive information, as well as arms, torso (Van Zijl, 2013).

Expected results

Analysis is under process. We hypothesize that the amplitude will increase when they play in an exaggerated manner with respect to projected and deadpan modalities of interpretation (Van Zijl, 2013). It has been showed that musicians moved less and movements had smaller amplitude in the deadpan performance than in the exaggerated performance (Davidson, 2005). For the speed, we expected that speed's variance will also increase in the exaggerated mode with respect to the two others (Van Zijl, 2013). We hypothesize that the interpretation in the projected modality will show higher consistency over the different repetitions with respect to the two others modalities of interpretation.

Implications

The first part of this study is relevant to understand how musical gesture may explain the differences in the various expressive modalities of interpretation. Future work includes the measure of how such variability is perceived by an audience.

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Biography

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Gesture and the sonic event in Karnatak music

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Background

Research on Indian performance traditions has been prominent among studies of music and gesture; Clayton (2007), Leante (2009), and Rahaim (2012) have each presented analyses of physical gesture in Hindustani (North Indian) music. In their work the dynamic form of gesture can be seen to relate to pulse, pitch, communication, and analogies of motion such as a bouncing ball or the tying of a knot (Fatone et al., 2011). Correspondence between physical movement and musical phrase has been examined by Rahaim (2012) in the context of Hindustani music, and Wanderley (2002) in Western clarinet performance. Rahaim (2012) observed that certain hand gestures frequently co-occur with the same musical phrase over the course of a performance, while Wanderley (2002) found close correspondence between clarinetists' movements and musical features across different performances of the same composition.

Aims

This paper presents an analysis of hand gesture in a Karnatak (South Indian) vocal lesson recorded in Srirangam, Tamil Nadu in September 2011. The relationship between a subset of the vocal teacher's hand gestures and the musical phrases with which they co-occur is examined. Through this analysis the study aims to contribute to the debate on the factors that influence gesture in music pedagogy.

Main contribution

Methods
A video recording of the fifteen-minute vocal lesson was made. The teacher's hand movements were tracked and traced in After Effects motion graphics software. Gestural types were identified based on qualitative assessments of motion trajectory. It was observed that some gestural types co-occurred with the same musical phrase over the course of the lesson. Four gesture/musical-phrase pairings that frequently co-occurred were analyzed in order to observe variations in their relationship over time. Composite figures were produced, comprising pitch contour graphs made in Praat (Boersma & Weenink, 2012), musical transcriptions, and still images of the traced hand gestures, in order to illustrate the relationship between sonic and kinetic movement.

Results
In the four musical phrases analyzed, over half of all renditions consisted of a stable gesture/musical-phrase pairing. The gesture that accompanied

the musical phrase typically altered in two circumstances: when the teacher corrected the student's performance, and when the phrase appeared in a different musical context. The outer points of gestural trajectories frequently co-occurred with stressed pitch change and rapid oscillation in pitch.

Conclusions

The evidence suggests that the teacher in this study formed temporary associations between a subset of gestural patterns and musical phrases. The circumstances in which modifications occurred in the accompanying gestures point to the influence of the wider musical and communicative context on gestural form.

Implications

The findings have implications for the fields of music cognition and music pedagogy. The existence of relationships between gestural patterns and musical phrases suggest that a performer's cognition of musical phrase is embodied. The circumstances in which the gestural type becomes modified provide information on the factors that influence gesture in music pedagogy.

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Biography

Lara Pearson completed her MA in ethnomusicology with distinction at Goldsmiths, University of London, and is the recipient of an AHRC scholarship for her doctoral research at Durham University.

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Analysis of Jaques-Dalcroze compositions

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Background

As it is well known, Emile Jaques-Dalcroze (1865-1950) has thought and realized a very important method for music education; Nowadays his thoughts influence many methods and it is the focus of many studies in the field of music education.

It is less known that Emile Jaques Dalcroze was a very active musician; he studied composition with musicians like G. Fauré, Fuchs and Bruckner. Jaques-Dalcroze had a very big success with his pedagogical intuition, and also with his musical production.

Aims

Reading his biography and listening to his music, that now is very difficult to find, many questions were born:
1) Is the Jaques-Dalcroze music strictly linked to his pedagogical method, so, to the body movement dimension of that?
2) Are the composition processes of Jaques-Dalcroze influenced by this body movement dimension?

Main contribution

Methods
To answer these questions, two kinds of Jaques-Dalcroze compositions are analyzed: some didactic composition, like *Dix Miniatures pour Jeunes Pianistes* and *Esquisse*, and some composition written for the performance like *Impressions fugitives* for piano. A specific grid, based on the foundations of the Jaques-Dalcroze method, in particular on the plastique animeé technique, is used to compare the two types of compositions.

Results
The composition activity of Jaques-Dalcroze appears strongly influenced by his conception of movement. The music composed for performance presents many features of the pedagogical method, a very complex system, that deals with music parameters deeply, and the more evident elements are the improvisation style, and the recognition of a particular type of movement (codified in the method) in the music. Also harmonic and melodic features are found.

Conclusions

Without intention of exhaustiveness, this study is a part of an articulated research in progress that aims to investigate the Jaques-Dalcroze thought.

Implications

This study proposes an original way to consider the Jaques-Dalcroze method, not only in a pedagogical way, but also in a scientific and musicological way. There are no studies focused on this topic, and the big number of Jaques-Dalcroze compositions are for the most unknown or used for pedagogical activity, without a scientific systematization. Also the bibliography about Jaques-Dalcroze is focused, for the most, on the biography and on the proposal of activities. Only in the last years, various studies treat the possibilities of applications of the method in a scientific way.

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Biography

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Evaluation of individual contributions in a group estimate of the position of a moving point of common interest

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Background

Non-verbal signals are part of human nature and represent a very important communication medium. Psychological studies have shown that the use of different facial expressions, tones of voice, postures and gestures is an intrinsic feature of human brain, which can be used to convey information about people's mood and thought (Knapp & Hall, 1971; Richmond & McCroskey, 1995). Because of the importance of this communication medium, for decades researches have been conducted in order to obtain theories and models to understand how it works. Thanks to the development of modern technologies, able to extract more and more precise data, and with the growing interest in human-computer interaction, recently this matter has been expanded considerably. Several studies have been performed to understand not yet explained natural behaviors, such as the emergence of a person within a group, or some factors involved in social interactions among people (e.g., leadership, dominance, role recognition and synchronization mechanisms) (Varni, Volpe, & Camurri, 2010; Vinciarelli, Salamin, & Pantic, 2009).

Aims

A method is developed to evaluate individual contributions in the estimate of the position of a mobile point of interest by a group of people. Such an estimate is obtained combining measures of head positions and orientations, which are acquired, e.g., by motion capture techniques. Moreover it is looked for a computationally efficient solution in order to perform the calculation of the individual contributions in real time.

Main contribution

Our study investigates the application of the theory of cooperative games as a method to quantify the individual contributions in the group estimate of the position of the point of interest. More precisely, the problem is modelled as a Transferable Utility Game (TU-Game), using the Shapley value as a solution concept (Roth, 1988). Different algorithms are also proposed in order to compute efficiently the Shapley value (or its approximation) for this problem, making feasible the application of the method in real time. The proposed method is tested with a series of experiments, in which the individual contributions turn out to be strongly dependent on the locations of the players, on their behavior, on their

coordination, and on the type of movement that the point of interest performs.

Implications

In a musical context, the method may be easily applied, e.g., to a symphony orchestra, or to a string quartet: in this framework, the musicians represent the group of people who interact through non-verbal signals, while the conductor - or the current leader of the quartet - represents the common point of interest. Using the above method, it is possible to quantify how much each musician looks at the point of interest at certain times of the performance, then to compare the behaviour of different musicians.

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Biography

Davide Punta, Giulio Puri and Fabio Tollini are three students, friends and schoolmates at the last year of the graduate program in Computer Science at the University of Genoa, School of Engineering. The work is the result of a student project supervised by Giorgio Gnecco, Prof. Sanguineti, and Prof. Camurri for the course "Multimodal Systems for Human - Computer Interaction" at Casa Paganini - InfoMus Laboratory, University of Genoa.

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Note: This talk is based on the best student group project of the course "Multimodal Systems for Human-Computer Interaction", part of the Master Degree in Computer Engineering, DIBRIS-University of Genoa. Prof. Antonio Boccalatte (President, Computer Engineering Degree) introduced the speakers who received an award at this conference.

"Can you distinguish between a musician playing alone or within an ensemble?"

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Background

An increasing number of studies have investigated the role of gestures and movement in social communication. Some researchers (e.g., Vines et al. 2011, Rodger et al. 2012) found that variations in expressive intention of the player during the performance had their greatest impact when the performances are seen.

Aim

Investigate individuals' capacity to perceive the social context of music performance (e.g., playing alone or within an ensemble) as a function of musical expertise (musicians vs non-musicians) and display (usual audio-video recordings vs audio-point light displays obtained through motion capture - mocap).

Main contribution

Methods
Forty-nine participants (F=39%, mean age 29±13 years, musicians=61%) were randomly assigned to one of two display conditions: audio-video recording or mocap data coupled with audio. Through a personal computer, they were presented with twenty trials consisting in 20/30-sec excerpts displaying the performance of the first violinist of a string quartet (SQ). Half of the trials were solo performances, the other half ensemble performances. After each trial participants were asked to tell whether, in their opinion, the musician was playing alone or with other musicians. Grounding on Signal Detection Theory, a number of accuracy indices were computed: Sensitivity (SE, proportion of actual solo/ensemble performances correctly identified as such), predictive power (PP, proportion of correct solo/ensemble answers), and overall accuracy (OA, proportion of total correct answers) Area under the curve (AUC, ability to correctly classify performances as solo or ensemble).

Results
In general, both non-musicians (mean AUC=.59, 95% confidence interval [CI]: .54-.64) and musicians (mean AUC = .66, 95% CI: .61-.70) performed significantly better than chance (AUC=.50). Factorial analysis of covariance models were specified including age and gender as covariates and expertise (musician vs non-musician) and display (video vs

mocap) as factors. Results showed that SE to solo performance ($p=.011$, $r=.35$) and ensemble PP ($p=.012$, $r=.36$) were statistically higher in musicians. SE to ensemble ($p=.024$, $r=.32$), OA ($p=.016$, $r=.33$) and AUC ($p=.019$, $r=.33$) were higher in the video condition. Significant display by expertise interaction effects were found for SE to solo ($p=.010$, $r=.38$) and ensemble PP ($p=.005$, $r=.41$) (musicians were better than non-musicians with the mocap display but not with the video) and for OA ($p=.039$, $r=.31$) and AUC ($p=.037$, $r=.32$) (only non-musicians performed better with video displays than with mocap ones).

Conclusions

The accuracy of participants' judgment in distinguishing the two conditions (Solo Vs. Ensemble) appears to be substantially affected by the kind of display and, to a lesser extent, by their expertise. Usual audio-video recordings may contain a number of visual features (e.g., gaze) which might be helpful in the perceptual task, whereas such features are missing in impoverished stimuli such as the mocap ones.

Implications

Considering musician's non-verbal behavior as a communicative act, the study showed how some acts would have a shared decoded meaning among member of a same social group (like musicians), but not for others. This is in line with the hypothesis that the learning of such acts occurs by socialization in a specific (musical) context. The significance of a display effect also suggest that without facial information can became difficult to understand the communicative intention of the musicianas suggested by the poorer performance of both experts and non-experts in the mocap condition

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Biography

Arianna Riolfo is a master student in Psychology at the University of Genoa, Italy and she is interested in the transmission of the understanding of mental states. She is also a trained piano player.

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Audiovisual synchrony: Cross-modal transient structure and tempo

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Background

What are the considerations of a composer when designing music to accompany moving images? Music is inserted within audiovisual compositions with considered reason, be it motivic, thematic, emotive, semantic or otherwise. Ultimately music is utilised to affect the audioviewer[1], yet the consequences of this dual modality interaction lacks clarity. Investigating cross-modal interaction at the level of basic exposure[2] functions as a foundation in understanding audioviewer perception.

The moving image and music are intrinsically temporal and consequently carry rhythmic potential. In the context of concurrent non-diegetic music[3] and the moving image, an audioviewer's unified perception is dependent upon an interpretation of audiovisual rhythms (Bordwell, 1993). Rhythms are constructed within their individual modalities via the periodic structure of transients, but crucially the transient structure becomes cross-modal in the audiovisual.

Multimodal integration studies (Koelewijn et al., 2010) have shown that synchronous audiovisual transients will bind, creating a unified percept which consequently increases the 'transientness' of such events. Dynamic Attending Theory (Jones & Boltz, 1989) understands that rhythmic stimuli entrain attention, which further dictates response to transient composition. The potential for auditory rhythmic manipulations to influence unified audiovisual perception is engaging.

Aims

The facilitation or inhibition of the processing of synchronous and asynchronous audiovisual transients is investigated subject to various tempi steady state rhythmic auditory stimuli using a modification of the reaction time paradigm implemented by Escoffier et al. (2010).

Main contribution

Methods

Nineteen British undergraduates (mean age = 18.5, SD = 0.8) voluntarily participated in the study. Neurobs presentation software recorded reaction times as subjects responded to state the orientation of images of neutral faces that were displayed in correct or flipped orientation. The images were displayed in silence or with rhythmic stimuli that was synchronous or asynchronous to visual stimulus onsets (drum kit bass and snare

alternating at steady tempi ranging from 25 to 300 BPM in intervals constructed to synchronise with a screen refresh rate of 25 frames per second).

Results

Reaction time decreases with increasing tempo.
Synchronous audiovisual transient onsets facilitated quicker reaction times compared to silence and asynchronous audiovisual composition.

Conclusions

The reduction of reaction time in synchronous audiovisual design confirms the literature in cross-modal integration. The effect of increased transientness is further pronounced by higher tempi, suggesting dynamic attending is more prominent within this range. Cognitive arousal and stimuli onset boundary windows further the analysis.

Implications

Understanding orientation of attention and how transients are interpreted by an audioviewer has clear implications in advertising and all other targeted media. Benefiting this via rhythmic manipulation is a simple and effective process to increase the efficiency of the presentations message.

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Biography

Andrew Rogers' research interests include audiovisual interaction, focusing on the consequences of musical transient structure in audiovisual media.

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[1]When viewing and listening to an audiovisual composition, the term *Audioviewer* is utilised by Chion (1994) to describe what is more commonly described as a viewer to highlight the eqaulity of auditory and visual elements.

[2]Basic exposure is the first response in the semantic appreciation of art.

[3]Often referred to as background music, non-diegetic refers to music coming from outside of the story space in the moving images.

Studying modulation using the priming paradigm

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Background

Bharucha and Stoeckig (1986) found that when a target chord was closely related to a preceding priming chord, reaction time (RT) for an auditory discrimination task was reduced compared to unrelated targets. Further experimentation (Bharucha & Stoeckig, 1987; Bigand et al., 2003; Tekman & Bharucha, 1998) showed that priming effects were the result of cognitively represented harmonic relationships, rather than overlapping frequency spectra between target and prime or common chord tones. Global tonal context also has an effect on processing speed (Bigand & Pineau, 1997).

Aims

This study is aimed at establishing a method for investigating local (chord-to-chord) and global (full chord sequence) tonal effects during shifts of tonal centre.

Main contribution

Methods
Subjects (N = 30, mean age 23.9 years (SD = 5.3), 10 males) indicated whether the final chord in an 8-chord sequence contained an out-of-key note. Non-musicians (N = 11) were defined as those professing no history of musical tuition and no ability to play a musical instrument. The first six chords established a tonal context, while the penultimate (prime) and final (target) chords constituted a V-I in either the context tonic key (control), the supertonic major (near modulation), or the tritone major (far modulation). RT for the discrimination task and accuracy of task response were recorded.

Results
Linear mixed effects modelling of log-transformed RTs was selected for statistical analysis. A significant modulation*musicianship interaction was observed (χ^2 (2) = 7.16, p < .05). This broke down into a significant far modulation*musicianship interaction (β = 0.05, SE = .02, t = 2.67, p < .01), and no significant near modulation *musicianship interaction. For musicians, near modulations resulted in a significantly slower RT compared to non-modulating sequences (β = 0.03, SE = .01, t = 2.79, p = .005), with far modulations slower still (β = 0.04, SE = .01, t = 3.51, p < .001). The situation is similar for non-musicians: near modulations result in a significant increase in RT latency (β = 0.05, SE = .01, t = 3.55, p < .001), far modulations even more so (β = 0.08, SE = .01, t = 5.93, p

< .0001). Non-musicians performed significantly worse than musicians in the discrimination task $t(10.9) = -2.32$, $p = .041$, $d = 1.12$, Welch modified df).

Conclusions

The effect of the prime chord in a modulatory prime-target pair does not nullify the effects of global tonal hierarchy, with processing cost in abrupt modulatory contexts bearing a relation to mappings of chord relatedness within diatonic contexts. Specialist musical training significantly reduces processing costs for distant modulations.

Implications

The results of this study complement connectionist models popular in the priming literature (Bharucha, 1992). It is hoped that this data could provide a foundation for further investigations of modulation, such as studies increasing the length of the modulated area (i.e., varying the length of the 'prime' portion of each trial).

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Biography

Barry Ross is a PhD student, examining the hypothesized existence of shared cognitive processing for musical and linguistic syntax.

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Perception of pitch organisation in equitone music: Implications for psychology and ethnomusicology

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Background

Various theories exist regarding the acquisition and application of tonal knowledge. One dominant theory, intervallic rivalry theory (IRT), focuses on the interval structure of the diatonic set (Brown, Butler & Jones, 1994; Butler, 1989). Like many tonal systems, the Western diatonic set is comprised of non-uniform scale step sizes. As a result, frequency of occurrence differs across interval classes within the set (Balzano, 1980). This gives rise to structural features that have been found to be psychologically important in tonal orientation (Brown & Butler, 1981). Specifically, IRT affords importance to rare intervals (e.g. the tritone) in tonal orientation. Little cross-cultural work exists regarding the structural features of tonal and pitch-organisational systems. Nevertheless, there is strong ethnomusicological evidence for the existence of equitonic musical traditions: systems with equidistant scale steps and syntactical pitch organisation. Such systems pose significant challenges for current structure-based theories of tonal perception, particularly if equitone systems feature hierarchical tonal organisation around cognitive anchor points. This is because equal-spaced scales afford no structurally rare intervals.

Aims

A principle aim of this paper is to bring the existence and implications of equitonicism to the attention of a broader psychological (and potentially interdisciplinary) audience. This paper further aims to propose some tentative solutions to the problem of tonal orientation in equitone music.

Main contribution

The ethnomusicological literature contains various examples of ostensibly equitonic systems. Many of these focus on sub-Saharan African traditions, e.g. the Chopi (Mozambique), the Basoga and Baganda (Uganda), and the Asena (Malawi). Evidence also exists for equitonicism in European music (Ambrazevičius, 2009). Although these reports require further corroboration, the perception of pitch organisation must nevertheless be accounted for in these cultures. Several suggestions can be made regarding alternative indicators of tonal orientation: listeners may rely on information regarding pitch class distribution; pitch patterns may function as learnt cues; or secondary musical parameters may assume greater

functionality. Additionally, rare intervals may still indicate syntactical orientation, but rarity here would be statistical rather than structural: performers may simply play some intervals less frequently due to cultural norms. To empirically determine which of these strategies are adopted in any given situation will require significant interdisciplinary collaboration.

Implications

Once corroborated, psychologists must investigate how equitone music affords perception of pitch organisation, and adapt existing theories of tonal perception to incorporate these findings. For ethnomusicologists, the question arises of the degree to which tonal knowledge is linked to cultural convention as opposed to structural properties inherent in the musical stimulus. Furthermore, we hope that this question will prompt closer collaboration between psychologists and ethnomusicologists. Without ethnomusicologists, psychologists cannot carry out culturally meaningful empirical research; psychologists, meanwhile, are able to indicate areas of investigation for ethnomusicologists which are likely to prove fruitful sites for cross-cultural examination. The evidence presented here for the existence of equitone music also challenges the view that unequal-stepped scales are a musical universal (Brown & Jordania, 2011; Sloboda, 1985).

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Biography

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Multiple 3D density maps to visualize musicians' expressive behaviour

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Background

Body movement can represent a useful source of information to understand how an individual copes with others and with the environment. Rudolf Laban (1947), in the Theory of Effort, developed the concept of General Space and kinesphere to describe how dancers occupy the space surrounding their body in an expressive manner. Drawing upon his work, Camurri et al. (2003) and Glowinski (2011) respectively developed and extended a conceptual framework of expressive gesture analysis to characterize body emotional expressions (e.g. moving upwards both hands together to express joy). Since then, a number of non-verbal expressive features have been developed and implemented over a variety of software platform (e.g., Matlab, EyesWeb).

Aims

An improvement may consist in understanding how these expressive features evolve over time and space. The final output of such an implementation is a 3D density map, which resumes the distribution of expressive features over space and time. The present work here focused on space occupation during music performance, i.e., the way the musician moves his or her body through space (e.g., leaning forward, backward).

Main contribution

Methods
A set of software applications have been developed to compute and visualize space occupation of musician expressive movement. As illustrated in Figure 1, movement of musicians are first collected through a motion capture system (e.g., Qualisys) which describe for each joint (e.g., shoulders, head, etc.) their displacement in a three dimensional space. To give an overview of the displacement over time of each body part (in particular, to detect regions, where body parts tends to occur more frequently), we draw the spatial distributions of the positions of several markers, representing them with colors: warm colors (with a red tint) represent higher densities and cooler ones (with a blue tint) lower densities.
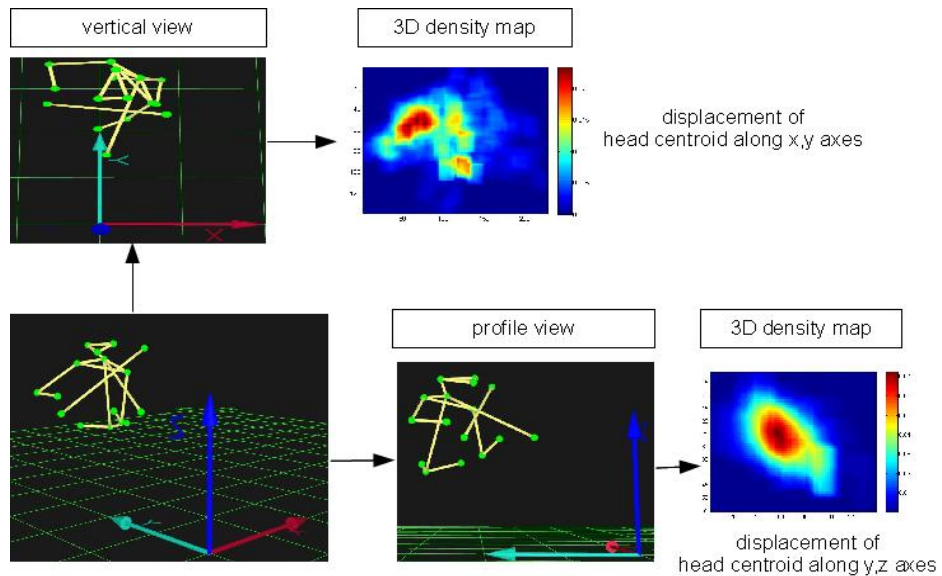
Figure 1 - 3D Density Maps of Head Centroid to visualize head displacements in two frames of reference (respectively x,y and y,z axes)

Results

These software applications are now tested on an archive of motion capture data related to the performance of musicians in string quartet (www.siempre.infomus.org).

Implications

These software applications have been developed with the framework of the EU-ICT *siempre* project to be available to the scientific community.

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Biography

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Pictorial structure of M.K. Čiurlionis's aphoristic piano compositions

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Background

Although Mikalojus Konstantinas Čiurlionis is widely recognized as a painter influenced by music, which has primarily resulted from the large amount of scholarly research regarding his artistic output (see: Goštautas ,1994; Kazokas, 2009; Vergo, 2010), his musical output had not received any scholarly attention until the publication of a monograph by Landsbergis (1986) followed by works of Kučinskas (2003) and Holm-Hudson (2004). Outside of his native Lithuania, Čiurlionis's music has attracted little analytical attention, with the notable exception of Eero Tarasti, who dedicated an article to the interrelations of the arts in Čiurlionis's creative output (Tarasti, 1993) as well as two chapters in his latest book (Tarasti, 2012), where the oeuvre of Čiurlionis is placed in the broader context of Tarasti's semiotic theory.

Aims

I will examine the role of contour line in Čiurlionis's paintings and his attitude towards musical line in piano pieces that were composed in parallel with his paintings to reveal their contour-based formal structure.

Main Contribution

For Tarasti (2012) and others, the core of the problem evoked by Čiurlionis's output is "how a painting can be music and music painting" (p. 368). However, I claim that painting cannot be music and music cannot be painting simply for ontological reasons, although surely they can inspire each other. Moreover, as listeners perceive music as music, it must be appreciated as such through musical, not pictorial, means. Nevertheless, I acknowledge the interrelations of painting and music in Čiurlionis's works. My claim is that although the formal structure of particular piano pieces by Čiurlionis are clearly of pictorial origin, they can be appreciated independently from his paintings in a musically viable way. Arguing in favour of this thesis, I will identify the strategies chosen by Čiurlionis to emancipate musical line from the rigors of harmony and rhythm so that it can serve as a subject and basic formal unit of a composition.

Implications

Tarasti (2012) suggested that "close examination of Čiurlionis's work may perhaps one day reveal something central to the problematics of the

interrelationships of arts" (p. 368). Indeed, my work reveals some analogies between music and painting that have remained unnoticed elsewhere. However, the main intention is to bring theoretical reflection on Čiurlionis's music back to the realm of sound, where its meaning is constituted in the act of listening. Thus, the interdisciplinary matter of my considerations can be of interest to musicologists, musicians, art critics and historians.

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Biography

Paweł Siechowicz received bachelor's degree at the College of Liberal Arts, University of Warsaw and continues his studies combining musicology and economics within an individual curriculum. He is interested in interrelations of music and painting on one hand, and economics of musical composition and performance on the other.

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Is a contemporary listener able to distinguish between the musical emotional figures created by Monteverdi?

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Background

There is an increasing interest in automatically characterizing emotion conveyed through music starting from audio content description (Lartillot et al., 2009; Scherer et al., 2001). There is also a longstanding tradition in music, where such a description of musical figures was formulated in practice and in theory (e.g. rhetoric in music) (Civra, 1991).

Aims

This paper aims to understand to what extent the two approaches (experimental and musicological) can result in the same conclusion.

Main contribution

We chose Monteverdi's works to conduct such parallel analysis because he gives a full explanation of 3 passions (anger, humility and tenderness) and what these should provoke in a listener. They are illustrated by 3 distinct musical styles, which are supposed to awaken the corresponding emotion, respectively: *stile concitato*, *stile temperato* and *stile molle.* Each style is characterized by a set of musical rhetorical figures, i.e. combinations of rhythm, dynamic and melody.

Methods

Stimuli: Audio recordings of emblematic extracts of Monteverdi's 3 styles (*Concitato*, *Temperato* and *Molle*). Three complementary approaches will be used to characterize Monteverdi's musical rhetorical figures: musicological, computational audio description and participants' judgements.

    -Musicological: we will refer to the preface (Monteverdi, 1638) in which Monteverdi described the 3 styles and we have established the musical characteristics typical of each style.

    -Computational audio description: Audio recordings will be analyzed with MIRtoolbox, in order to extract detailed audio and musical features (register, dynamics, timbre, rhythmical and metrical analysis, structural analysis, etc.).

    -Participants' judgements: The setup will be devised to evaluate participants' judgements through questionnaires. A first group of participants will be instructed to fulfil a modified version of the Geneva Emotional Music Scale (GEMS) questionnaire (*anger* and *humility*, as

indicated by Monteverdi, are added). A second group will be instructed to fulfil a simpler questionnaire only containing Monteverdi's 3 passions. Both groups will be asked to answer the following questionnaires at the end of the listening session: short version of the Big 5 (Rammstedt & John, 2007) and Musical preferences questionnaire. The outcomes of each approach will be described and compared to each other.

Results
We expect to find a distinction between Monteverdi's 3 styles. Based on the GEMS-scales description, we hope to give a precise description of the emotional content conveyed by Monteverdi's selected pieces.

Conclusions
The comparison of the 3 complementary approaches may result in the same conclusion. We might be able to answer that a contemporary listener is able to distinguish between these musical emotional figures.

Implications

The important aspect of this project is to associate two different means of working and questioning, to collaborate and enlighten each another's field of research.

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Biography

Louise Sykes obtained a Masters degree in Musicology at the University of Geneva in 2012. She then began a thesis under the supervision of Brenno Boccadoro (University of Geneva) and Luca Zoppelli (University of Fribourg). Member of the NCCR in Geneva since 2012, she has just started an assistant position in the Department of Musicology at the University of Fribourg.

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Perceiving rhythm complexity under different body movements: Can people tell the difference between each rhythm?

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Background

It is commonly observed that people move to music voluntarily. Chen et al. (2006) suggested that among musical elements, metrical structure and the sense of beat play especially important roles in the activation of body movement with rhythm through auditory-motor interactions. Most research on the relationship between body movements and music address metrical structures and rhythm. Phillips-Silver and Trainor (2007) found that simply tapping the foot in different ways results in varying perceptions of rhythm; even being moved rhythmically by adults affects the rhythm perception of infants (Phillips-Silver & Trainor, 2005).

To see how music activates body movements of listeners, Toiviainen et al. (2010) explored the hierarchical expressions of body movements toward the metrical structures of music. Previous studies have suggested that there seems to be a natural preference for a tempo of 120 BPM (Repp, 2005).

Aims

This experiment aims to explore whether or not people perceive the complexity of different rhythms and whether or not patterns of body movement influence ratings of rhythmic complexity.

Main contribution

Methods
Twelve of the 35 rhythms from Shmulevich and Povel (2000) were used to generate stimuli, in two sets of six, representing high and low complexity. Participants were asked to judge the complexity of each rhythm played through a stereo set by giving a score ranging from 1 (simple) to 5 (complex) in the following 5 conditions in random order: *No-move* (sit still), *move-head*, *move-hand*, *move-feet* and *move-whatever they want* when listening to the rhythms. The data collected through the complexity judged by participants and through camera recordings were analyzed.

Results
A repeated measures mixed ANOVA conducted to compare the effect of rhythm structure and movement type on rhythm complexity perception revealed a main effect of rhythmic structure, $F(1, 14)=19.672$, $p=0.001$ (<0.05) indicating participants could tell the difference between simple and complex rhythms. There is an interactive effect between movement

and pulse, $F(4, 11)=5.888$, $p=0.011$ (<0.05). Test of between subjects effects revealed that enjoyment has a marginal effect, $F(2, 14)=10.895$, $p=0.043$ (<0.05). There is no significant difference between complexity scores given by participants under different movement tasks ($p=0.108 > 0.05$), but the order in which participants accomplished the tasks did have an effect.

Conclusions

One reason why people move with music naturally may be because body movements accompanying rhythms enable them to perceive music differently. It is not necessarily the case that body movements render the rhythms more easily perceivable. For some, listening to rhythms accompanying body movements may be a challenge resulting in the rhythm being perceived as more complex. Nevertheless, body movements provide an opportunity for listenrs to utilise music in different ways.

Implications

It is hoped that this research will contribute to our understanding of how and why people move to music and how these interactions enable direct engagement in musical activities.

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Biography

Li-Ching Wang is currently working on a PhD at the Centre for Music and Science at the University of Cambridge. She received her BA in physical therapy and MA in musicology from National Taiwan University.

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